Final

Remedial Investigation Work Plan
Towers Road Disposal Areas

Harvey Point Defense Testing Activity
Hertford, North Carolina

Task Order 20

April 2013

Prepared for

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Subject: *Final Remedial Investigation Work Plan, Towers Road Disposal Areas*
Harvey Point Defense Testing Activity, Hertford, North Carolina
IHSB Site Name: Towers Road Disposal Area
IHSB Site ID No.: NONCD0002893

Dear Mr. Aufman:

On behalf of Harvey Point Defense Testing Activity, CH2M HILL is pleased to submit the Remedial Investigation Work Plan for the Towers Road Disposal Areas in Hertford, North Carolina. If you have any questions or comments regarding the referenced document, please contact me at (757) 671-6231.

Sincerely,
CH2M HILL

Kim Henderson
Registered Site Manager

cc: Mr. Kirk Stevens (1 hard copy and 1 CD)
Mr. Brian Murphy/HPDTA (2 hard copies and 2 CDs)
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REC PROGRAM DOCUMENT CERTIFICATION FORM - PAGE 1 OF 2
IHSB SITE NAME Towers Road Disposal Area, Site ID NONCD0002893
DATE & NAME OF DOCUMENT April 2013 Remedial Investigation Work Plan
TYPE OF SUBMITTAL (circle all that apply): Report, Work plan, Work Phase Comp. Statement, Schedule Change

REMEDIATING PARTY DOCUMENT CERTIFICATION STATEMENT (.0306(B)(2))

"I certify under penalty of law that I have personally examined and am familiar with the information contained in this submittal, including any and all documents accompanying this certification, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, the material and information contained herein is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for willfully submitting false, inaccurate or incomplete information."

Erik Freestone, D/Admin HPDTA
Name of Remediating Party

Signature of Remediating Party

25 April 2013
Date

NOTARIZATION

North Carolina (Enter State)

Perquimans **COUNTY**

I, Deborah Lyman, a Notary Public of said County and State, do hereby certify that Erik Freestone did personally appear and sign before me this day, produced proper identification in the form of Drivers License, was duly sworn or affirmed, and declared that, to the best of his or her knowledge and belief, after thorough investigation, the information contained in the above certification is true and accurate, and he or she then signed this Certification in my presence.

WITNESS my hand and official seal this 25th day of April, 2013.

Deborah O Lyman
Notary Public (signature)

My commission expires: 24 July 2015

(Official Seal)
DEBORAH LOSEYMAN
NOTARY PUBLIC
MY COMMISSION EXPIRES 24 July 2015
PERQUIMANS COUNTY, N.C.

REC PROGRAM DOCUMENT CERTIFICATION FORM - PAGE 2 OF 2
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TYPE OF SUBMITTAL (circle all that apply): Report, Work plan, Work Phase Comp. Statement, Schedule Change

REGISTERED SITE MANAGER CERTIFICATION OF SIGNATURES

As the Registered Environmental Consultant for the Site for which this filing is made, I certify that the signatures included herewith are genuine and authentic original handwritten signatures and/or true, accurate, and complete copies of the genuine and authentic original handwritten signatures of the persons who purport to sign for this filing. I further certify that I have collected through reliable means the originals and/or copies of said signatures from the persons authorized to sign for this filing who, in fact, signed the originals thereof. Those persons and I understand and agree that any copies of signatures have the same legally binding effect as original handwritten signatures, and I certify that any person for whom I am submitting a copy of their signature has provided me with their express consent to submit said copy. Additionally, I certify that I am authorized to attest to the genuineness and authenticity of the signatures, both originals and any copies, being submitted herewith and that by signing below, I do in fact attest to the genuineness and authenticity of all the signatures, both originals and copies, being submitted for this filing.

Kim Henderson
Name of Registered Site Manager

Signature of Registered Site Manager

4/29/13
Date

REGISTERED SITE MANAGER DOCUMENT CERTIFICATION STATEMENT (.0306(b)(1))

"I certify under penalty of law that I am personally familiar with the information contained in this submittal, including any and all supporting documents accompanying this certification, and that the material and information contained herein is, to the best of my knowledge and belief, true, accurate and complete and complies with the Inactive Hazardous Sites Response Act N.C.G.S. 130A-310, et seq, and the remedial action program Rules 15A NCAC 13C .0300. I am aware that there are significant penalties for willfully submitting false, inaccurate or incomplete information."

Kim Henderson
Name of Registered Site Manager

Signature of Registered Site Manager

4/29/13
Date

NOTARIZATION

VA (Enter State)

Virginia Beach **COUNTY**

I, Rebecca Singleton a Notary Public of said County and State, do hereby certify that Kim Henderson did personally appear and sign before me this day, produced proper identification in the form of VA Dr. License was duly sworn or affirmed, and declared that, he or she is the duly authorized environmental consultant of the remediating party of the property referenced above and that, to the best of his or her knowledge and belief, after thorough investigation, the information contained in the above certifications is true and accurate, and he or she then signed these Certifications in my presence.

WITNESS my hand and official seal this 29th day of April, 2013

(OFFICIAL SEAL)

Notary Public (signature)

My commission expires: 12/31/16

My Commission No. 180880

Document Certification Form No. DC - II
(Revised 8/11)

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Acronyms and Abbreviations

AHA	activity hazard analysis
AOC	area of contamination
APP	accident prevention plan
bgs	below ground surface
CFR	Code of Federal Regulations
DGPS	differential global positioning system
DO	dissolved oxygen
DoD	Department of Defense
DPT	direct-push technology
ELAP	Environmental Laboratory Accreditation Program
ESCP	erosion and sediment control plan
ft	foot/feet
FTL	Field Team Leader
HPDTA	Harvey Point Defense Testing Activity
HSA	hollow-stem auger
ID	identification
IDW	investigation-derived wastes
IHSB	Inactive Hazardous Sites Branch
INRMP	Integrated Natural Resources Management Plan
msl	mean sea level
NCAC	North Carolina Administrative Code
NCDENR	North Carolina Department of Environment and Natural Resources
ORP	oxidation reduction potential
PCB	polychlorinated biphenyl
PM	Project Manager
PPE	personal protective equipment
QAPP	quality assurance project plan
QC	quality control
QCP	quality control plan
REC	Registered Environmental Consultant
RI	Remedial Investigation
RSL	regional screening level
RSM	Registered Site Manager
SOP	standard operating procedure
SRG	soil remediation goal
STC	Senior Technical Consultant
SVOC	semi-volatile organic compound
TBD	to-be-determined
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VOC	volatile organic compound
WP	work plan

SECTION 1

Introduction

This Remedial Investigation (RI) work plan (WP) presents the strategy and technical approach for groundwater and soil investigation activities at the Towers Road Disposal Areas, Harvey Point Defense Testing Activity (HPDTA), Hertford, North Carolina (**Figure 1-1**). The Towers Road Disposal Areas consists of the 2nd Street Disposal Area and 5th Street Disposal Area (**Figure 1-2**). In 2012, the site was transferred to the North Carolina Division of Waste Management Inactive Hazardous Sites Branch (IHSB) as Site ID Number NONCD0002893. An Administrative Agreement for Registered Environmental Consultant (REC)-directed voluntary assessment and remedial action was signed in April 2013. The Administrative Agreement specifies that HPDTA (the remediating party) is responsible for the assessment and remediation of the areas contaminated through previous disposal practices and is pending final signature. HPDTA selected CH2M HILL as the REC for the Towers Road Disposal Areas.

The scope of work presented in this WP includes tasks needed to meet the REC guidelines for both the Phase I and II RI activities. The objectives of the Phases I activities are to identify all releases of hazardous substances, characterize the chemical nature of releases, and to collect sufficient data to establish remediation goals. The objectives of Phase II activities are to delineate the lateral and vertical extent of contamination in each area of concern and characterize the site conditions sufficiently to conduct a feasibility study to support a proposed remedy. To achieve these objectives, the following field investigation activities will be implemented:

- Land surveying
- Geophysical surveying
- Test pitting
- Groundwater sampling
- Surface and subsurface soil sampling

A crosswalk table (**Table 1-1**) provides the location in this plan of information required by the REC Program Implementation Guidance (NCDENR, 2012).

TABLE 1-1

Crosswalk to Required Information

Towers Road Disposal Areas

Harvey Point Defense Testing Activity

Hertford, North Carolina

REC Program Implementation Guidance*	Required Information	Location in this RI Work Plan
15A NCAC 13C .0306(g)(1)	Site Location Information	Sections 2.1 and 2.2
15A NCAC 13C .0306(g)(2)	Hazardous Waste Management Practices Summary	Section 2.3
15A NCAC 13C .0306(g)(3)	USGS Topograph Map with One-mile Radius Topography	Appendix A3
15A NCAC 13C .0306(g)(4)	Site Survey Plat	Appendix A2
15A NCAC 13C .0306(g)(5)	Geology and Hydrogeology Description	Sections 2.1 and 2.2
15A NCAC 13C .0306(g)(6)	Potable Water Sources within One-half Mile Radius of Site	Section 2.2 and Figure 2-1
15A NCAC 13C .0306(g)(7)	Environmentally Sensitive Area Survey	Section 2.2
15A NCAC 13C .0306(g)(8)	Current Owner's (s') Property Deed(s)	Appendix B
15A NCAC 13C .0306(g)(9)	Previous Owners List	Section 2.1
15A NCAC 13C .0306(g)(10)	Operational History, Including Aerial Photographs** & Sanborne Fire Insurance Maps	Section 2.1, Appendix A1
15A NCAC 13C .0306(g)(11)	Hazardous Substance Use or Storage Summary	Section 2.3
15A NCAC 13C .0306(g)(12)	Environmental Permit History	Section 2.3
15A NCAC 13C .0306(g)(13)	Previous Investigations Summary	Section 2.4, Table 2-1
15A NCAC 13C .0306(g)(14)	Site Characterization Procedures	Section 3
15A NCAC 13C .0306(g)(15)	Sample Locations and Collection Methods	Section 3, Figure 3-1, and Appendix H
15A NCAC 13C .0306(g)(16)	Quality Assurance/Quality Control of Field and Lab Procedures	Appendix H
15A NCAC 13C .0306(g)(17)	Analytical Parameters and Analytical Methods	Sections 3.8, 3.9 and Appendix H
15A NCAC 13C .0306(g)(18)	Decontamination Procedures	Section 3.10 and Section 4.2.3
15A NCAC 13C .0306(g)(19)	Health and Safety Plan	Appendix D

Notes:

*North Carolina Department of Environment and Natural Resources, Division of Waste Management, Superfund Section Inactive Hazardous Sites Branch, *Registered Environmental Consultant Program Implementation Guidance, November 2012*

**Aerial Photographs, aside from what is presented in Figures 1-1 through 3-1, are not available.

12-112-002

Legend

- HPDTA Boundary
- Investigation Area

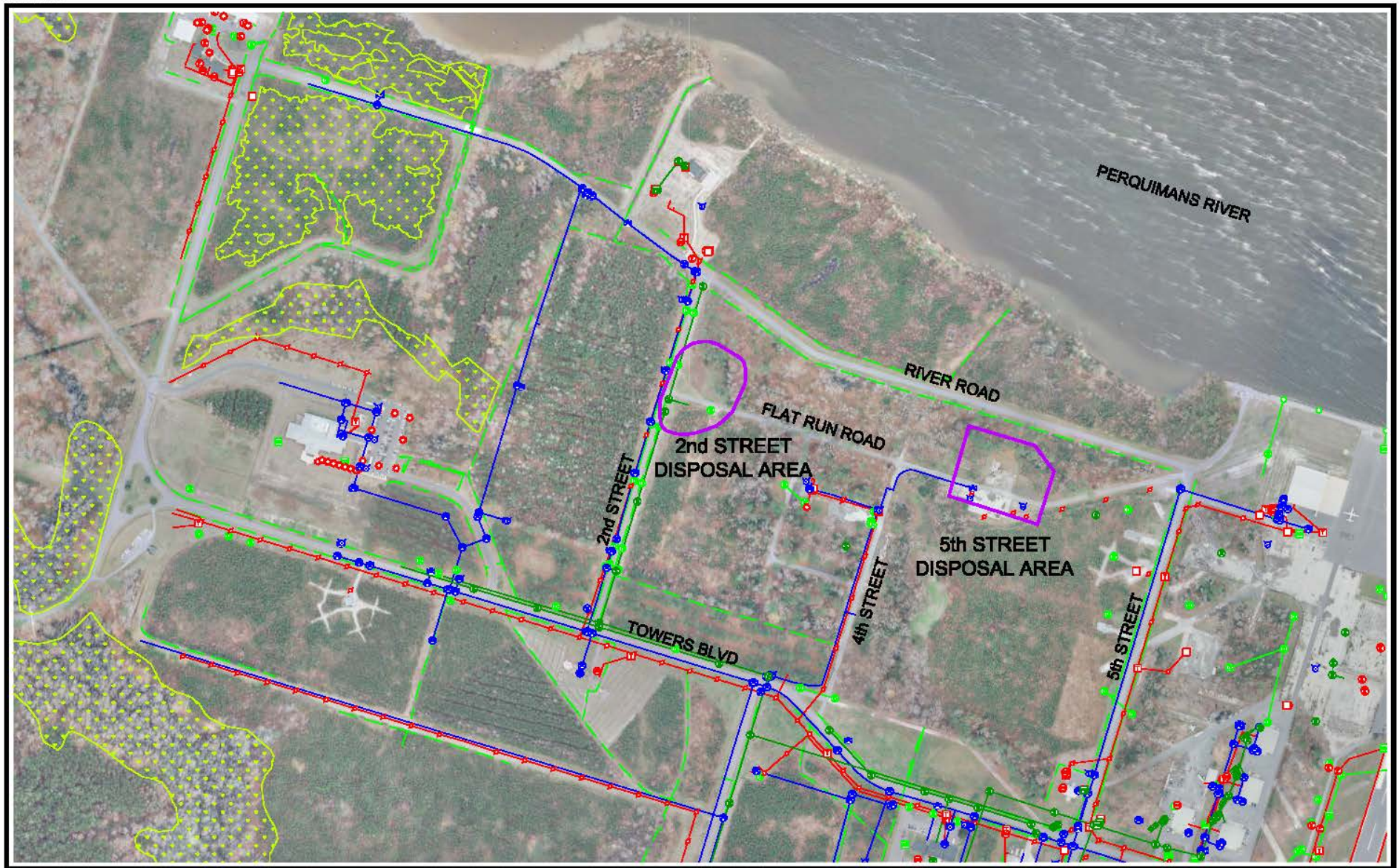
N
W E
S

0 6000 12000 Feet

Figure 1-1
HPDTA Location
Towers Road Disposal Areas Remedial Investigation
Harvey Point Defense Testing Activity
Hertford, North Carolina

CUES MappingServices

12-112-001



Legend

- Investigation Area
- Wetland
- Storm Sewer Utility
- Open Drainage
- Electrical Utility
- Water Utility
- Wastewater Utility

N
W E
S

0 300 600 Feet

Figure 1-2
Site Location
Towers Road Disposal Areas Remedial Investigation
Harvey Point Defense Testing Activity
Hertford, North Carolina

CUES MappingServices

SECTION 2

Site Background

2.1 Facility Description and History

A brief description of HPDTA is provided below.

Commissioned: 1943 as a Navy seaplane pilot training installation and 1961 as HPDTA.

Operational History: From 1943 to the end of World War II, the installation was used for Navy seaplane pilot training. HPDTA is an active Department of Defense (DoD) facility which currently tests and evaluates ordnance and ballistic materials and conducts related training. Historic aerial photographs are not available. The Sanborn Fire Insurance Maps for Perquimans County are included in **Appendix A**.

Location: the facility is located at 2835 Harvey Point Road, Hertford, Perquimans County, North Carolina (36°06'13.02" N and 76°19'59.03"W) and is bounded by surface water on three sides: the Perquimans River to the north and the Albemarle Sound to the south and east. Land west of the facility is mostly agricultural land with some residential properties.

Ownership: HPDTA is currently owned by the DoD. The original purchase of the Harvey Point property occurred as a result of a condemnation civil suit in March of 1943, which conveyed 1,265 acres to the U.S. Government. The 2nd and 5th Street Disposal Areas were included in the March 1943 property acquisition. In 1958 and 1962, respectively, drainage ditch and spoil area agreements were obtained from the state of North Carolina for conducting infrastructure upgrades. These agreements conveyed another 115 acres to the federal government. In 1962, 5 acres adjoining the southwest side of the original property were conveyed to the government in another condemnation lawsuit. In January 1967, approximately 198 acres were purchased, and in March of 1985, an additional 112 acres were purchased. From 2000 to 2007, HPDTA acquired 1,383 acres. The survey plat for the facility is included in **Appendix A**. The current property deed is included in **Appendix B**.

Acreage: 3,078 acres

Environmental Setting: The facility comprises approximately 1,900 acres of upland forests, 860 acres of wetlands, 158 acres of grass fields, and 160 acres of urban/developed land.

Natural Resources: The extensive shoreline along the Perquimans River and the Albemarle Sound, bottomland hardwood swamps, and pine forests are the most significant natural resources at HPDTA.

Geology: HPDTA lies within the Outer Atlantic Coastal Plain physiographic province. The Coastal Plain consists of surficial deposits, undivided sand, clay, gravel, and peat deposited in marine, fluvial, eolian, and lacustrine environments. The surficial sediments are generally underlain by the Yorktown Formation, which consists of fossiliferous clay with varying amounts of fine-grained sand and bluish gray shell material commonly concentrated in lenses north of the Neuse River. The majority of the Outer Coastal Plain is gently sloping. HPDTA has elevations that range from mean sea level (msl) to approximately 10 feet (ft) above msl. The higher elevations occur primarily along John Harvey Boulevard, which traverses the center of the property from east to west, and at Harvey Point, the far eastern tip of the installation. The soil at the facility consists of the following five soil types; chowan silt loam, dogue fine sandy loam, roanoke silt loam, tomotley fine sandy loam, and loamy udorthents (HPDTA, 2007).

Hydrogeology: HPDTA is located on a low-lying peninsula that is part of the Albemarle-Pamlico Drainage Basin. In general, both surface and groundwater flow directions are controlled by topographic contours of land forms in the Coastal Plain, with flow occurring perpendicular to the contours from high to low elevations. A small portion of HPDTA drains into the Perquimans River, with the majority flowing into the Albemarle Sound. Due to the area's flat terrain, much of the land is poorly drained. Sluggish streams, marshes, and swamps are common. The natural hydrology at HPDTA has been altered by ditches to improve drainage. Extensive drainage systems and relic furrows are visible on land that was previously drained and used for agriculture.

Land Usage: Major land uses at the installation include administration, an airfield/runway, training and test ranges, areas of undeveloped forested and agricultural land, and station roads that connect the installation's various buildings.

2.2 Site Description

A brief description of the 2nd and 5th Street Disposal Areas (**Figure 1-2**) is provided below. A United States Geological Survey (USGS) topographic map displaying the area within a one-mile radius of the disposal areas is included in **Appendix A**.

Site Location and Description: The 2nd Street and 5th Street Disposal Areas are located in the northern portion of HPDTA. The 2nd Street Disposal Area is located at the corner of 2nd Street and Flat Run Road. The 5th Street Disposal Area is located approximately 1,000 ft east, along Flat Run Road, of the 2nd Street Disposal Area. The 2nd Street Disposal Area is primarily a grassy field. The 5th Street Disposal Area contains an asphalt paved area.

Site Topography/Geology: The ground surface at both areas is relatively flat. The soil at both disposal areas consists of dogue fine sandy loam, which is characterized as a nearly level to gently sloping (0% to 6%) soil that is moderately well drained with moderately slow permeability and moderate available water capacity.

Potable Water Usage: HPDTA uses six supply wells, located within ½-mile radius (2,640 ft) and assumed to be upgradient of the 2nd and 5th Street Disposal Areas, to meet the water needs for the facility (**Figure 2-1**). The groundwater from the supply wells is pumped into a vertical AST, treated with chlorine, and then pumped into an elevated water tower for distribution into the HPDTA water system. There are no other (i.e., off facility) supply wells within ½-mile radius (2, 640 ft) of the 2nd or 5th Street Disposal Areas.

Environmentally Sensitive Areas: Information gathered from the sensitive environment contacts listed in Appendix C of the REC Program Implementation Guidance (NCDENR, 2012) and the Integrated Natural Resources Management Plan (INRMP) (HPDTA, 2007) did not identify any documented occurrences of federal or state listed rare, threatened, or endangered species at HPDTA. Results of the INRMP assessment indicated that HPDTA does not contain suitable habitat for any Federally-listed endangered or threatened species known to occur in the area. The INRMP identified approximately 860 acres of wetlands at HPDTA and the closest wetland is approximately 700 ft from the 2nd Street Disposal Area (**Figure 1-2**). The most abundant wetland type is palustrine deciduous forest, which accounts for over 80 percent of the wetlands at HPDTA.

2.3 Site History

Trash disposal reportedly occurred at two locations, the 2nd Street and 5th Street Disposal Areas, until the early 1980s. Combined, the disposal areas are estimated to extend over 2 acres and to a depth of up to 16 ft below ground surface (bgs). Disposal practices reportedly included digging pits and burying waste, pouring diesel on waste and burning it, and possible chemical dumping (e.g., from a nearby dry cleaning facility and photography shop). The specific contents of the waste disposal areas are not known but are reported to include paper, utensils, computer disks, broken dishes, glass, and guns (but no ammunition) at both locations; drums at the 2nd Street Disposal Area; and safes, metal cars, and polychlorinated biphenyls (PCBs) at the 5th Street Disposal Area. Based on known site history, no munitions and explosives of concern or radiological components were disposed of at the 2nd and 5th Street Disposal Areas. There are no records of federal, state, or local environmental permits being issued to HPDTA for the 2nd or 5th Street Disposal Areas. With the exception of the reported trash disposal, there are no records of potentially hazardous waste being stored, disposed, spilled, used, generated, treated, or managed at the two areas.

The 2nd and 5th Street Disposal Areas were discovered by HPDTA on September 20, 2011. The North Carolina Department of Environment and Natural Resources (NCDENR) Division of Solid Waste Management IHSB was notified of the existence of the disposal areas within 90 days of discovery. Following NCDENR's notification of the existence of the disposal areas, soil and groundwater sampling were conducted in January 2012 as a requirement for entry into the North Carolina REC program (Section 2.5).

2.4 Previous Investigations and Actions

Previous investigations and removal actions at the disposal areas are summarized in **Table 2-1**. The results of the January 2012 groundwater and soil sampling event are provided in Section 2.5. Historical documents related to the disposal areas are provided in **Appendix C**.

2.5 Nature and Extent of Impacts

This section describes the nature and extent of waste based on the 2011 geophysical surveys and contamination of soil and groundwater at the 2nd Street Disposal Area and 5th Street Disposal Area based on the January 2012 sampling event. **Figure 2-2** shows the area of elevated electromagnetic induction response from the geophysical surveys and the location of the soil and groundwater samples.

2.5.1 Geophysical Survey

The geophysical survey for the 2nd Street Disposal Area covered approximately 1.7 acres. The resistivity data suggest that the depth of the buried materials is probably not more than 16 ft, and the limited vertical extent of the low-resistivity zones suggests little or no migration of dissolved constituents.

The geophysical survey for the 5th Street Disposal Area covered approximately 0.9 acres. The resistivity data suggest buried materials may exist beyond the limits of the existing data and the possible presence of dissolved constituents that may have migrated vertically downward from the buried materials due to extensive vertical extent of the low-resistivity zones.

2.5.2 Soil and Groundwater

The soil and groundwater samples were collected from Geoprobe borings at a depth of 8 to 12 ft bgs. Three of the four samples from the 2nd Street Disposal Area were collected north of Flat Run Road within 100 ft of each other, and the fourth sample was collected south of Flat Run Road approximately 200 ft from the cluster of samples collected north of Flat Run Road. The four samples from 5th Street Disposal Area were collected in the northern portion of the disposal area within 130 ft of each other. The complete analytical results for the January 2012 sampling event are included in **Appendix C**.

Soil

The eight soil samples, four from each disposal area, were screened against the following criteria; (1) North Carolina IHSB (NCIHSB) Residential Health-Based Soil Remediation Goal (SRG), (2) NCIHSB Protection of Groundwater SRG, and (3) US Environmental Protection Agency (USEPA) Residential Soil Regional Screening Levels (RSLs) (**Table 2-2**).

The 2nd Street Disposal Area samples had eleven metals (aluminum, antimony, arsenic, cadmium, chromium, cobalt, iron, manganese, silver, thallium, and vanadium) detected at concentrations that exceeded one or more of the screening criteria and no volatile organic compounds (VOCs) that exceeded any of the screening criteria.

The 5th Street Disposal Area samples had 13 metals (aluminum, antimony, arsenic, cadmium, chromium, cobalt, iron, lead, manganese, mercury, thallium, vanadium, and zinc) detected at concentrations that exceeded one or more of the screening criteria and no VOCs that exceeded any of the screening criteria.

Groundwater

The eight groundwater samples, four from each disposal area, were screened against the following criteria; (1) USEPA groundwater maximum contaminant level, (2) North Carolina Administrative Code (NCAC) 15A-2L Standard gross contaminant level, and (3) USEPA Tap Water RSLs (**Table 2-3**).

The 2nd Street Disposal Area samples had 14 metals (antimony, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, thallium, vanadium, and zinc) and one VOC (vinyl chloride) detected at concentrations that exceeded one or more of the screening criteria.

The 5th Street Disposal Area samples had 12 metals (antimony, arsenic, barium, cadmium, chromium, cobalt, iron, lead, manganese, mercury, thallium, and vanadium) and two VOCs (dichlorodifluoromethane and vinyl chloride) detected at concentrations that exceeded one or more of the screening criteria.

2.5.3 Data Gaps from Previous Investigations

The nature and extent of contamination was not completely characterized during the previous investigations. Specific data gaps that will be addressed during the Phase I RI activities include the following:

- Documentation of existing conditions at the site
- Identification of all releases of hazardous substances at the site
- Characterization of the chemical nature of releases
- Collection of sufficient data to establish remediation goals

Specific data gaps that will be addressed during the Phase II RI activities include the following:

- Horizontal and vertical delineation of the extent of buried debris, contamination in groundwater, and contamination in soil
- Characterization of conditions at the site to conduct a Feasibility Study to support a proposed remedy

TABLE 2-1

Previous Investigations and Removal Actions

Towers Road Disposal Areas

Harvey Point Defense Testing Activity

Hertford, North Carolina

Previous Investigations/Removal Actions	Year	Investigation Activities
2nd Street Disposal Area		
Geophysical Survey (ATS, 2011)	2011	Conducted a geophysical survey to determine the extent of buried debris in the accesible areas.
Groundwater and Soil Sampling	2012	Completed soil and groundwater sampling at four locations in January 2012. The samples were colllected from Geoprobe borings at a depth of 8 to12 ft below ground surface (bgs). The samples were analyzed for volatile organic compounds (VOCs) and target analyte list (TAL) metals. The sampling was required by the state of North Carolina after a notice was sent to the North Carolina Department of Environment and Natural Resources (NCDENR) in preparation for entry into the Responsible Environmental Consultant (REC) Program.
5th Street Disposal Area		
Remediation of PCB-Contaminated Soil at Range Areas A, B and D (OHM, 1997)	1996	A polychlorinated biphenyl (PCB) removal action was conducted to dispose of 2,544 tons of PCB-contaminated soil within the 5th Street Disposal Area. Confirmation samples from the removal action indicated that PCBs remained in place after the completion of the removal action.
Geophysical Survey (ATS, 2011)	2011	Conducted a geophysical survey to determine the extent of buried debris in the accesible areas.
Groundwater and Soil Sampling	2012	Completed soil and groundwater sampling at four sample locations in January 2012. The samples were colllected from Geoprobe borings at a depth of 8 to 12 ft bgs. The samples were analyzed for VOCs and TAL metals. The sampling was required by the state of North Carolina after a notice was sent to the NCDENR in preparation for entry into the REC Program.

TABLE 2-2

Soil Analytical Data Exceedances

Towers Road Disposal Areas

Harvey Point Defense Testing Activity

Hertford, North Carolina

Station ID	Soil Screening Criteria			2nd Street Disposal Area				5th Street Disposal Area			
Sample ID	NC IHSB Residential Health-based SRG (mg/kg)	NC IHSB Protection of Groundwater SRG (mg/kg)	USEPA RSLs Residential Soil (mg/kg)	2-1	2-2	2-3	2-4	5-1	5-2	5-3	5-4
Sample Date				01/10/12	01/10/12	01/10/12	01/10/12	01/10/12	01/10/12	01/10/12	01/10/12
Volatile Organic Compounds (mg/kg)											
No Exceedances											
Metals (mg/kg)											
Aluminum	15,000	NC	7,700	14,100	13,600	13,300	18,800	11,300	21,600	12,000	17,700
Antimony	6.2	0.9	3.1	4.5	3.11	ND	ND	ND	0.762	1.33	3.75
Arsenic	0.39	5.8	0.39	29.6	4.35	2.73	0.862	1.03	3.37	1.83	3.79
Cadmium	14	3	7	3.15	2.7	0.0219 J	0.0336 J	0.0307 J	2.1	2.29	7.35
Chromium	NC	NC	0.29	43.1	25.1	17.1	36.1	15.6	35.7	36.2	58.3
Cobalt	4.6	0.9	2.3	5.68	3.85	2.79	4.37	2.47	4.72	3.25	3.39
Iron	11,000	150	5,500	12,700	18,900	8,400	10,400	6,050	36,200	9,920	36,300
Lead	NC	NC	400	112	202	3.52	5.36	6.51	243	372	692
Manganese	360	65	180	229	231	43.5	89.3	53.2	141	136	235
Mercury	NC	NC	2.3	0.312	1.74	0.00368 J	0.038	0.0143	0.0512	1.64	2.31
Silver	78	3.4	39	8.8	1.62	ND	0.0224 J	ND	0.0808 J	0.0704 J	0.153
Thallium	0.16	0.28	0.078	0.0632 J	0.0636 J	0.0437 J	0.101 J	0.0715 J	0.104 J	0.0821 J	0.0471 J
Vanadium	78	6	39	18.9	21.2	19	34.5	16.1	25.3	15.3	9.89
Zinc	4,600	1,200	2,300	481	439	16.3	27.2	17.6	168	343	2,550

Notes:

Represents exceedance of one or more screening criteria

ND - Analyte not detected

J - Reported value is estimated

NC - No Criteria

mg/kg - milligrams per kilogram

TABLE 2-3

Groundwater Analytical Data Exceedances

Towers Road Disposal Areas

Harvey Point Defense Testing Activity

Hertford, North Carolina

Station ID	Groundwater Screening Criteria			2nd Street Disposal Area				5th Street Disposal Area			
Sample ID	USEPA Groundwater MCL (ug/l)	NCAC 15A-2L Standard GCL (ug/l)	USEPA RSLs Tapwater (ug/l)	2-1	2-2	2-3	2-4	5-1	5-2	5-3	5-4
Sample Date				01/10/12	01/10/12	01/10/12	01/10/12	01/10/12	01/10/12	01/10/12	01/10/12
Volatile Organic Compounds (ug/l)											
Dichlorodifluoromethane	NC	1,000	19	ND	ND	4.5 J	ND	ND	45.6	ND	ND
Vinyl Chloride	2	0.03	0.015	ND	ND	0.18 J	ND	ND	13.6	ND	ND
Metals (ug/l)											
Antimony	6	NC	0.6	0.6 J	0.7 J	0.5 J	ND	ND	ND	2.3 J	0.5 J
Arsenic	10	10	0.045	8.5	64.1	53.6	47.6	3.1 J	71.7	17.1	11.1
Barium	2,000	700	290	172	1,520	578	415	153	768	499	276
Cadmium	5	2	0.69	0.5 J	2.7 J	0.6 J	0.3 J	ND	0.9	3.1 J	1.1 J
Chromium	100	10	0.031	58.9	495	311	184	45.2	367	160	107
Cobalt	NC	NC	0.47	17.3	150	82.5	27.8	67.2	27.1	85.1	39.8
Copper	1,300	1,000	62	32.3	399	138	59.3	21.8	16.3	18.5	59.9
Iron	NC	300	1,100	21,200	237,000	158,000	110,000	24,000	206,000	85,100	54,800
Lead	15	15	15	15.3	233	80.7	53.9	12.7	99.9	46.5	94.6
Manganese	NC	50	32	299	2,880	2,500	2,880	1,300	3,500	1,860	932
Mercury	2	1	0.43	0.0584 J	1.75	0.167	0.364 J	0.0274 J	0.0198 J	1.27	0.347
Nickel	NC	100	30	45.5	338	179	78	37.2	30.4	96.5	72.3
Thallium	2	NC	0.016	ND	1.9 J	0.9 J	0.6 J	ND	1.1 J	0.5 J	0.3 J
Vanadium	NC	NC	7.8	65.3	645	381	242	72	43.1	22.4	155
Zinc	NC	1,000	470	96.9	932	306	181	52.5	415	433	251

Notes:

Represents exceedance of one or more screening criteria

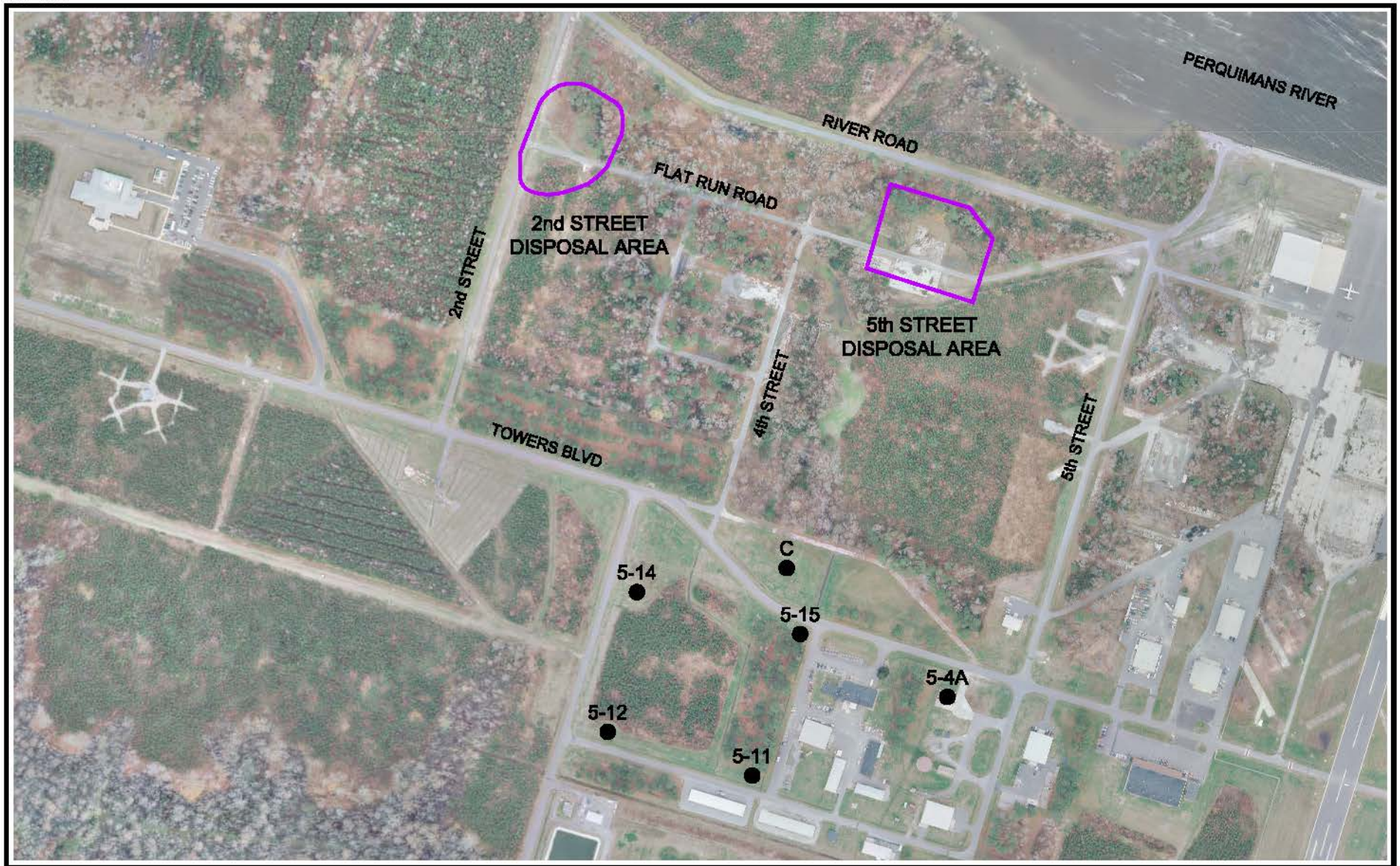
ND - Analyte not detected

J - Reported value is estimated

NC - No Criteria

ug/l - micrograms per liter

12-112-001



Legend

Investigation Area

Water Supply Well

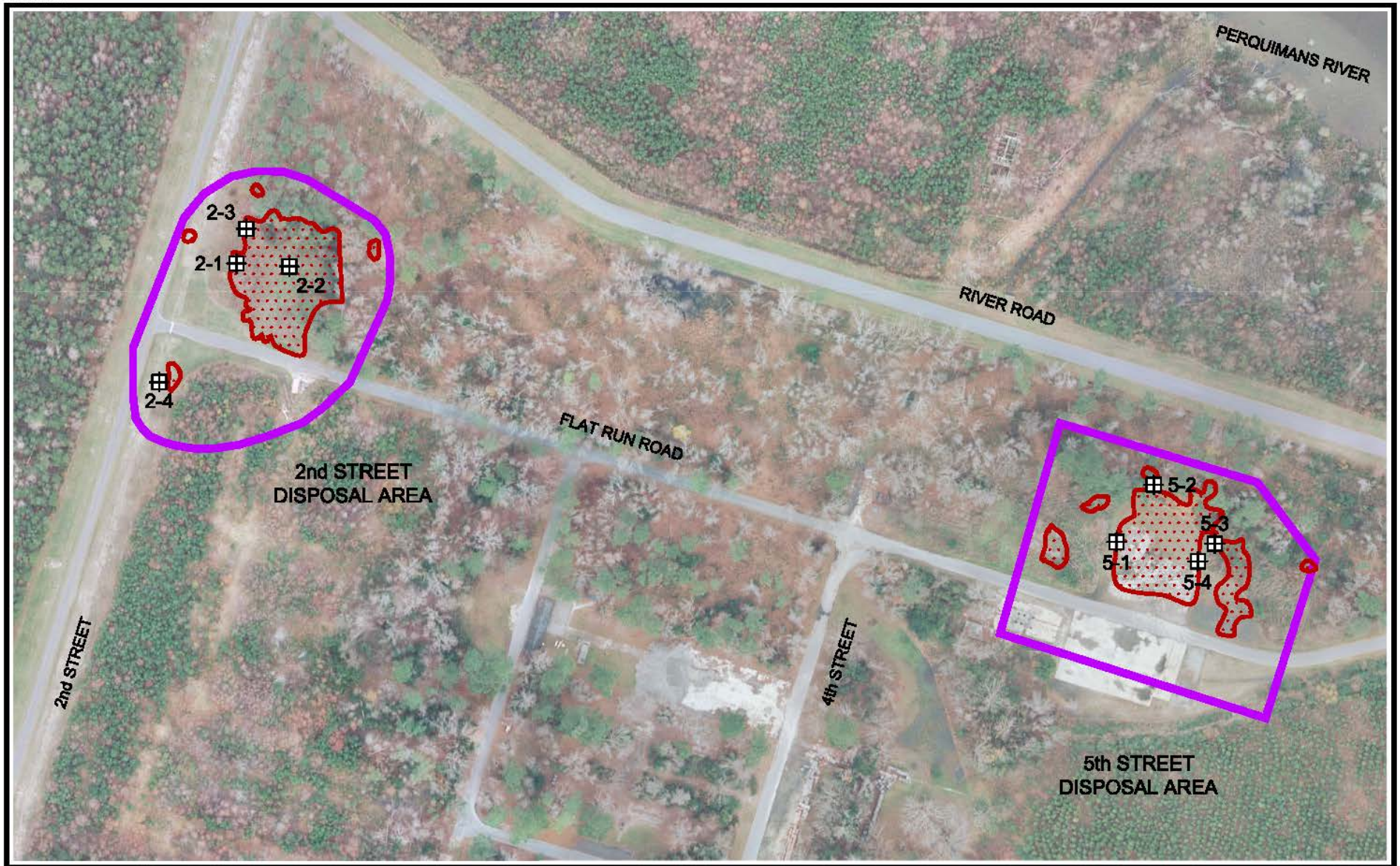
N
W E
S

0 250 500 Feet

Figure 2-1
Water Supply Well Locations
Towers Road Disposal Areas Remedial Investigation
Harvey Point Defense Testing Activity
Hertford, North Carolina

CUES MappingServices

12-112-001



Legend

- Investigation Area
- Elevated Electromagnetic Induction Response Area
- Previous Sample Location

N
W E
S

0 100 200 Feet

Figure 2-2
Previous Sample Locations
Towers Road Disposal Areas Remedial Investigation
Harvey Point Defense Testing Activity
Hertford, North Carolina

CUES MappingServices

SECTION 3

Field Investigation Activities

All activities associated with the scope of work for the RI will be in accordance with the accident prevention plan (APP) (**Appendix D**). The RI will be conducted in two phases, Phase I will consist of geophysical surveying, test pitting, groundwater sampling and soil sampling. Based on the results of the Phase I RI activities and development of preliminary remediation goals, activities conducted during Phase II of the RI will consist of delineation and characterization through test pitting, groundwater sampling, and soil sampling. This section discusses the activities needed to complete an RI in accordance with REC guidance, including:

- Complete an underground utility location prior to conducting any intrusive work.
- Arrange for a North Carolina registered professional land surveyor to complete a civil survey of the existing conditions at the site.
- Vegetation clearance of forested land within the site.
- Complete a geophysical survey to determine the extent of buried debris in previously inaccessible forested land within the site.
- Conduct test pitting to evaluate the horizontal and vertical extents and nature of buried debris.
- Install monitoring wells to determine the horizontal extent of groundwater contamination.
- Measure groundwater levels at the site to develop a potentiometric surface map.
- Conduct a groundwater and soil sampling event to evaluate the nature and extent of contamination.
- Decontaminate equipment and personnel.
- Manage investigation-derived waste (IDW).

These activities will be conducted in accordance with the REC Program Implementation Guidance (NCDENR, 2012). The project schedule is presented in **Figure 3-1.** The schedule for additional tasks will be developed as necessary.

3.1 Pre-Mobilization Facility Access

Access to HPDTA will be coordinated through either the Registered Site Manager (RSM), Project Manager (PM), or Field Team Leader (FTL). All contractors will abide by the base rules and regulations and provide biographical data and authorization to release information prior to being granted access to the facility. Visitor access lists will be provided to HPDTA security one week prior to the start of field activities. Further details regarding base access, rules, and regulations will be provided in the field project instructions that will be distributed to the FTL and subcontractors prior to beginning field activities.

3.2 Mobilization and Site Setup

Construction personnel, equipment, and materials will mobilize to the site to complete the project as defined in the statement of work. Initially, key individuals will mobilize to receive equipment essential to complete the project activities. The support areas for the site, including sanitation facilities, will be setup at locations approved by HPDTA. CH2M HILL will coordinate with HPDTA for access to nearby buildings for office space. Additional personnel and equipment will mobilize to the site as dictated by task resource demands, and will be subsequently released from the project when work assignments are completed.

3.3 Site Preparation

3.3.1 Utility Location

Prior to conducting any intrusive work, a subsurface utility location will be completed to locate and mark out any underground utilities within the estimated boundaries of the 2nd and 5th Street Disposal Areas and a surrounding buffer, to be conservative, in accordance with the applicable utility locating standard operating procedure (SOP) (**Appendix E**). Utilities will be identified using non-intrusive subsurface detection equipment (i.e., magnetometers, ground penetrating radar, or similar devices) as well as opening manhole covers to verify pipe direction. Utilities will be marked on the ground with survey marking paint, or any other means necessary to ensure the safety of drilling, test pitting, and sampling personnel and the protection of the facility infrastructure.

3.3.2 Site Survey

A survey of the site shall be completed under the direction of a professional land surveyor registered and in good standing in the state of North Carolina. The survey will be conducted to capture the existing site conditions prior to beginning the activities listed in this RI WP. A topographic map at a scale of 1”= 50’ with 1’ contour intervals will be prepared and will document, at a minimum, benchmarks, buildings, roads, all perennial and non-perennial surface water features, drainage ditches, dense vegetation, and storage vessels.

3.3.3 Erosion and Sediment Control

The RI is anticipated to disturb approximately 3.5 acres and will require the submission of an Erosion and Sediment Control Plan (ESCP) (**Appendix F**) for approval. Erosion and sediment controls will be installed prior to conducting any intrusive work in accordance with the approved ESCP. The ESCP will be reviewed and approved by NCDENR prior to mobilization. All erosion and sediment controls will be established, inspected, and maintained as indicated in the approved ESCP and in accordance with the *North Carolina Erosion and Sediment Control Planning and Design Manual* and North Carolina Sedimentation Pollution Control Act of 1973. Inspections of the erosion and sediment control measures will be performed at the rate specified in the approved ESCP and documented on the Storm Water Pollution Prevention checklist (**Appendix G**).

3.3.4 Vegetation Clearance

Vegetation clearance via mechanical means will be conducted across forested land that was inaccessible during the 2011 geophysical surveys (**Appendix C**). The vegetation clearance shall consist of selected removal of vegetation and trees to within 6 inches of the ground surface. Vegetation clearance will be minimized to only what is necessary to conduct the geophysical survey, collect soil samples, and install groundwater monitoring wells; other trees should be left in place as they serve as a sound and visual barrier for the facility. All trees over 6 inches in diameter and all stumps that are removed shall be disposed of offsite. All branches, trees less than 6 inches in diameter, and bushes that are removed shall be mulched and left in place.

3.4 Geophysical Survey

Ground-based geophysical surveying will be conducted across the 2nd and 5th Street Disposal Areas to determine the lateral extent (i.e. footprint) of suspected buried debris. The geophysical survey will be conducted using the Geonics, Ltd. EM31-MK2 instrument in vertical dipole mode (or an equivalent geophysical system). Quadrature phase (i.e. terrain conductivity) and in-phase (i.e. buried metal) response data will be recorded in order to evaluate the lateral extent of potential metallic and non-metallic debris. Data will be collected along individual profiles with a nominal spacing of 5 ft (1.5 meters), extending across the accessible portions of survey area. The data point spacing along the transects will be 2 ft or less.

Positional data for the geophysical survey will be collected using differential global positioning system (DGPS) with a minimum of sub-meter horizontal accuracy. DGPS will be used to record the location of relevant features (e.g., surface obstructions, surface debris, etc.) for overlay on the geophysical results. Elevations will not be reported as part of this geophysical survey.

The results of the geophysical survey will be presented as plan-view, color contour maps of the terrain conductivity and in-phase response data collected across the survey areas. The lateral extent of suspected buried debris, if present, will be identified on the maps. Relevant features will also be superimposed on the contour maps to assist in the interpretation of the geophysical data.

3.5 Test Pitting

Following completion of the geophysical survey, test pits will be excavated at the 2nd Street Disposal Area and 5th Street Disposal Area to aid in selecting soil sample locations, and to assist with waste characterization for the purpose of disposal. The Phase I RI test pitting results will be used to identify releases of hazardous substances and document existing site conditions and the Phase II RI test pitting results will be used to delineate the horizontal and vertical extents of buried debris. It is anticipated that test pitting will continue vertically to a maximum of 16 ft bgs or until the water table is reached. No dewatering of the test pits will be performed. During Phase I RI test pitting, a material processing area will be constructed to stage material, generated from both the Phase I and Phase II RI test pitting, for offsite disposal.

During Phase I RI test pitting, all test pitting material will be placed back into the excavation area unless potentially-hazardous waste or materials with potential to impact other media (e.g., drums or containers) are encountered, which will be characterized and disposed of offsite. Following backfill, restoration will be conducted in accordance with Section 3.12.

During Phase II RI test pitting, all excavated material will be placed into the material processing area. Test pit locations will be backfilled with imported borrow material to return the site to pre-existing grade and restoration will be conducted in accordance with Section 3.12. Imported fill material will be tested to ensure that the source is certified as clean through analytical testing for VOCs, SVOCs, metals, pesticides, PCBs, and dioxins and comparison to the NCDENR SRGs for both health-based and protection of groundwater SRGs and background data, and approved by HPDTA prior to being brought to the site.

3.6 Monitoring Well Installation

A total of eight monitoring wells will be installed, during Phase I of the RI, to include two monitoring wells within the 2nd Street Disposal Area, two monitoring wells within the 5th Street Disposal Area, and two background monitoring wells at each disposal area. The proposed well installation locations are shown on **Figure 3-2**. The monitoring well locations in grass covered areas will be flush mount wells and the wells in wooded areas will be above grade stickup wells. Following completion of Phase I RI groundwater sampling, the groundwater data will be evaluated to determine if additional monitoring wells need to be installed to meet the objectives of the Phase II RI.

For the purpose of selecting background well locations, groundwater flow was assumed to be to the northeast, toward the Perquimans River, which is the nearest major surface water body to the site. Therefore, background wells are proposed to the south and southwest of each disposal area.

Wells selected to represent the site conditions of both disposal areas are proposed based on geophysical survey data from 2011 and laboratory analytical data from soil and groundwater samples collected in January 2012. The following well locations are proposed, but these locations may be modified based on any debris encountered during test pitting activities:

3.6.1 2nd Street Disposal Area

- One well in the central portion of the elevated electromagnetic induction response area to evaluate conditions in the waste source area and to evaluate a potential upgradient source of low levels of vinyl chloride identified in location 2-3
- One well southeast of former location 2-2 to evaluate any impacts to groundwater from likely buried debris located in the northeast area of the site based on the previous geophysical survey

3.6.2 5th Street Disposal Area

- One well slightly downgradient of former sample location 5-2 to serve as a permanent point for evaluating dichlorofluoromethane and vinyl chloride contaminations detected at levels greater than screening values in this area
- One well between previous sample location 5-2 and previous location 5-4 to assess site impacts in the largest area at which geophysical anomalies were noted, to address a potential upgradient source of VOCs to location 5-2 and to assess potentially elevated metals downgradient of location 5-2, where elevated levels of a number of metals were previously identified in soil

Drilling and well installation activities will be conducted by a North Carolina licensed driller in accordance with the North Carolina Well Construction Standards and the applicable SOP (**Appendix E**).

Groundwater monitoring wells will be 2-inch diameter Schedule 40 polyvinyl chloride wells installed to the confining unit, which is assumed to be at a maximum depth of 35 ft bgs. This depth represents a lower elevation than the screened interval for direct-push technology (DPT) samples because the parent compound for vinyl chloride (trichlorothene) and its daughter products have specific gravities greater than water, indicating these chemicals are expected to be found at higher concentrations in deeper portions of the aquifer. The monitoring wells will have 20-ft screens. The borings for the monitoring wells will be made using a 4.25-inch inner diameter hollow stem auger (HSA). The monitoring well will be constructed within the HSA. The annular space around the 20-ft screens will be filled with sand filter pack material to approximately 2 ft above the top of the screened interval. Sodium bentonite pellets will be placed above the sand pack to form a seal of approximately 3 ft thick. The remaining borehole annular space will be completed, up to 1 ft bgs, with a cement-bentonite grout seal using a tremie pipe method. The monitoring well will be completed through installation of a riser casing, concrete pad, and bollards at each corner of the concrete pad.

Monitoring wells will be developed by surging (with a surge block) and over-pumping in accordance with the applicable SOP (**Appendix E)**. Field parameters [conductivity, temperature, pH, dissolved oxygen (DO), oxidation reduction potential (ORP), and turbidity] will be monitored during development. Development pumping and surging will not start until the last grout pumped into the well has had at least 24 hours to cure.

3.7 Measurement of Groundwater Levels

Groundwater elevations in the monitoring wells will be measured in accordance with the applicable SOP (**Appendix E)** to clearly define the groundwater flow patterns in order to ensure that at least one monitoring well is installed hydraulically downgradient of the source area. The well caps will be opened and the water levels will be allowed to equilibrate prior to measurement. Water levels will be measured from the top of casing to the nearest 0.01 ft using an electronic water level indicator. The data will be recorded on forms such as the one shown in **Appendix G**. Measurements will be made relative to top of casing elevations established by a registered land surveyor.

3.8 Groundwater Sampling

All groundwater sampling will be conducted in accordance with the Quality Assurance Project Plan (QAPP) (**Appendix H**). The analytical results from the groundwater samples will be used in Phase I of the RI to characterize the chemical nature of releases, determine groundwater background concentrations, identify releases of hazardous substances, and evaluate geochemical and physical properties of the aquifer. During Phase I RI activities, groundwater samples will be collected from the eight newly installed monitoring wells (**Figure 3-2**) in accordance with the applicable SOP (**Appendix E)**.

The Phase II RI groundwater sampling analytical results will be used to delineate the vertical and horizontal extent of contamination in groundwater and characterize the conditions at the site to conduct a Feasibility Study to support proposed remedy. During Phase II RI activities, groundwater samples will be collected from the monitoring wells shown in **Figure 3-2** and any additional monitoring wells that are installed following completion

of the Phase I RI groundwater sampling analytical data evaluation. Groundwater samples will be collected in accordance with the applicable SOP (**Appendix E)**.

Prior to sampling, the pump intake will be positioned within the screen and groundwater extracted at a low rate while pH, specific conductance, DO, ORP, turbidity, and temperature are measured periodically. Measurements during purging will be recorded on a groundwater purge form (**Appendix G)**. When these parameters have stabilized, the groundwater samples will be collected in appropriately labeled and preserved containers using the same pump setup and pumping rate. Additionally, Hach™ field test kits will be used to analyze for ferrous iron and DO at the time of sample collection. All pumping equipment and water quality meters will be decontaminated in accordance with the applicable SOP (**Appendix E)**. The decontamination fluids and purge water will be contained in 55-gallon drums for staging and subsequent disposal.

Groundwater samples will be packaged and shipped under standard chain-of-custody procedures to an analytical laboratory licensed in the State of North Carolina and possessing a DoD Environmental Laboratory Accreditation Program (ELAP) accreditation. The groundwater samples within the disposal areas will be analyzed in the laboratory for the following parameters:

- VOCs
- Semi-volatile organic compounds (SVOCs)
- Pesticides/PCBs
- Metals
- Mercury
- Hexavalent Chromium
- *Dehalococcoides*
- Alkalinity
- Chloride
- Dissolved gases; methane
- Nitrate/Nitrite
- Sulfate/Sulfide
- Total Organic Carbon

The groundwater samples within the background areas will initially be analyzed in the laboratory for the following parameters:

- Metals
- Mercury
- Hexavalent Chromium

If the data indicates concentrations of SVOCs and pesticides at levels greater than screening values, additional collection of background data for these chemicals may be completed for the purpose of determining any widespread anthropogenic sources which may be unrelated to the areas.

3.9 Soil Sampling

All soil sampling will be conducted in accordance with the QAPP (**Appendix H**). Soil sample locations will be selected based on the results of test pitting and the geophysical survey as described in the following subsections. The analytical results from the soil samples will be used in Phase I of the RI to characterize the chemical nature of releases, determine soil background concentrations, and identify releases of hazardous substances. The Phase II RI soil sampling analytical results will be used to delineate the horizontal and vertical extent of contamination in soil and characterize site conditions to conduct a Feasibility Study to support a proposed remedy.

The excess soil from the surface soil sampling will be returned to the sample location and the soil cuttings from the subsurface soil sampling will be staged in the material processing area for subsequent disposal. Soil samples will be packaged and shipped under standard chain-of-custody procedures to Environmental Conservation Laboratories, Inc., a State of North Carolina licensed laboratory possessing a DoD ELAP accreditation.

3.9.1 Surface Soil Sampling

Surface soil samples will be collected using a hand auger. The samples will be collected at 6 to 12 inches bgs for VOCs and 0 to 6 inches bgs for all other analytes for samples within the 2nd and 5th Street Disposal Areas. All background data set samples will be collected from 6 to 12 inches bgs.

Five 4-point composite surface soil samples will be collected at each disposal area and analyzed for the following parameters:

- VOCs
- SVOCs
- Pesticides/PCBs
- Metals

A total of four surface soil samples (two samples from each disposal area) will be analyzed for the analytes listed above and the following parameters:

- Mercury
- Hexavalent Chromium

While exact sample locations will not be determined until test pitting and geophysical activities are complete, the elevated chromium and mercury detected during the January 2012 investigation will be taken into consideration when selecting sample locations. At the 2nd Street Disposal Area, samples will be located in the proximity of former sample locations 2-1 and 2-2. At the 5th Street Disposal Area, samples will be located in the proximity of former sample locations 5-3 and 5-4.

Five 4-point composite surface soil samples will be collected at locations outside of the 2nd Street Disposal Area and 5th Street Disposal Area to establish a background data set. Each of the background samples will be analyzed for metals. The sample location most upslope of the 2nd and 5th Street Disposal Area boundaries will also be analyzed for mercury and hexavalent chromium. If the data indicates concentrations of SVOCs and pesticides at levels greater than screening values, additional collection of background data for these chemicals may be completed for the purpose of determining any widespread anthropogenic sources which may be unrelated to the site.

3.9.2 Subsurface Soil Sampling

A total of 18 soil borings will be advanced using the DPT rig. Continuous soil cores will be retrieved from each boring using an open core barrel and piston DPT sampling device along with 4- or 5-ft disposable acetate liners. All of the borings will be advanced to 16 ft bgs. A new liner will be used to collect each continuous soil sample, from the ground surface down to the bottom of the borehole. The down-hole sampling equipment will be decontaminated between each sample location.

Subsurface soil samples will be collected from the following three depth intervals:

- 0.5 ft to 1 ft bgs
- 1 ft to 8 ft bgs (or the water table, whichever is encountered first)
- 8 ft bgs (or the water table, whichever is encountered first) to 16 ft bgs

The subsurface soil samples will be collected at six locations within the 2nd Street Disposal Area and seven locations within the 5th Street Disposal Area. All of the samples from the 2nd Street Disposal Area and 5th Street Disposal Area will be analyzed for the following parameters:

- VOCs
- SVOCs,
- Pesticides/PCBs
- Metals

One sample location from each disposal area will be analyzed for the analytes listed above and the following parameters:

- Mercury
- Hexavalent Chromium

While exact sample locations will not be determined until test pitting and geophysical activities are complete, the elevated chromium and mercury detected during the January 2012 investigation will be taken into consideration when selecting sample locations. At the 2nd Street Disposal Area, both the mercury and chromium samples will be collected in the vicinity of former sample location 2-2. At the 5th Street Disposal Area, the mercury and hexavalent chromium samples will be located in the proximity of former sample location 5-3.

Five locations outside of the 2nd Street Disposal Area and 5th Street Disposal Area will be sampled to establish a background data set. Each of the five background samples will be analyzed for metals. The sample location at the 2nd and 5th Street Disposal Areas most upslope of the disposal area boundaries will be analyzed for the mercury and hexavalent chromium. If the data indicates concentrations of SVOCs and pesticides at levels greater than screening values, additional collection of background data for these chemicals may be completed for the purpose of determining any widespread anthropogenic sources which may be unrelated to the site.

3.10 Decontamination Procedures

Heavy equipment used to excavate the test pits shall be decontaminated using high-pressure, low-volume steam cleaning at a designated staging area prior to leaving the site and in between traveling from one disposal area to the other. The heavy equipment will be decontaminated following completion of the 2nd Street Disposal Area test pitting, following completion of the 5th Street Disposal Area test pitting activities, and prior to commencing backfilling of the test pit locations.

Drill rigs, drill tools, and associated equipment will be steam-cleaned with live steam prior to commencement of drilling at each well location in accordance with the applicable SOP (**Appendix E)**. Decontamination of the drill rig, augers, pipes, bits, tools, and well casing will consist of high-pressure, low-volume steam cleaning at a designated staging area.

The water-level indicator probe and cable will be decontaminated after each use according to the applicable SOP (**Appendix E**).

Decontamination of the sample collection equipment will be performed prior to the collection of each sample to minimize cross-contamination. Sampling equipment will be disposed of after each use or decontaminated, as appropriate. A Grundfos® pump or peristaltic pump and Teflon®-lined tubing will be used to collect groundwater samples from the monitoring wells for low-flow sampling. Pumps and tubing will be decontaminated according to the applicable SOP (**Appendix E**).

Decontamination fluids will be contained in 55-gallon drums for staging and subsequent disposal.

3.11 Investigation-derived Waste Management

During Phase I RI activities, IDW will consist of any potentially-hazardous soil/debris from the test pitting (if encountered), soil cuttings from the monitoring well installation, purged/excess groundwater, personal protective equipment (PPE), and decontamination fluids. During Phase II RI activities, IDW may consist of stockpiled soil/debris from test pitting, soil cuttings from the monitoring well installation, purged/excess groundwater, personal protective equipment (PPE), and decontamination fluids. PPE, such as sampling gloves and acetate liners, will be placed in black, non-translucent garbage bags and disposed of in an onsite dumpster. Soil IDW generated during the Phase I RI activities, not including test pitting, will be placed in 55-gallon drums. If any potentially-hazardous soil/debris is generated during Phase I RI test pitting the soil/debris will be placed in an onsite material processing area, covered with polyethylene sheeting, labeled in accordance with Section 4.2.6, and segregated in accordance with Section 4.2.7 from non-hazardous IDW generated during the RI until the soil/debris is transported offsite for disposal. Soil/debris IDW from the Phase II RI test pitting activities will be stockpiled in an

onsite material processing area. Any soil IDW generated from monitoring well installation during Phase II RI as well as all liquid IDW will be placed in 55-gallon drums. The drums will be labeled and staged at the HPDTA hazardous and non-hazardous waste storage area pending final disposition. The IDW subcontractor will transport the stockpiled soil from the test pitting activities and the drums to a disposal facility with a valid USEPA/State permit for the disposal of the waste.

3.12 Site Restoration

Restoration activities will be conducted in accordance with the ESCP (**Appendix F**) and will include the following activities:

- Offsite disposal of the material processing area following completion of offsite disposal of the IDW to an approved Subtitle D disposal facility.
- Application of a permanent seed mixture across all disturbed areas of the site.
- Removal of temporary erosion and sediment controls after vegetation has become established.

3.13 Demobilization

In preparation for demobilization, all equipment will be decontaminated and area clean-up activities will occur. All support equipment, staging areas, waste materials, and heavy equipment will be removed. All equipment will be free of solid material(s) and decontaminated in accordance with Section 3.10 prior to demobilization. The material processing area will be removed, and the area will be seeded in accordance with the ESCP (**Appendix F**). Following completion of the Phase I RI activities, an inspection of the site will be conducted by HPDTA. Once HPDTA has approved of the current site conditions, all materials used during the performance of Phase I RI field activities will be removed and properly disposed offsite.

Following completion of Phase II RI activities, an inspection of the site will be conducted by HPDTA. Upon approval from HPDTA that the condition of the site is satisfactory, all materials used during the performance of Phase II RI field activities to include the erosion and sediment controls will be removed and properly disposed offsite.

3.14 Reporting

At the conclusion of Phase I field activities, a Phase I RI Technical Memorandum will be prepared. This technical memorandum will summarize all of the Phase I RI activities and present the results, provide verification that the scope of work is complete, and document the inspection and acceptance of the site. At the conclusion of the Phase II field activities, a Phase II RI Report will be prepared. This report will summarize all of the Phase I and II RI project activities and present the results, provide verification that the scope of work is complete, and document the inspection and acceptance of the site.

The draft reports will be distributed for Navy and HPDTA review within 90 days of the final inspection. Final versions will be prepared, once comments are received and resolved, and submitted to NCDENR within 30 days of completion (i.e., within 30 days of certification by the RSM). The RI is required to be completed within three years of the effective date of the REC Administrative Agreement.

ID	Task Name	Duration	Start	Finish	Predecessors
1	**Task 1 - PM, Admin Support & Meetings**	**592 days**	**Wed 7/25/12**	**Thu 10/30/14**	
2	Monthly Progress Reports	592 days	Wed 7/25/12	Thu 10/30/14	
3	**Quarterly Progress Reports**	**333 days**	**Mon 7/8/13**	**Wed 10/15/14**	
4	Quarterly Progress Report	6 days	Mon 7/8/13	Mon 7/15/13	
5	Quarterly Progress Report	6 days	Tue 10/8/13	Tue 10/15/13	
6	Quarterly Progress Report	6 days	Wed 1/8/14	Wed 1/15/14	
7	Quarterly Progress Report	6 days	Tue 4/8/14	Tue 4/15/14	
8	Quarterly Progress Report	6 days	Tue 7/8/14	Tue 7/15/14	
9	Quarterly Progress Report	6 days	Wed 10/8/14	Wed 10/15/14	
10	**Task 2 - Work Plan**	**194 days**	**Tue 7/31/12**	**Fri 4/26/13**	
11	Historical & Environmental Information Provided by HPDTA	1 day	Tue 7/31/12	Tue 7/31/12	
12	Historical & Environmental Information Review	7 days	Wed 8/1/12	Thu 8/9/12	11
13	Draft Work Plan & Sampling Plan	43 days	Tue 7/31/12	Thu 9/27/12	
14	NAVFAC/HPDTA Review of Draft Work Plan & Sampling Plan	26 days	Fri 9/28/12	Fri 11/2/12	13
15	Final Work Plan and Sampling Plan	21 days	Thu 3/28/13	Thu 4/25/13	
16	Submit Final Work Plan and Sampling Plan to NCDENR	1 day	Fri 4/26/13	Fri 4/26/13	21,15
17	**SWPPP (ESCP & General Permit)**	**80 days**	**Wed 8/1/12**	**Tue 11/20/12**	
18	SWPPP development/Submittal to HPDTA	35 days	Wed 8/1/12	Tue 9/18/12	11
19	HPDTA & NAVFAC Review	11 days	Wed 9/19/12	Wed 10/3/12	18
20	Resolution of HPDTA Comments & submittal to NCDENR	12 days	Thu 10/4/12	Fri 10/19/12	19
21	SWPPP (NCDENR Approva - assumes no commentsl)	22 days	Mon 10/22/12	Tue 11/20/12	20
22	**Task 3 - Phase 1 Remedial Investigation**	**331 days**	**Fri 9/28/12**	**Fri 1/3/14**	
23	Subcontractor Procurement	101 days	Fri 9/28/12	Fri 2/15/13	13
24	**Field Work**	**77 days**	**Mon 5/20/13**	**Tue 9/3/13**	
25	Mobilize, locate utilities, conduct survey	1 day	Mon 5/20/13	Mon 5/20/13	16,23
26	Install E&S Controls and Clear vegetation	4 days	Tue 5/21/13	Fri 5/24/13	25
27	Conduct geophysical survey	2 days	Mon 5/27/13	Tue 5/28/13	26
28	Set up Material Handling Area	1 day	Tue 5/28/13	Tue 5/28/13	27SS+1 day
29	Excavate test pits & stage material	2 days	Wed 5/29/13	Thu 5/30/13	28
30	Collect surface soil samples using hand auger	2 days	Fri 5/31/13	Mon 6/3/13	29
31	Install monitoring wells	4 days	Mon 6/3/13	Thu 6/6/13	30SS+1 day
32	Collect subsurface soil samples using DPT	2 days	Fri 6/7/13	Mon 6/10/13	31
33	Collect groundwater samples	4 days	Tue 6/11/13	Fri 6/14/13	32
34	IDW Disposal	1 day	Tue 9/3/13	Tue 9/3/13	32FS+60 days
35	**Phase 1 Tech Memo**	**85 days**	**Mon 9/9/13**	**Fri 1/3/14**	
36	Develop Draft Phase 1 Tech Memo	43 days	Mon 9/9/13	Wed 11/6/13	33FS+60 days
37	NAVFAC/HPDTA Review of Draft Phase 1 Tech Memo	21 days	Thu 11/7/13	Thu 12/5/13	36
38	Final Phase 1 Tech Memo	21 days	Fri 12/6/13	Fri 1/3/14	37
39	**Task 4 - Phase 2 Remedial Investigation**	**216 days**	**Mon 1/6/14**	**Mon 11/3/14**	
40	Invesigation Scoping & Subcontractor Procurement	66 days	Mon 1/6/14	Mon 4/7/14	38
41	Field work	40 days	Tue 4/22/14	Mon 6/16/14	40FS+10 days
42	Phase 2 Reporting	60 days	Tue 8/12/14	Mon 11/3/14	41FS+40 days

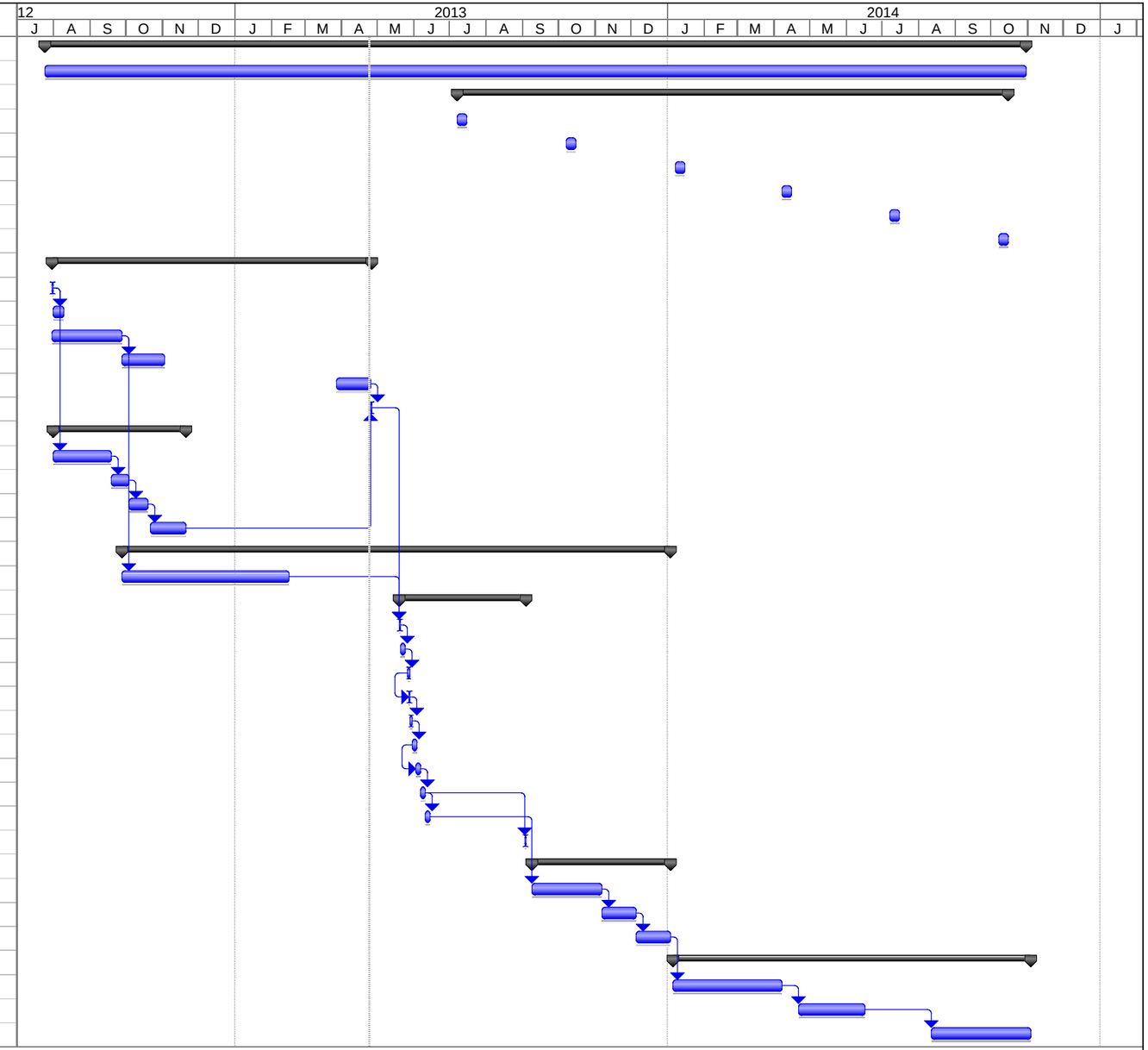
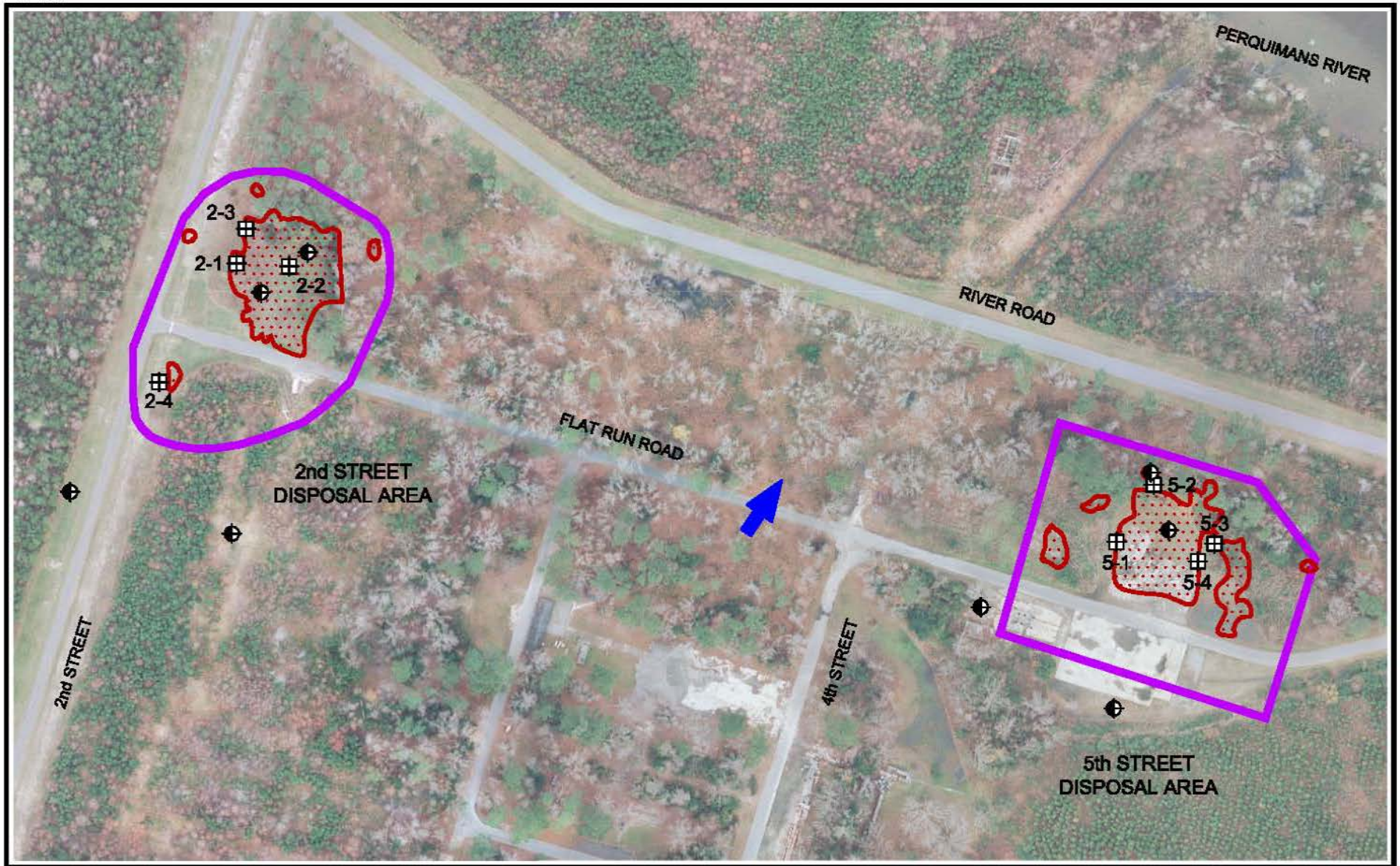


Figure 3-1 - Project Schedule

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

Assumption: Project schedule assumes that field work will be conducted without work stoppages.

12-112-001



Legend

- Investigation Area
- Elevated Electromagnetic Induction Response Area
- Previous Sample Location
- Proposed Monitoring Well Location
- Assumed Groundwater Flow Direction

N
W E
S

0 100 200 Feet

Figure 3-2
Proposed Monitoring Well Locations
Towers Road Disposal Areas Remedial Investigation
Harvey Point Defense Testing Activity
Hertford, North Carolina

CUES MappingServices

SECTION 4

Environmental Protection Plan

This Environmental Management Plan contains general procedures that will be implemented to manage environmental risk during the project. The information in this plan is intended to be used in conjunction with the QAPP (**Appendix H**) and APP (**Appendix D**).

General procedures are included regarding the following topics:

- Management of waste
- Spill prevention and control
- Protection of Air Quality
- Protection of Water Quality
- Protection of Surrounding Community
- Protection of Vegetation
- Protection of Fish and Wildlife
- Monitoring well installation
- Site Restoration

4.1 Chemical Inventory

A hazardous material is defined as any material that, because of its quantity, concentration, or physical, chemical, or infectious characteristics, may pose a substantial hazard to human health or the environment. Bulk chemicals are chemicals that are maintained onsite in containers or quantities that are not intended for use by the general public. Currently there is no need to store bulk or hazardous chemicals onsite during the performance of the work. Should that change, the project Environmental Manager should be contacted for assistance.

4.2 Waste Management Plan

Waste management is the primary environmental risk that has been identified for this project. The following sections detail procedures that will be followed for waste management. These procedures apply only to the management tasks that will be performed by CH2M HILL and its subcontractors.

4.2.1 Waste Streams

It is anticipated that the following waste streams will be generated and managed as indicated in **Table 4-1**. Consult the project Environmental Manager for waste streams that are not identified below.

4.2.2 Waste Characterization

In general, wastes generated during the course of the project, will be assessed to determine proper handling and final disposition through sampling and laboratory analysis. The exceptions are uncontaminated wastes (i.e. no contact with contaminated media or remediation chemicals) and trash. Samples of these waste streams will be taken and analyzed only if appropriate.

Environmental media will be analyzed for VOCs, SVOCs, metals, herbicides, and pesticides using the toxicity characteristic leaching procedure, reactivity, ignitability, and corrosivity along with any additional chemical analysis required by the disposal facility. Samples will be collected in accordance with the general procedures in the QAPP (**Appendix H**) and sent to a contracted laboratory for analyses. The results will be reviewed, by CH2M HILL and then forwarded to HPDTA and NAVFAC for review, for comparison to hazardous waste criteria and transport, storage, and disposal facility acceptance criteria to determine if the material is non-hazardous or hazardous and ensure that the material meets the disposal facility requirements.

4.2.3 Equipment Decontamination

Sampling methods and equipment have been selected to minimize decontamination requirements and the possibility of cross-contamination. Reusable sampling equipment will be decontaminated as stated in Section 3.10 of this work plan and in the *Decontamination of Personnel and Equipment* SOP in the QAPP (**Appendix H**).

4.2.4 Waste Profile

If waste will be disposed of offsite, waste characterization information will be documented on a waste profile form provided by the disposal facility. The profile will be reviewed and approved by the CH2M HILL Environmental Manager prior to being sent to the client for review and approval.

The profile typically requires the following information:

- Generator information, including name, address, contact, and phone number
- Site name, including street/mailing address
- Process-generating waste
- Source of contamination
- Historical use for area
- Waste composition (e.g., 95 percent soil, 5 percent debris)
- Physical state of waste (e.g., solid, liquid)
- Applicable hazardous waste codes

CH2M HILL will coordinate with the disposal subcontractor to schedule the transportation of the waste to the offsite disposal facility after the copy of the approved waste profile is received.

4.2.5 Waste Accumulation Time Limit

The accumulation start date for all wastes generated during the course of this project is the date that the first drop of waste enters the container. All wastes that are removed from the area of contamination (AOC) for staging will be transported for offsite disposal within 90 days of the accumulation start date. Wastes that remain within the AOC, but are destined for offsite disposal should be removed within 90 days of the date of generation or as soon as practical.

If wastes will be staged for periods longer than 90 days, client approval of that practice is required. Steel drums may begin to lose structural integrity after 90 days when exposed to the elements. Therefore, containers staged onsite for an extended amount of time prior to shipment must be thoroughly inspected prior to transport to ensure that they are still structurally sound.

4.2.6 Labels

Waste containers will be labeled upon use concerning their contents. In addition, containers will be labeled and in accordance with 49 Code of Federal Regulations (CFR) 172, 173, and 178. The labels will note the type of waste, location from which the waste was generated, and accumulation start date. One of the following labels will be used:

- “Analysis Pending” or “Waste Material”—Temporary or handwritten label until analytical results are received and reviewed. This label will include the accumulation start date.
- “Non-Hazardous Waste”—Preprinted labels with the following information:
  - Accumulation start date
  - USEPA identification (ID) number
  - Waste-specific information (e.g., contaminated soil)

- "Hazardous Waste"—Pre-printed hazardous waste labels with the following information:
  - Accumulation start date
  - Generator name
  - USEPA ID number
  - Waste codes
  - Before transport, the manifest number must be added (for containers of less than 110-gallon capacity)

4.2.7 General Waste Management Requirements

Wastes will be accumulated in an area identified or approved by HPDTA. Hazardous wastes will be segregated from non-hazardous wastes. Additionally, incompatible hazardous wastes (e.g., flammable and corrosive wastes) will be segregated with a physical barrier such as a wall or berm. Wastes of the same matrix, contamination, and source may be aggregated to facilitate accumulation and disposal with the approval of the project Environmental Manager. At this time, no aggregation of waste is planned during this project.

In addition to these procedures, hazardous waste accumulation areas will have available fire extinguishers in areas where wastes are known or suspected to be flammable or ignitable, decontamination equipment, and an alarm system (if radio equipment is not available to all personnel working in accumulation area). The APP identifies the specific emergency response procedures and equipment.

All containers will be physically moved and handled in accordance with the APP and task specific activity hazard analysis (AHAs). Additional management requirements for the containers expected to be put into use can be found in **Table 4-2**.

4.2.8 Inspection of Waste Accumulation Areas

Waste accumulation areas will be inspected at least weekly for conditions that could result in a release of waste to the environment. Inspections will focus on conditions such as equipment malfunction, container or containment deterioration, signs of leakage or discharge. Specifically, containers (drums and roll offs) will be inspected for leaks, signs of corrosion, or signs of general deterioration and the material processing area will be inspected for signs of tearing or deterioration of the liner.

Any deficiencies observed or noted during inspection will be corrected immediately. Appropriate measures may include transferring waste from a leaking container to a new container, replacing the liner or cover, or repairing the containment berm.

Inspections will be recorded in the project log book. Deficiencies and corrections will also be documented. All of the following items will be noted in the log book for each inspection:

- The location of the area
- Total number of containers and/or stockpiles present
- Date
- Verification that all containers are labeled with the accumulation start date, contents, Base point of contact, and any relevant hazards (flammable, oxidizer, etc.). Labels must be visible, legible, and not faded.
- The condition of containers and/or the liner for the material processing area. Good condition for containers is defined as no severe rusting, dents, structural defects, or leaks.
- Verification that all containers are completely closed with all bolts, lids, and locking mechanisms engaged as though ready for immediate transport.
- Verification that containers are staged in rows not more than two drums wide, with labels facing outward and 3 ft of space between rows.
- Verification that all containers and stockpiled soil are being tracked on the transportation and disposal log.
- Verification that the accumulation area is clean and free of debris.

- Verification that emergency response equipment is present if required for the waste being staged.

Shipping Documentation

Before waste is shipped for offsite disposal, a waste approval package for each waste stream will be prepared. This package will consist of a waste profile naming HPDTA as the generator of the waste, analytical summary table(s) applicable to the waste, a completed waste manifest, land disposal restriction notification or certification form for hazardous wastes, and any other applicable information necessary for HPDTA to complete its review of the disposal package and sign as the generator.

The signed profile will then be submitted to the designated offsite facility for acceptance and approval. Once approval is received from the designated facility, transportation can be scheduled.

Each load of waste material will be manifested before it is transported. At a minimum, the manifest form will include the following information:

- Generator information, including name, address, contact, and phone number, USEPA ID number (if hazardous)
- Transporter information, including name, address, contact and phone number, USEPA ID number (if hazardous)
- Designated facility information, including name, address, phone number, USEPA ID number (if hazardous)
- Site name including street/mailing address
- Department of Transportation proper shipping name (e.g., Hazardous Waste Solid, n.o.s., 9, UN 3077, PG III [F002])
- Type and number of containers (if transporting containers)
- Quantity of waste (volumetric estimate)
- Task order or job number
- Profile number
- 24-hour emergency phone number

The generator and the transporter must sign the manifest before the waste leaves the site. The original signed manifest will be returned to the address of the generator.

Transportation

Each transportation vehicle and load of waste will be inspected before leaving the site, and the inspection will be documented in the log book. The quantities of waste leaving the site should be recorded on a transportation and disposal log. A subcontractor licensed for commercial transportation will transport non-hazardous wastes. If the wastes are hazardous, the transporter will have a USEPA ID number and will comply with transportation requirements outlined in 49 CFR 171-179 (Department of Transportation) and 40 CFR 263.11 and 263.31 (Hazardous Waste Transportation).

The transporter will observe the following practices when hauling and transporting wastes offsite:

- Minimize impacts to general public traffic.
- Clean up waste spilled in transit.
- Line and cover trucks/trailers used for hauling contaminated waste to prevent releases and contamination.
- Decontaminate vehicles prior to reuse.

Disposal

The waste will be transported offsite to a disposal facility with a valid USEPA/State Permit. Other disposal practices to be followed are as follows:

- Hazardous waste will be sent to an offsite, permitted, Resource Conservation and Recovery Act Subtitle C treatment, storage, or disposal facility or Waste Water Treatment Facility permitted under Clean Water Act.
- Non-hazardous wastes will be disposed at an offsite Subtitle D facility permitted to receive such wastes.
- Decontamination water will be disposed offsite at a facility permitted to accept the waste. *De minimus* amounts of decontamination water that does not contain surfactants or solvents of any kind or at any concentration may be discharged to the ground surface. In this case, *de minimus* means that the water will be readily absorbed and will not saturate the soil. In no case may the water run off of the site.
- Uncontaminated debris may be sent to municipal landfills, landfills designated for construction/demolition debris or a recycling facility.
- General trash will be disposed in dumpsters at HPDTA.

The designated offsite facility will be responsible for providing a copy of the fully executed waste manifest and a certificate of treatment or disposal for each load of waste received.

Training

Field personnel who will manage hazardous or potentially hazardous waste will meet the hazardous waste generator training requirements of 40 CFR 265.16 through the following:

- Occupational Safety and Health Administration 1910.120 Hazardous Waste Operations and Emergency Response training, including the Remediation Waste Management Module from the internal CH2M HILL class.
- On-the-job training that includes:
  - Site-specific APP review—requires each site worker and guests to review and sign the plan
  - AHA and daily “tailgate” meetings
  - Project-specific review of this plan

Documentation

The following records and documents shall be maintained as they relate to any activity that was performed by CH2M HILL:

- A transportation and disposal log that contains the following information:
  - A specific ID number corresponding to each container generated at the site
  - The date that waste was first placed in the container
  - The staging location
  - The profile number associated with the waste
  - The date that the container was transported for final disposal and the name of the transporter moving the container
  - The means of disposal: onsite/offsite; bulk shipment/in containers. If containers are consolidated for bulk transport, that should be noted in the comments.
  - Manifest number (offsite disposal only)

- Transportation and offsite disposal records, including:
  - Profiles and associated characterization data
  - Manifests (maintained by HPDTA)
  - Designated offsite facility waste receipts, certificates of disposal/recycling (maintained by HPDTA)
- A log of the amount of water transported for onsite disposal containing the date and time of transfer and the approximate amount of water.
- Training records
- Inspection records

4.2.9 Spill Prevention and Control

Procedures and controls regarding spills can be found in the APP. The CH2M HILL FTL will report any release of any potentially hazardous waste, chemical, or material to the CH2M HILL PM and Environmental Manager or their designated representative and the facility. The definition of release includes any "spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed containers)" of any potentially hazardous chemical, substance, and/or material.

4.2.10 Protection of Air Quality

Construction activities will be monitored by the CH2M HILL FTL to minimize the discharge of any air pollutants. It is anticipated that the field activities have minimal potential to discharge air pollutants; however, the following general practices will be implemented to protect air quality:

- Vehicles, drill rigs, excavators, and other motorized equipment will be maintained within manufacturer's design limits to ensure minimal discharge of exhaust emissions.
- Daily equipment inspections will be performed.
- Burning of any materials is not allowed for this project.

4.2.11 Protection of Water Quality

It is anticipated that work activities performed for this task order have minimal potential to impact water quality due to:

- The scope of the work activities is relatively limited in a real extent and duration.
- Spill prevention measures discussed in the APP will be implemented throughout the project to minimize potential for environmental impacts due to spills.

Erosion and sediment controls will be installed and maintained in accordance with the ESCP (**Appendix F**) which will be strictly adhered to as a means of preventing any potential water quality impacts.

4.2.12 Protection of Surrounding Community

Based on the site location within the secure facility boundary and the protective measures that will be implemented, as described in this work plan and the APP (**Appendix D**), there is no anticipated impact to the surrounding community from exposure to site contaminants during this investigation. Any waste transported off-site will be managed properly as described in the previous subsections.

4.2.13 Protection of Vegetation

The results of the environmentally sensitive area survey are discussed in Section 2.2 and there are no known rare, endangered, or threatened plant species within a 1,500-ft radius of the 2nd and 5th Street Disposal Areas. If any rare plant species are encountered, fieldwork will be adjusted so that they will not be disturbed.

4.2.14 Protection of Fish and Wildlife

There are no federally protected species within a 1,500-ft radius of the 2nd and 5th Street Disposal Areas. No impact to fish and wildlife is anticipated to occur during work activities associated this task order, because the scope of work activities is relatively limited in extent and duration and is not located in areas with sensitive habitat.

While it is unlikely that migratory birds will be present at the site, North Carolina is located in the Atlantic Migratory Flyway and migratory birds could be present at any time. Destruction of the birds, nests, or eggs by site operations is prohibited by the Migratory Bird Treaty Act. If nesting birds, nests (active or inactive), or eggs are encountered at the site, operations will stop and the CH2M HILL PM and Environmental Manager will be notified. Operations will not resume until it is determined whether the bird species is protected and, if so, what actions must be taken to remain in compliance.

4.2.15 Monitoring Well Installation

Monitoring wells will be properly installed and abandoned in accordance with North Carolina regulations 15A NCAC 02C.0108 and .113, respectively, to prevent contamination from reaching uncontaminated groundwater resources via the well.

TABLE 4-1
Waste Management
TOWERS ROAD DISPOSAL AREAS
HARVEY POINT DEFENSE TESTING ACTIVITY
HERTFORD, NORTH CAROLINA

Waste stream	Source/Process	Staged in	Staged at:	Final disposition
Soil	Soil borings	Material Processing Area	Client approved location to-be-determined (TBD)	Offsite disposal
Soil	Test Pitting	Material Processing Area	Client approved location TBD	Offsite disposal
Groundwater	Well development and purging	55-gallon steel drums	Client approved location TBD	Offsite disposal
Wastewater	Decontamination of reusable equipment	55-gallon steel drums	Client approved location TBD	Offsite disposal
Debris including PPE plastic sheeting, disposable sampling equipment	Sampling and remedial efforts involving disposable equipment	Black non-translucent trash bags (55-gallon steel drums if potentially hazardous)	Removed daily	Dumpsters at HPDTA
Miscellaneous trash that has not contacted contaminated media	Construction / Investigation activities	Black non-translucent trash bags	Removed daily	Dumpsters at HPDTA

TABLE 4-2

Waste Accumulation Requirements

TOWERS ROAD DISPOSAL AREAS
HARVEY POINT DEFENSE TESTING ACTIVITY
HERTFORD, NORTH CAROLINA

Accumulating In:	Requirements
Drums/Small Containers	• Inspected upon arrival onsite for signs of contamination and/or deterioration. Any container arriving with contents or in poor condition shall be rejected. – Closed head drums: Drum lids will be inspected to verify that the gasket is in good shape and that the lid will seat properly on the drum. – Open head drums: Will be inspected to verify that the bung will close properly • Arranged in rows of no more than 2 drums with at least 3 ft between rows. • Each container will be provided with its own label, and labels will be visible. • Drums will remain completely closed with all lids, covers, bolts, and locking mechanisms engaged, as though ready for immediate transport, except when removing or adding waste to the drum. • Drums will be disposed of with the contents. If the contents are removed from the drums for offsite transportation and treatment or disposal, the drums will be decontaminated prior to re-use or before leaving the site. • Drums containing hazardous waste will be provided with secondary containment. • New empty drums will be marked with the word “Empty”. Drums that are being reused will be marked with “Empty, last contained [previous contents]”
Material Processing Area	• Constructed in accordance with the ESCP (**Appendix F**).

Notes:
All containers will be tracked on the field transportation and disposal log

SECTION 5

Quality Control Plan

This Quality Control Plan (QCP) describes the quality control (QC) approach and procedures for the Phase I and Phase II RI activities. The QC forms referenced throughout this section are provided in **Appendix G**.

5.1 Project Organization and Responsibilities

The organizational structure and responsibilities of the project team are designed to provide project QA/QC for Phase I and II RI activities. The proposed management and staffing of the investigation for this project are as follows:

- Ms. Janna Staszak, P.E. – PM
- Ms. Kim Henderson – RSM
- Mr. Chris Bozzini, P.E. – Senior Technical Consultant (STC)
- Mr. Nate Price, P.E. – FTL
- Ms. Hope Wilson – Environmental Manager
- Mr. Ronald Wambles – Laboratory PM
- Field Staff
- The following subcontractor services will be utilized during the RI:
  - Underground Utility Location
  - Vegetation Clearance
  - Geophysical Surveying
  - Test Pitting
  - Drilling/Well Installation
  - Land Surveying
  - IDW Management and Disposal
  - Laboratory

5.2 Data Management, Evaluation, and Reporting

A QAPP (**Appendix H**) has been developed for the site that include a description of analytical methods, reporting limits, and quality assurance goals that will be used to achieve the data quality objectives for the chemical analysis of the soil and groundwater data. All data management, evaluation and reporting will be in accordance with the QAPP (**Appendix H**). Data management will be coordinated between the FTL, PM, and project chemist to ensure that data is received by the contracted laboratory and the proper analysis is being performed. The project chemist and laboratory PM will coordinate receipt of the analytical results by CH2M HILL. Evaluation of the analytical results will be performed by CH2M HILL and the results will be presented in the Phase I RI Technical Memorandum and Phase II RI Report. The data will be used by NAVFAC and HPDTA (and their contractors) to sufficiently characterize the nature and extent of contamination at the 2nd and 5th Street Disposal Areas in order to conduct a Feasibility Study to support a proposed remedy.

5.3 Project Auditing

The FTL is responsible for verifying compliance with this QCP through audits and surveillance. The FTL, PM, RSM, or a designee is to inspect/audit the quality of work being performed and verify that procedures conform to applicable specifications stated in this work plan or other applicable guidance. Identified deficiencies are to be communicated to the responsible individual and documented in the field logbook. Corrective actions are to be verified by the FTL and recorded in the field logbook. Audit records are to be maintained as part of the project files.

5.4 Corrective/Preventive Action Procedures

The corrective and preventive action procedures are designed to prevent quality problems and to facilitate process improvements, as well as identify, document, and track deficiencies until corrective action has been verified.

5.4.1 Preventive Measures and Continual Improvement

This QCP is directed toward problem prevention, but if a problem and/or deficiency does occur, tracking and communicating problems and/or deficiencies provide a mechanism for preventing their recurrence.

Project staff at all levels are encouraged to provide recommendations for improvements in established work processes and techniques. The intent is to identify activities that are compliant but can be performed in a more efficient or cost-effective manner. Typical quality improvement recommendations include identifying an existing practice that should be improved and/or recommending an alternate practice that provides a benefit without compromising prescribed standards of quality.

5.4.2 Deficiency Identification and Resolution

While deficiency identification and resolution occurs primarily at the operational level, QC audits provide a backup mechanism to address problems that either are not identified or cannot be resolved at the operational level. The FTL is responsible for verifying that deficiencies are identified, documented in the field logbook, and corrected in a timely manner. The FTL is also responsible for ensuring that the PM and RSM are notified of any deficiencies and the corrective actions taken.

5.4.3 Lessons Learned and Other Documentation

The lessons learned through the deficiency management process will be submitted by the FTL to the PM and RSM through an agreed upon form (i.e., verbal, email, weekly status report, etc.). To share the lessons learned, these documents can be submitted to the Client through an agreed upon reporting method (i.e., weekly status reports, email correspondence, etc.).

5.5 Records Generated

5.5.1 Onsite Project File

The FTL will establish and maintain an onsite project file in accordance with the CH2M HILL corporate quality manual for document control. The onsite files will be maintained in the project field office or designated field vehicle. The purpose of these files is to maintain a complete set of all documents, reports, certifications, and other records that provide information on project plans, contractual agreements, and project activities.

5.5.2 Weekly Status Report

The FTL is responsible for preparing and submitting the Weekly Status Report to the PM and RSM. The PM, RSM, or their designee is responsible for providing the weekly status report to the Navy either verbally or via email. The Weekly Status Report is to provide an overview of field and QC activities performed each day, including those performed by subcontractors. The status reports must present an accurate and complete picture of field and QC activities by reporting both conforming and deficient conditions, and the reports should be precise, factual, legible, and objective. Copies of supporting documentation, such as checklists, are to be attached.

5.6 Submittal Management

The PM is responsible for overall management and control of project submittals. The PM is also responsible for submittal scheduling and tracking.

5.6.1 Review of Plans and Specifications

Prior to mobilizing to the site, the PM is responsible for staffing. The STC, RSM, and PM are responsible for reviewing the plans. The primary purpose of this review is to identify and resolve potential conflicts prior to initiating work operations. The FTL will review and approve the work plan prior to implementation in the field.

Pen and ink changes are authorized for minor corrections. Changes involving or impacting safety or quality requires a Field Change Request (**Appendix G**).

5.6.2 Review and Approval of Submittals

The PM, RSM, or their designee must review submittals prepared by CH2M HILL and subcontractors for completeness and compliance with the specifications of the project and Contract. Non-compliant submittals are to be returned to the originator for corrective action and re-submittal to the PM and RSM or their designee. Although part of the QC process, technical reviewers may include, but are not limited to, the FTL and STC.

5.7 Personnel Qualifications and Training

All project staff members will be qualified to perform their assigned jobs in accordance with the terms outlined in the Contract and by the project plans. Health and safety training requirements for onsite project personnel have been established in accordance with Occupational Safety and Health Act/Occupational Safety and Health Administration requirements for hazardous site workers (29 CFR 1910.120) and are specified in the APP (**Appendix D**). These training requirements must be met before project personnel can begin field work.

The FTL will maintain records documenting the required qualifications, training, and certifications for each onsite worker. The FTL will monitor expiration dates to provide advance warning to the PM and RSM of when employees will require refresher training or other renewals. The FTL will maintain records of site-specific and routine training for personnel and visitors, as required by these project plans. These records will be maintained onsite for audit purposes.

5.8 Testing and Maintenance

Testing and maintenance of equipment such as heavy equipment, drill rigs, and other equipment will be performed per the manufacturer’s specifications, this work plan, and all applicable SOPs.

Test results must be documented by the individual performing the test. Testing and maintenance records associated with the measuring and testing of equipment must be generated by the individual performing the activity. Documentation for testing and maintenance of equipment is to be made available to the client upon request.

The FTL is responsible for ensuring that the tests are performed and that the results are summarized and provided with the weekly status report. To track each failing test for future retesting, the failing test must be noted on the deficiency log. Resolution of the failing test is complete when retesting is performed and the corrective action is documented in the field logbook.

SECTION 6

References

ATS, 2011a. *Geophysical Survey for the Second Street Trash Site, Harvey Point Defense Testing Activity, Hertford, North Carolina*. November.

ATS, 2011b. *Geophysical Survey for the Fifth Street Trash Site, Harvey Point Defense Testing Activity, Hertford, North Carolina*. November.

HPDTA, 2007. 2007 *Integrated Natural Resources Management Plan, Harvey Point Defense Testing Activity, Hertford, North Carolina*. May

NCDENR, 2012. *Registered Environmental Consultant Program Implementation Guidance.* November edited 12/12/12.

OHM, 1997. *Contractor's Closeout Report for Remediation of PCB-Contaminated Soil at Range Areas A, B and D, Harvey Point Defense Testing Activity, Hertford, North Carolina*. May

Pyramid Environmental & Engineering (PEE), P.C. 1999. *Comprehensive Site Assessment Report, Department of Defense, HPDTA – Building 3-1, 2835 Harvey Point Road, Hertford, Perquimans County, NC.* September.

Appendix A
Site Maps

FFC912.72
H57.1

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1925 (5 SHEETS)

1

SANBORN MAP COMPANY.
POPULATION 2500
PREVAILING WINDS S. W.
WATER FACILITIES SEE NOTE
NO STEAM & TWO CHEM ENGINES
ONE HOSE REEL
ONE HOOK & LADDER TRUCK

HERTFORD

PERQUIMANS COUNTY,
NORTH CAROLINA
JUNE
1916

11 BROADWAY, NEW YORK.

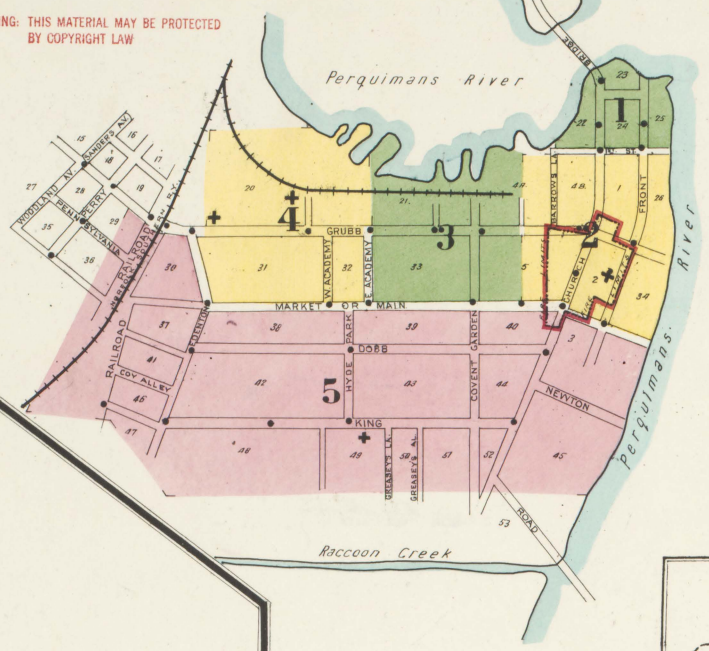
COPYRIGHT 1916 BY THE SANBORN MAP COMPANY

JUL 25 1916
©CLF 29988

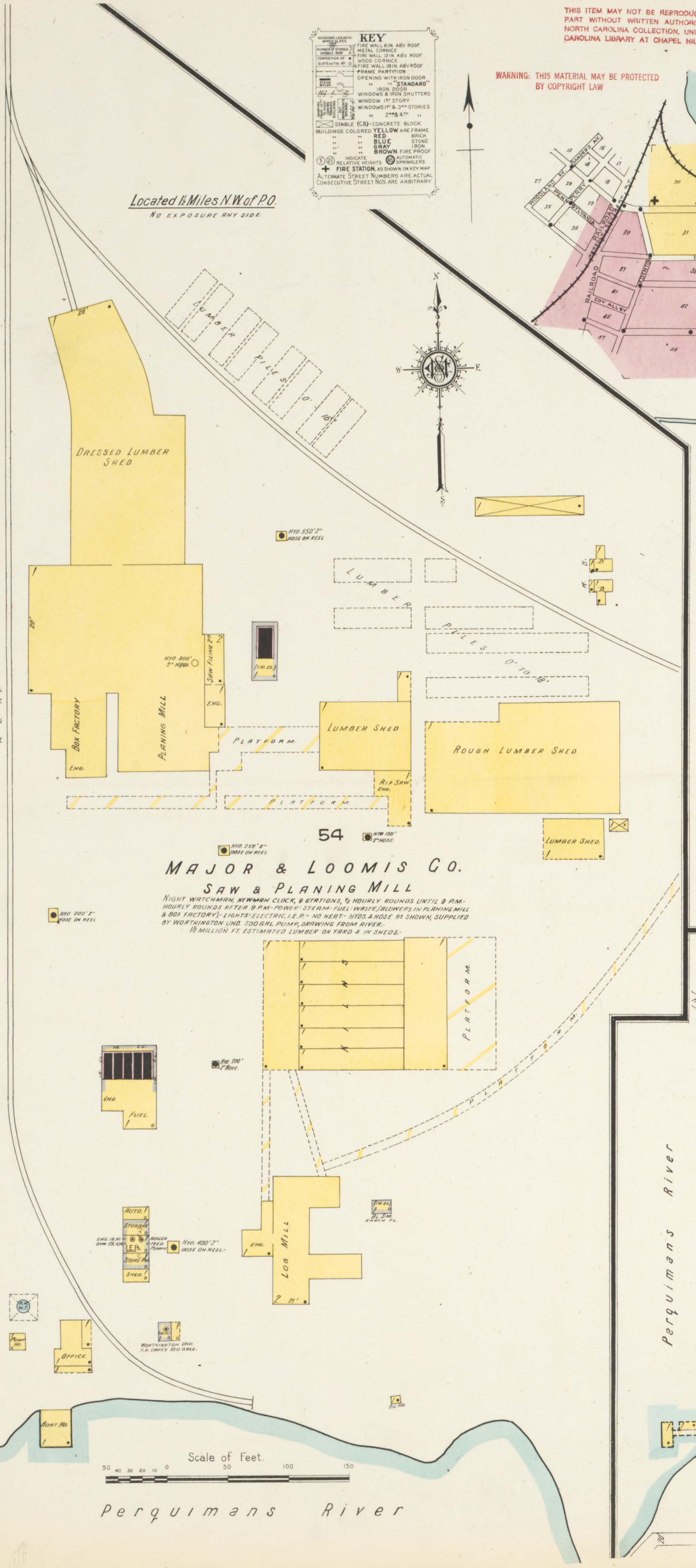
KEY

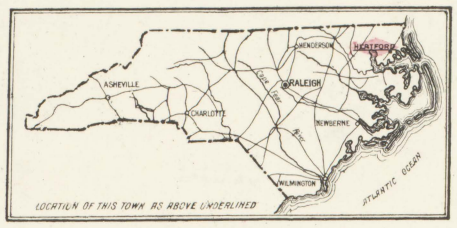
- FIRE WALL 6 IN. ABV ROOF
- METAL CORNICE
- FIRE WALL 12 IN. ABV ROOF
- WOOD CORNICE
- FIRE WALL 18 IN. ABV ROOF
- FRAME PARTITION
- OPENING WITH IRON DOOR
- " " "STANDARD" IRON DOOR
- WINDOWS & IRON SHUTTERS
- WINDOW 1ST STORY
- WINDOWS 1ST & 3RD STORIES
- " 2ND & 4TH "
- STABLE (C.B.) - CONCRETE BLOCK
- BUILDINGS COLORED YELLOW ARE FRAME, RED BRICK, BLUE STONE, GRAY IRON, BROWN FIRE PROOF
- INDICATE RELATIVE HEIGHTS
- AUTOMATIC SPRINKLERS
- FIRE STATION, AS SHOWN ON KEY MAP

ALTERNATE STREET NUMBERS ARE ACTUAL. CONSECUTIVE STREET NOS ARE ARBITRARY.



Located 1½ Miles N.W. of P.O.
NO EXPOSURE ANY SIDE.





WATER FACILITIES:
60,000 gal. tank (sheet No. 4) will supply 34 double hydrants through 6" & 8" mains.- 2 Canton-Hughes Underwriters F.P.'s capcy 750 gals. each will supply tank & hydrants.- System of W.P. completed about January 1916 but water acceptable to State Board of Health not obtained up to time of survey, June 1916.-

FIRE DEPT:
Not organized.- One 60 gal. Chemical Wagon, Sheet No. 2.- One 60 gal. Chemical Wagon & 1 Reel & 600' hose, Sheet No. 4.- 1 Hand Hook & Ladder Truck Sheet No. 5.-
NOTE:- Hose at Albermarle Lumber Co. & Eastern Cotton Oil Co. does not fit town hydrants.- Fire alarm system: mill whistle.-

Streets: level, not paved.- Public lights: electric.-

INDEX

STREETS

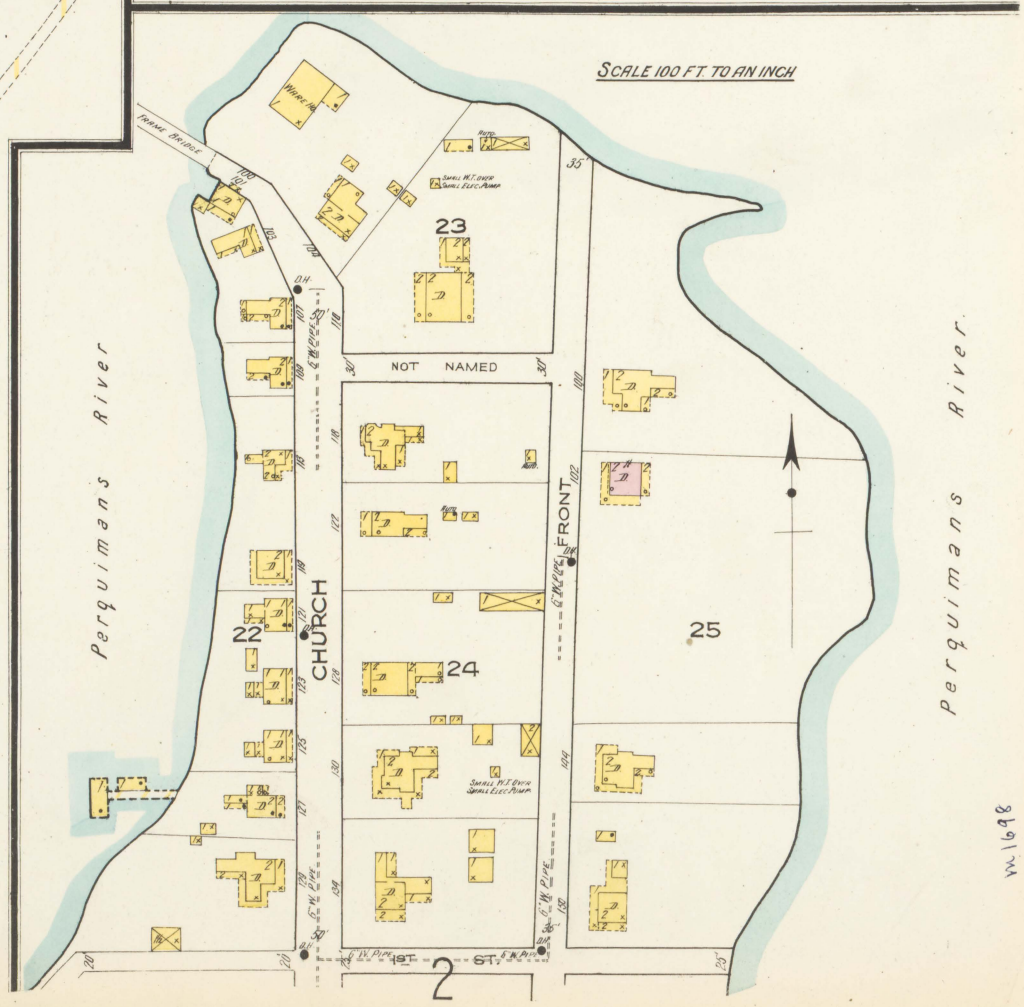
	SHEET
A	
Academy, E.,	3 & 4
" W.,	4
B	
Barrow's Lane,	2
C	
Church,	100-135 1
"	200-333 2
"	400-529 5
Clyde Alley (arbitrary),	5
Convent Garden,	3 & 5
Cox's Alley,	5
Creasey's Alley,	5
" Lane,	5
D	
Dewey Alley,	5
Dobb,	100-511 5
E	
Edenton,	4 & 5
F	
First,	1 & 2
Front,	100-151 1
"	200-319 2
"	320-425 5
G	
Grubb,	1-119 2
"	120-227 3
"	228-341 4
"	400-409 5
H	
Hyde Park,	5
K	
King,	100-415 5
M	
Main,	1-339 *5
"	2-118 *2
"	120-224 *3
"	226-342 *4
"	400-511 5
Market,	1-339 *5
"	2-118 *2
"	120-224 *3
"	226-342 *4
"	400-511 5
N	
Newton,	5
P	
Pennsylvania Ave.,	5
R	
Railroad,	5
S	
Sanders Av., see Pennsylvania Av.	

SPECIALS

	SHEET
A	
Albemarle Lumber Co.,	4
B	
Baptist Church,	3
" " (Negro),	5
C	
County Court House and Jail,	2
E	
Eastern Cotton Oil Co.,	3 & 4
Elliott, R. D., & Co., Wagon Shop and Plow Works,	5
F	
Fire Dept., Station, Front St.,	2
" " " Grubb St.,	4
" " " King St.,	5
" " " rear of 314 Grubb St.,	4
H	
Hertford Graded School,	4
" Light, Water & Ice Dept.	4
Holy Trinity Episcopal Church,	5
Hotel Hertford,	2
M	
Major & Loomis Co., Saw & Planing Mill,	1
Masonic Hall (Negro),	5
Meth. Episc'l Church (South),	5
N	
N. S. Railway Depot,	5
P	
Post Office,	2
Public School (Negro),	5
R	
Reed & Felton, Grist Mill,	3
S	
St. Paul A. M. E. Zion Church,	5
Shannonhouse & Blanchard, Feed and Grain Warehouse,	3
Small, P. H., Saw & Planing Mill (formerly),	3
T	
Town of Hertford Light, Water and Ice Department,	4

* Indicates only one side of Street shown.

SCALE 100 FT. TO AN INCH



m1698

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JUNE 1916
HERTFORD N.C.

2

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JUNE 1916
HERTFORD
N.C.

Perquimans River

EASTERN COTTON OIL CO.
See Sheet #4.

FERTILIZER HOUSE
MIXING & STORAGE
(BUILT ON PILES)
ENG. BLR.

PLATFORM
HOISTING ENGS.
PLATFM.
NITRATE OF SODA HO.

OIL HO.
OIL TANKS - 2000 GAL. EA.

SAWMILL (BUILT ON PILES)
HAY STGE.
REED & FELTON GRIST MILL
OFF.
DRYING KILN

FISH

SHANNONHOUSE & BLANCHARD
FEED & GRAIN WARE HO.
(BUILT ON PILES UNDER WATER)

BURT HO.
PLATFM. RAISED 6"
FORMERLY
SAW & PLANING MILL OF P. H. SMALL
(NOW VACANT)
ENG.
PLATFM. RAISED 6"
PLATFORM
ENG.
DRINKING FOUNTAIN

SPUR FROM N. S. RY.

21
SHED
4
SHINGLES STORED HERE
TANK OVER
4A
EASTERN COTTON OIL CO.
COTTON STORAGE
Gro.
D.H.
6" W. PIPE
GRUBB
2

33
Gro.
AUTO.
SHED
SMALL W.T. OVER
SMALL ELECT. PUMP
(From Plans)
SMALL ELECT. PUMP
SMALL W.T. OVER
OFF.
TO BE MOVED TO HERE
E. ACADEMY
COVENT GARDEN
5
BAPTIST CHURCH
FURRED WALLS
HEAT: FURNACE
LIGHTS: ELECTRIC
32' TO EAVES
8" W. PIPE
Scale of Feet.
MARKET OR MAIN
5

4
JUNE 1916
HERTFORD
N.C.
Perquimans River
ALBEMARLE LUMBER Co.
LUMBER SHED
PLANING MILL & BOX FACTORY
SHED
LUMBER SHED
SPUR FROM N.S. RY.
NO EXPOSURE BEYOND 200' LONG
LUMBER PILES
SAW FILING
SAWMILL
ENG.
FUEL BIN
DRY KILNS
PLATFORM
LOADING SHED OPEN 21' 16'
6" W. PIPE
3" W. PIPE
HYD. 50' 2½" HOSE
HYD. 50' 2½"
HYD. 50' 2½" HOSE
20
31
5
3
32
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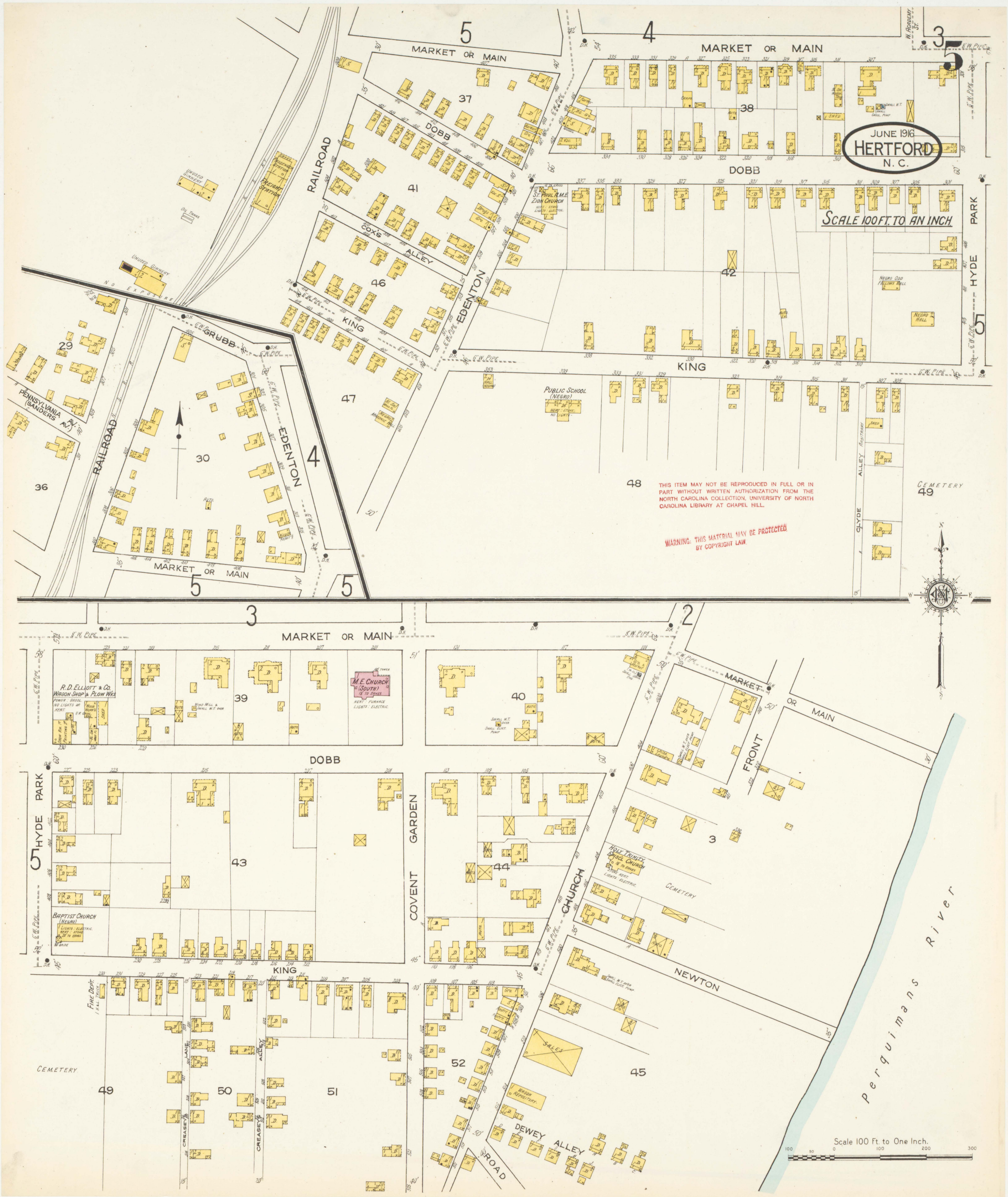
WARNING: THIS MATERIAL MAY BE PROTECTED BY COPYRIGHT LAW
TO BE ELECTRIC LIGHT PLANT
I.E.P.
ICE PLANT
FREEZING TANKS
TOWN OF HERTFORD
LIGHT, WATER & ICE DEPT.
D.H. (E.C.O. CO.) 100 2½" HOSE
60,000 GAL. W'T. 92' HIGH. (TOWN)
D.H. (TOWN)
HERTFORD FIRE DEPT
REEL & 600' 2½" HOSE
OIL HO.
CORD WOOD
EASTERN COTTON OIL COMPANY
SEED HO.
VACANT
SEED HOUSE
ENG. ROOM
PLATFORM
OIL TANKS 7500 GALS. EACH
CAKE CONCRETE FLOOR COVR. IRON ROOF ON STEEL FRAME
CAKE PRESS F'M LINTER
LINTER PRESS
SEPARATING ROOM
GINNERY
SEED COTTON
OFFICE
MEAL HO.
ESTIMATED 2 MILLION FEET OF LUMBER IN SHEDS AND ON YARD. NIGHT WATCHMAN. NAME CLOCK. 11 STATIONS HOURLY ROUNDS. POWER: STEAM. NO HEAT. LIGHTS: ELECTRIC. I.E.P. FUEL: WASTE. (BLOWERS IN PLANING MILL ONLY). WORTHINGTON UNDERWRITERS F.P. CAPACITY 250 GALS. DRIVING FROM RIVER SUPPLIES 22,000 GAL. TANK. TOWN SUPPLIES HYDS. AND HOSE SHOWN HERE. AND AT EASTERN COTTON OIL CO. TO BE CONN. TO TOWN SUPPLY AS SOON AS IN OPERATION.
NIGHT WATCHMAN. NEW ARN CLOCK. 6 STATIONS HOURLY ROUNDS. POWER: STEAM. FUEL: COAL. LIGHTS: ELECTRIC. I.E.P. NO HEAT. HYDS. AND HOSE AS SHOWN SUPPLIED BY ALBEMARLE LUMBER CO. TO BE CONN. TO TOWN SUPPLY AS SOON AS IN OPERATION.
FIRE DEPT.
1-60 GAL. CHEMICAL
GRUBB
EDENTON
MARKET OR MAIN
W. ACADEMY
E. ACADEMY
HERTFORD GRADED SCHOOL
HEAT: FURNACE.
LIGHTS: ELECTRIC.
Barber
Market
Cabinet shop
SHED
HARDWARE STORAGE
AUTO.
Scale of Feet.
HYDE PARK



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PC 2 Slide 166 Map # 8

NORTH CAROLINA, PERQUIMANS COUNTY

I, Beverly E Gregory, REVIEW OFFICER OF PERQUIMANS COUNTY CERTIFY THAT THE MAP OR PLAT TO WHICH THIS CERTIFICATION IS AFFIXED MEETS ALL STATUTORY REQUIREMENTS FOR RECORDING.

Beverly E Gregory 10/16/07
REVIEW OFFICER

CERTIFICATE OF ACCURACY

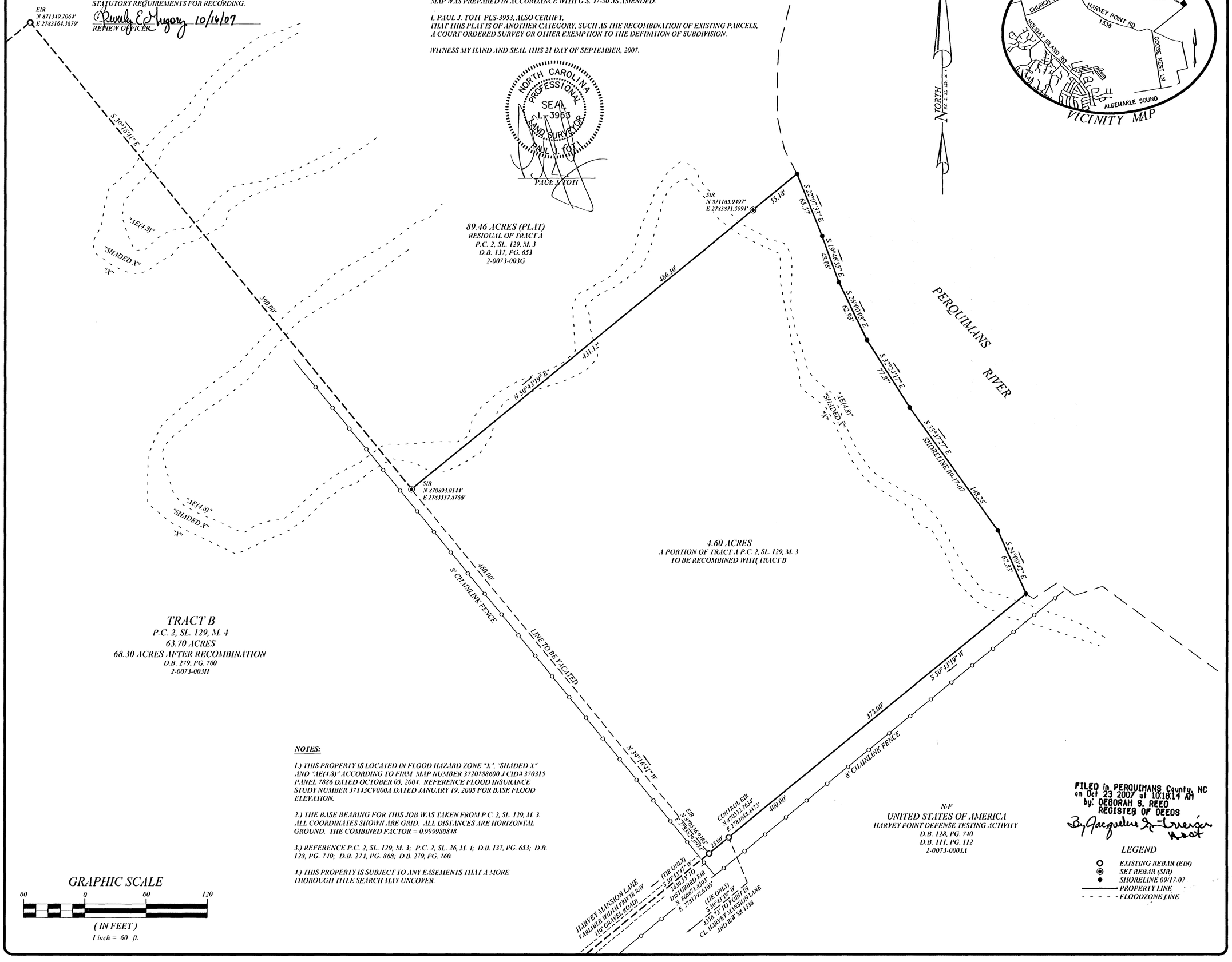
I, PAUL J. TOTH, CERTIFY THAT THIS MAP WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY MADE BY ME : DEED DESCRIPTION FOUND IN DEED BOOK SEE, PAGE REF.; THAT THE RATIO OF PRECISION AS CALCULATED IS 1:10,000 + ; THAT BOUNDARIES NOT SURVEYED ARE SHOWN AS BROKEN LINES PLOTTED FROM INFORMATION FOUND IN D.B. SEE, PG. REF.; THAT THIS MAP WAS PREPARED IN ACCORDANCE WITH G.S. 47-30 AS AMENDED.

I, PAUL J. TOTH PLS-3953, ALSO CERTIFY,
THAT THIS PLAT IS OF ANOTHER CATEGORY, SUCH AS THE RECOMBINATION OF EXISTING PARCELS, A COURT ORDERED SURVEY OR OTHER EXEMPTION TO THE DEFINITION OF SUBDIVISION.

WITNESS MY HAND AND SEAL THIS 21 DAY OF SEPTEMBER, 2007.

NORTH CAROLINA PROFESSIONAL SEAL L-3953 LAND SURVEYOR PAUL J. TOTH

PAUL J. TOTH



NOTES:

1.) THIS PROPERTY IS LOCATED IN FLOOD HAZARD ZONE "X", "SHADED X" AND "AE(1.8)" ACCORDING TO FIRM MAP NUMBER 3720788600 J CID# 370315 PANEL 7886 DATED OCTOBER 05, 2004. REFERENCE FLOOD INSURANCE STUDY NUMBER 37143CV000A DATED JANUARY 19, 2005 FOR BASE FLOOD ELEVATION.

2.) THE BASE BEARING FOR THIS JOB WAS TAKEN FROM P.C. 2, SL. 129, M. 3. ALL COORDINATES SHOWN ARE GRID. ALL DISTANCES ARE HORIZONTAL GROUND. THE COMBINED FACTOR = 0.9999808418

3.) REFERENCE P.C. 2, SL. 129, M. 3; P.C. 2, SL. 26, M. 4; D.B. 137, PG. 653; D.B. 128, PG. 710; D.B. 274, PG. 868; D.B. 279, PG. 760.

4.) THIS PROPERTY IS SUBJECT TO ANY EASEMENTS THAT A MORE THOROUGH TITLE SEARCH MAY UNCOVER.

FILED in PERQUIMANS County, NC
on Oct 23 2007 at 10:18:14 AM
by: DEBORAH S. REED
REGISTER OF DEEDS
By Jacqueline F. Lueger
Asst

LEGEND
- EXISTING REBAR (EIR)
- SET REBAR (SIR)
- SHORELINE 09/17/07
- PROPERTY LINE
- FLOODZONE LINE

PAUL J. TOTH LAND SURVEYING
131 MAIN STREET
GATESVILLE, NORTH CAROLINA
PHONE (252) 357-1581

RECOMBINATION SURVEY
OF A PORTION OF P.C. 2, SL. 129, M. 3 AND P.C. 2 SL. 26, M. 4 FOR
JOSIAH W. AND ANN J. PROCTOR & DEPARTMENT OF U.S. NAVY
BETHEL TOWNSHIP - PERQUIMANS COUNTY
NORTH CAROLINA

HARVEY POINT DEFENSE TESTING ACTIVITY

DRAWN BY: RKC	
CHECKED: PJT	SCALE: 1" = 60'
PROJECT #: 07181	DRAWING #: 07181
FIELD BOOK: RANGER1	SURVEY CREW: GSB/PJT/RKC
DATE: 09/21/2007	
SHEET NUMBER: 1 OF 1	

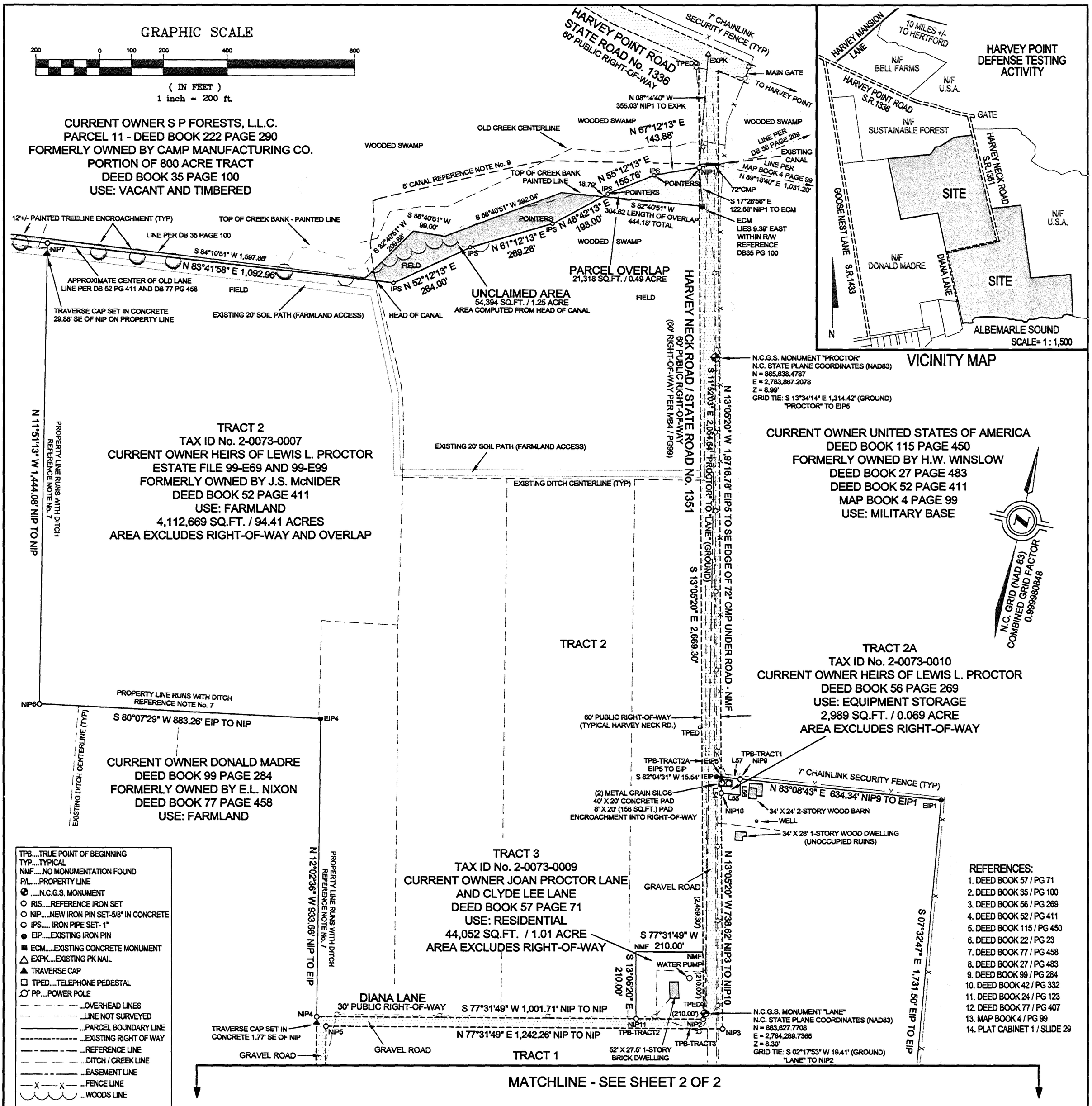
F:\07181 - Harvey Point\dwg\07181.dwg, Model, 10/15/2007 1:30:02 PM, 1:60

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

CURRENT OWNER S P FORESTS, L.L.C.
PARCEL 11 - DEED BOOK 222 PAGE 290
FORMERLY OWNED BY CAMP MANUFACTURING CO.
PORTION OF 800 ACRE TRACT
DEED BOOK 35 PAGE 100
USE: VACANT AND TIMBERED



REFERENCES:
1. DEED BOOK 57 / PG 71
2. DEED BOOK 35 / PG 100
3. DEED BOOK 56 / PG 269
4. DEED BOOK 52 / PG 411
5. DEED BOOK 115 / PG 450
6. DEED BOOK 22 / PG 23
7. DEED BOOK 77 / PG 458
8. DEED BOOK 27 / PG 483
9. DEED BOOK 99 / PG 284
10. DEED BOOK 42 / PG 332
11. DEED BOOK 24 / PG 123
12. DEED BOOK 77 / PG 407
13. MAP BOOK 4 / PG 99
14. PLAT CABINET 1 / SLIDE 29

TPB....TRUE POINT OF BEGINNING
TYP....TYPICAL
NMF....NO MONUMENTATION FOUND
P/L.....PROPERTY LINE
.....N.C.G.S. MONUMENT
RIS.....REFERENCE IRON SET
NIP.....NEW IRON PIN SET-5/8" IN CONCRETE
IPS..... IRON PIPE SET- 1"
EIP.....EXISTING IRON PIN
ECM.....EXISTING CONCRETE MONUMENT
EXPK...EXISTING PK NAIL
TRAVERSE CAP
TPED....TELEPHONE PEDESTAL
PP....POWER POLE
...OVERHEAD LINES
...LINE NOT SURVEYED
...PARCEL BOUNDARY LINE
...EXISTING RIGHT OF WAY
...REFERENCE LINE
...DITCH / CREEK LINE
...EASEMENT LINE
...FENCE LINE
...WOODS LINE
ACCESS EASEMENT
R/W.....RIGHT-OF-WAY
PARCEL OVERLAP
PAINTED TREE ENCROACHMENT

LEGEND

NORTH CAROLINA
WAKE COUNTY

I, Jesse J. Price, certify that this plat was drawn under my supervision from an actual survey made under my supervision and referenced from a recorded survey for J.S. McNider, Dated January 30, 1948, recorded in the Perquimans County register of deeds in deed book 52 page 411 (including deed book 57 page 71, deed book 77 page 407, deed book 56 page 269) that the boundaries not surveyed are clearly indicated; that the ratio of precision as calculated is second order accuracy of 1:108,901; that this survey is a boundary survey of existing parcels of land; that this plat was prepared in accordance with G.S.47-30 as amended. Witness my original signature, registration number and seal this 18 day of MAY, A.D., 2001

Professional Land Surveyor Number L-3220

NORTH CAROLINA
PERQUIMANS COUNTY

I, N.P. GREGORY JR., Review Officer for Perquimans County, certify that the map or plat to which this certification is affixed meets all statutory requirements for recording.

Date: 04-01-02

Review Officer

FILED in Perquimans County, NC
on Apr 01 2002 at 10:41:48 AM
by: Deborah S. Reed S. Reed
Register of Deeds

PC 2 Slide 95 Map # 8

TITAN ATLANTIC GROUP, INC.
ENGINEERING ▲ SURVEYING ▲ PLANNING ▲ SUBSURFACE LOCATION
5240 GREEN'S DAIRY RD., RALEIGH, N.C.27616 (919)873-2211

Recorded in the Perquimans County Registry at Plat Book _____ , Page _____

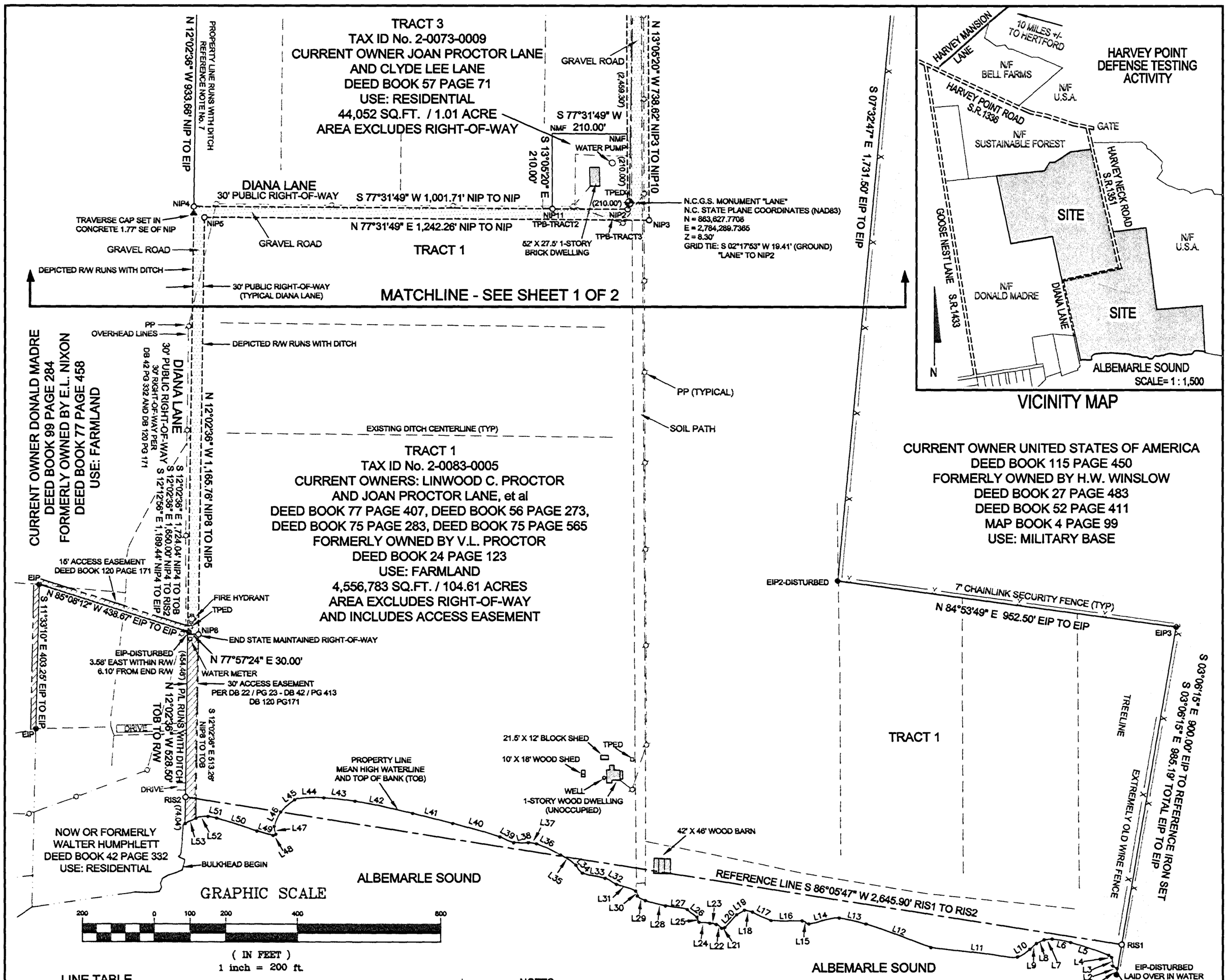
SHEET 1 OF 2

CODE ID. NO. SIZE C	DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND		
SCALE: 1" = 200'	ATLANTIC DIVISION		
FED DRAWING NO.	NAVAL STATION — NORFOLK, V.A.		
STA. PROJ. NO.	PROPERTY SURVEY OF: LEWIS L. PROCTOR ESTATE ADJOINING HARVEY POINT DEFENSE TESTING ACTIVITY	A/E CONTRACT NO. N62470-99-D-3303	
SPEC. NO.		APPROVED DATE	
CONSTR. CONTR. NO. N62470		ACTIVITY - SATISFACTORY TO	
NAVFAC DRAWING NO.	PERQUIMANS COUNTY, NORTH CAROLINA BETHEL TOWNSHIP	APPROVED DATE	
SHEET 1 OF 2		FOR EFD FOR COMMANDER NAVFAC	

5-18-01
NORTH CAROLINA PROFESSIONAL SEAL L-3220 LAND SURVEYOR JESSE J. PRICE
SEAL

A/E	FED
R.P. DESIGN	
R.P. DRAWN	
J.P. REVIEW	
R.C. CHIEF ARCH/ ENGR.	
PROJECT MANAGER	
FIRE PROTECTION	
QUALITY CONTROL	
DIVISION MANAGER	
DESIGN DIRECTOR	

REVISIONS			
SYM.	DESCRIPTION	DATE	APPROVED



LINE TABLE

LINE	BEARING	DISTANCE
L1	N08°37'38"W	17.28'
L2	N75°13'11"W	13.39'
L3	N19°19'59"W	24.45'
L4	N65°55'12"W	10.85'
L5	N84°22'05"W	111.71'
L6	S87°42'14"W	52.70'
L7	S72°11'46"W	22.12'
L8	S50°19'52"W	23.64'
L9	S37°18'13"W	24.76'
L10	S44°30'50"W	39.78'
L11	S83°19'05"W	243.59'
L12	N82°56'55"W	193.31'
L13	S89°39'15"W	76.33'
L14	S66°03'19"W	86.77'
L15	N76°58'06"W	20.78'
L16	S77°50'50"W	86.72'
L17	N78°14'28"W	56.85'
L18	S88°56'41"W	23.44'
L19	S46°19'07"W	24.49'
L20	S30°04'13"W	49.29'
L21	S65°25'40"W	8.98'
L22	N68°54'09"W	18.57'
L23	S89°49'54"W	17.95'
L24	S81°50'25"W	30.14'
L25	N34°28'25"W	15.35'
L26	N65°14'36"W	34.45'
L27	S87°01'12"W	61.16'
L28	N88°07'46"W	58.30'
L29	N73°18'50"W	25.69'
L30	N30°23'28"W	14.38'

LINE TABLE

LINE	BEARING	DISTANCE
L31	N83°13'45"W	57.35'
L32	N74°43'04"W	35.64'
L33	S89°59'55"W	65.09'
L34	N52°51'15"W	27.70'
L35	N68°13'09"W	52.01'
L36	N78°23'06"W	74.31'
L37	S85°13'14"W	23.10'
L38	S76°43'39"W	40.56'
L39	N80°06'56"W	41.49'
L40	N86°57'55"W	137.46'
L41	N88°46'42"W	115.50'
L42	S89°08'32"W	164.00'
L43	S83°18'15"W	87.92'
L44	S73°31'14"W	81.71'
L45	S36°06'21"W	52.04'
L46	S10°55'21"W	44.42'
L47	S24°50'27"E	22.07'
L48	S50°06'25"W	8.29'
L49	N87°26'57"W	46.93'
L50	N84°55'32"W	118.12'
L51	S88°13'22"W	24.91'
L52	S88°04'42"W	34.33'
L53	S51°02'10"W	33.65'
L54	N13°05'20"W	50.22'
L55	S82°56'40"W	60.00'
L56	S13°06'59"E	50.00'
L57	N83°09'28"E	60.00'

N.C. GRID (NAD 83)
COMBINED GRID FACTOR
0.999980848

NOTES:

1. ALL DISTANCES ARE HORIZONTAL GROUND MEASUREMENTS UNLESS OTHERWISE NOTED.
2. THE COMBINED GRID FACTOR IS 0.999980848
3. THE AREA IS COMPUTED BY COORDINATE CALCULATIONS.
4. THIS PLAT IS DERIVED FROM INFORMATION GATHERED BY AN ACTUAL FIELD SURVEY MADE BY THIS OFFICE AND PLATTED APRIL 2001.
5. ALL "NIP...NEW IRON PIN" ARE 5/8" BY 3' IRON PIN SET IN CONCRETE.
6. A THOROUGH TITLE SEARCH WAS CONDUCTED BY THIS OFFICE TO DETERMINE DEED CALLS BETWEEN THE SUBJECT PARCELS AND ADJOINING PROPERTIES. THERE WERE SEVERE ERRORS IN CLOSURE FOR SEVERAL OF THE REFERENCED DEEDS. THERE WERE ALSO LIMITED TITLES WITH NO METES AND BOUNDS EXCEPT FOR ADJOINERS NAMES AND DITCH LINES. THIS SURVEY HAS UTILIZED THE FIELD LOCATION OF THESE DITCH LINES TOGETHER WITH MONUMENTATION TO DEPICT THE SUBJECT PARCELS BOUNDARY.
7. THE DEPICTED PROPERTY LINE IS THE CENTER OF THE EXISTING DITCH. THIS OFFICE CONTACTED JOAN PROCTOR AND DONALD MADRE ON FEBRUARY 1, 2001 IN REFERENCE TO DEED CALLS REFERRING TO THE AFOREMENTIONED DITCH. THROUGH AN ONSITE VERIFICATION BY BOTH PARTIES IT WAS AGREED THAT THE REFERENCED DITCH IS THE CURRENT PROPERTY LINE AND SAID DITCH WAS THE SAME AGREED LINE BETWEEN L.L. PROCTOR AND E.L. NIXON.
8. ALL KNOWN VISIBLE ENCROACHMENTS ARE NOTED.
9. THE DEPICTED CANAL WAS CREATED DURING THE EARLY 1960'S BY THE ARMY CORPS OF ENGINEERS. THE CORPS DREDGED THE EXISTING CREEK TO ALLOW DRAINAGE OF THE SWAMP. THE NATURAL MEANDERS OF THE CREEK WERE ALTERED DUE TO THIS DREDGING OPERATION.
10. THE SCOPE OF THIS SURVEY DID NOT INCLUDE DETERMINATION OF F.E.M.A. FLOOD HAZARD AREAS.

N.C. GRID EVIDENCE TABLE

POINT	NORTHING	EASTING
NIP1	866,208.2753	2,783,684.4885
NIP2	863,608.3730	2,784,288.9580
NIP3	863,592.4230	2,784,354.2657
NIP4	863,346.7376	2,783,105.8509
NIP5	863,323.8754	2,783,141.4030
NIP6	864,108.3537	2,782,040.8895
NIP7	865,521.5340	2,781,744.2791
NIP8	862,183.7922	2,783,384.6339
NIP9	864,367.9029	2,784,235.1973
NIP10	864,311.8385	2,784,186.9990
NIP11	863,563.0294	2,784,083.9159
RIS1	861,913.2139	2,786,089.8215
RIS2	861,733.0841	2,783,450.1156
EIP1	864,443.6258	2,784,864.9864
EIP2	862,727.1559	2,785,092.3818
EIP3	862,811.8763	2,786,041.0883
EIP4	864,259.8333	2,782,911.0467
EIP5	864,360.7550	2,784,175.6257

* COORDINATES ARE STATE PLANE (NAD-83)
COMBINED GRID FACTOR= 0.999980848
THIS PROJECT HAS BEEN LOCALIZED ABOUT
N.C.G.S. MONUMENT "LANE"

NORTH CAROLINA
PERQUIMANS COUNTY

I, N.P. GREGORY, JR. Review Officer for Perquimans County, certify that the map or plat to which this certification is affixed meets all statutory requirements for recording.

Date: 04-01-02

Review Officer

NORTH CAROLINA
WAKE COUNTY

I, Jesse J. Price, certify that this plat was drawn under my supervision from an actual survey made under my supervision and referenced from a recorded survey for J.S. McNider, Dated January 30, 1948, recorded in the Perquimans County register of deeds in deed book 52 page 411 (including deed book 57 page 71, deed book 77 page 407, deed book 56 page 269) that the boundaries not surveyed are clearly indicated; that the ratio of precision as calculated is second order accuracy of 1:108,901; that this survey is a boundary survey of existing parcels of land; that this plat was prepared in accordance with G.S.47-30 as amended. Witness my original signature, registration number and seal this 18 day of MAY, A.D., 2001

PC 2 Slide 96 Map # 1

Professional Land Surveyor Number L-3220

TITAN ATLANTIC GROUP, INC.
ENGINEERING ▲ SURVEYING ▲ PLANNING ▲ SUBSURFACE LOCATION
5240 GREEN'S DAIRY RD., RALEIGH, N.C.27616 (919)873-2211

Recorded in the Perquimans County Registry at Plat Book _____ , Page _____

SHEET 2 OF 2

CODE ID. NO. SIZE C	DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND	
SCALE: 1" = 200'	ATLANTIC DIVISION	
FED DRAWING NO.	NAVAL STATION — NORFOLK, V.A.	A/E CONTRACT NO. N62470-99-D-3303
STA. PROJ. NO.	PROPERTY SURVEY OF: LEWIS L. PROCTOR ESTATE ADJOINING HARVEY POINT DEFENSE TESTING ACTIVITY	APPROVED DATE
SPEC. NO.		ACTIVITY - SATISFACTORY TO
CONSTR. CONTR. NO. N62470		APPROVED DATE
NAVFAC DRAWING NO.	PERQUIMANS COUNTY, NORTH CAROLINA BETHEL TOWNSHIP	FOR EFD FOR COMMANDER NAVFAC
SHEET 2 OF 2		

5-18-01
NORTH CAROLINA PROFESSIONAL SEAL L-3220 LAND SURVEYOR JESSE J. PRICE
SEAL

A/E	FED
R.P. DESIGN	
R.P. DRAWN	
J.P. REVIEW	
R.C. CHIEF ARCH./ ENGR.	
PROJECT MANAGER	
FIRE PROTECTION	
QUALITY CONTROL	
DIVISION MANAGER	
DESIGN DIRECTOR	

REVISIONS

SYM.	DESCRIPTION	DATE	APPROVED

NORTH CAROLINA
WAKE COUNTY

I, Jesse J. Price, certify that this plat was drawn under my supervision from an actual survey made under my supervision and referenced in the Perquimans County Register of Deeds in deed book 224 page 796; that the boundaries not surveyed are clearly indicated; that the ratio of precision as calculated is second order accuracy of 1:81,751; that this survey creates a subdivision of land in a municipality that regulates subdivisions of land; that this plat was prepared in accordance with G.S.47-30 as amended. Witness my original signature, registration number and seal this 20 day of MAY, A.D., 2002

Professional Land Surveyor Number L-3220

NORTH CAROLINA
PERQUIMANS COUNTY

I, N. Paul Gregory, Review Officer for Perquimans County, certify that the map or plat to which this certification is affixed meets all statutory requirements for recording.

Date: 05-20-02

Review Officer

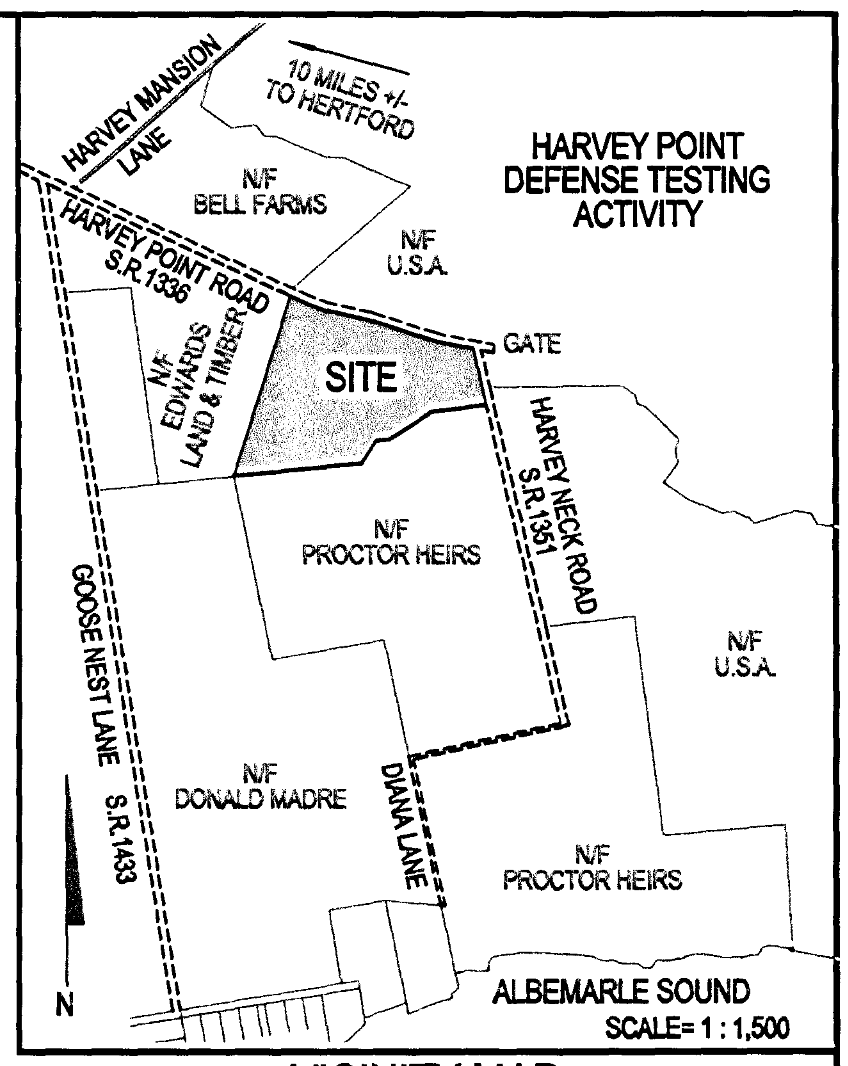
GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

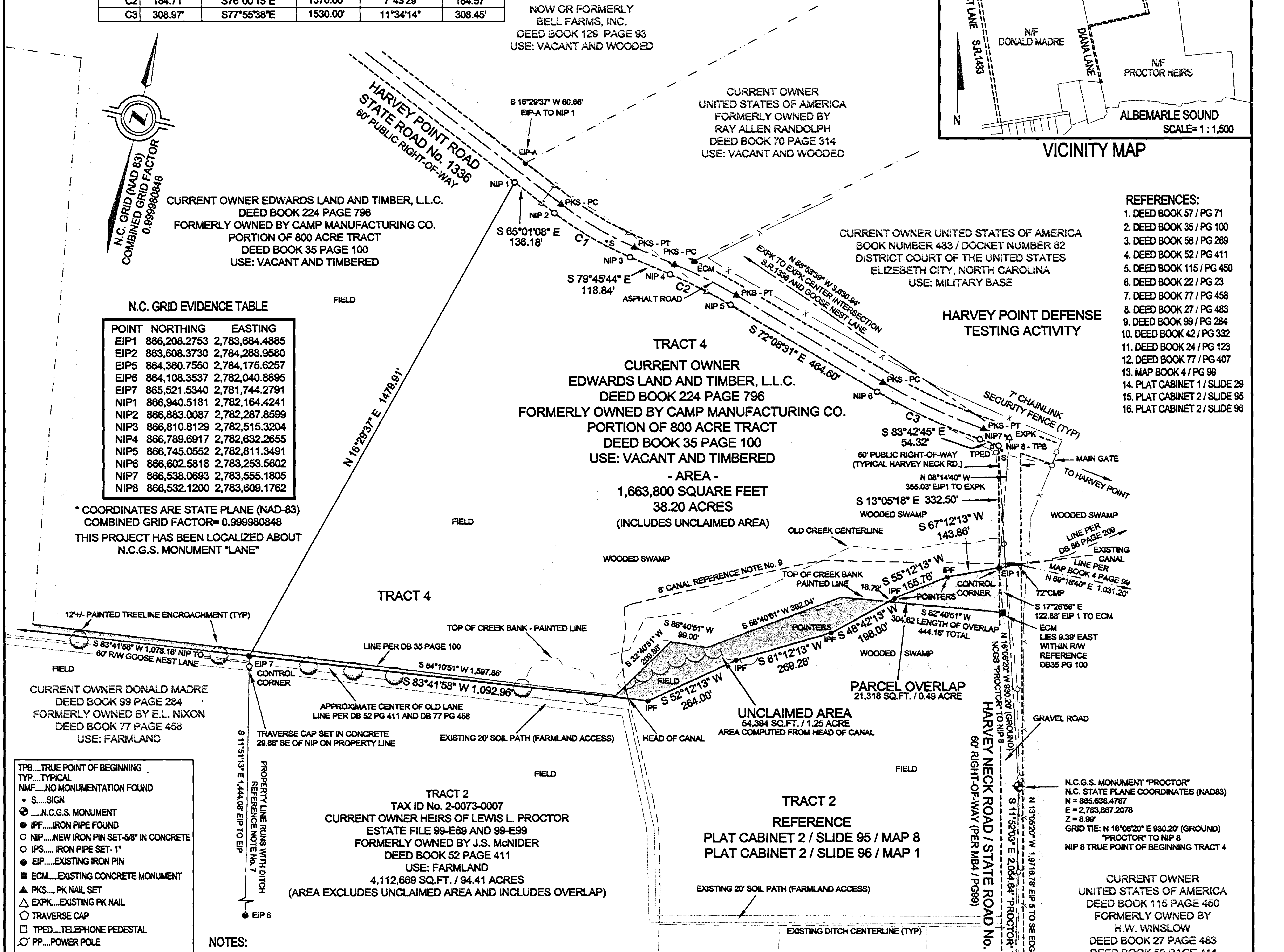
- CURVE TABLE -

CURVE	ARC	CHORD BEARING	RADIUS	DELTA	CHORD
C1	239.31'	S72°23'26"E	930.00'	14°44'36"	238.65'
C2	184.71'	S76°00'15"E	1370.00'	7°43'29"	184.57'
C3	308.97'	S77°55'38"E	1530.00'	11°34'14"	308.45'



VICINITY MAP

REFERENCES:
1. DEED BOOK 57 / PG 71
2. DEED BOOK 35 / PG 100
3. DEED BOOK 56 / PG 269
4. DEED BOOK 52 / PG 411
5. DEED BOOK 115 / PG 450
6. DEED BOOK 22 / PG 23
7. DEED BOOK 77 / PG 458
8. DEED BOOK 27 / PG 483
9. DEED BOOK 99 / PG 284
10. DEED BOOK 42 / PG 332
11. DEED BOOK 24 / PG 123
12. DEED BOOK 77 / PG 407
13. MAP BOOK 4 / PG 99
14. PLAT CABINET 1 / SLIDE 29
15. PLAT CABINET 2 / SLIDE 95
16. PLAT CABINET 2 / SLIDE 96



N.C. GRID EVIDENCE TABLE

POINT	NORTHING	EASTING
EIP1	866,208.2753	2,783,684.4885
EIP2	863,608.3730	2,784,288.9580
EIP5	864,360.7550	2,784,175.6257
EIP6	864,108.3537	2,782,040.8895
EIP7	865,521.5340	2,781,744.2791
NIP1	866,940.5181	2,782,164.4241
NIP2	866,883.0087	2,782,287.8599
NIP3	866,810.8129	2,782,515.3204
NIP4	866,789.6917	2,782,632.2655
NIP5	866,745.0552	2,782,811.3491
NIP6	866,602.5818	2,783,253.5602
NIP7	866,538.0693	2,783,555.1805
NIP8	866,532.1200	2,783,609.1762

* COORDINATES ARE STATE PLANE (NAD-83)
COMBINED GRID FACTOR= 0.999980848

THIS PROJECT HAS BEEN LOCALIZED ABOUT N.C.G.S. MONUMENT "LANE"

LEGEND

- TPB....TRUE POINT OF BEGINNING
- TYP....TYPICAL
- NMF.....NO MONUMENTATION FOUND
- S.....SIGN
- .....N.C.G.S. MONUMENT
- IPF.....IRON PIPE FOUND
- NIP.....NEW IRON PIN SET-5/8" IN CONCRETE
- IPS..... IRON PIPE SET- 1"
- EIP.....EXISTING IRON PIN
- ECM.....EXISTING CONCRETE MONUMENT
- PKS.... PK NAIL SET
- EXPK....EXISTING PK NAIL
- TRAVERSE CAP
- TPED....TELEPHONE PEDESTAL
- PP....POWER POLE
- ...OVERHEAD LINES
- ...LINE NOT SURVEYED
- ...PARCEL BOUNDARY LINE
- ...EXISTING RIGHT OF WAY
- ...REFERENCE LINE
- ...DITCH / CREEK LINE
- ...EASEMENT LINE
- ...FENCE LINE
- ...WOODS LINE
- UNCLAIMED AREA
- R/W.....RIGHT-OF-WAY
- PARCEL OVERLAP
- PAINTED TREE ENCROACHMENT

NOTES:

1. ALL DISTANCES ARE HORIZONTAL GROUND MEASUREMENTS UNLESS OTHERWISE NOTED.
2. THE COMBINED GRID FACTOR IS 0.999980848
3. THE AREA IS COMPUTED BY COORDINATE CALCULATIONS.
4. THIS PLAT IS DERIVED FROM INFORMATION GATHERED BY AN ACTUAL FIELD SURVEY MADE BY THIS OFFICE AND PLATTED APRIL 2002.
5. ALL "NIP...NEW IRON PIN" ARE 5/8" BY 3' IRON PIN SET IN CONCRETE.
6. A THOROUGH TITLE SEARCH WAS CONDUCTED BY THIS OFFICE TO DETERMINE DEED CALLS BETWEEN THE SUBJECT PARCELS AND ADJOINING PROPERTIES. THERE WERE SEVERE ERRORS IN CLOSURE FOR SEVERAL OF THE REFERENCED DEEDS. THERE WERE ALSO LIMITED TITLES WITH NO METES AND BOUNDS EXCEPT FOR ADJOINERS NAMES AND DITCH LINES. THIS SURVEY HAS UTILIZED THE FIELD LOCATION OF THESE DITCH LINES TOGETHER WITH MONUMENTATION TO DEPICT THE SUBJECT PARCELS BOUNDARY.
7. THE DEPICTED PROPERTY LINE IS THE CENTER OF THE EXISTING DITCH. THIS OFFICE CONTACTED JOAN PROCTOR AND DONALD MADRE ON FEBRUARY 1, 2001 IN REFERENCE TO DEED CALLS REFERRING TO THE AFOREMENTIONED DITCH. THROUGH AN ONSITE VERIFICATION BY BOTH PARTIES IT WAS AGREED THAT THE REFERENCED DITCH IS THE CURRENT PROPERTY LINE AND SAID DITCH WAS THE SAME AGREED LINE BETWEEN L.L. PROCTOR AND E.L. NIXON.
8. ALL KNOWN VISIBLE ENCROACHMENTS ARE NOTED.
9. THE DEPICTED CANAL WAS CREATED DURING THE EARLY 1960'S BY THE ARMY CORPS OF ENGINEERS. THE CORPS DREDGED THE EXISTING CREEK TO ALLOW DRAINAGE OF THE SWAMP. THE NATURAL MEANDERS OF THE CREEK WERE ALTERED DUE TO THIS DREDGING OPERATION.
10. THE SCOPE OF THIS SURVEY DID NOT INCLUDE DETERMINATION OF F.E.M.A. FLOOD HAZARD AREAS.
11. PORTIONS OF HARVEY NECK ROAD DO NOT LIE WITHIN THE CENTER OF THE RIGHT-OF-WAY.

FILED in Perquimans County, NC
on May 20 2002 at 02:11:19 PM
by: Deborah S. Reed
Register of Deeds
By Jacqueline E. Frierson, Deputy

TITAN ATLANTIC GROUP, INC.
ENGINEERING ▲ SURVEYING ▲ PLANNING ▲ SUBSURFACE LOCATION
5240 GREEN'S DAIRY RD., RALEIGH, N.C.27616 Phone (919) 873-2211

Recorded in the Perquimans County Registry at Map Cabinet 2, Slide 98, Map 4

CODE ID. NO. SIZE C	DEPARTMENT OF THE NAVY / NAVAL FACILITIES ENGINEERING COMMAND
SCALE: 1" = 200'	ATLANTIC DIVISION
FED DRAWING NO.	NAVAL STATION / NORFOLK, V.A.
STA. PROJ. NO.	PROPERTY SURVEY OF:
SPEC. NO.	EDWARDS LAND AND TIMBER, L.L.C., ADJOINING
CONSTR. CONTR. NO. N62470	HARVEY POINT DEFENSE TESTING ACTIVITY
NAVFAC DRAWING NO.	PERQUIMANS COUNTY, NORTH CAROLINA
SHEET 1 OF 1	BETHEL TOWNSHIP

A/E CONTRACT NO. N62470-99-D-3303
APPROVED DATE
ACTIVITY - SATISFACTORY TO
APPROVED DATE
FOR EFD FOR COMMANDER NAVFAC

NORTH CAROLINA PROFESSIONAL SEAL L-3220 LAND SURVEYOR JESSE J. PRICE
5-20-02
SEAL

A/E		FED
R.P.	DESIGN	
R.P.	DRAWN	
J.P.	REVIEW	
R.C.	CHIEF ARCH./ ENGR.	
	PROJECT MANAGER	
	FIRE PROTECTION	
	QUALITY CONTROL	
	DIVISION MANAGER	
	DESIGN DIRECTOR	

REVISIONS

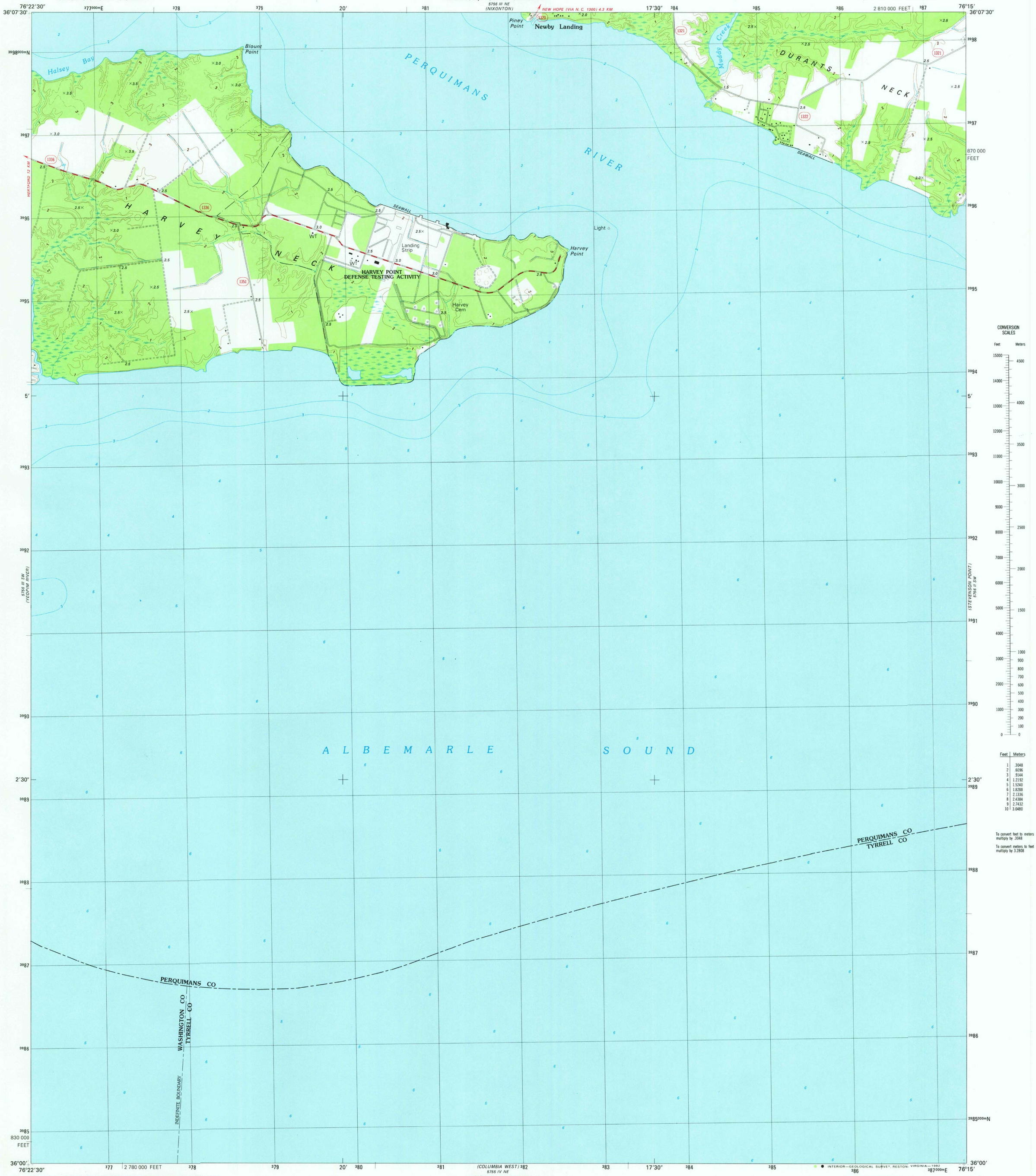
SYM.	DESCRIPTION	DATE	APPROVED

PC 2 Slide 98 Map # 4

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF NORTH CAROLINA
DEPARTMENT OF NATURAL RESOURCES
AND COMMUNITY DEVELOPMENT
RALEIGH, NORTH CAROLINA

HARVEY NECK QUADRANGLE
NORTH CAROLINA
7.5 MINUTE SERIES (TOPOGRAPHIC)
SE/4 HERTFORD 15' QUADRANGLE



Feet	Meters
1	.3048
2	.6096
3	.9144
4	1.2192
5	1.5240
6	1.8288
7	2.1336
8	2.4384
9	2.7432
10	3.0480

To convert feet to meters multiply by .3048

To convert meters to feet multiply by 3.2808

Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1975. Field checked 1976. Map edited 1982

Selected hydrographic data compiled from NOS chart 12205 (1981)
This information is not intended for navigational purposes

Projection and 10,000-foot grid ticks: North Carolina coordinate system (Lambert conformal conic)
1000-meter Universal Transverse Mercator grid, zone 18
1927 North American Datum
To place on the predicted North American Datum 1983 move the projection lines 12 meters south and 29 meters west as shown by dashed corner ticks

There may be private inholdings within the boundaries of the National or State reservations shown on this map

MN GN
8½° 151 MILS
0°46' 14 MILS
UTM GRID AND 1982 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

KILOMETERS 1 .5 0 1 2
METERS 1000 0 1000 2000
MILES 1 .5 0 1
FEET 1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10 000

CONTOUR INTERVAL 2 METERS
SUPPLEMENTARY CONTOUR INTERVAL 1 METER
DASHED SUPPLEMENTARY CONTOURS ARE APPROXIMATE
NATIONAL GEODETIC VERTICAL DATUM OF 1929
CONTROL ELEVATIONS SHOWN TO THE NEAREST 0.1 METER
OTHER ELEVATIONS SHOWN TO THE NEAREST 0.5 METER
DEPTH CURVES AND SOUNDINGS IN METERS—DATUM IS MEAN LOW WATER
THE RELATIONSHIP BETWEEN THE TWO DATUMS IS VARIABLE
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE PERIODIC TIDES IN THIS AREA ARE NEGLIGIBLE

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

N. C.
QUADRANGLE LOCATION

CONTOURS AND ELEVATIONS IN METERS

ROAD CLASSIFICATION

Primary highway, hard surface
Light-duty road, hard or improved surface
Secondary highway, hard surface
Unimproved road
Interstate Route
U. S. Route
State Route

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1982

DEC 06 1982

195

HARVEY NECK, N. C.
SE/4 HERTFORD 15' QUADRANGLE
N3600—W7615/7.5
1982

DMA 5756 III SE—SERIES V842

Appendix B
Property Deed

IN THE DISTRICT COURT OF THE UNITED STATES

FOR THE EASTERN DISTRICT OF NORTH CAROLINA.

United States of America, Petitioner v. Certain lands situate at Harvey's Neck, Bethel Township, Perquimans County, State of North Carolina, Mrs. Marshall Jones, et al., Defendants	)	CIVIL NO. 82

DECLARATION OF TAKING

WHEREAS, pursuant to the Acts of Congress approved March 27, 1942 (Public Law 807, 77th Congress), and the Act approved August 6, 1942 (Public Law 700, 77th Congress), the above styled condemnation proceeding has been instituted,

NOW, THEREFORE, pursuant to the provisions of the Act of Congress approved February 26, 1931 (46 Stat., 1421), I, Acting Secretary of the Navy, acting for and in behalf of the Secretary of the Navy, do hereby make and cause to be filed this declaration of taking, and by virtue of authority thereof, do hereby state that the lands selected for acquisition aggregate one thousand two hundred sixty-four and five-tenths (1,264.5)

acres, more or less, at Harvey's Neck, Perquimans County, North Carolina, which said lands are more particularly described in Exhibit "A" attached hereto and made a part hereof. The said lands are shown on map entitled "Lands to be Acquired by the United States of America, Harvey Point Seaplane Base, Hertford, Perquimans Co., North Carolina", dated January 26, 1943, attached hereto as Exhibit "B" and made a part hereof.

And I do declare said lands to be taken under authority of the aforesaid acts of Congress; that the use to which the lands are to be put is the establishment of a Seaplane Base at Harvey's Neck, Perquimans County, North Carolina, as authorized by said acts; and that the estate hereby taken in said lands for the public use aforesaid is in fee simple, subject to the right of the public to use, operate and maintain, for road purposes only, those portions of public roads forming a part of the exterior boundaries of said lands.

And I do hereby state that the sum of money estimated by me to be just compensation for all of said lands, improvements thereon and appurtenances thereunto belonging, is Forty-One Thousand, Seven Hundred Fifty-One and 00/100 Dollars ($41,751.00), which is hereby deposited into the registry of the court for the use and benefit of the persons entitled thereto, and the amount of just compensation for said lands which are hereby taken, is shown on Schedule "A" attached hereto and made a part of this declaration of taking.

I am of the opinion that the ultimate award for the taking of said lands will be within the limits prescribed by Congress.

IN WITNESS WHEREOF, the petitioner, by and through the Acting Secretary of the Navy, acting for and in behalf of the Secretary of the Navy, has caused this declaration of taking to be signed and the seal of

the Department of the Navy to be affixed hereto on the 3rd day of February, 1943, in the City of Washington, District of Columbia.

UNITED STATES OF AMERICA

By_____
James Forrestal
Acting
Secretary of the Navy

(SEAL)

SCHEDULE "A"

The names and addresses of the persons having title to or other interest in the lands described in the within declaration of taking, and the amounts estimated to be fair compensation for each respective ownership, including all improvements thereon, are as follows:

Name and Address	Parcel Number	Acres	Estimated Fair Compensation
Mabel D.B. Jones, Elizabeth City, North Carolina;	1	1,264.5	$ 34,500.00
W.B. Coppersmith, Elizabeth City, North Carolina.			
Josephine S. Powell, G.T. Powell, Marshall Jones, Mrs. Marshall Jones, Hertford, North Carolina.		(Crops)	7,250.00
For any roads or any interest or easement in any and all of the lands herein taken or appurtenances thereunto belonging.			1.00
TOTALS		1,264.5	$ 41,751.00

1264.5 ACRES MORE OR LESS, LOCATED AT HARVEY'S NECK, PERQUIMANS COUNTY, N. C. (HARVEY'S NECK SEAPLANE BASE, NORTH CAROLINA)

All that land lying and being situate at Harvey's Neck, Bethel Twp., Perquimans Co., North Carolina, being that certain tract of land as described in conveyance from George Bright to Mabel Bright Jones, dated November 2, 1936, and recorded in Perquimans County Registry; being more particularly described as follows:

Beginning at a point on the mean low water line on the northern shore of Albemarle Sound, Perquimans County, Bethel Township, North Carolina, the said point being 10.1 miles southeastwardly from Hertford, also between two ditches and witnessed by an iron stake on the bank of the said Albemarle Sound; the said point being the corner between the property herein described and the land of J. S. McNider.

The Longitude of the said beginning point is approximately 76 degrees 20 minutes 7.571 seconds; Latitude 36 degrees 05 minutes 17.436 seconds; from said point of beginning proceed North 11 deg. 11 min. West 2830.1 ft. to a large Oak on the South side of Cypress Swamp; thence across Cypress Swamp North 11 deg. 17 min. East 611.5 ft. to an iron stake on the North side of Cypress Swamp; thence along the North side of Cypress Swamp North 64 deg. 36 min. West 28 ft. to an iron stake; thence North 43 deg. 20 min. West 124.5 ft. to an iron stake; thence North 76 deg. 38 min. West 281.8 ft.; thence North 82 deg. 0 min. West 175 ft. to an iron stake; thence North 28 deg. 42 min. West 101.2 ft. to an iron stake; thence North 80 deg. 46 min. West 121.3 ft. to an iron stake; thence South 76 deg. 47 min. West 144.9 ft. to an iron stake; thence South 73 deg. 0 min. West 186 ft. to an iron stake; thence North 43 deg. 52 min. West 61.2 ft.; thence North 63 deg. 01 min. West 128.7 ft. to a Poplar; thence South 85 deg. 02 min. West 99 ft. to a Gum; thence North 65 deg. 26 min. West 280 ft. to an Elm; thence North 55 deg. 03 min. West 226.8 ft.; thence North 36 deg. 21 min. East 190.9 ft. to an iron stake; thence North 6 deg. 15 min. West 94.8 ft. to an iron stake; thence North 15 deg. 30 min. East 93.3 ft. to an iron stake; thence North 43 deg. 38 min. West 367.1 ft.; thence North 67 deg. 45 min. West 66 ft. to an iron stake; thence North 10 deg. 37 min. West 66 ft. to an iron stake; thence North 52 deg. 31 min. West 129 ft. to an iron stake set in an old lightwood stump; thence North 88 deg. 56 min. West 1031.2 ft. to a point at Diana bridge in a road; thence along the said road North 13 deg. 30 min. West 365 ft. to a stake in Harvey Neck road; thence along Harvey Neck road North 79 deg. 04 min. West 330 ft. to a stake; thence along Harvey road North 71 deg. 04 min. West 659 ft. to a stake; thence North 52 deg. 48 min. East 2089.9 ft. to an iron stake; thence North 20 deg. 34 min. East 1385 ft. to an iron stake; thence North 38 deg. 34 min. East 590.8 ft. to an iron stake at the head of a swamp; thence North 37 deg. 31 min. East 635 ft. to a point at mean low water on the Southern shore of Perquimans River; thence easterly along the mean low water on the Southern shore of Perquimans River to its junction with Albemarle Sound; thence westerly along the mean low water on the northern shore of Albemarle Sound to the point of beginning. Containing approximately 1264.5 acres.

Excepting from the above described property, the cemetery as now existing.

As delineated on that certain map entitled "Lands to be Acquired by the United States of America Harvey Point Seaplane Base, Hertford, Perquimans Co., North Carolina" dated January 25, 1943.

EXHIBIT "A"

ADDRESS REPLY TO
THE SECRETARY OF THE NAVY
AND REFER TO INITIALS
AND No.

File Harvey's Neck
B.
Hearings

NDG/N1-13
F-8-3/DWA/cjc
34-44

NAVY DEPARTMENT
WASHINGTON

February 3, 1943

Sir:

By letter of October 24, 1942, the Acting Secretary of the Navy requested that you file condemnation proceedings pursuant to the Second War Powers Act approved March 27, 1942 (Public Law 507, 77th Congress) and the Act approved August 6, 1942 (Public Law 700, 77th Congress), to acquire certain lands at Harvey's Neck, Perquimans County, NorthCarolina, for the establishment of a Seaplane Base at Harvey's Neck.

Since the foregoing request was made of you, the property has been appraised to determine its fair market value and in order that estimated just compensation may be made available immediately to the owners or others having compensable interests therein, the enclosed declaration of taking has been prepared pursuant to the authority of the Act of February 26, 1931 (46 Stat., 1421), and is forwarded herewith with the request that it be filed in the cause.

A check in the amount estimated to be the just compensation for the lands described in the enclosed declaration of taking is submitted herewith to be deposited with the Clerk of the Court for the benefit and use of the persons entitled thereto.

Very truly yours,

James Forrestal
Acting

Enclosures

The Honorable,
The Attorney General.

CC : ComN Co NAS Norfolk, Va. Lt. Brown

FOR VICTORY
BUY
UNITED STATES DEFENSE
BONDS AND STAMPS

Rec. A.M.B.
FEB 23 1943

Appendix C
Site Reports

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Geophysical Survey for the Second Street Trash Site Harvey Point Defense Testing Activity Hertford, North Carolina

prepared for

Independent Environmental Consultants, LLC
11506 Allecingie Parkway
Suite 1A
Richmond, VA 23235

by

ATS International, Inc.
107 Lester Street
Christiansburg, Virginia 24073
www.ats-intl.com

ATS International Project No. P11-71

November 22nd, 2011

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Figure 5. EM response for the inphase component of the EM data, in parts per million.

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To evaluate the lateral distribution of buried materials at the site, electromagnetic induction (EM) was used. EM is a geophysical method that measures the conductivity of the materials beneath the instrument. In general, fill materials exhibit a higher conductivity than natural earth materials because the fill often contains objects and/or chemicals that are of higher conductivity than natural soils. In addition to the EM investigation, two-dimensional surface resistivity imaging methods were employed to provide vertical imaging of the subsurface across the study area. Resistivity imaging provides cross-sectional images of the resistance of subsurface materials to electric current, from which geologic conditions can be inferred. In general, fill materials tend to exhibit lower resistivity than natural materials.

Both the EM and resistivity imaging surveys reveal geophysical anomalies which may represent buried materials. There is no evidence in the EM or resistivity data that any buried materials exists south of Fifth Street except for the isolated anomaly that is coincident with the grassy mound west of the tree line. North of Fifth Street, there are elevated EM anomalies at the periphery of the data to the north and east of data set. Therefore, the existing EM data coverage does not necessarily represent the lateral extent of fill at the site. The resistivity data suggest that the depth of the buried materials is probably not more than 16 feet, and the limited vertical extent of the low-resistivity zones suggests little or no migration of dissolved constituents beneath the study area.

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The tasks involved in this study included:

1) Collection, processing, and interpretation of electromagnetic induction (EM) data.

2) Collection, processing, and interpretation of electrical resistivity data.

3) Preparation of this document detailing our methods and findings.

2. Site Description

The geology of the site consists of coastal plain sediments of sand, silt and clay. Observations at the site indicate that the surface soils are primarily sand with minor amounts of finer sediments and organics. Topographic relief at the site is negligible. Groundwater is reported to be approximately 3 to 4 feet below grade.

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3.1. Electromagnetic Induction Principles

EM investigation utilizes a low frequency transmitter to induce electrical current into the subsurface. The induced current creates secondary electromagnetic fields which are measured by the EM device. The amplitude and phase of these secondary fields are related to the electrical properties of the subsurface material, and therefore a measurement of the secondary fields is a measure of how well the subsurface materials conduct electric current.

The EM device measures the quadrature (terrain conductivity) and in-phase components of the electromagnetic fields generated by the instrument's transmitter. The quadrature component of the EM data reveals apparent terrain conductivity in units of milliSiemens per meter (mS/m), which is a weighted average of the conductivity through the depth of measurement beneath the instrument. High magnitude responses, either positive or negative, indicate high bulk conductivity in the materials under the instrument.

The in-phase component of the EM data is the ratio of the secondary to primary magnetic field, and is presented in parts per million (ppm). The in-phase component is sensitive to the presence of highly conductive material, especially shallow metal objects. It is important to note that the size, depth of burial, and degree of corrosion of a metal object are all factors which affect the in-phase response (Jordan and Constantini, 1995).

The instrument used for this investigation was the EMP-400 manufactured by Geophysical Survey Systems, Inc. The unit consists of a portable control module attached to a boom with a transmitter coil at one end and a receiver coil at the other end, and operated at a frequency of 10000 kHz. The effective depth of exploration of the EMP-400 is approximately 20 to 25 feet.

EM surveys are usually conducted along traverses through the area of interest with measurements taken at fixed distances or at a fixed time interval along the traverse. By conducting sub-parallel traverses, substantial lateral coverage can be obtained. The data can then be contoured to evaluate the spatial distribution of the measured conductivity values.

3.2. EM Field Methods

For this study, data were collected in the open areas of the site in near-parallel traverses spaced approximately 5 to 10 feet apart. In the wooded areas of the site, EM data collection was dictated by the occurrence of thickets and underbrush. Therefore, the EM data in those areas are more randomly distributed, with significant data gaps existing in those areas which were not accessible to traversing with the instrument. The EM data were collected with a continuous time-stamp log with measurements taken at 1-second intervals, while a concurrent time-stamped global positioning system (GPS) track log of coordinates was also collected. Location data from the GPS track log were integrated with the EM data to produce X and Y coordinates for each EM measurement. These data were subsequently contoured to evaluate the spatial distribution of the EM response.

The GPS tracks of traverses with the EM instrument are illustrated in Figure 3. In evaluating the GPS tracks, it is evident that some small degree of drift in the GPS must have occurred at times, likely as a result of the approximately 2- to 3-meter accuracy of the GPS unit. The possible drift is evidenced by some adjacent traverses slightly overlapping one another in Figure 3, whereas in the field they did not overlap. This is a limitation of the accuracy of the GPS signal and/or unit, and the total amount of drift is appears to be minimal when viewed overlain onto the aerial photo.

Contour maps of the quadrature and in-phase components of the EM response are illustrated in Figures 4 and 5, respectively. Several metallic objects observed on site are accentuated in the EM

contours in Figures 4 and 5, and include an office trailer, staged heavy equipment, manholes and other utilities.

3.2.1. Quadrature component of the EM response

The contour map of the quadrature component of the EM response in Figure 4 reveals background conductivity values of the natural soils of approximately 1,000 mS/m to -1,000 mS/m, illustrated generally by the green contours. Also observed are several areas of elevated EM response, both positive and negative, which reveal strong changes in the subsurface conductivity. A broad zone of elevated EM response is observed in the northeast corner of the study area. This broader area also contains several slightly isolated "hot-spots". This broad area is likely to be underlain by disturbed soils and/or buried materials.

Another area of elevated EM response is observed in the southwest-central portion of the study area, near the tree line in the field on the south side of Fifth Street. This area is coincident with a slightly elevated mound and is likely the result of an isolated zone of buried materials.

3.2.2. In-phase component of the EM response

The contour map of the in-phase component of the EM response in Figure 5 reveals similar results as the quadrature contours. Since the in-phase component is more sensitive to metallic objects, it is likely that these areas of elevated EM response result in whole or in part from buried metallic material. This is consistent with field observations where metallic objects were seen protruding from the ground in the woods near the tree line.

4. Resistivity Imaging

In addition to the EM investigation, two-dimensional surface resistivity imaging methods were employed to provide continuous imaging of the subsurface across the study area. Resistivity imaging provides cross-sectional images of the resistance of subsurface materials to electric current, from which geologic conditions can be inferred. Electrical resistivity is a fundamental parameter describing how easily a material can transmit electrical current. High values of resistivity imply that the material is very resistant to the flow of electricity; low values of resistivity imply that the material transmits electrical current very easily.

4.1. Principles of Resistivity

Experiments by George Ohm in the early 19th century revealed the empirical relationship between the current flowing through a material and the potential required to drive that current. This relationship is described by

$$V = IR$$

where V is voltage in volts, I is the current in amperes, and R is the proportionality constant. Rearranging the equation to

$$\frac{V}{I} = R$$

gives resistance with the units of volts divided by amperes, or ohms.

The resistance of a material is dependent not only on the property of the material but also the geometry of the material. Specifically, a longer travel path for the current or smaller cross-sectional area would cause the resistance to increase. The geometry-independent property used to quantify the flow of electric current through a material is resistivity, given by

$$\rho = \frac{RA}{L}$$

where ρ is the resistivity, R is the resistance, A is the cross-sectional area through which the current flows, and L is the length of the current flow path. With all length units expressed as meters, the units associated with resistivity are ohm-meters.

Resistivity surveys are conducted by inducing an electric current into the ground between two electrodes, and measuring the potential at other electrodes. Numerous configurations of electrode placement are commonly employed, each with unique data characteristics. The configuration utilized for this study was the dipole-dipole array. For the dipole-dipole array, a current is applied to two adjacent electrodes positioned a predetermined distance apart (distance a). The voltage across two other electrodes is measured simultaneously with the applied current. The two sets of electrodes are always spaced distance a apart and the distance between the current and voltage electrodes is always a multiple of a (n• a). To obtain apparent resistivity values, the voltage and current measurements are input into the following formula for dipole-dipole surveys

$$\rho = 2\pi(n+1)\cdot(n+2)\cdot a\cdot\frac{V}{I}$$

4.2. Field Methods

Data for two resistivity lines were collected at the site on November 1st, 2011. Field data were collected using a SuperSting R8 IP® multi-electrode resistivity system manufactured by Advanced Geosciences Inc. Data were collected using the dipole-dipole array with a current of up to 200 milliamps. For each electrode configuration in the array, measurements were repeated a minimum of two times or until the error between measurements was less than or equal to five percent.

The electrodes were assigned a unique identifier consisting of the line number followed by a dash and the electrode number. For example, the first electrode on Line 1 is 1-1, the first electrode on Line 2 is 2-1, etc. The locations of the resistivity lines were recorded with a handheld GPS so that

they could be plotted onto aerial photography of the site (Figure 6). Line 1 was oriented northwest to southeast, originating on the west side of Second Street and extending across the open area and into the woods to the southeast. Line 2 was oriented southwest to northeast, originating near a storm sewer manhole and extending across Fifth Street through the study area. Both lines consisted of 28 electrodes with a 4 meter (13 feet) spacing between electrodes.

4.3. Inversion Modeling

The resistivity measurements on a section are called apparent resistivities. They may differ from the actual resistivities because of passage through inhomogeneous materials and the distance of travel through the media. Therefore, linear inversion techniques were applied to the data. Linear inversion modeling fits the measured data in the resistivity section to an earth model that may represent the actual resistivities in the section. The inversion modeling is completed by calculating apparent resistivity from the earth model for comparison to the measured data. If the comparison is within reasonable limits, the earth model can be accepted as an approximation of subsurface conditions. Details of the inversion process may be found in Lines and Treitel (1984), Loke and Barker (1995), and Loke and Barker (1996).

4.4. Resistivity Results

The locations of both the broad and isolated areas of elevated EM response, as illustrated in Figures 4 and 5, are shaded red in the resistivity electrode map in Figure 6 so that any correlations can be made between the two geophysical methods. Both Lines 1 and 2 extended through the broad EM anomaly in the northwest portion of the Second Street study area. Additionally, Line 2 passed through the isolated EM anomaly in the southwest portion of the study area.

The measured resistivity values in Lines 1 and 2 range from 11 ohm-meters to 2,780 ohm-meters. In the sections for both Lines 1 and 2, distinct zones of the lowest measured resistivity values are observed coincident with those portions of the lines which extend across the broad EM anomaly (Figure 7). These zones are illustrated in the resistivity sections from electrodes 1-16 through 1-28 and from electrodes 2-19 through 2-28. The characteristics of these zones, exhibited by the very low resistivity values at the near-surface, are consistent with buried materials or fill. These low-resistivity zones extend to a depth of approximately 16 feet. However, it should be noted that if dissolved constituents from the buried materials has migrated vertically downward, then the interface between the fill materials and the natural soils could be masked by the low-resistivity dissolved constituents.

Of additional interest is a low-resistivity zone in the section for Line 2 beneath electrodes 2-2 to 2-8. This zone is coincident with the location of the isolated EM anomaly illustrated in plan-view Figures 4 through 6. As such, this area may also represent buried materials.

5. Conclusions

Both the EM and resistivity imaging surveys reveal geophysical anomalies which may represent fill materials. There is no evidence in the EM or resistivity data that any buried materials exists south of Fifth Street except for the isolated anomaly that is coincident with the grassy mound west of the tree line. North of Fifth Street, there are elevated EM anomalies at the periphery of the data to the north and east of data set. Therefore, the existing EM data coverage does not necessarily represent the lateral extent of fill at the site. The resistivity data suggest that the depth of the buried materials is probably not more than 16 feet, and the limited vertical extent of the low-resistivity zones suggests little or no migration of dissolved constituents.

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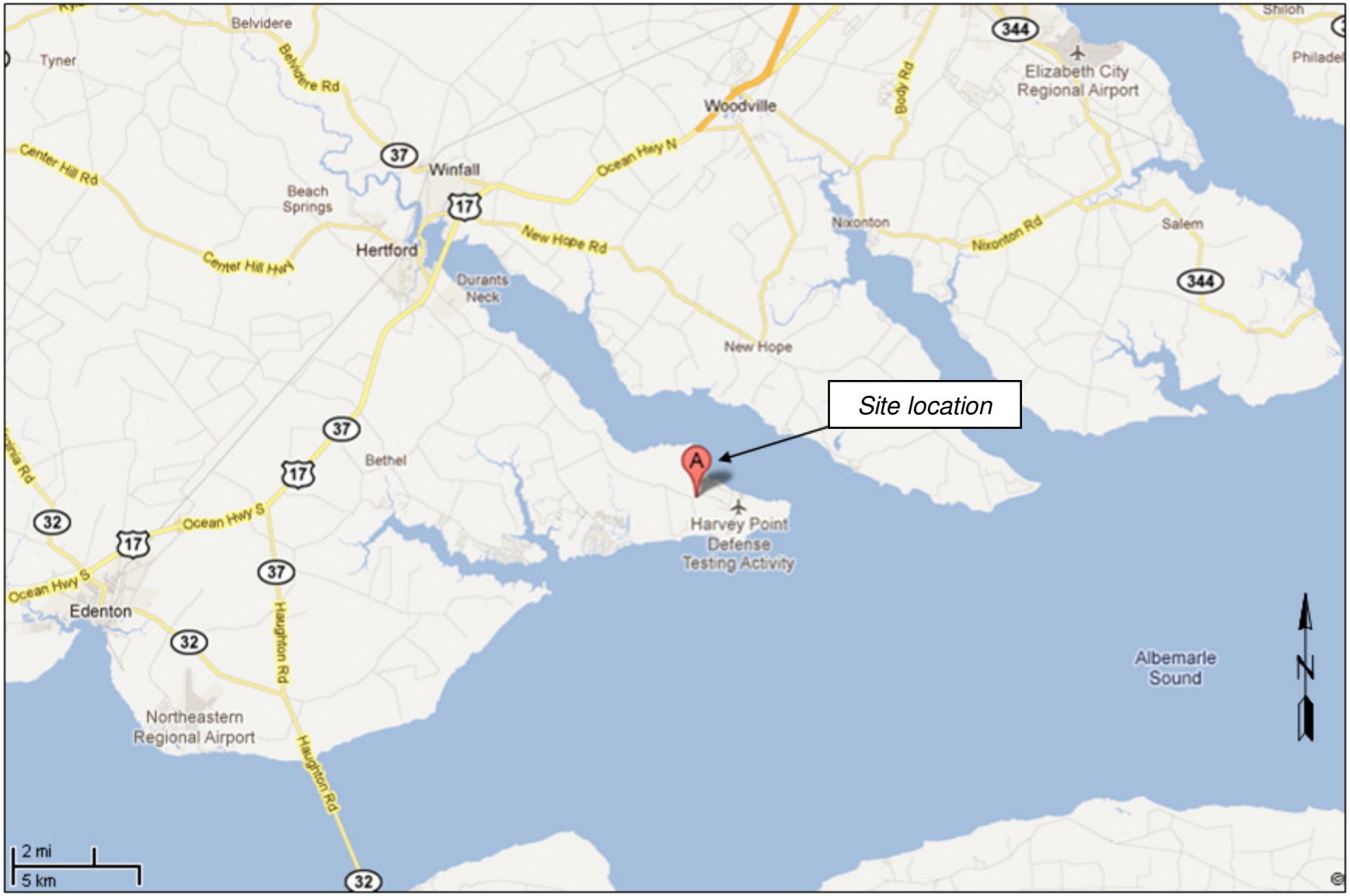

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File Name: *Harvey Point Second Street Trash Site ls.ppt*	
Date: *11/14/11*	Draftsman: *CMP*
ATS Project Number: *P11-71*	

Figure 1. Site location map.

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N

Scale: 1 inch = 20 meters

0 10 20 30 40

Map axis coordinates: UTM Zone 18 WGS84 meters

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Figure 2. Aerial photo of the Second Street Trash Site.

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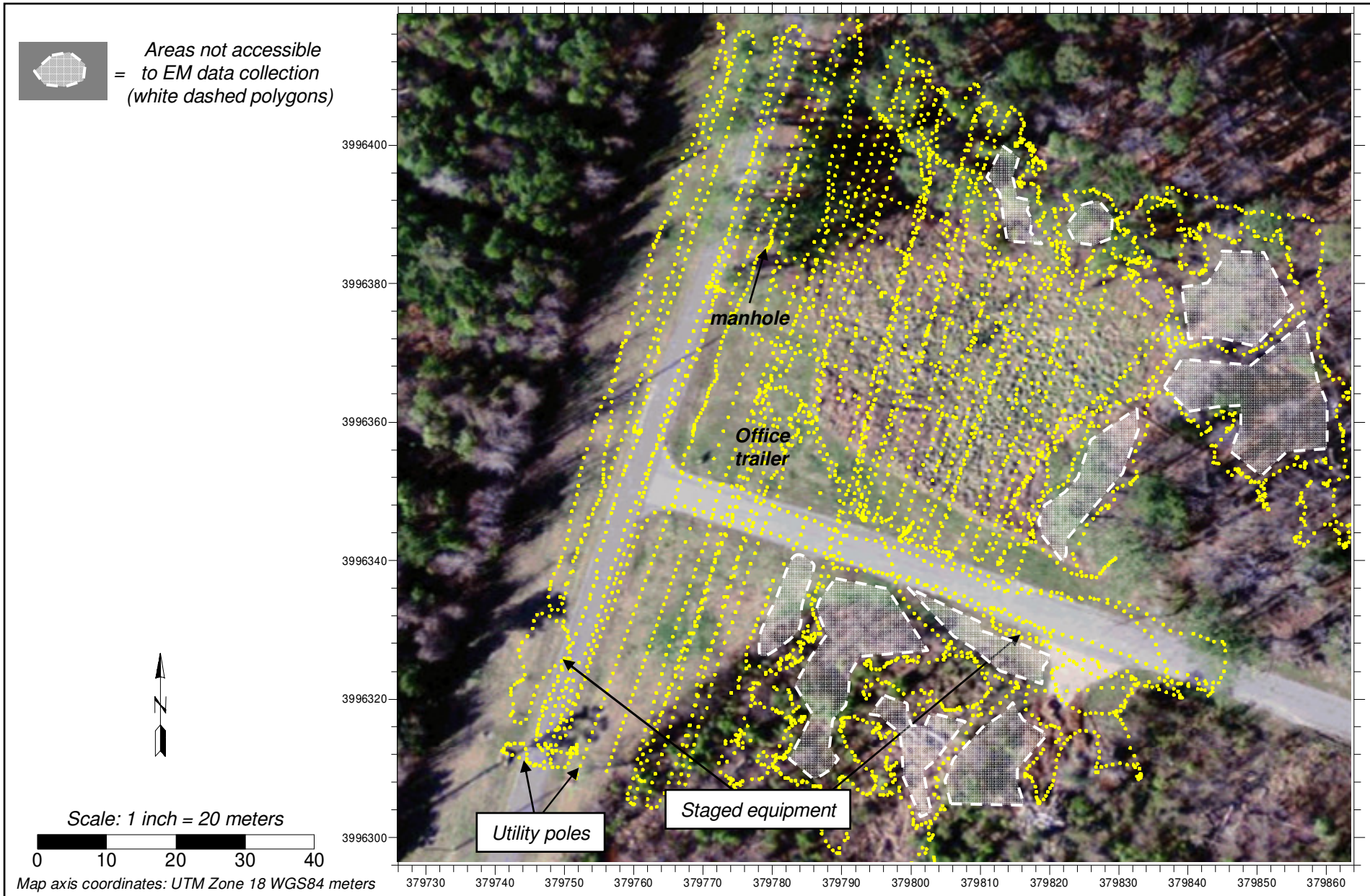

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Figure 3. GPS track of the EM survey illustrating the GPS locations of individual EM datum points (yellow dots).

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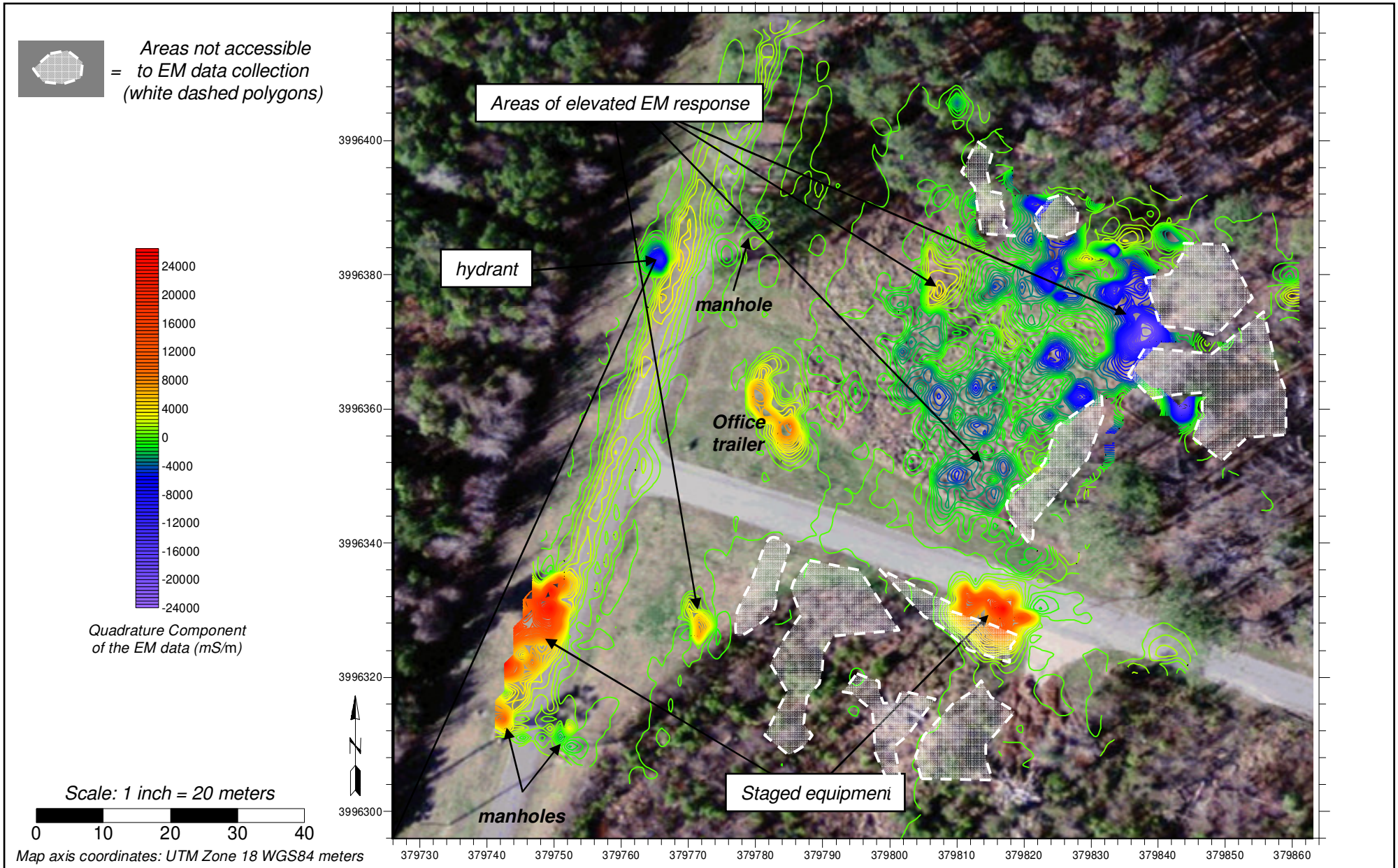

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Figure 4. EM response for the quadrature component of the EM data, in milliSiemens per meter.

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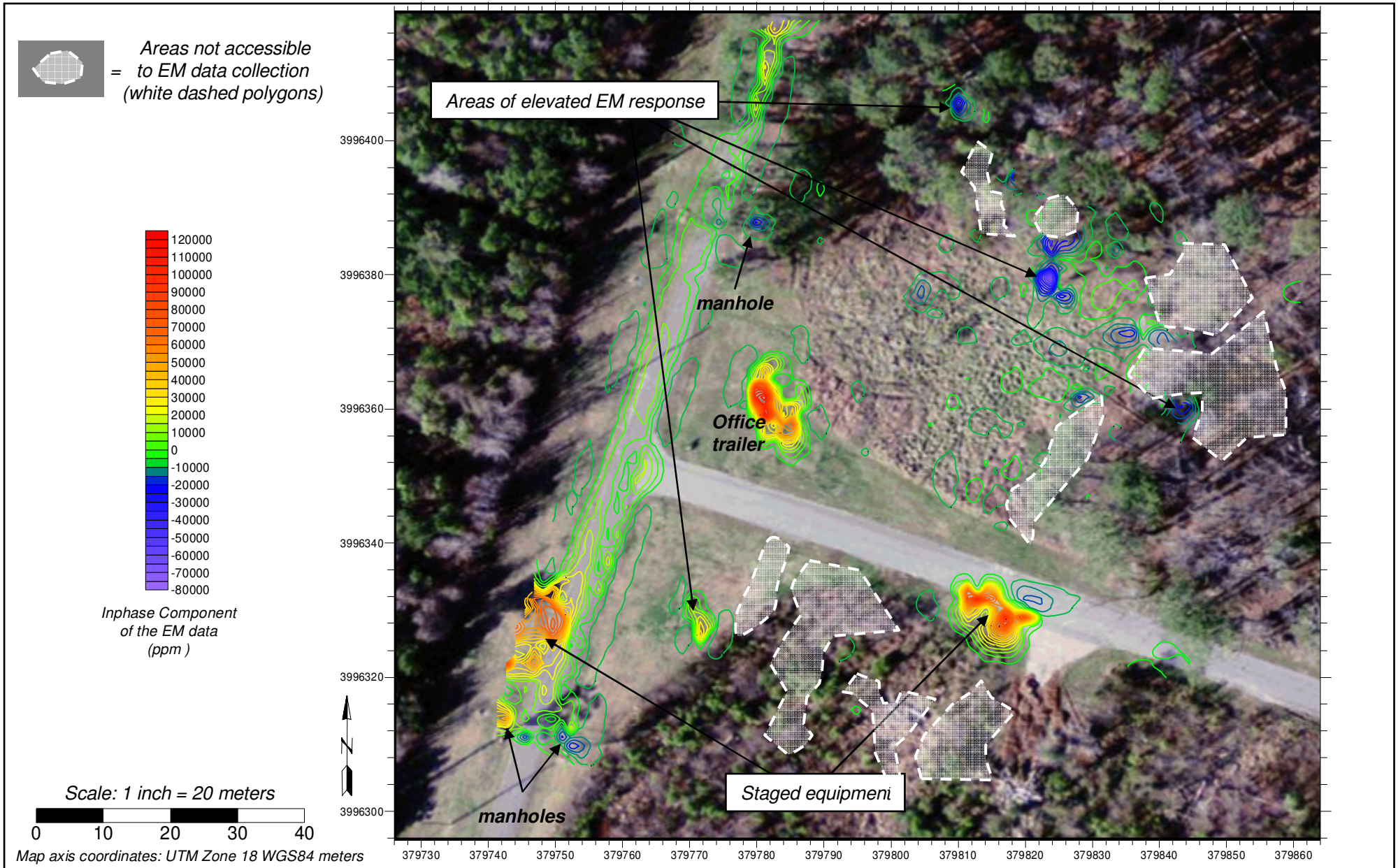

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Figure 5. EM response for the in-phase component of the EM data, in parts per million.

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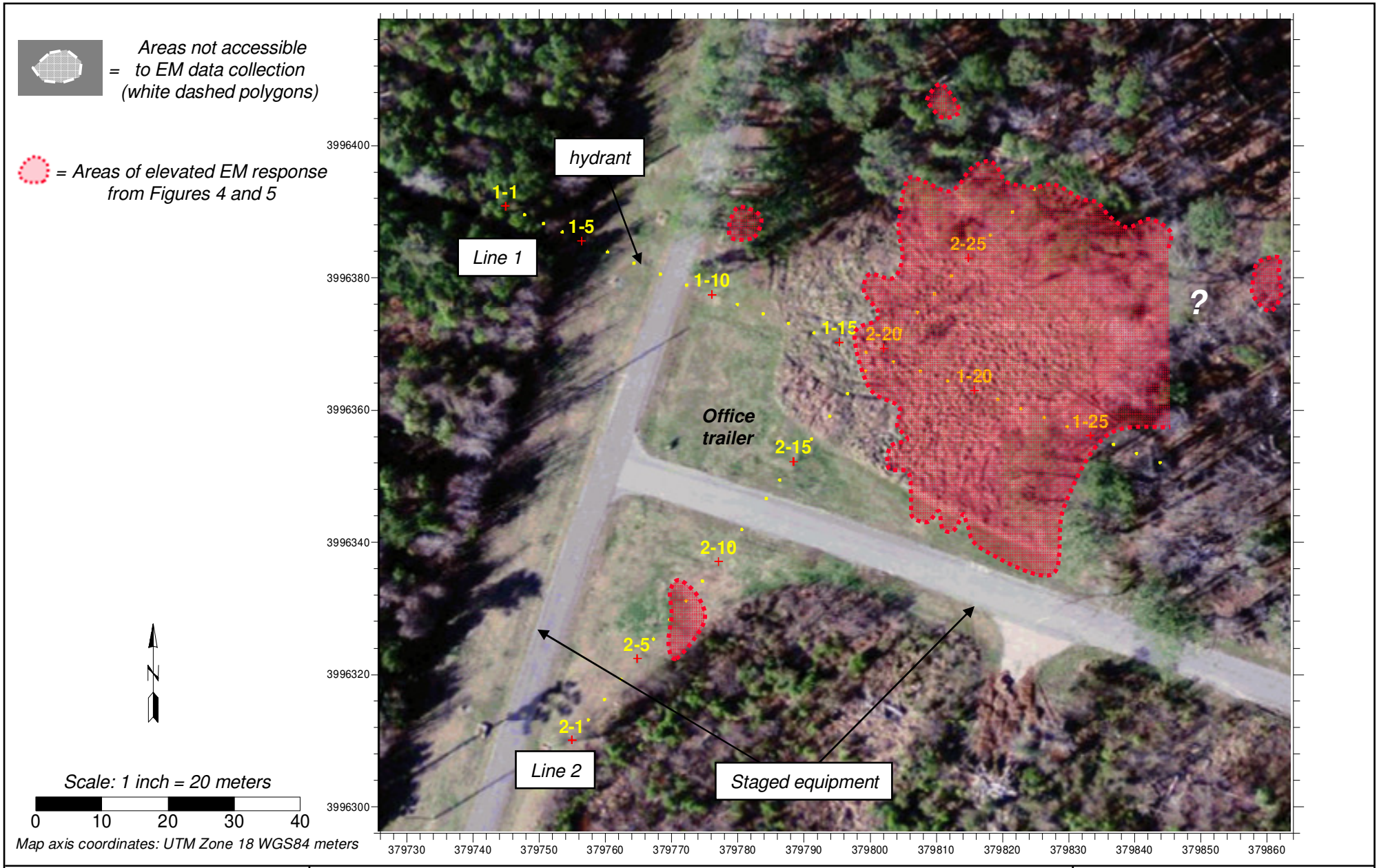

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Figure 6. Locations of electrodes for resistivity Lines 1 and 2 and areas of elevated EM response from Figures 4 and 5.

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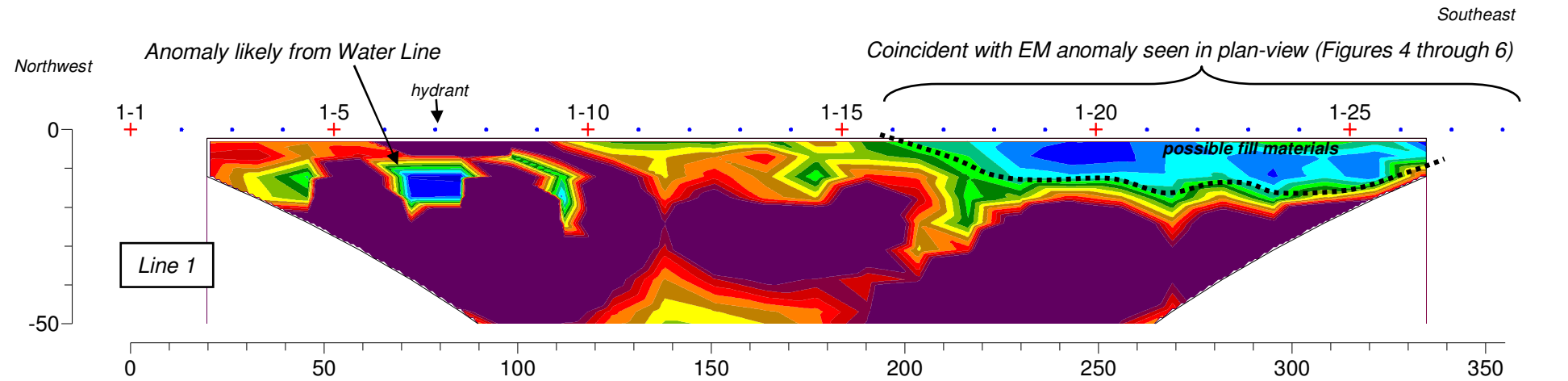

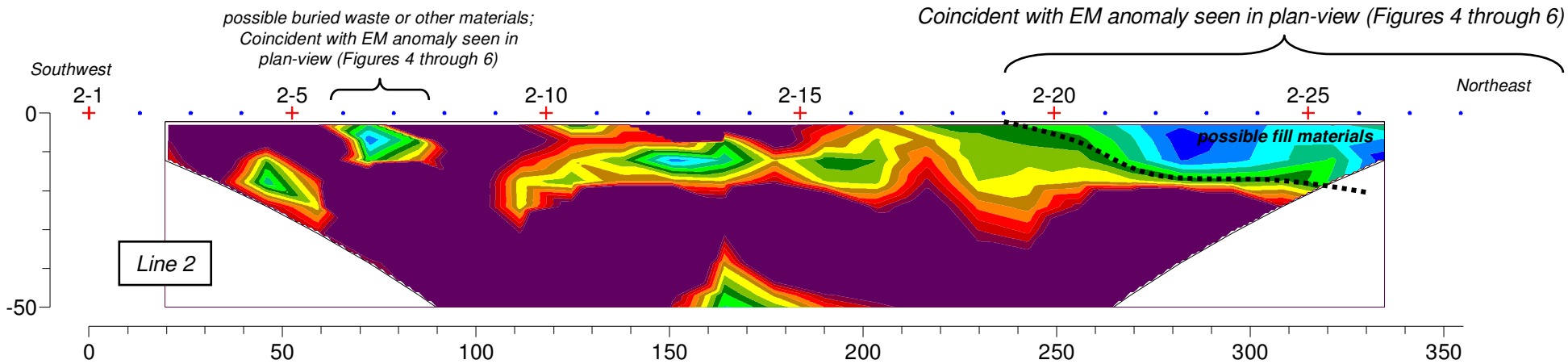

Scale: 1 inch = 40 feet

0 20 40 60 80

Resistivity Scale (ohm-meters)

0 15 30 45 60 75 90 105

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Figure 7. Resistivity results for Lines 1 and 2.

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Geophysical Survey at the Fifth Street Trash Site Harvey Point Defense Testing Activity Hertford, North Carolina

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Both the EM and resistivity imaging surveys reveal geophysical anomalies which may represent buried fill materials. The EM data suggest substantial lateral extent of fill in the northern portions of the open field. There are areas of elevated EM response on the peripheries of the data coverage to the west, north, and east of the site. Therefore, buried materials may exist beyond the limits of the existing data. If the limits of the fill need to be defined by geophysical means, substantial machine-clearing of underbrush will need to be accomplished prior to additional geophysical data collection.

The resistivity data display several low-resistivity zones that are vertically extensive. This suggests the possible presence of dissolved constituents that may have migrated vertically downward from the fill materials. As such, the actual depth of the materials cannot be determined from the data, but it is unlikely that fill was placed more than 10 to 15 feet below grade. The presence of a shallow water table would make it difficult to place fill far beneath the water table.

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The EM device measures the quadrature (terrain conductivity) and in-phase components of the electromagnetic fields generated by the instrument's transmitter. The quadrature component of the EM data reveals apparent terrain conductivity in units of milliSiemens per meter (mS/m), which is a weighted average of the conductivity through the depth of measurement beneath the instrument. High magnitude responses, either positive or negative, indicate high bulk conductivity in the materials under the instrument.

The in-phase component of the EM data is the ratio of the secondary to primary magnetic field, and is presented in parts per million (ppm). The in-phase component is sensitive to the presence of highly conductive material, especially shallow metal objects. It is important to note that the size, depth of burial, and degree of corrosion of a metal object are all factors which affect the in-phase response (Jordan and Constantini, 1995).

The instrument used for this investigation was the EMP-400 manufactured by Geophysical Survey Systems, Inc. The unit consists of a portable control module attached to a boom with a transmitter coil at one end and a receiver coil at the other end, and operated at a frequency of 10000 kHz. The effective depth of exploration of the EMP-400 is approximately 20 to 25 feet.

EM surveys are usually conducted along traverses through the area of interest with measurements taken at fixed distances or at a fixed time interval along the traverse. By conducting sub-parallel traverses, substantial lateral coverage can be obtained. The data can then be contoured to evaluate the spatial distribution of the measured conductivity values.

3.2. EM Survey

For this study, data were collected in the open areas of the site in near-parallel traverses spaced approximately 5 to 10 feet apart. In the wooded areas of the site, EM data collection was dictated by the occurrence of thickets and underbrush. Therefore, the EM data in those areas are more randomly distributed, with significant data gaps existing in those areas which were not accessible to traversing with the instrument. The EM data were collected with a continuous time-stamp log with measurements taken at 1-second intervals, while a concurrent time-stamped global positioning system (GPS) track log of coordinates was also collected. Location data from the GPS track log were integrated with the EM data to produce X and Y coordinates for each EM measurement. These data were subsequently contoured to evaluate the spatial distribution of the EM response.

The GPS tracks of traverses with the EM instrument at the Fifth Street Site are illustrated in Figure 3. The contour maps of the quadrature and in-phase components of the EM response are illustrated in Figures 4 and 5, respectively.

3.2.1. Quadrature component of the EM response

The contour map of the quadrature component of the EM response in Figure 4 reveals a broad area of high-amplitude negative EM response (blue contours) overlapping with the location of the

concrete pad and piles of riprap stone. Much of the elevated EM response in this area may be due to reinforcement steel within the concrete pad. However, an area of elevated EM is observed extending from the northern edge of the pad which may be the result of buried materials.

To the north and northeast of the concrete pad, an elongated area of high-amplitude positive EM response (red contours) is observed extending in a northwest-southeast direction. This area is likely underlain by disturbed soils or buried materials.

Another area of high-amplitude EM response (both positive and negative) is observed in the westernmost portion of the study area. This area is coincident with a concrete slab and therefore this may be the result of reinforcement steel within the slab.

Additional areas of slightly to moderately elevated EM response are observed across the study area, characterized by blue or red contours or areas of closely spaced contours, even if those contour lines are green and represent mid-range values. Much of the area west of the open field was inaccessible due to thick growth, but several paths into the thickets revealed somewhat elevated conductivity.

3.2.2. In-phase component of the EM response

The contour map of the in-phase component of the EM response in Figure 5 reveals similar results as the quadrature contours. Since the in-phase component is more sensitive to metallic objects, it is highly possible that many of the areas of elevated response seen in Figure 5 result from at least some amount of buried metallic materials. This is consistent with observations in the field where metal debris was seen protruding from the ground surface, especially in those areas immediately within the tree line.

4. Resistivity Imaging

In addition to the EM investigation, two-dimensional surface resistivity imaging methods were employed to provide continuous imaging of the subsurface across the study area. Resistivity imaging provides cross-sectional images of the resistance of subsurface materials to electric current, from which geologic conditions can be inferred. Electrical resistivity is a fundamental parameter describing how easily a material can transmit electrical current. High values of resistivity imply that the material is very resistant to the flow of electricity; low values of resistivity imply that the material transmits electrical current very easily.

4.1. Principles of Resistivity

Experiments by George Ohm in the early 19th century revealed the empirical relationship between the current flowing through a material and the potential required to drive that current. This relationship is described by

$$V = IR$$

where V is voltage in volts, I is the current in amperes, and R is the proportionality constant. Rearranging the equation to

$$\frac{V}{I} = R$$

gives resistance with the units of volts divided by amperes, or ohms.

The resistance of a material is dependent not only on the property of the material but also the geometry of the material. Specifically, a longer travel path for the current or smaller cross-sectional area would cause the resistance to increase. The geometry-independent property used to quantify the flow of electric current through a material is resistivity, given by

$$\rho = \frac{RA}{L}$$

where ρ is the resistivity, R is the resistance, A is the cross-sectional area through which the current flows, and L is the length of the current flow path. With all length units expressed as meters, the units associated with resistivity are ohm-meters.

Resistivity surveys are conducted by inducing an electric current into the ground between two electrodes, and measuring the potential at other electrodes. Numerous configurations of electrode placement are commonly employed, each with unique data characteristics. The configuration utilized for this study was the dipole-dipole array. For the dipole-dipole array, a current is applied to two adjacent electrodes positioned a predetermined distance apart (distance a). The voltage across two other electrodes is measured simultaneously with the applied current. The two sets of electrodes are always spaced distance a apart and the distance between the current and voltage electrodes is always a multiple of a (n• a). To obtain apparent resistivity values, the voltage and current measurements are input into the following formula for dipole-dipole surveys

$$\rho = 2\pi(n+1)\cdot(n+2)\cdot a\cdot\frac{V}{I}$$

4.2. Field Methods

Data for two resistivity lines were collected at the site on November 1st, 2011. Field data were collected using a SuperSting R8 IP® multi-electrode resistivity system manufactured by Advanced Geosciences Inc. Data were collected using the dipole-dipole array with a current of up to 200 milliamps. For each electrode configuration in the array, measurements were repeated a minimum of two times or until the error between measurements was less than or equal to five percent.

The two resistivity lines are identified as Lines 3 and 4. This is because another resistivity survey was conducted at a separate study area, and those lines were identified as Lines 1 and Line 2. The

electrodes for Lines 3 and 4 were assigned a unique identifier consisting of the line number followed by a dash and the electrode number. For example, the first electrode on Line 3 is 3-1, the first electrode on Line 4 is 4-1, etc. The locations of the resistivity lines were recorded with a handheld GPS so that they could be plotted onto aerial photography of the site (Figure 6).

Line 3 was oriented southeast to northwest originating on the south side of Fifth Street and extending through the study area into the woods. Line 4 was oriented approximately east-west, roughly parallel to the northern edge of the concrete pad. Both lines consisted of 28 electrodes with a 5 meter (16 feet) spacing between electrodes.

4.3. Inversion Modeling

The resistivity measurements on a section are called apparent resistivities. They may differ from the actual resistivities because of passage through inhomogeneous materials and the distance of travel through the media. Therefore, linear inversion techniques were applied to the data. Linear inversion modeling fits the measured data in the resistivity section to an earth model that may represent the actual resistivities in the section. The inversion modeling is completed by calculating apparent resistivity from the earth model for comparison to the measured data. If the comparison is within reasonable limits, the earth model can be accepted as an approximation of subsurface conditions. Details of the inversion process may be found in Lines and Treitel (1984), Loke and Barker (1995), and Loke and Barker (1996).

4.4. Resistivity Results

The locations of areas of elevated EM response, as illustrated in Figures 4 and 5, are shaded red in the resistivity electrode map in Figure 6, so that any correlations can be made between the two geophysical methods. Lines 3 and 4 both extended through various EM anomalies across the study area.

The measured resistivity values in Lines 3 and 4 range from less than 10 ohm-meters to 1,374 ohm-meters. The sections for Lines 3 and 4 both reveal distinct areas of very low resistivity values coincident with the locations of the EM anomalies, as illustrated in plan view in Figures 4 through 6. These zones are illustrated in the resistivity sections in Figure 7 from electrodes 3-9 to 3-12, 3-16 to 3-23 and 4-6 to 4-16.

The resistivity characteristics of these zones, exhibited by the low resistivity values at the near-surface, are consistent with fill materials. The depth of these low-resistivity zones is not discernible, due to the fact that low resistivity values extend to significant depths in both of the sections (greater than 50 feet in depth). These vertically extensive low-resistivity zones may represent dissolved constituents from the buried materials which may have migrated vertically downward, masking the boundary between the fill and the natural materials. It is most likely that the actual depth of fill is consistent with the low resistivities observed between 3-16 and 3-19 which extend to approximately 10 to 12 feet below grade.

5. Conclusions

Both the EM and resistivity imaging surveys reveal geophysical anomalies which may represent buried materials. The EM data suggest substantial lateral extent of fill in the northern portions of the open field. There are areas of elevated EM response on the peripheries of the data coverage to the west, north, and east of the site. Therefore, buried materials may exist beyond the limits of the existing data. If the limits of the fill need to be defined by geophysical means, substantial machine-clearing of underbrush will need to be accomplished prior to additional geophysical data collection.

The resistivity data display several low-resistivity zones that are vertically extensive. This suggests the possible presence of dissolved constituents that may have migrated vertically downward from the buried materials. As such, the actual depth of fill cannot be determined from the data, but it is unlikely that fill was placed more than 10 to 15 feet below grade. The presence of a shallow water table would make it difficult to place fill far beneath the water table.

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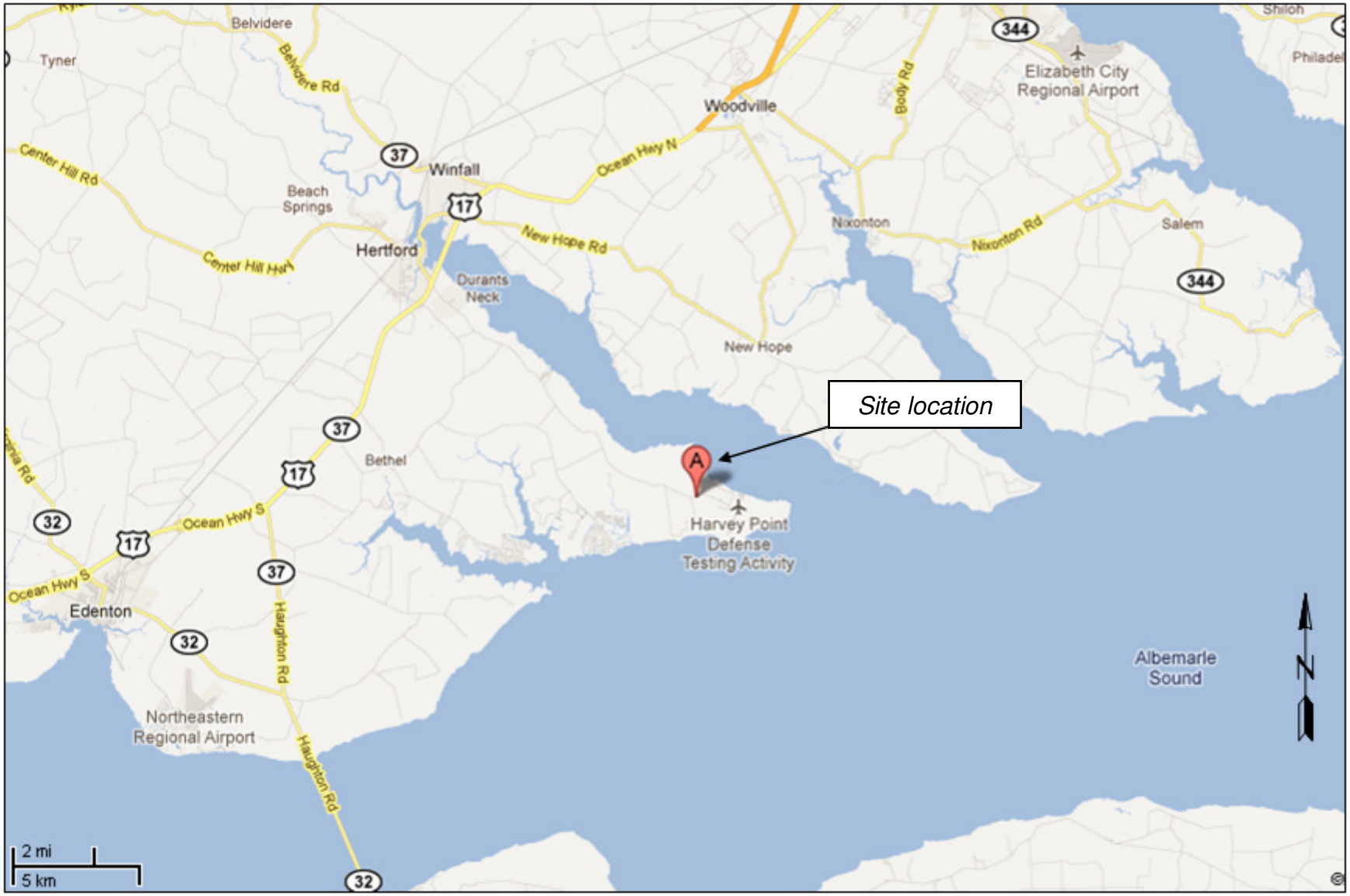
7. Figures



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File Name: *Harvey Point Fifth Street Trash Site ls.ppt*	
Date: *11/14/11*	Draftsman: *CMP*
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Figure 1. Site location map.

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Figure 2. Aerial photo of the Fifth Street Site. (Note: the structures visible on the concrete pad no longer exist, but piles of riprap stone are currently staged in that vicinity.

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Figure 3. GPS track of the EM survey illustrating the GPS locations of individual EM datum points (yellow dots).

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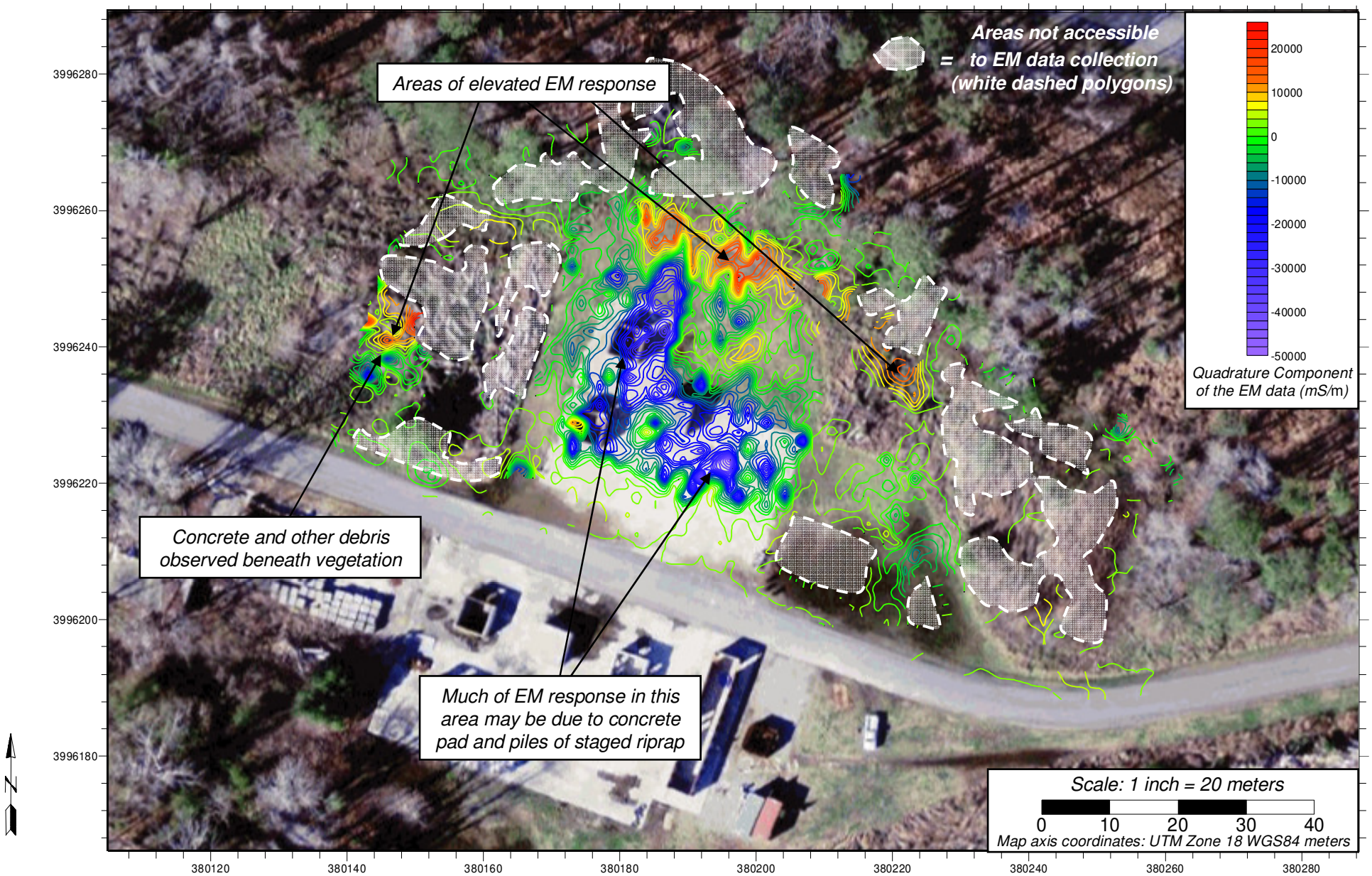

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Figure 4. EM response for the quadrature component of the EM data, in milliSiemens per meter.

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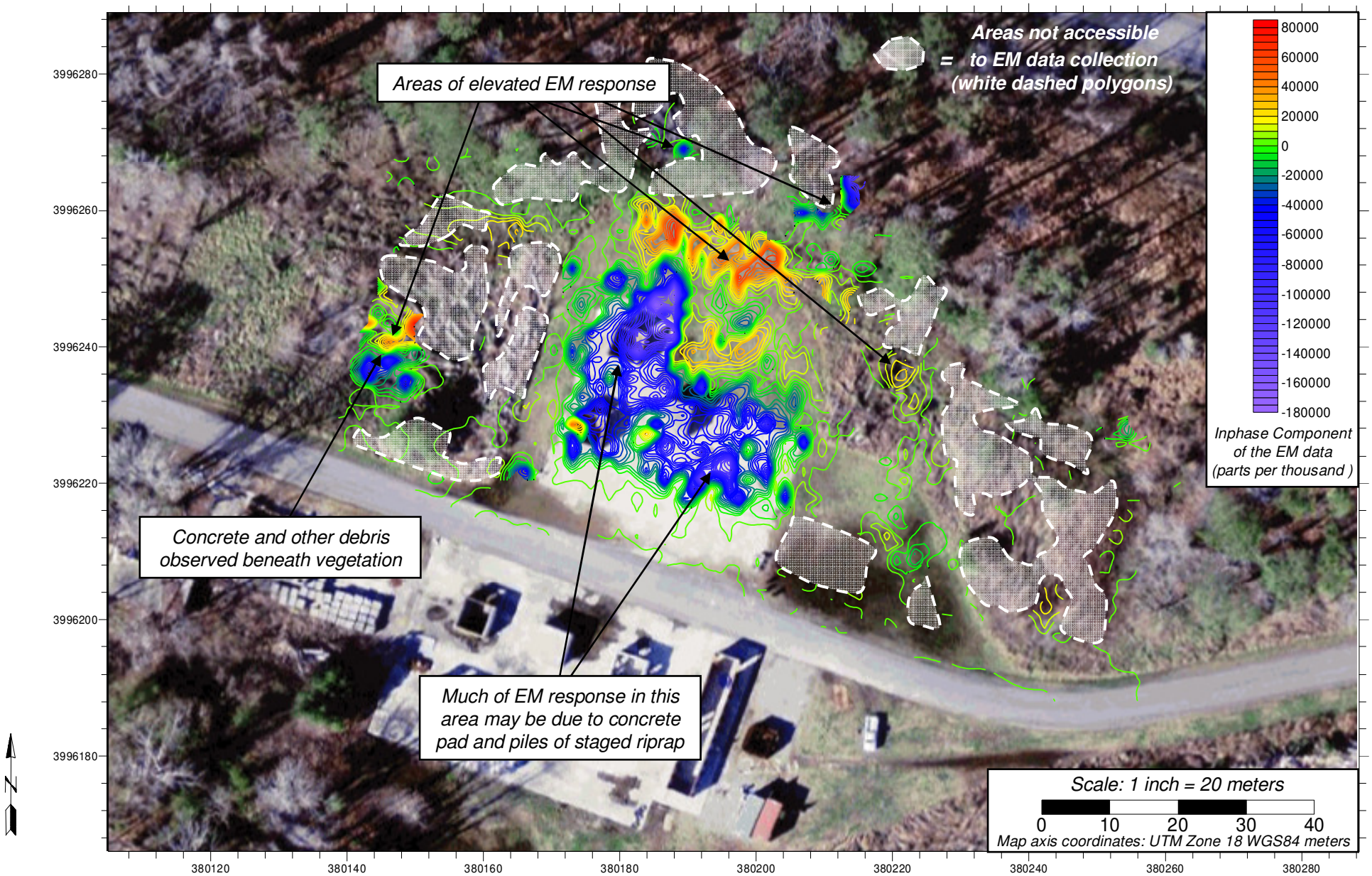

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Figure 5. EM response for the in-phase component of the EM data, in parts per million.

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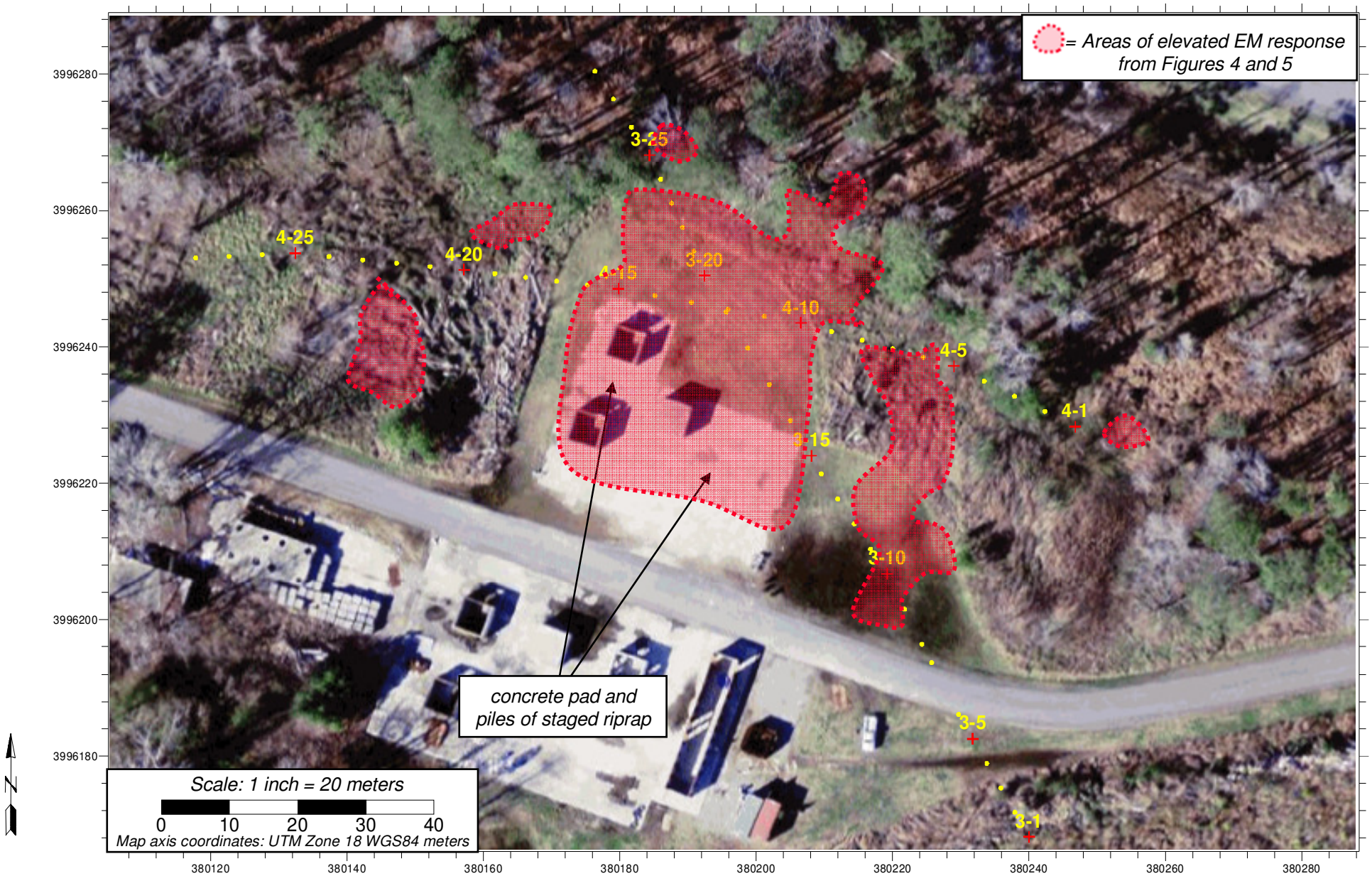

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Figure 6. Locations of electrodes for resistivity Lines 3 and 4 and areas of elevated EM response from Figures 4 and 5. (Note: Lines 1 and 2 were collected at a separate study area.)

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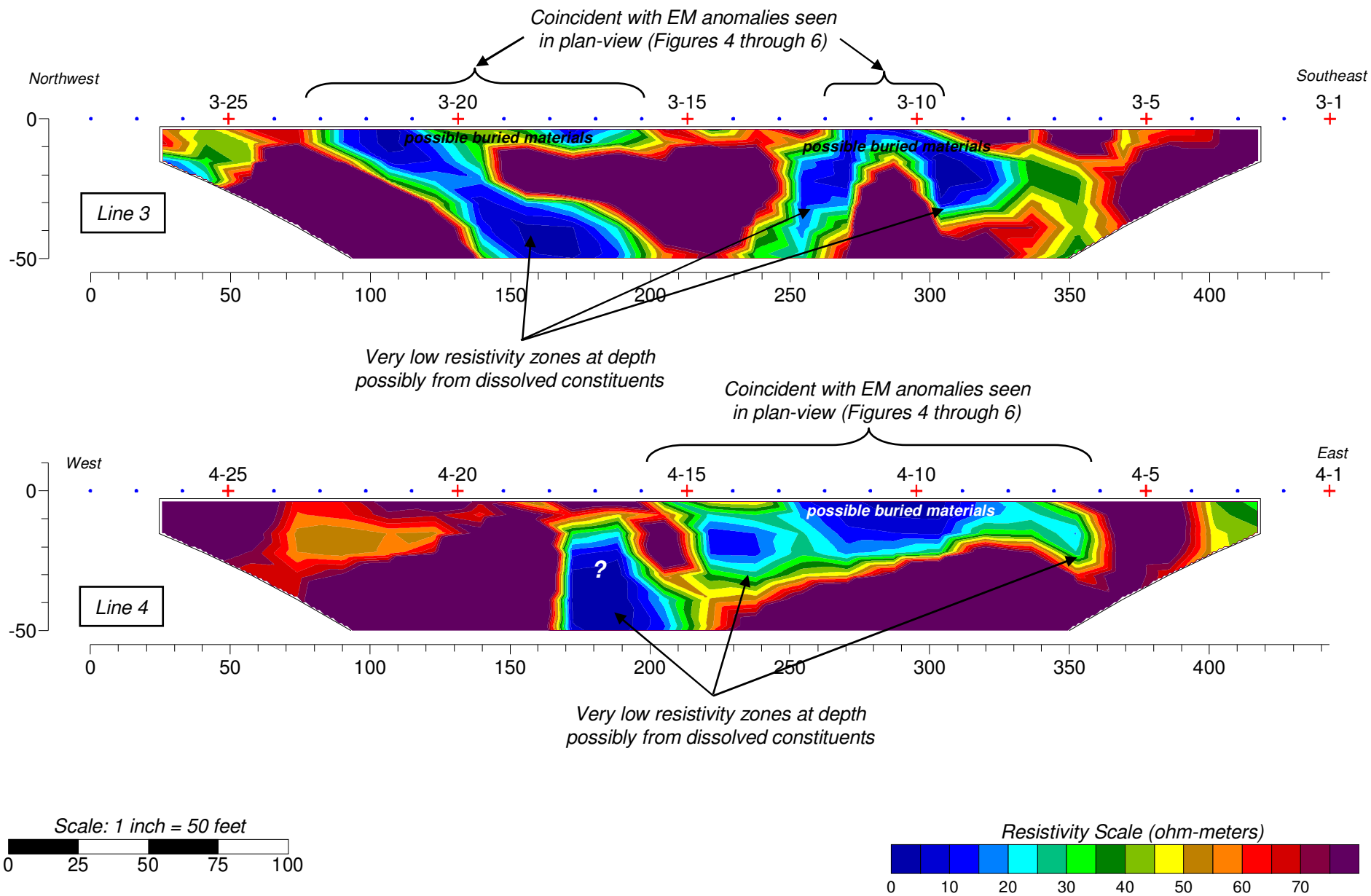

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Figure 7. Resistivity results for Lines 3 and 4. (Note: Lines 1 and 2 were collected at a separate study area.)

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Contractor's Closeout Report
for
Remediation of PCB-Contaminated Soil
At Range Areas A, B and D
Harvey Point Defense Testing Activity
Hertford, North Carolina

Prepared for:

DEPARTMENT OF THE NAVY
Contract No. N62470-93-D-3032
Delivery Order 0110

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May 1997

OHM Project No. 18641

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Appendix D Disposal Certification
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EXECUTIVE SUMMARY

OHM Remediation Services Corp. (OHM) performed removal and disposal of approximately 1,277 tons of regulated PCB-contaminated soils and approximately 3,522 tons of non-regulated PCB-contaminated soils at Harvey Point Defense Testing Activity (HPDTA), Hertford, North Carolina at Ranges A, B, and D. The work was performed in two phases. Phase I was conducted on April 20, 1996 and April 21, 1996 and entailed the removal of regulated and non-regulated stockpiled PCB-contaminated soil stockpiled from Range A.

Phase II activities commenced September 13, 1996 and were completed November 6, 1996. Phase II entailed the excavation and removal of regulated and non-regulated PCB-contaminated soils from Ranges A, B, and D. OHM's project activities involved water treatment, clearing and grubbing, excavating, loading, sampling, field screening, backfilling, reseeding, and transportation and disposal of the contaminated soil.

During Phase II, PCB immunoassay test kits were used on-site by the project chemist to field screen samples prior to confirmation analysis and delineate contaminated soil above and below specified action levels. If the field screen results were below 1 mg/kg total PCBs for the floor samples and below 10 mg/kg PCBs for the sidewall samples, then samples were shipped off for confirmation analysis. If the field screen results were above the action levels, then additional excavation was performed and another round of samples collected. The frequency of sampling was every 50 linear feet for sidewall samples and 500 square feet for floor samples.

Upon completion of all excavation activities, confirmation sampling performed revealed that soils remaining on-site exhibited concentrations of PCBs below the action levels specified in the work plan. Site restoration included placement of clean backfill from an off-site borrow pit and revegetation.

1.0 INTRODUCTION

This Contractor's Closeout Report summarizes action taken during the removal and disposal of polychlorinated biphenyl (PCB) contaminated soil at Range areas A, B, and D, at Harvey Point Defense Testing Activity (HPDTA) located in Hertford, North Carolina. This closeout report has been prepared for the Department of the Navy, Naval Facilities Engineering Command (NAVFAC), Atlantic Division (LANTDIV) under Multi Contaminant Remedial Action Contract (RAC), Contract Number N62470-93-D-3032 by OHM Remediation Services Corp. (OHM).

This report was developed in accordance with the 100% Technical Specifications prepared by Roy F. Weston Inc. dated May 1996, Section 01010, Paragraph 1.3.1.10 and Section 6.0 of OHM's Work Plans dated April 1996 (Phase I) and OHM's Work Plans dated August 1996 (Phase II). Final revisions to the work plans were submitted in early October, 1996. OHM has completed all activities as required by Delivery Order Number 0110: Remediation of PCB-Contaminated Soil at Range Areas A, B, and D, Harvey Point Defense Testing Activity, Hertford, North Carolina.

1.1 SITE BACKGROUND

HPDTA is a training base for the Department of Defense located in Perquimans County, North Carolina. During the 1960s and 1970s, electrical transformers containing PCB liquids were occasionally used as target material for explosive charges at Ranges A and B. The transformer debris was then temporarily stored at the scrap storage area designated as Range D, awaiting final disposition.

Prior characterization of Ranges A, B, and D includes a preliminary assessment by Potomac - Hudson Engineering in 1992 and 1993. This preliminary assessment detected elevated concentrations of PCBs at all three ranges. Based upon these results, partial excavation of Ranges A and B began in 1993. Some the soils excavated from Range A was left stockpiled on-site. Another investigation occurred in 1995 and 1996 and was performed by Roy F. Weston, Inc. The purpose of this investigation was to delineate the extent of PCB contamination in the soil and test surface water for PCBs.

1.2 SITE DESCRIPTION

HPDTA covers approximately 1570 acres and includes approximately five miles of coast line in Perquimans County, North Carolina. HPDTA is bounded to the north by the Perquimans River, to the east and south by the Albermarle Sound, and to the west by

private property. The town of Hertford, North Carolina is located west of the facility on State Road 1336.

Range A is located on the eastern confines of HPDTA. The site is approximately two miles east of the main entrance to the facility. It is a level area approximately 16 acres in size. Range A is located east of Ninth Street and west of Range Road. John Harvey Boulevard and Power Line Road form the northern and southern boundaries of the site. The site is mainly cleared and divided by a dirt road. Range B is approximately 1,000 feet west of Range A, north of John Harvey Boulevard, and is the same size, 15 acres. The site is mainly cleared and is encircled and divided by a dirt road. Range D was used as a temporary storage area for metal debris and is approximately five acres in size. The range is bisected by Flat Run Road. All three ranges are located on Figure 1.1.

1.3 SITE SOIL REMEDIATION GOALS

The objective of the remedial action at HPDTA was to remove and dispose of contaminated soils which contain PCBs exceeding the established remediation goals. Under this approach, potential risks due to contaminated soil exposure and contaminant migration due to surface runoff would be reduced. The risk based remediation goal was revised from that presented in the Roy F. Weston, Inc. Statement of Work and 100% Technical Specifications to include subsurface soil (below 1 foot depth). The revision was incorporated based on NCDEHNR's review of the work plan. Table 1.1 presents the applicable remediation goal for contaminated surface and subsurface soils.

Table 1.1 – Remediation Goals

Type	*PCB mg/kg*
Subsurface (>12")	1.0
Surface (<12")	10.0

2.0 SUMMARY OF WORK

OHM performed the work in two phases. Phase I involved the loading, transportation and disposal of four stockpiles of non-regulated soils and one stockpile of regulated PCB-contaminated soils excavated by others from Range A. OHM's Phase II activities involved the excavation, transportation, and disposal of PCB-contaminated soils from Ranges A, B, and D. For purposes of this report, TSCA regulated soils are those which contain PCB concentrations greater than 50 mg/kg.

2.1 PHASE I ACTIVITIES

Upon receipt of the notice to proceed from LANTDIV for Phase I activities, OHM commenced preparatory activities for the project including plan preparation and review for all site activities. The work was categorized into definable phases for economical and efficient execution of the work. Listed below are the major phases of the work that were performed from March 1996 to April 1996 to fulfill the project specifications:

- Phase 1 - Submit work plans and sample and analyze soil from the stockpiles to characterize the soil for disposal.
- Phase 2 - Mobilization of all equipment and personnel to the site.
- Phase 3 - Load out of contaminated soils for disposal.
- Phase 4 - Demobilization of all equipment and personnel from the site.

The following sections provide additional detail on specific events that were performed to support the major site work efforts.

2.1.1 Submittals

On April 10, 1996, OHM submitted plans for Delivery Order Number 0110. The plans consisted of a Work Plan, Environmental Protection Plan, Materials Transportation and Disposal Plan, Sampling and Analysis Plan, Construction Quality Control Plan, and a Site-Specific Health and Safety Plan. The plans provided a description of the project objectives, schedule, sampling, analysis, decontamination, site work, excavation, construction, storage, transportation, quality control, and disposal requirements that would be implemented to fulfill the requirements of the project specifications. The plans were reviewed and approved by LANTDIV.

2.1.2 Waste Characterization

On April 02, 1996, OHM collected grab samples from each of the five stockpiles for waste characterization analysis to obtain disposal approval. Results of the soil analyses were submitted to various disposal facilities to develop waste profiles and to obtain disposal pre-approval and pricing. See section 6.0 for a summary of the waste characterization sample. The completed waste profiles for the selected facilities were submitted to HPDTA for final approval.

2.1.3 Mobilization and Site Preparation

A preconstruction meeting was held on April 2, 1996 at HPDTA. Site work was performed on a Saturday and Sunday as not to affect operations at the range. OHM mobilized equipment and personnel to the site on April 20, 1996. Sixteen drums of investigation derived waste (IDW) soil cuttings and one drum of personal protective equipment (PPE) were emptied into the non-TSCA regulated stockpiles. These drums as well as the stockpiles were left from work performed during the investigation stages.

2.1.4 Stockpile Load-Out

Based upon the waste characterization sampling, four stockpiles were deemed non-TSCA regulated and transported by HILCO Trucking to Waste Management Corporation, Piedmont Landfill and Recycling Center in Kernersville, North Carolina. Two trucks from Dart Trucking were loaded from the TSCA regulated stockpile and transported the soil to USPCI - Grayback Mountain facility located in Clive, Utah.

The contaminated stockpiles were removed using an excavator, loading directly into transport vehicles and routed for off-site disposal. The load out activities removed approximately 44 tons of TSCA regulated soils and approximately 205 tons of non-TSCA regulated soils. To mitigate the spread of contaminants off-site, the trucks were loaded on 6 mil plastic and decontaminated by brushing the tires and sides of the truck bed to remove soil and/or debris prior to leaving the site.

Approximately one truck load of non-TSCA regulated and one truck load of TSCA regulated soil were not loaded out. This material was covered with plastic and removed during the Phase II activities. Photographic documentation of the project activities is provided in Appendix B.

2.2 PHASE II ACTIVITIES

Upon receipt of the Notice-to-Proceed from LANTDIV for Phase II activities, OHM commenced preparatory activities for the project such as plan preparation and review for all site activities. The work was also categorized into definable phases of work. Listed

below are the major tasks of the site work that were performed from August 1996 to November 1996 to fulfill the project specifications:

- Task 1- Prepare and submit work plans and rebid all subcontracts including soil transportation and disposal.
- Task 2 - Mobilization of all equipment and personnel to the site. This also included set-up of a 50,000 gallon containment pool.
- Task 3 - Excavation and disposal of PCB-contaminated soils.
- Task 4 - Field screening and confirmation sampling to verify limits of the excavation.
- Task 5 - Treatment of water from ponds in Ranges A and B.
- Task 6 - Backfilling the ranges, grading, and seeding.
- Task 7 - Demobilization of all equipment and personnel from the site.

The following sections provide more detail on specific events that were performed to support the major site work efforts.

2.2.1 Submittals

On August 28, 1996, OHM submitted plans for Delivery Order Number 0110. The plans included a Work Plan, Environmental Protection Plan, Materials Transportation and Disposal Plan, Sampling and Analysis Plan, Construction Quality Control Plan, and Site-Specific Health and Safety Plan. The plans provided a description of the project objectives, schedule, sampling, analysis, decontamination, site work, excavation, construction, storage, transportation, quality control, and disposal requirements that would be implemented to fulfill the requirements of the project specifications. The plans were reviewed and approved by LANTDIV prior to commencement of field activities. Submittal of final revised project plans occurred on October 9, 1996.

2.2.2 Waste Characterization

OHM used the initial sample characterization results from Phase I for Phase II activities. Results of the soil analysis were resubmitted to various disposal facilities to obtain disposal pre-approval and pricing. The completed waste profiles for the selected facilities were submitted to HPDTA for signature and final approval.

2.2.3 Water Treatment

Low lying areas within portions of Ranges A and B contained surface water which was managed prior to excavation. A 50,000-gallon containment pool and two 2,000-pound carbon units were set-up on-site to store and treat water from the ponds at Ranges A and B. Approximately 25,000 gallons from the two ponds were pumped and transported to the containment pool using a tanker truck.

On September 27, 1996 OHM tested the performance of the water treatment system. Section 6.0 includes a description of the test. After receiving the test run results, OHM proceeded to treat the approximately 25,000 gallons of water through the carbon units at a rate of 10-15 GPM. The water was discharged on the ground at an area specified by the Navy Technical Representative.

2.2.4 Clearing and Grubbing

Ranges A and D had areas that required clearing and grubbing. The trees were cut down with a chain-saw and the stumps removed with the excavator. The stumps were transported off-site with the non-TSCA regulated soils. The trees and brush were staged at each site for subsequent burning by HPDTA.

2.2.5 Excavation of Contaminated Soil

Due to the accessibility of the ranges, Range B was completed first followed by Ranges A and D. All necessary measures for site drainage, siltation, and erosion control were implemented. Soil in areas identified as having PCB levels > 50 mg/kg were excavated to a depth of approximately 1 foot. The soil was stockpiled and then loaded into transport vehicles and routed to the off-site permitted disposal facility operated by Chemical Waste Management, in Emelle, Alabama. Field screening, as described in Section 6.0, was used to confirm the horizontal limits of the excavated areas. The excavation activities removed 912 tons from Range A, 304 tons from Range B, and 60 tons from Range D of hazardous soils. To mitigate the spread of contaminants the trucks were decontaminated by brushing the tires and sides of the truck bed to remove soil and/or debris prior to leaving the site. Figures 6.1, 6.2 and 6.3 in Appendix A are as-builts showing excavated areas in each range.

After the >50 mg/kg PCB areas were delineated and excavated, the non-TSCA regulated areas (<50 mg/kg) were stockpiled and then loaded into transport vehicles and routed to the off-site permitted disposal facility operated by Browning-Ferris Industries, Sampson County Landfill in Roseboro, North Carolina. Field screening was used to identify areas requiring further excavation prior to the shipment of confirmation samples to the off-site laboratory. Areas above the clean-up criteria were excavated and resampled until confirmation sampling identified it as below the action level. Confirmation sampling activities and results are presented in Section 6.0. The excavation activities removed 1,236 tons from Range A, 580 tons from Range B, and 1,705 tons from Range D of non-TSCA

regulated soils. Figures 6.1, 6.2, and 6.3 in Appendix A show the surveyed excavation limits for each range.

2.2.6 Backfilling and Revegetation

Upon completion of field construction activities, excavated areas were backfilled with soils from an off-site borrow area. OHM collected a composite sample of the borrow material prior to placement. The sample results are summarized in Section 6.0. The backfill was compacted utilizing the heavy equipment on-site. Once the areas were brought to the approximate original grade, the area was prepared for reseeding. The disturbed areas were fertilized and reseeded with a mixture of fescue, winter rye, and clover.

3.0 FINAL HEALTH AND SAFETY REPORT

3.1 MOBILIZATION AND SITE PREPARATION

The site set-up for HPDTA, Hertford, North Carolina, included the following:

- An office trailer was set-up at the facility and used as the command center for all three ranges. During Phase I, Stockpile Removal Range A, a van was used as the command center because of the short duration of this phase.

- Prior to the start of on-site operations, all on-site OHM personnel read, understood and signed the OHM Site-Specific Health and Safety Plan (HASP). In accordance with OSHA requirements, the following items were set-up on-site:
  - Employee Right-To-Know poster and station
  - Material Safety Data Sheets (MSDSs) for all on-site chemicals
  - Hospital route and map posted in the command center and a copy placed in the glove compartments of all site vehicles
  - Site-specific evacuation plan posted in the command center
  - Exit signs posted in the command center

3.2 ON-SITE OPERATIONS

The excavation and disposal of PCB contaminated soil at HPDTA included these tasks:

- Water treatment
- Clearing and grubbing
- Soil excavation and off-site disposal of contaminated soils
- Site sampling and on-site field screening
- Backfill and site restoration

Prior to excavation of the soil, HPDTA informed OHM that there are no underground utility lines located within the three ranges. OHM performed real-time air monitoring using a mini-ram and PID during the excavation activities. Daily Safety Meeting Logs are included in Appendix J.

All sampling of soil, excavation of hazardous and nonhazardous soil, and water treatment activities were performed in Level D-modified PPE which included tyvek and hood, sample gloves or nitrile gloves, hard hat, steel toe shoes, and vinyl booties. Safety issues stressed during work activities included good housekeeping and heat stress.

Surveying, Backfill operations, and site restoration activities were performed in Level D PPE. These tasks required protective clothing including hard hat, safety glasses, steel toe boots and cotton gloves. Safety issues stressed during work activities included good housekeeping, heat stress, zone delineation, and communication system for site personnel.

3.3 TRAINING REQUIREMENTS

OHM employees, subcontractors and site visitors allowed access to work areas were required to have completed the 40-hour health and safety training course for Hazardous Waste Site Operations in accordance with 29 CFR 1910.120 and had to read, understand and sign the HASP.

3.4 ACCIDENTS AND/OR INJURIES

The project was completed without an OSHA Reportable Accident or Lost Time Injury.

4.0 SUMMARY OF RECORD DOCUMENTS

A tabular summary of the record documents submitted to the Navy Technical Representative for Delivery Order 0110 is presented in Table 4.1.

Table 4.1 - [illegible]tal Register

Spec. No.	SD No. and Type of Submittal Material or Product	Spec. Para. No.	Approval by CO	Gov. or A/E Reviewer	Trans. Control No.	Planned Sub. Date	Action Code	Date of Action	Date Forwarded to Appro. Auth./Date Received from Contr.	Date Forwarded to Other Reviewer	Date Received from Other Reviewer	Action Code	Date of Action	Mailed to Contr./Recd. from Appro. Auth.	Remarks
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p
01010	SD-09, Reports	1.2.1													
	Work Plan	1.2.1.1	G			8/28/96		8/28/96				A/N	9/6/96		
01010	SD-18, Records	1.3.1													
	As-built Records	1.3.1.1				Closeout Rpt		11/26/96							
	Environmental Conditions Rpt	1.3.1.2				Work Plan		8/28/96				A/N	9/6/96		
	Network Analysis Diagram	1.3.1.3				Work Plan		8/28/96				A/N	9/6/96		
	Status Reports	1.3.1.3				Monthly									
	QC Meeting Minutes	1.3.1.4				Weekly									
	Test Results Summary Report	1.3.1.5				As rec. from lab									
	Contractor Production Report	1.3.1.6				Daily									
	QC Report	1.3.1.7				Closeout Rpt		11/26/96							
	Rework Items List	1.3.1.8				NA									
	Permits	1.3.1.9				As received									
	Contractors Closeout Report	1.3.1.10				Closeout Rpt		11/26/96							
01430	SD-08, Statements	1.2.1				NA									
	Sample Log	1.3.1				Closeout Rpt		11/26/96							
01430	SD-12, Field Test Reports	1.2.2				NA									
	Confirmation Sampling	1.3.3				Closeout Rpt		11/26/96							
01562	SD-02, Manufacturer's Catalog Data	1.3.1				NA									
	Silt Fence	2.1				NA									
	Dust Suppressors	2.2.3				NA									
01562	SD-04, Drawings	1.3.2				NA									
	Erosion Control Plan	1.3.2.1				Work Plan		8/28/96				A/N	9/6/96		
02231	SD-14, Samples	1.1.1				NA									
	Tree Wound Paint	2.1				NA									
02315	SD-04, Drawings	1.3.1				NA									
	Required Data	1.3.1.1				NA									
02315	SD-09, Reports	1.3.2				Closeout Rpt		11/26/96							
	Remediation Closeout Report	1.3.2.1				Closeout Rpt		11/26/96							
02315	SD-12, Field Test Reports	1.3.3				NA									
	Fill and Backfill	2.1.2				As received		10/10/96				A/N	10/10/96		

N/A = Not Applicable

Spec. No.	SD No. and Type of Submittal Material or Product	Spec. Para. No.	Approval by CO	Gov. or A/E Reviewer	Trans. Control No.	Planned Sub. Date	Action Code	Date of Action	Date Forwarded to Appro. Auth./Date Received from Contr.	Date Forwarded to Other Reviewer	Date Received from Other Reviewer	Action Code	Date of Action	Mailed to Contr./Recd. from Appro. Auth.	Remarks
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p
02318	SD-08, Statements	1.1.1				NA									
	Disposal Facility Permit	1.1.1.1				Closeout Rpt		11/26/96							
02318	SD-18, Records	1.1.2													
	Shipment manifests	1.1.2.1				Closeout Rpt		11/26/96							
	Delivery Certificates	1.1.2.1				Closeout Rpt		11/26/96							
	Disposal Site Decon Certificate	1.1.2.3				Closeout Rpt		11/26/96							
	Work Site Decon Certificate	1.1.2.4				Closeout Rpt		11/26/96							
	Treatment and Disposal Cert	1.1.2.5				Closeout Rpt		11/26/96							

N/A = Not Applicable

5.0 FIELD CHANGES AND CONTRACT MODIFICATIONS

5.1 FIELD CHANGES

During field operations, weekly progress meetings were held with the Navy Technical Representative (NTR). During these meetings, items of concern and project status were discussed. Field changes were discussed and implemented when conditions dictated. The following is a summary of changes agreed to by OHM and the Navy with a brief explanation:

Immunoassay test kits were used to delineate the horizontal limits of the hazardous areas of concern.

5.2 CONTRACT MODIFICATIONS

There were no contract modifications to this delivery order.

6.0 SUMMARY OF CHEMICAL TESTING

6.1 SAMPLING AND ANALYSIS OVERVIEW

Various matrices including excavated soil, backfill material, water treatment system effluent, and activated carbon were sampled and analyzed during the remediation activities at Harvey Point Defense Testing Facility- Hertford, North Carolina. The purpose of the sampling was to (1) guide soil excavation activities and minimize contaminated soil removal; (2) determine when remedial action goals had been achieved; and/or (3) characterize residuals for transportation, recycling or disposal Samples were collected and analyzed following the protocols presented in Table A-1 of the final Sampling and Analysis Plan.

The main categories of sampling and analysis performed included on-site field screening using immunoassay test kits and off-site confirmation analysis at a fixed base laboratory. OHM's Analytical Division (OHM-AD) laboratory located in Findlay, Ohio performed chemical analysis of the samples shipped off-site. OHM-AD is certified by NEESA and is approved by the State of North Carolina. Off-site analytical results were reported within approximately 24 hours of the sample receipt. Analytical data was subsequently validated by Chemworld Environmental, Inc., an independent third-party data evaluation agency located in Rockville, Maryland. The data was evaluated following the guidelines presented in NEESA 20.2-047B (NEESA, 1988), the National Functional Guidelines for validation of Organics (USEPA, 1991) and Inorganics (USEPA, 1988), and Quality Assurance in Environmental Analysis, (NEESA, 1990)..

The specific sampling and analysis events listed below were conducted to ensure that the project requirements were met. Analytical results of the samples are presented in Appendix H.

- Waste Characterization for Disposal
- Field Screening using Immunoassay Test Kits
- Confirmation Sampling of the Excavated Area
- QC Sampling and Data Validation

6.2 SAMPLE IDENTIFICATION AND HANDLING

Soil samples were collected from Ranges A, B and D. As contaminated soils were removed, representative soil samples were collected from each area for field testing and off-site laboratory analysis. Grab samples were collected using stainless steel spoons and bowls. Samples were homogenized thoroughly before containerizing.

All samples collected were identified with a unique sample designation following the protocol described in the Sampling and Analysis Plan with one exception. The rinsate blank samples were identified with "RN" in the identification instead of "RB" suffix as stated by the plans. The analytical laboratory and the data evaluation agency were informed about the change. The designations served to identify the site, location, specific sample number and any other information such as quality control or blank spike.

Sampling equipment was thoroughly decontaminated between samples using cleaning procedures described in the Sampling and Analysis Plan. Field sampling personnel used disposable gloves during sampling. All environmental samples as well as the QA/QC samples were preserved to a temperature of 4 plus or minus 2° centigrade after collection and during overnight shipment to the off-site analytical laboratory. All samples were analyzed within prescribed holding times. The field chemist recorded results of the field tests, along with the sample identification number, date and time of sampling, and results of off-site laboratory analysis.

All off-site laboratory samples were sent under a Chain-Of-Custody which are presented in Appendix G. All laboratory analytical results are presented in Appendix H, and the Quality Control report generated from the data validation process is presented in Appendix F.

6.3 WASTE CHARACTERIZATION

Several samples were obtained for characterizing materials for disposal, recycling, or discharge purposes. Included were the TSCA regulated soil (>50 mg/kg PCB), the non-TSCA regulated soil (< 50 mg/kg PCB), water treatment residuals (activated carbon), and contractor generated waste including PPE. Additionally, the soil backfill material was also tested to determine its suitability for fill at the HPDTF. The following sections present a summary of the sampling and analysis performed for each matrix.

Initial Soil Characterization

As described in Section 2.2.2, OHM obtained characterization data on various soils at the HPDTF for disposal purposes. The soils fit into one of two categories: TSCA regulated soil (> 50 mg/kg PCBs) and non TSCA regulated (< 50 mg/kg PCBs). It was not necessary for the initial characterization work to be repeated for Phase II activities. Waste profiles and disposal approvals were completed and accepted using the initial information.

Water Treatment System Effluent

Surface water from the three ranges was removed and stored in a 50,000 gallon holding pool erected by OHM. Rain water from the open excavations and decontamination water

was also added to this water for treatment. Approximately 25,000 gallons of water was treated using activated carbon adsorption prior to discharge. Prior to discharge, a representative grab sample was collected from the effluent of the water treatment unit. The water sample was tested for PCBs for discharge compliance. The effluent results showed non-detectable concentrations of PCBs in the water. Based on these results, the treated effluent was discharged to the ground as specified by the NTR.

Activated Carbon

Following carbon treatment of the accumulated waters (surface water, rainwater, decon water), a representative sample of the activated carbon was removed and analyzed for characterization purposes. The sample was analyzed for PCBs using EPA Method 8080 to determine disposal alternatives. The sample results indicated non-detectable levels of PCBs in the sample. The 4,000 lbs of carbon residual was subsequently regenerated off-site as a non-TSCA regulated material.

Backfill Material

Excavated areas at Ranges A, B and D were backfilled with borrow soils obtained from on off-site source and vendor A representative grab sample was collected of the backfill soils and analyzed for TCLP volatile organic compounds, semi-volatiles, pesticides, herbicides and metals, total PCBs, and reactivity, corrosivity, and ignitability. Analytical results indicated that the material was suitable for use as backfill. A copy of the results were forwarded to the base.

6.4 FIELD IMMUNOASSAY TEST KIT SCREENING

During excavation of the contaminated soil, field screening was conducted using Ensys PCB immunoassay test kits to help delineate soils containing different concentrations of PCBs. Grab samples were collected at a frequency of every 500 square feet from the floor of the excavation and every 50 linear feet or fraction thereof along the sidewalls. Given the higher cost of disposing TSCA regulated soil (> 50 mg/kg), the screening kits proved to be a valuable tool to: (1) differentiate soils during the excavation process; and (2) determine when remedial goals were achieved. Soil action levels for the kits were 1 mg/kg PCB for the floor, 10 mg/kg PCB for the sidewalls of the excavation, and 50 mg/kg to differentiate TSCA from non-TSCA regulated soils.

Figures 6.1, 6.2, and 6.3 show the initial boundary (as defined by the Engineer in the preconstruction design documents) and actual excavation limits for Range areas A, B, and D. The actual limits were documented by a licensed land surveyor as shown. As the excavation proceeded along the initial limits for each area, a map was produced showing all sample points and their corresponding concentrations to confirm the horizontal boundaries. The walls of the excavation were sloped and therefore were accessible for

sampling within the open excavation. The first few inches of the sample were discarded prior to collecting the grab sample. Samples were collected using a clean stainless steel spoon and bowl. The samples were thoroughly homogenized before containerization.

The > 50 mg/kg TSCA regulated soils were excavated first. Once the soil was removed to the predetermined limits, the perimeter was field screened to verify that the appropriate amount of soil had been removed. If the test kit results exceeded 50 mg/kg PCBs, the NTR was informed by the Project Manager that additional soil volumes were required to be excavated. Contaminated soils were removed to the limits as specified by the NTR.

Excavation then proceeded outward to the lesser contaminated areas. If the sidewall sample results exceeded 10 mg/kg PCBs or the floor sample results exceeded 1 mg/kg based on the test kits, additional soil volumes were excavated at the direction of the NTR Screened samples which indicated concentrations below the Remediation goals were sent off-site for laboratory confirmation analysis as discussed in Section 6.5. A total of 213 samples were field screened using the Immunoassay test kits. Table 6.1 summarizes the field screening sample data including results from each of the Range areas.

To satisfy the Quality Control requirements of the method, one blank and three calibration standards were analyzed by the immunoassay test kits per set of samples. The calibration standards were at 1, 10 and 50 mg/kg. Duplicates were analyzed at a rate of 5 percent (once every 20 samples).

6.5 CONFIRMATION SAMPLING

At each sample point, a split sample was collected. When the field screening results indicated that the soil PCB concentration was below the appropriate threshold for floor and sidewalls (1 mg/kg PCBs and 10 mg/kg PCBs respectively), the split sample was sent off-site for confirmation analysis.

Grab samples were collected at a frequency of every 500 square feet from the floor of the excavation and every 50 linear feet or fraction thereof along the sidewalls for confirmation analysis. The sidewall samples were collected at a point that was halfway between the floor and the top of the excavation. For the floor samples, the total area (square feet) was divided by 500 to determine the number of samples to be collected. The walls of the excavation were sloped and accessible for sampling within the hole. The first few inches of the sample was discarded prior to collecting each grab sample. The samples were collected using clean stainless steel spoon and bowl, and were thoroughly homogenized before containerizing. The samples were packed and shipped overnight to OHM-AD laboratory for analysis following procedures described in the Sampling and Analysis Plan.

A total of 282 confirmation samples (including QC samples) were sent to OHM-AD for analysis. This number included resampled areas following additional excavation. Figures 6.4, 6.5, and 6.6 show the locations of these confirmation samples relative to their respective Range area A, B, or D. Sample results are summarized in Table 6.2.

6.6 CONFIRMATION SAMPLE DATA VALIDATION

Confirmation sample results from OHM-AD that indicated that remedial goals were met were submitted to a third party data validator as specified in Remedial Action Work Plan. A total of 207 confirmation samples were subjected to data validation. This work was performed by Chemworld Environmental, Inc. The data are acceptable as reported.

Table 6.1

Range	Location	Sample ID No.	Sampling Date	Conc. Field Screen (ppm)
B	Sidewall inner perimeter	HP-FS-001	9/16/96	1-5
B	Sidewall inner perimeter	HP-FS-002	9/16/96	5-10
B	Sidewall inner perimeter	HP-FS-003	9/16/96	5-10
B	Floor	HP-FS-004	9/16/96	5-10
B	Duplicate of HP-CS-004	HP-FS-DUP1	9/16/96	5-10
B	Floor	HP-FS-005	9/16/96	10-50
B	Rinsate of sampling equipment collected for 9/16/96			NA
B	Collected at HP-FS-005 after further excavation of non haz. waste			1-5
B	Collected at HP-FS-005R after receiving lab results and after further excavation			NA
B	Sidewall inner perimeter	HP-FS-006	9/17/96	10-50
B	Sidewall inner perimeter	HP-FS-007	9/17/96	5-10
B	Sidewall inner perimeter	HP-FS-008	9/17/96	>50
B	Sidewall inner perimeter	HP-FS-009	9/17/96	1-5
B	Sidewall inner perimeter	HP-FS-010	9/17/96	5-10
NA	Rinsate of sampling equipment collected for 9/17/96			NA
B	Collected at HP-FS-008 after further excavation of haz. waste	HP-FS-011	9/19/96	<1
B	Sidewall outer perimeter	HP-FS-012	9/19/96	<1
B	Sidewall outer perimeter	HP-FS-013	9/19/96	<1
B	Sidewall outer perimeter	HP-FS-014	9/19/96	<1
B	Sidewall outer perimeter	HP-FS-015	9/19/96	<1
B	Sidewall outer perimeter	HP-FS-016	9/19/96	<1
B	Sidewall outer perimeter	HP-FS-017	9/19/96	<1
B	Sidewall outer perimeter	HP-FS-018	9/19/96	1-5
B	Sidewall outer perimeter	HP-FS-019	9/19/96	<1
B	Sidewall outer perimeter	HP-FS-020	9/19/96	<1
B	Floor	HP-FS-021	9/19/96	<1
B	Floor	HP-FS-022	9/19/96	1-5
B	Collected at HP-FS-022 after receiving lab results and after further excavation			NA
B	Floor	HP-FS-023	9/19/96	<1
B	Floor	HP-FS-024	9/19/96	<1
B	Duplicate of HP-FS-024	HP-FS-DUP2	9/19/96	<1
NA	Rinsate of sampling equipment collected for 9/19/96			NA
B	Floor	HP-FS-025	9/19/96	<1
B	Floor	HP-FS-026	9/19/96	<1
B	Floor	HP-FS-027	9/19/96	<1
B	Floor	HP-FS-028	9/20/96	5-10
B	Floor	HP-FS-029	9/20/96	<1
B	Collected at HP-FS-029 after receiving lab results and after further excavation			NA
B	Floor	HP-FS-030	9/20/96	<1

Table 6.1

Range	Location	Sample ID No.	Sampling Date	Conc. Field Screen (ppm)
B	Collected at HP-FS-030 after receiving lab results and after further excavation			NA
B	Floor	HP-FS-031	9/20/96	<1
B	Floor	HP-FS-032	9/20/96	<1
B	Floor	HP-FS-033	9/20/96	1-5
B	Collected at HP-FS-033 after receiving lab results and after further excavation			NA
B	Floor	HP-FS-034	9/20/96	<1
B	Floor	HP-FS-035	9/20/96	1-5
B	Floor	HP-FS-036	9/20/96	<1
B	Floor	HP-FS-037	9/20/96	<1
B	Floor	HP-FS-038	9/20/96	<1
B	Floor	HP-FS-039	9/20/96	1-5
B	Collected at HP-FS-039 after receiving lab results and after further excavation			NA
B	Floor	HP-FS-040	9/20/96	<1
B	Collected at HP-FS-040 after receiving lab results and after further excavation			NA
B	Duplicate of HP-FS-040	HP-FS-040D	9/20/96	<1
NA	Rinsate of sampling equipment collected for 9/20/96			NA
B	Sidewall of circular area	HP-FS-041	9/20/96	<1
B	Sidewall of circular area	HP-FS-042	9/20/96	<1
B	Floor of circular area	HP-FS-043	9/21/96	<1
B	Floor of circular area	HP-FS-044	9/21/96	<1
B	Duplicate of HP-FS-044	HP-FS-044D	9/21/96	<1
D	Sidewall inner perimeter	HP-FS-045	9/22/96	10-50
D	Floor	HP-FS-046	9/22/96	<1
D	Collected at HP-CS-46 after receiving lab. results and after further excavation			NA
D	Floor	HP-FS-047	9/22/96	10-50
D	Collected at HP-FS-047after further excavation of non-hazardous waste			NA
D	Collected at HP-FS-047R after receiving lab results and after further excavation			NA
D	Collected at HP-FS-047RR after receiving lab results and after further excavation			NA
D	Sidewall inner perimeter	HP-FS-048	9/22/96	10-50
D	Duplicate of HP-FS-048	HP-FS-048D	9/22/96	10-50
D	Sidewall inner perimeter	HP-FS-049	9/22/96	10-50
D	Sidewall inner perimeter	HP-FS-050	9/22/96	10-50
D	Sidewall inner perimeter	HP-FS-051	9/22/96	1-10
D	Sidewall inner perimeter	HP-FS-052	9/22/96	10-50
D	Floor	HP-FS-053	9/22/96	1-10
D	Collected at HP-FS-053 after receiving lab results and after further excavation			NA
D	Collected at HP-FS-053R after receiving lab results and after further excavation			NA
NA	NA	HP-FS-054	NA	NA
D	Sidewall inner perimeter	HP-FS-055	9/22/96	1-10

Table 6.1

Range	Location	Sample ID No.	Sampling Date	Conc. Field Screen (ppm)
D	Floor	HP-FS-056	9/22/96	<1
D	Sidewall inner perimeter	HP-FS-057	9/22/96	<1
D	Floor	HP-FS-058	9/22/96	<1
D	Sidewall inner perimeter	HP-FS-059	9/22/96	1-10
D	Floor	HP-FS-060	9/22/96	1-10
D	Collected at HP-FS-060 after receiving lab results and after further excavation			NA
D	Collected at HP-FS-060R after receiving lab results and after further excavation			NA
D	Sidewall inner perimeter	HP-FS-061	9/22/96	1-10
D	Duplicate of HP-FS-061	HP-FS-061D	9/22/96	1-10
D	Floor	HP-FS-062	9/22/96	1-10
D	Collected at HP-FS-062 after receiving lab results and after further excavation			NA
NA	Rinsate of sampling equipment collected for 9/22/96			NA
A	Sidewall inner perimeter	HP-FS-063	9/23/96	>50
A	Collected at HP-FS-063 after further excavation of haz. waste	HP-FS-063R	9/26/96	<1
A	Sidewall inner perimeter	HP-FS-064	9/23/96	10-50
A	Collected at HP-FS-064 after further excavation of non haz. waste			NA
A	Sidewall inner perimeter	HP-FS-065	9/23/96	1-10
A	Sidewall inner perimeter	HP-FS-066	9/23/96	>50
A	Collected at HP-FS-066 after further excavation of haz. waste	HP-FS-066R	9/26/96	!-5
A	Recollected at HP-FS-066R after further excavation of haz. waste	HP-FS-066R	9/26/96	!-5
A	Sidewall inner perimeter	HP-FS-067	9/23/96	>50
A	Collected at HP-FS-067 after further excavation of haz. waste	HP-FS-067R	9/26/96	<1
A	Sidewall inner perimeter	HP-FS-068	9/23/96	<1
A	Floor	HP-FS-069	9/23/96	>50
A	Collected at HP-FS-069 after further excavation of haz. waste			NA
A	Floor	HP-FS-070	9/23/96	>50
A	Collected at HP-FS-070 after further excavation of haz. waste			NA
A	Duplicate of HP-CS-070R			NA
A	Floor	HP-FS-071	9/23/96	>50
A	Collected at HP-FS-071 after further excavation of haz. waste			NA
A	Collected at HP-FS-071R after receiving lab results and after further excavation			NA
A	Floor	HP-FS-072	9/23/96	10-50
A	Collected at HP-FS-072 after further excavation of non haz. waste			NA
A	Floor	HP-FS-073	9/23/96	5-10
A	Collected at HP-FS-073			NA
A	Floor	HP-FS-074	9/23/96	<1
A	Duplicate of HP-FS-074	HP-FS-074D	9/23/96	1-5
A	Collected at HP-FS-074D after receiving lab results and after further excavation			NA
A	Collected at HP-FS-074R after receiving lab results and after further excavation			NA

Table 6.1

Range	Location	Sample ID No.	Sampling Date	Conc. Field Screen (ppm)
NA	Rinsate of sampling equipment collected for 10/5/96			NA
A	Floor	HP-FS-075	9/23/96	10-50
A	Collected at HP-FS-075 after further excavation of non haz. waste			NA
A	Floor	HP-FS-076	9/23/96	5-10
A	Collected at HP-FS-076 after receiving lab results and after further excavation			NA
A	Collected at HP-FS-076R after receiving lab results and after further excavation			NA
A	Floor	HP-FS-077	9/23/96	5-10
A	Collected at HP-FS-077 after receiving lab results and after further excavation			NA
A	Floor	HP-FS-078	9/23/96	>50
A	Collected at HP-FS-078 after further excavation of haz. waste			NA
A	Floor	HP-FS-079	9/23/96	1-5
A	Collected at HP-FS-079 after receiving lab results and after further excavation			NA
A	Floor	HP-FS-080	9/23/96	>50
A	Collected at HP-FS-080 after further excavation of haz. waste			NA
A	Floor	HP-FS-081	9/23/96	<1
A	Duplicate of HP-FS-081	HP-FS-081D	9/23/96	<1
A	Collected at HP-FS-081D after receiving lab results and after further excavation			NA
A	Floor	HP-FS-082	9/23/96	1-5
NA	Rinsate of sampling equipment collected for 9/23/96			NA
A	Floor	HP-FS-083	9/24/96	10-50
A	Collected at HP-FS-083 after further excavation of non haz. waste			NA
A	Floor	HP-FS-084	9/24/96	1-5
A	Collected at HP-FS-084 after receiving lab results and after further excavation			NA
A	Floor	HP-FS-085	9/24/96	10-50
A	Collected at HP-FS-085 after further excavation of non haz. waste			NA
A	Collected at HP-FS-085R after receiving lab results and after further excavation			NA
A	Floor	HP-FS-086	9/24/96	10-50
A	Collected at HP-FS-086 after further excavation of non haz. waste			NA
A	Floor	HP-FS-087	9/24/96	1-5
A	Collected at HP-FS-087 after receiving lab results and after further excavation			NA
A	Collected at HP-FS-087R after receiving lab results and after further excavation			NA
A	Floor	HP-FS-088	9/24/96	10-50
A	Collected at HP-FS-088 after further excavation of non haz. waste			NA
A	Floor	HP-FS-089	9/24/96	10-50
A	Collected at HP-FS-089 after further excavation of non haz. waste			NA
A	Duplicate of HP-CS-089R			NA
A	Floor	HP-FS-090	9/24/96	10-50
A	Collected at HP-FS-090 after further excavation of non haz. waste			NA
A	Floor	HP-FS-091	9/24/96	10-50

Table 6.1

Range	Location	Sample ID No.	Sampling Date	Conc. Field Screen (ppm)
A	Collected at HP-FS-091 after further excavation of non haz. waste			NA
A	Floor	HP-FS-092	9/24/96	<1
A	Collected at HP-FS-092 after receiving lab results and after further excavation			NA
A	Collected at HP-FS-092R after receiving lab results and after further excavation			NA
A	Floor	HP-FS-093	9/24/96	10-50
A	Collected at HP-FS-093 after further excavation of non haz. waste			NA
A	Duplicate of HP-FS-093	HP-FS-093D	9/24/96	10-50
A	Sidewall inner perimeter	HP-FS-094	9/24/96	10-50
A	Collected at HP-FS-094 after further excavation of non haz. waste			NA
A	Sidewall inner perimeter	HP-FS-095	9/24/96	10-50
A	Collected at HP-FS-095 after further excavation of non haz. waste			NA
A	Sidewall outer perimeter	HP-FS-096	9/26/96	<1
A	Sidewall outer perimeter	HP-FS-097	9/26/96	<1
A	Sidewall outer perimeter	HP-FS-098	9/26/96	<1
A	Sidewall outer perimeter	HP-FS-099	9/26/96	<1
A	Sidewall outer perimeter	HP-FS-100	9/26/96	<1
A	Collected at HP-FS-100 after receiving lab results and after further excavation			NA
NA	Rinsate of sampling equipment collected for 10/3/96			NA
A	Sidewall outer perimeter	HP-FS-101	9/26/96	<1
A	Sidewall outer perimeter	HP-FS-102	9/26/96	<1
A	Duplicate of HP-FS-102	HP-FS-102D	9/26/96	NA
A	Sidewall outer perimeter	HP-FS-103	9/26/96	<1
A	Duplicate of HP-FS-103	HP-FS-103D	9/26/96	<1
A	Sidewall outer perimeter	HP-FS-104	9/26/96	5-10
A	Collected at HP-FS-104 after receiving lab results and after further excavation			NA
A	Sidewall outer perimeter	HP-FS-105	9/26/96	>50
A	Collected at HP-FS-105 after further excavation of haz. waste			NA
A	Sidewall outer perimeter	HP-FS-106	9/26/96	<1
NA	Rinsate of sampling equipment collected for 9/26/96			NA
D	Sidewall outer perimeter	HP-FS-107	9/27/96	5-10
D	Collected at HP-FS-107 after receiving lab results and after further excavation			NA
NA	Rinsate of sampling equipment collected for 10/4/96			NA
D	Sidewall outer perimeter	HP-FS-108	9/27/96	5-10
D	Floor	HP-FS-109	9/27/96	1-5
D	Sidewall outer perimeter	HP-FS-110	9/27/96	1-5
D	Sidewall outer perimeter	HP-FS-111	9/27/96	1-5
D	Sidewall outer perimeter	HP-FS-112	9/27/96	1-5
D	Sidewall outer perimeter	HP-FS-113	9/27/96	10-50
D	Collected at HP-FS-113 after further excavation of non haz. waste			NA

Table 6.1

Range	Location	Sample ID No.	Sampling Date	Conc. Field Screen (ppm)
D	Floor	HP-FS-114	9/27/96	<1
D	Floor	HP-FS-115	9/27/96	>50
D	Collected at HP-FS-115 after further excavation of haz. waste			NA
D	Floor	HP-FS-116	9/27/96	<1
D	Floor	HP-FS-117	9/27/96	1-5
D	Duplicate of HP-FS-117	HP-FS-117D	9/27/96	10-50
D	Collected at HP-FS-117D after further excavation of non haz. waste			NA
A	Floor	HP-FS-118	9/27/96	1-5
A	Collected at HP-FS-118 after receiving lab results and after further excavation			NA
A	Floor	HP-FS-119	9/27/96	5-10
A	Collected at HP-FS-119 after receiving lab results and after further excavation			NA
A	Collected at HP-FS-119R after receiving lab results and after further excavation			NA
A	Floor	HP-FS-120	9/27/96	1-5
A	Collected at HP-FS-120 after receiving lab results and after further excavation			NA
A	Collected at HP-FS-120R after receiving lab results and after further excavation			NA
NA	Rinsate of sampling equip for 10/9/96			NA
A	Floor	HP-FS-121	9/27/96	1-5
A	Floor	HP-FS-122	9/27/96	1-5
A	Floor	HP-FS-123	9/27/96	1-5
A	Duplicate of HP-CS-123			NA
A	Floor	HP-FS-124	9/27/96	<1
A	Floor	HP-FS-125	9/27/96	<1
A	Duplicate of HP-FS-125	HP-FS-125D	9/27/96	<1
A	Floor	HP-FS-126	9/27/96	<1
A	Floor	HP-FS-127	9/27/96	10-50
A	Collected at HP-FS-127 after further excavation of non haz. waste			NA
A	Recollected at HP-FS-127R after receiving lab results and after further excavation			NA
A	Floor	HP-FS-128	9/27/96	1-5
A	Floor	HP-FS-129	9/27/96	10-50
A	Collected at HP-FS-129 after further excavation of non haz. waste			NA
A	Recollected at HP-FS-129R after receiving lab results and after further excavation			NA
NA	Rinsate of sampling equipment collected for 9/30/96			NA
A	Floor	HP-FS-130	9/27/96	5-10
A	Floor	HP-FS-131	9/27/96	1-5
A	Floor	HP-FS-132	9/27/96	<1
A	Floor	HP-FS-133	9/27/96	<1
A	Collected at HP-FS-133 after receiving lab results and after further excavation			NA
A	Floor	HP-FS-134	9/27/96	>50
A	Collected at HP-FS-134R after further excavation of haz. waste			NA

Table 6.1

Range	Location	Sample ID No.	Sampling Date	Conc. Field Screen (ppm)
A	Collected at HP-FS-134R after receiving lab results and after further excavation (See COC)			NA
NA	Rinsate of sampling equipment for 10/7/96			NA
A	Floor	HP-FS-135	9/27/96	>50
A	Collected at HP-FS-135 after further excavatioin of haz. waste			NA
A	Duplicate of HP-FS-135D			NA
A	Collected at HP-FS-135R after receiving lab results and after further excavation	HP-FS-135RR		NA
A	Floor	HP-FS-136	9/27/96	>50
A	Collected at HP-FS-136 after further excavatoin of haz. waste			NA
A	Floor	HP-FS-137	9/27/96	>50
A	Collected at HP-FS-137 after further excavatoin of haz. waste			NA
D	Floor	HP-FS-138	9/28/96	<1
D	Duplicate of HP-FS-138	HP-FS-138D	9/28/96	<1
D	Collected at HP-FS-138D after receiving lab results and after further excavation			NA
D	Floor	HP-FS-139	9/28/96	<1
D	Sidewall outer perimeter	HP-FS-140	9/28/96	<1
D	Sidewall outer perimeter	HP-FS-141	9/28/96	1-5
D	Collected at HP-FS-141 after receiving lab results and after further excavation			NA
D	Sidewall outer perimeter	HP-FS-142	9/28/96	1-5
D	Sidewall outer perimeter	HP-FS-143	9/28/96	1-5
D	Sidewall outer perimeter	HP-FS-144	9/28/96	<1
D	Sidewall outer perimeter	HP-FS-145	9/28/96	<1
D	Sidewall outer perimeter	HP-FS-146	9/28/96	1-5
D	Collected at HP-FS-146 after receiving lab results and after further excavation			NA
D	Sidewall outer perimeter	HP-FS-147	9/28/96	<1
D	Sidewall outer perimeter	HP-FS-148	9/28/96	1-5
D	Sidewall outer perimeter	HP-FS-149	9/28/96	1-5
D	Duplicate of HP-FS-149	HP-FS-149D	9/28/96	1-5
D	Collected atHP-FS-149D after receiving lab results and after further excavation			NA
D	Sidewall outer perimeter	HP-FS-150	9/28/96	<1
D	Sidewall outer perimeter	HP-FS-151	9/28/96	<1
D	Sidewall outer perimeter	HP-FS-152	9/28/96	<1
D	Sidewall outer perimeter	HP-FS-153	9/28/96	1-5
D	Sidewall outer perimeter	HP-FS-154	9/28/96	<1
D	Sidewall outer perimeter	HP-FS-155	9/28/96	<1
D	Sidewall outer perimeter	HP-FS-156	9/28/96	1-5
D	Collected at HP-FS-156 after receiving lab results and after further excavation			NA
D	Collected at HP-FS-156R after receiving lab results and after further excavation			NA
D	Sidewall outer perimeter	HP-FS-157	9/28/96	1-5
D	Collected at HP-FS-157 after receiving lab results and after further excavation			NA

Table 6.1

Range	Location	Sample ID No.	Sampling Date	Conc. Field Screen (ppm)
D	Collected at HP-FS-157R after receiving lab results and after further excavation			NA
D	Sidewall outer perimeter	HP-FS-158	9/28/96	1-5
D	Sidewall outer perimeter	HP-FS-159	9/28/96	1-5
D	Duplicate of HP-FS-159	HP-FS-159D	9/28/96	1-5
D	Collected at HP-FS-159D after receiving lab results and after further excavation			NA
D	Duplicate of HP-CS-159R			NA
D	Floor	HP-FS-160	9/28/96	1-5
D	Collected at HP-FS-160 after receiving lab results and after further excavation			NA
D	Floor	HP-FS-161	9/28/96	1-5
D	Floor	HP-FS-162	9/28/96	1-5
D	Collected at HP-FS-162 after receiving lab results and after further excavation			NA
D	Floor	HP-FS-163	9/28/96	5-10
D	Collected at HP-FS-163 after receiving lab results and after further excavation			NA
D	Floor	HP-FS-164	9/28/96	<1
D	Collected at HP-FS-164 after receiving lab results and after further excavation			NA
D	Collected at HP-FS-164R after receiving lab results and after further excavation			NA
D	Floor	HP-FS-165	9/28/96	<1
D	Collected at HP-FS-165 after receiving lab results and after further excavation			NA
D	Floor	HP-FS-166	9/28/96	1-5
D	Collected at HP-FS-166 after receiving lab results and after further excavation			NA
D	Collected at HP-FS-166R after receiving lab results and after further excavation			NA
D	Duplicate of HP-FS-166RR			NA
D	Floor	HP-FS-167	9/28/96	<1
D	Collected at HP-FS-167 after receiving lab results and after further excavation			NA
D	Recollected at HP-FS-167R after receiving lab results and after further excavation			NA
D	Floor	HP-FS-168	9/28/96	10-50
D	Collected at HP-FS-168 after further excavation of non haz. waste			NA
D	Recollected at HP-FS-168R after receiving lab results and after further excavation			NA
D	Recollected at HP-FS-168R after receiving lab results and after further excavation			NA
D	Floor	HP-FS-169	9/28/96	<1
D	Duplicate of HP-FS-169	HP-FS-169D	9/28/96	<1
D	Floor	HP-FS-170	9/28/96	1-5
D	Collected at HP-FS-170 after receiving lab results and after further excavation			NA
D	Floor	HP-FS-171	9/28/96	1-5
D	Collected at HP-FS-171 after receiving lab results and after further excavation			NA
D	Floor	HP-FS-172	9/29/96	<1
D	Collected at HP-FS-172 after receiving lab results and after further excavation			NA
D	Duplicate of HP-FS-172	HP-FS-172D	9/29/96	<1
D	Floor	HP-FS-173	9/29/96	1-5

Table 6.1

Range	Location	Sample ID No.	Sampling Date	Conc. Field Screen (ppm)
D	Collected at HP-FS-173 after receiving lab results and after further excavation			NA
D	Floor	HP-FS-174	9/29/96	1-5
D	Collected at HP-FS-174 after receiving lab results and after further excavation			NA
D	Floor	HP-FS-175	9/29/96	1-5
D	Collected at HP-FS-175 after receiving lab results and after further excavation			NA
D	Floor	HP-FS-176	9/29/96	<1
D	Collected at HP-FS-176 after receiving lab results and after further excavation			NA
D	Floor	HP-FS-177	9/29/96	1-5
D	Collected at HP-FS-177 after receiving lab results and after further excavation			NA
D	Floor	HP-FS-178	9/29/96	<1
D	Collected at HP-FS-178 after receiving lab results and after further excavation			NA
NA	Rinsate of sampling equipment for 10/7/96			NA
D	Floor	HP-FS-179	9/29/96	1-5
D	Collected at HP-FS-179 after receiving lab results and after further excavation			NA
D	Floor	HP-FS-180	9/29/96	1-5
D	Collected at HP-FS-180 after receiving lab results and after further excavation			NA
D	Floor	HP-FS-181	9/29/96	<1
D	Collected at HP-FS-181 after receiving lab results and after further excavation			NA
D	Floor	HP-FS-182	9/29/96	<1
D	Floor	HP-FS-183	9/29/96	<1
D	Floor	HP-FS-184	9/29/96	<1
D	Floor	HP-FS-185	9/29/96	<1
D	Floor	HP-FS-186	9/29/96	<1
D	Floor	HP-FS-187	9/29/96	<1
D	Sidewall outer perimeter	HP-FS-188	9/29/96	1-5
D	Collected at HP-FS-188 after receiving lab results and after further excavation			NA
D	Sidewall outer perimeter	HP-FS-189	9/29/96	<1
D	Duplicate of HP-FS-189	HP-FS-189D	9/29/96	<1
D	Sidewall outer perimeter	HP-FS-190	9/29/96	1-5
D	Sidewall outer perimeter	HP-FS-191	9/29/96	5-10
D	Collected at HP-FS-191 after receiving lab results and after further excavation			NA
D	Sidewall outer perimeter	HP-FS-192	9/29/96	1-5
D	Floor	HP-FS-193	9/29/96	1-5
D	Collected at HP-FS-193 after receiving lab results and after further excavation			NA
D	Floor	HP-FS-194	9/29/96	1-5
D	Collected at HP-FS-194 after receiving lab results and after further excavation			NA
D	Duplicate of HP-FS-194R			NA
D	Floor	HP-FS-195	9/29/96	5-10
D	Collected at HP-FS-195 after receiving lab results and after further excavation			NA

Table 6.1

Range	Location	Sample ID No.	Sampling Date	Conc. Field Screen (ppm)
D	Collected at HP-FS-195R after receiving lab results and after further excavation			NA
D	Floor	HP-FS-196	9/29/96	1-5
D	Floor	HP-FS-197	9/29/96	1-5
D	Collected at HP-FS-197 after receiving lab results and after further excavation			NA
D	Floor	HP-FS-198	9/29/96	5-10
D	Collected at HP-FS-198 after receiving lab results and after further excavation			NA
D	Collected at HP-FS-198R after receiving lab results and after further excavation			NA
D	Floor	HP-FS-199	9/29/96	1-5
D	Collected at HP-FS-199 after receiving lab results and after further excavation			NA
D	Duplicate of HP-FS-199	HP-FS-199D	9/29/96	1-5
D	Floor	HP-FS-200	9/29/96	10-50
D	Collected at HP-FS-200 after further excavation of non haz. waste			NA
D	Recollected at HP-FS-200R after receiving lab results and after further excavation			NA
D	Floor	HP-FS-201	9/29/96	1-5
D	Collected at HP-FS-201 after receiving lab results and after further excavation			NA
D	Duplicate of HP-FS-201R			NA
D	Floor	HP-FS-202	9/29/96	1-5
D	Collected at HP-FS-202 after receiving lab results and after further excavation			NA
NA	Water source sample from fire hydrant			NA
NA	Backfill soil sample			NA

NA - Not Analyzed

Table 6.2

Range	Location	Sample ID Number	Sampling Date	Conc. Off-Site Laboratory(ppm)
B	Sidewall inner perimeter	HP-CS-001	9/16/96	NA
B	Sidewall inner perimeter	HP-CS-002	9/16/96	NA
B	Sidewall inner perimeter	HP-CS-003	9/16/96	NA
B	Floor	HP-CS-004	9/16/96	0.88
B	Duplicate of HP-CS-004	HP-CS-DUP1	9/16/96	NA
B	Floor	HP-CS-005	9/16/96	NA
NA	Rinsate of sampling equipment collected for 9/16/96	HP-RN-001	9/16/96	Not analyzed
B	Collected at HP-CS-005 after further excavation of non haz. waste	HP-CS-005R	9/20/96	1.54
B	Collected at HP-CS-005R after receiving lab results and after further excavation	HP-CS-005RR	9/26/96	BDL
B	Sidewall inner perimeter	HP-CS-006	9/17/96	NA
B	Sidewall inner perimeter	HP-CS-007	9/17/96	NA
B	Sidewall inner perimeter	HP-CS-008	9/17/96	NA
B	Sidewall inner perimeter	HP-CS-009	9/17/96	NA
B	Sidewall inner perimeter	HP-CS-010	9/17/96	NA
NA	Rinsate of sampling equipment collected for 9/17/96	HP-RN-002	9/18/96	Not analyzed
B	Collected at HP-CS-008 after further excavation of haz. waste	HP-CS-011	9/19/96	NA
B	Sidewall outer perimeter	HP-CS-012	9/19/96	BDL
B	Sidewall outer perimeter	HP-CS-013	9/19/96	BDL
B	Sidewall outer perimeter	HP-CS-014	9/19/96	0.33
B	Sidewall outer perimeter	HP-CS-015	9/19/96	BDL
B	Sidewall outer perimeter	HP-CS-016	9/19/96	BDL
B	Sidewall outer perimeter	HP-CS-017	9/19/96	BDL
B	Sidewall outer perimeter	HP-CS-018	9/19/96	4.19
B	Sidewall outer perimeter	HP-CS-019	9/19/96	BDL
B	Sidewall outer perimeter	HP-CS-020	9/19/96	BDL
B	Floor	HP-CS-021	9/19/96	BDL
B	Floor	HP-CS-022	9/19/96	15.00
B	Collected at HP-CS-022 after receiving lab results and after further excavation	HP-CS-022R	9/26/96	BDL
B	Floor	HP-CS-023	9/19/96	BDL
B	Floor	HP-CS-024	9/19/96	BDL
B	Duplicate of HP-CS-024	HP-CS-DUP2	9/19/96	0.50
NA	Rinsate of sampling equipment collected for 9/19/96	HP-RN-003	9/19/96	BDL
B	Floor	HP-CS-025	9/19/96	0.35
B	Floor	HP-CS-026	9/19/96	BDL
B	Floor	HP-CS-027	9/19/96	.415
B	Floor	HP-CS-028	9/20/96	0.33
B	Floor	HP-CS-029	9/20/96	3.26

Table 6.2

Range	Location	Sample ID Number	Sampling Date	Conc. Off-Site Laboratory(ppm)
B	Collected at HP-CS-029 after receiving lab results and after further excavation	HP-CS-029R	9/26/96	BDL
B	Floor	HP-CS-030	9/20/96	3.53
B	Collected at HP-CS-030 after receiving lab results and after further excavation	HP-CS-030R	9/26/96	BDL
B	Floor	HP-CS-031	9/20/96	BDL
B	Floor	HP-CS-032	9/20/96	0.41
B	Floor	HP-CS-033	9/20/96	1.17
B	Collected at HP-CS-033 after receiving lab results and after further excavation	HP-CS-033R	9/26/96	BDL
B	Floor	HP-CS-034	9/20/96	0.31
B	Floor	HP-CS-035	9/20/96	0.46
B	Floor	HP-CS-036	9/20/96	BDL
B	Floor	HP-CS-037	9/20/96	0.32
B	Floor	HP-CS-038	9/20/96	BDL
B	Floor	HP-CS-039	9/20/96	5.02
B	Collected at HP-CS-039 after receiving lab results and after further excavation	HP-CS-039R	9/26/96	BDL
B	Floor	HP-CS-040	9/20/96	2.22
B	Collected at HP-CS-040 after receiving lab results and after further excavation	HP-CS-040R	9/26/96	BDL
B	Duplicate of HP-CS-040	HP-CS-040D	9/20/96	1.06
NA	Rinsate of sampling equipment collected for 9/20/96	HP-FS-RN4	9/20/96	BDL
B	Sidewall of circular area	HP-CS-041	9/20/96	BDL
B	Sidewall of circular area	HP-CS-042	9/20/96	BDL
B	Floor of circular area	HP-CS-043	9/21/96	BDL
B	Floor of circular area	HP-CS-044	9/21/96	BDL
B	Duplicate of HP-CS-044	HP-CS-044D	9/21/96	BDL
D	Sidewall inner perimeter	HP-CS-045	9/22/96	NA
D	Floor	HP-CS-046	9/22/96	2.22
D	Collected at HP-CS-46 after receiving lab. results and after further excavation	HP-CS-046R	10/11/96	BDL
D	Floor	HP-CS-047	9/22/96	NA
D	Collected at HP-CS-047after further excavation	HP-CS-047R	9/30/96	7.84
D	Collected at HP-CS-047R after receiving lab results and after further excavation	HP-CS-047RR	10/3/96	12.72
D	Collected at HP-CS-047RR after receiving lab results and after further excavation	HP-CS-047RRR	10/11/96	BDL
D	Sidewall inner perimeter	HP-CS-048	9/22/96	NA
D	Duplicate of HP-CS-048	HP-CS-048D	9/22/96	NA
D	Sidewall inner perimeter	HP-CS-049	9/22/96	NA
D	Sidewall inner perimeter	HP-CS-050	9/22/96	NA
D	Sidewall inner perimeter	HP-CS-051	9/22/96	NA
D	Sidewall inner perimeter	HP-CS-052	9/22/96	NA
D	Floor	HP-CS-053	9/22/96	40.40

Table 6.2

Range	Location	Sample ID Number	Sampling Date	Conc. Off-Site Laboratory(ppm)
D	Collected at HP-CS-053 after receiving lab results and after further excavation	HP-CS-053R	9/30/96	7.22
D	Collected at HP-CS-053R after receiving lab results and after further excavation	HP-CS-053RR	10/4/96	BDL
NA	NA	HP-CS-054	NA	NA
D	Sidewall inner perimeter	HP-CS-055	9/22/96	NA
D	Floor	HP-CS-056	9/22/96	.633
D	Sidewall inner perimeter	HP-CS-057	9/22/96	NA
D	Floor	HP-CS-058	9/22/96	BDL
D	Sidewall inner perimeter	HP-CS-059	9/22/96	NA
D	Floor	HP-CS-060	9/22/96	38.80
D	Collected at HP-CS-060 after receiving lab results and after further excavation	HP-CS-060R	9/30/96	5.19
D	Collected at HP-CS-060R after receiving lab results and after further excavation	HP-CS-060RR	10/3/96	BDL
D	Sidewall inner perimeter	HP-CS-061	9/22/96	NA
D	Duplicate of HP-CS-061	HP-CS-061D	9/22/96	NA
D	Floor	HP-CS-062	9/22/96	13.80
D	Collected at HP-CS-062 after receiving lab results and after further excavation	HP-CS-062R	9/30/96	0.83
NA	Rinsate of sampling equipment collected for 9/22/96	HP-FS-RN5	9/23/96	BDL
A	Sidewall inner perimeter	HP-CS-063	9/23/96	NA
A	Collected at HP-CS-063 after further excavation of haz. waste	HP-CS-063R	9/26/96	0.69
A	Sidewall inner perimeter	HP-CS-064	9/23/96	NA
A	Collected at HP-CS-064 after further excavation of non haz. waste	HP-CS-064R	9/30/96	BDL
A	Sidewall inner perimeter	HP-CS-065	9/23/96	NA
A	Sidewall inner perimeter	HP-CS-066	9/23/96	NA
A	Collected at HP-CS-066 after further excavation of haz. waste	HP-CS-066R	9/26/96	1.54
A	Recollected at HP-CS-066R after further excavation of haz. waste	HP-CS-066R	9/26/96	NA
A	Sidewall inner perimeter	HP-CS-067	9/23/96	NA
A	Collected at HP-CS-067 after further excavation of haz. waste	HP-CS-067R	9/26/96	0.47
A	Sidewall inner perimeter	HP-CS-068	9/23/96	NA
A	Floor	HP-CS-069	9/23/96	NA
A	Collected at HP-CS-069 after further excavation of haz. waste	HP-CS-069R	9/30/96	0.43
A	Floor	HP-CS-070	9/23/96	NA
A	Collected at HP-CS-070 after further excavation of haz. waste	HP-CS-070R	9/30/96	BDL
A	Duplicate of HP-CS-070R	HP-CS-070DR	9/30/96	BDL
A	Floor	HP-CS-071	9/23/96	NA
A	Collected at HP-CS-071 after further excavation of haz. waste	HP-CS-071R	9/30/06	1.27
A	Collected at HP-CS-071R after receiving lab results and after further excavation	HP-CS-071RR	10/9/96	BDL
A	Floor	HP-CS-072	9/23/96	NA
A	Collected at HP-CS-072 after further excavation of non haz. waste	HP-CS-072R	9/30/96	0.46

Table 6.2

Range	Location	Sample ID Number	Sampling Date	Conc. Off-Site Laboratory(ppm)
A	Floor	HP-CS-073	9/23/96	BDL
A	Collected at HP-CS-073	HP-CS-073R	9/30/96	BDL
A	Floor	HP-CS-074	9/23/96	0.59
A	Duplicate of HP-CS-074	HP-CS-074D	9/23/96	85.90
A	Collected at HP-CS-074D after receiving lab results and after further excavation	HP-CS-074R	9/30/96	1.27
A	Collected at HP-CS-074R after receiving lab results and after further excavation	HP-CS-074RR	10/5/96	BDL
NA	Rinsate of sampling equipment collected for 10/5/96	HP-RN-010	10/5/96	BDL
A	Floor	HP-CS-075	9/23/96	NA
A	Collected at HP-CS-075 after further excavation of non haz. waste	HP-CS-075R	9/30/96	0.34
A	Floor	HP-CS-076	9/23/96	2.36
A	Collected at HP-CS-076 after further excavation of non haz. waste	HP-CS-076R	9/30/96	2.87
A	Collected at HP-CS-076R after receiving lab results and after further excavation	HP-CS-076RR	10/9/96	BDL
A	Floor	HP-CS-077	9/23/96	260.00
A	Collected at HP-CS-077 after receiving lab results and after further excavation	HP-CS-077R	10/1/96	0.38
A	Floor	HP-CS-078	9/23/96	NA
A	Collected at HP-CS-078 after further excavation of haz. waste	HP-CS-078R	9/30/96	BDL
A	Floor	HP-CS-079	9/23/96	3.56
A	Collected at HP-CS-079 after receiving lab results and after further excavation	HP-CS-079R	9/30/96	0.65
A	Floor	HP-CS-080	9/23/96	NA
A	Collected at HP-CS-080 after further excavation of haz. waste	HP-CS-080R	10/7/96	BDL
A	Floor	HP-CS-081	9/23/96	0.45
A	Duplicate of HP-CS-081	HP-CS-081D	9/23/96	257.00
A	Collected at HP-CS-081D after receiving lab results and after further excavation	HP-CS-081R	10/1/96	BDL
A	Floor	HP-CS-082	9/23/96	BDL
NA	Rinsate of sampling equipment collected for 9/23/96	HP-FS-RN6	9/23/96	6.90
A	Floor	HP-CS-083	9/24/96	NA
A	Collected at HP-CS-083 after further excavation of non haz. waste	HP-CS-083R	9/30/96	BDL
A	Floor	HP-CS-084	9/24/96	72.20
A	Collected at HP-CS-084 after receiving lab results and after further excavation	HP-CS-084R	9/30/96	0.72
A	Floor	HP-CS-085	9/24/96	NA
A	Collected at HP-CS-085 after further excavation of non haz. waste	HP-CS-085R	9/30/96	6.26
A	Collected at HP-CS-085R after receiving lab results and after further excavation	HP-CS-085RR	10/9/96	BDL
A	Floor	HP-CS-086	9/24/96	NA
A	Collected at HP-CS-086 after further excavation of non haz. waste	HP-CS-086R	9/30/96	BDL
A	Floor	HP-CS-087	9/24/96	33.40
A	Collected at HP-CS-087 after receiving lab results and after further excavation	HP-CS-087R	9/30/96	1.51
A	Collected at HP-CS-087R after receiving lab results and after further excavation	HP-CS-087RR	10/9/96	BDL

Table 6.2

Range	Location	Sample ID Number	Sampling Date	Conc. Off-Site Laboratory(ppm)
A	Floor	HP-CS-088	9/24/96	NA
A	Collected at HP-CS-088 after further excavation of non haz. waste	HP-CS-088R	9/30/96	BDL
A	Floor	HP-CS-089	9/24/96	NA
A	Collected at HP-CS-089 after further excavation of non haz. waste	HP-CS-089R	9/30/96	BDL
A	Duplicate of HP-CS-089R	HP-CS-089DR	9/30/96	BDL
A	Floor	HP-CS-090	9/24/96	NA
A	Collected at HP-CS-090 after further excavation of non haz. waste	HP-CS-090R	9/30/96	BDL
A	Floor	HP-CS-091	9/24/96	NA
A	Collected at HP-CS-091 after further excavation of non haz. waste	HP-CS-091R	9/30/96	BDL
A	Floor	HP-CS-092	9/24/96	1.48
A	Collected at HP-CS-092 after receiving lab results and after further excavation	HP-CS-092R	9/30/96	2.27
A	Collected at HP-CS-092R after receiving lab results and after further excavation	HP-CS-092RR	10/7/96	BDL
A	Floor	HP-CS-093	9/24/96	NA
A	Collected at HP-CS-093 after further excavation of non haz. waste	HP-CS-093R	9/30/96	BDL
A	Duplicate of HP-CS-093	HP-CS-093D	9/24/96	NA
A	Sidewall inner perimeter	HP-CS-094	9/24/96	NA
A	Collected at HP-CS-094 after further excavation of non haz. waste	HP-CS-094R	9/30/96	BDL
A	Sidewall inner perimeter	HP-CS-095	9/24/96	NA
A	Collected at HP-CS-095 after further excavation of non haz. waste	HP-CS-095R	9/30/96	BDL
A	Sidewall outer perimeter	HP-CS-096	9/26/96	BDL
A	Sidewall outer perimeter	HP-CS-097	9/26/96	0.47
A	Sidewall outer perimeter	HP-CS-098	9/26/96	3.29
A	Sidewall outer perimeter	HP-CS-099	9/26/96	0.52
A	Sidewall outer perimeter	HP-CS-100	9/26/96	11.70
A	Collected at HP-CS-100 after receiving lab results and after further excavation	HP-CS-100R	10/1/96	0.45
NA	Rinsate of sampling equipment collected for 10/3/96	HP-RN-009	10/3/96	BDL
A	Sidewall outer perimeter	HP-CS-101	9/26/96	BDL
A	Sidewall outer perimeter	HP-CS-102	9/26/96	0.75
A	Duplicate of HP-CS-102	HP-CS-102D	9/26/96	0.38
A	Sidewall outer perimeter	HP-CS-103	9/26/96	1.19
A	Duplicate of HP-CS-103	HP-CS-103D	9/26/96	1.57
A	Sidewall outer perimeter	HP-CS-104	9/26/96	44.60
A	Collected at HP-CS-104 after receiving lab results and after further excavation	HP-CS-104R	10/1/96	0.46
A	Sidewall outer perimeter	HP-CS-105	9/26/96	NA
A	Collected at HP-CS-105 after further excavation of haz. waste	HP-CS-105R	9/30/96	BDL
A	Sidewall outer perimeter	HP-CS-106	9/26/96	2.28
NA	Rinsate of sampling equipment collected for 9/26/96	HP-FS-RN7	9/26/96	0.53

Table 6.2

Range	Location	Sample ID Number	Sampling Date	Conc. Off-Site Laboratory(ppm)
D	Sidewall outer perimeter	HP-CS-107	9/27/96	30.60
D	Collected at HP-CS-107 after receiving lab results and after further excavation	HP-CS-107R	10/4/96	1.47
NA	Rinsate of sampling equipment collected for 10/4/96	HP-RN-010	10/4/96	BDL
D	Sidewall outer perimeter	HP-CS-108	9/27/96	7.72
D	Floor	HP-CS-109	9/27/96	0.87
D	Sidewall outer perimeter	HP-CS-110	9/27/96	0.80
D	Sidewall outer perimeter	HP-CS-111	9/27/96	6.88
D	Sidewall outer perimeter	HP-CS-112	9/27/96	4.52
D	Sidewall outer perimeter	HP-CS-113	9/27/96	NA
D	Collected at HP-CS-113 after further excavation of non haz. waste	HP-CS-113R	9/29/96	2.04
D	Floor	HP-CS-114	9/27/96	BDL
D	Floor	HP-CS-115	9/27/96	NA
D	Collected at HP-CS-115 after further excavation of haz. waste	HP-CS-115R	9/29/96	0.64
D	Floor	HP-CS-116	9/27/96	1.03
D	Floor	HP-CS-117	9/27/96	NA
D	Duplicate of HP-CS-117	HP-CS-117D	9/27/96	NA
D	Collected at HP-CS-117D after further excavation of non haz. waste	HP-CS-117R	9/30/96	BDL
A	Floor	HP-CS-118	9/27/96	2.38
A	Collected at HP-CS-118 after receiving lab results and after further excavation	HP-CS-118R	10/3/96	BDL
A	Floor	HP-CS-119	9/27/96	12.70
A	Collected at HP-CS-119 after receiving lab results and after further excavation	HP-CS-119R	10/4/96	1.60
A	Collected at HP-CS-119R after receiving lab results and after further excavation	HP-CS-119RR	10/9/96	BDL
A	Floor	HP-CS-120	9/27/96	6.39
A	Collected at HP-CS-120 after receiving lab results and after further excavation	HP-CS-120R	10/4/96	5.98
A	Collected at HP-CS-120R after receiving lab results and after further excavation	HP-CS-120RR	10/9/96	BDL
NA	Rinsate of sampling equip for 10/9/96	HP-RN-12	10/9/96	BDL
A	Floor	HP-CS-121	10/7/96	BDL
A	Floor	HP-CS-122	10/7/96	BDL
A	Floor	HP-CS-123	10/7/96	BDL
A	Duplicate of HP-CS-123	HP-CS-123D	10/7/96	BDL
A	Floor	HP-CS-124	10/7/96	BDL
A	Floor	HP-CS-125	9/27/96	NA
A	Duplicate of HP-CS-125	HP-CS-125D	9/27/96	0.55
A	Floor	HP-CS-126	9/27/96	0.20
A	Floor	HP-CS-127	9/27/96	NA
A	Collected at HP-CS-127 after further excavation of non haz. waste	HP-CS-127R	9/30/96	1.67
A	Recollected at HP-CS-127R after receiving lab results and after further excavation	HP-CS-127R	10/7/96	BDL

Table 6.2

Range	Location	Sample ID Number	Sampling Date	Conc. Off-Site Laboratory(ppm)
A	Floor	HP-CS-128	10/7/96	BDL
A	Floor	HP-CS-129	9/27/96	NA
A	Collected at HP-CS-129 after further excavation of non haz. waste	HP-CS-129R	9/30/96	1.10
A	Recollected at HP-CS-129R after receiving lab results and after further excavation	HP-CS-129R	10/7/96	BDL
NA	Rinsate of sampling equipment collected for 9/30/96	HP-RN-008	9/30/96	BDL
A	Floor	HP-CS-130	10/7/96	BDL
A	Floor	HP-CS-131	10/7/96	BDL
A	Floor	HP-CS-132	10/7/96	BDL
A	Floor	HP-CS-133	9/27/96	3.54
A	Collected at HP-CS-133 after receiving lab results and after further excavation	HP-CS-133R	10/3/96	BDL
A	Floor	HP-CS-134	9/27/96	NA
A	Collected at HP-CS-134R after further excavation of haz. waste	HP-CS-134R	9/30/96	BDL
A	Collected at HP-CS-134R after receiving lab results and after further excavation (See COC)	HP-CS-134	10/7/96	BDL
NA	Rinsate of sampling equipment for 10/7/96	HP-RN-11	10/7/96	BDL
A	Floor	HP-CS-135	9/27/96	NA
A	Collected at HP-CS-135 after further excavatioin of haz. waste	HP-CS-135R	9/30/96	1.31
A	Duplicate of HP-CS-135R	HP-CS-135DR	9/30/96	0.73
A	Floor	HP-CS-136	9/27/96	NA
A	Collected at HP-CS-136 after further excavatoin of haz. waste	HP-CS-136R	9/30/96	BDL
A	Floor	HP-CS-137	9/27/96	NA
A	Collected at HP-CS-137 after further excavatoin of haz. waste	HP-CS-137R	9/30/96	BDL
D	Floor	HP-CS-138	9/28/96	BDL
D	Duplicate of HP-CS-138	HP-CS-138D	9/28/96	1.30
D	Collected at HP-CS-138D after receiving lab results and after further excavation	HP-CS-138R	10/5/96	BDL
D	Floor	HP-CS-139	9/28/96	0.61
D	Floor	HP-CS-139	9/28/96	0.61
D	Sidewall outer perimeter	HP-CS-140	9/28/96	BDL
D	Sidewall outer perimeter	HP-CS-141	9/28/96	31.80
D	Collected at HP-CS-141 after receiving lab results and after further excavation	HP-CS-141R	10/3/96	0.43
D	Sidewall outer perimeter	HP-CS-142	9/28/96	1.62
D	Sidewall outer perimeter	HP-CS-143	9/28/96	2.41
D	Sidewall outer perimeter	HP-CS-144	9/28/96	BDL
D	Sidewall outer perimeter	HP-CS-145	9/28/96	1.01
D	Sidewall outer perimeter	HP-CS-146	9/28/96	12.70
D	Collected at HP-CS-146 after receiving lab results and after further excavation	HP-CS-146R	10/5/96	BDL
D	Sidewall outer perimeter	HP-CS-147	9/28/96	7.28
D	Sidewall outer perimeter	HP-CS-148	9/28/96	6.37

Table 6.2

Range	Location	Sample ID Number	Sampling Date	Conc. Off-Site Laboratory(ppm)
D	Sidewall outer perimeter	HP-CS-149	9/28/96	6.55
D	Duplicate of HP-CS-149	HP-CS-149D	9/28/96	10.40
D	Collected atHP-CS-149D after receiving lab results and after further excavation	HP-CS-149R	10/5/96	5.96
D	Sidewall outer perimeter	HP-CS-150	9/28/96	BDL
D	Sidewall outer perimeter	HP-CS-151	9/28/96	2.92
D	Sidewall outer perimeter	HP-CS-152	9/28/96	0.98
D	Sidewall outer perimeter	HP-CS-153	9/28/96	4.67
D	Sidewall outer perimeter	HP-CS-154	9/28/96	1.63
D	Sidewall outer perimeter	HP-CS-155	9/28/96	1.41
D	Sidewall outer perimeter	HP-CS-156	9/28/96	16.10
D	Collected at HP-CS-156 after receiving lab results and after further excavation	HP-CS-156R	10/5/96	16.20
D	Collected at HP-CS-156R after receiving lab results and after further excavation	HP-CS-156RR	10/11/96	BDL
D	Sidewall outer perimeter	HP-CS-157	9/28/96	19.10
D	Collected at HP-CS-157 after receiving lab results and after further excavation	HP-CS-157R	10/5/96	39.60
D	Collected at HP-CS-157R after receiving lab results and after further excavation	HP-CS-157RR	10/11/96	BDL
D	Sidewall outer perimeter	HP-CS-158	9/28/96	8.98
D	Sidewall outer perimeter	HP-CS-159	9/28/96	8.15
D	Duplicate of HP-CS-159	HP-CS-159D	9/28/96	14.07
D	Collected at HP-CS-159D after receiving lab results and after further excavation	HP-CS-159R	10/5/96	BDL
D	Duplicate of HP-CS-159R	HP-CS-DUP-4R	10/5/96	1.90
D	Floor	HP-CS-160	9/28/96	1.68
D	Collected at HP-CS-160 after receiving lab results and after further excavation	HP-CS-160R	10/5/96	BDL
D	Floor	HP-CS-161	9/28/96	0.27
D	Floor	HP-CS-162	9/28/96	5.11
D	Collected at HP-CS-162 after receiving lab results and after further excavation	HP-CS-162R	10/5/96	BDL
D	Floor	HP-CS-163	9/28/96	12.76
D	Collected at HP-CS-163 after receiving lab results and after further excavation	HP-CS-163R	10/5/96	BDL
D	Floor	HP-CS-164	9/28/96	1.27
D	Collected at HP-CS-164 after receiving lab results and after further excavation	HP-CS-164R	10/7/96	5.33
D	Collected at HP-CS-164R after receiving lab results and after further excavation	HP-CS-164RR	10/11/96	BDL
D	Floor	HP-CS-165	9/28/96	6.55
D	Collected at HP-CS-165 after receiving lab results and after further excavation	HP-CS-165R	10/5/96	BDL
D	Floor	HP-CS-166	9/28/96	53.80
D	Collected at HP-CS-166 after receiving lab results and after further excavation	HP-CS-166R	10/5/96	4.85
D	Collected at HP-CS-166R after receiving lab results and after further excavation	HP-CS-166RR	10/11/96	BDL
D	Duplicate of HP-CS-166RR	HP-CS-166RRD	10/11/96	BDL
D	Floor	HP-CS-167	9/28/96	1.89

Table 6.2

Range	Location	Sample ID Number	Sampling Date	Conc. Off-Site Laboratory(ppm)
D	Collected at HP-CS-167 after receiving lab results and after further excavation	HP-CS-167R	10/5/96	7.61
D	Recollected at HP-CS-167R after receiving lab results and after further excavation	HP-CS-167R	10/11/96	BDL
D	Floor	HP-CS-168	9/28/96	NA
D	Collected at HP-CS-168 after further excavation of non haz. waste	HP-CS-168R	10/1/96	13.50
D	Recollected at HP-CS-168R after receiving lab results and after further excavation	HP-CS-168R	10/5/96	1.22
D	Recollected at HP-CS-168R after receiving lab results and after further excavation	HP-CS-168RR	10/11/96	BDL
D	Floor	HP-CS-169	9/28/96	0.30
D	Duplicate of HP-CS-169	HP-CS-169D	9/28/96	0.79
D	Floor	HP-CS-170	9/28/96	2.76
D	Collected at HP-CS-170 after receiving lab results and after further excavation	HP-CS-170R	10/5/96	BDL
D	Floor	HP-CS-171	9/28/96	3.13
D	Collected at HP-CS-171 after receiving lab results and after further excavation	HP-CS-171R	10/5/96	BDL
D	Floor	HP-CS-172	9/29/96	0.25
D	Collected at HP-CS-172 after receiving lab results and after further excavation	HP-CS-172R	10/11/96	BDL
D	Duplicate of HP-CS-172	HP-CS-172D	9/29/96	0.29
D	Floor	HP-CS-173	9/29/96	6.30
D	Collected at HP-CS-173 after receiving lab results and after further excavation	HP-CS-173R	10/7/96	BDL
D	Floor	HP-CS-174	9/29/96	3.00
D	Collected at HP-CS-174 after receiving lab results and after further excavation	HP-CS-174R	10/7/96	BDL
D	Floor	HP-CS-175	9/29/96	2.61
D	Collected at HP-CS-175 after receiving lab results and after further excavation	HP-CS-175R	10/7/96	BDL
D	Floor	HP-CS-176	9/29/96	0.84
D	Collected at HP-CS-176 after receiving lab results and after further excavation	HP-CS-176R	10/11/96	BDL
D	Floor	HP-CS-177	9/29/96	2.01
D	Collected at HP-CS-177 after receiving lab results and after further excavation	HP-CS-177R	10/11/96	BDL
D	Floor	HP-CS-178	9/29/96	BDL
D	Collected at HP-CS-178 after receiving lab results and after further excavation	HP-CS-178R	10/11/96	BDL
NA	Rinsate of sampling equipment for 10/7/96	HP-RN-013	10/11/96	BDL
D	Floor	HP-CS-179	9/29/96	6.60
D	Collected at HP-CS-179 after receiving lab results and after further excavation	HP-CS-179R	10/7/96	BDL
D	Floor	HP-CS-180	9/29/96	5.20
D	Collected at HP-CS-180 after receiving lab results and after further excavation	HP-CS-180R	10/7/96	BDL
D	Floor	HP-CS-181	9/29/96	3.99
D	Collected at HP-CS-181 after receiving lab results and after further excavation	HP-CS-181R	10/7/96	0.431
D	Floor	HP-CS-182	9/29/96	0.441
D	Floor	HP-CS-183	9/29/96	BDL
D	Floor	HP-CS-184	9/29/96	0.246

Table 6.2

Range	Location	Sample ID Number	Sampling Date	Conc. Off-Site Laboratory(ppm)
D	Floor	HP-CS-185	9/29/96	0.744
D	Floor	HP-CS-186	9/29/96	BDL
D	Floor	HP-CS-187	9/29/96	0.763
D	Sidewall outer perimeter	HP-CS-188	9/29/96	47.9
D	Collected at HP-CS-188 after receiving lab results and after further excavation	HP-CS-188R	10/7/96	9.39
D	Sidewall outer perimeter	HP-CS-189	9/29/96	2.08
D	Duplicate of HP-CS-189	HP-CS-189D	9/29/96	2.94
D	Sidewall outer perimeter	HP-CS-190	9/29/96	3.63
D	Sidewall outer perimeter	HP-CS-191	9/29/96	12.80
D	Collected at HP-CS-191 after receiving lab results and after further excavation	HP-CS-191R	10/7/96	4.65
D	Sidewall outer perimeter	HP-CS-192	9/29/96	4.18
D	Floor	HP-CS-193	9/29/96	1.66
D	Collected at HP-CS-193 after receiving lab results and after further excavation	HP-CS-193R	10/7/96	BDL
D	Floor	HP-CS-194	9/29/96	1.64
D	Collected at HP-CS-194 after receiving lab results and after further excavation	HP-CS-194R	10/7/96	0.57
D	Duplicate of HP-CS-194R	HP-CS-194RD	10/7/96	BDL
D	Floor	HP-CS-195	9/29/96	3.82
D	Collected at HP-CS-195 after receiving lab results and after further excavation	HP-CS-195R	10/7/96	1.32
D	Collected at HP-CS-195R after receiving lab results and after further excavation	HP-CS-195RR	10/11/96	BDL
D	Floor	HP-CS-196	9/29/96	0.64
D	Floor	HP-CS-197	9/29/96	8.02
D	Collected at HP-CS-197 after receiving lab results and after further excavation	HP-CS-197R	10/7/96	BDL
D	Floor	HP-CS-198	9/29/96	14.70
D	Collected at HP-CS-198 after receiving lab results and after further excavation	HP-CS-198R	10/7/96	6.82
D	Collected at HP-CS-198R after receiving lab results and after further excavation	HP-CS-198RR	10/11/96	BDL
D	Floor	HP-CS-199	9/29/96	6.32
D	Collected at HP-CS-199 after receiving lab results and after further excavation	HP-CS-199R	10/7/96	BDL
D	Duplicate of HP-CS-199	HP-CS-199D	9/29/96	3.67
D	Floor	HP-CS-200	9/29/96	NA
D	Collected at HP-CS-200 after further excavation of non haz. waste	HP-CS-200R	10/3/96	BDL
D	Recollected at HP-CS-200R after receiving lab results and after further excavation	HP-CS-200R	10/11/96	
D	Floor	HP-CS-201	9/29/96	9.48
D	Collected at HP-CS-201 after receiving lab results and after further excavation	HP-CS-201R	10/11/96	BDL
D	Duplicate of HP-CS-201R	HP-CS-201RD	10/11/96	BDL
D	Floor	HP-CS-202	9/29/96	8.17
D	Collected at HP-CS-202 after receiving lab results and after further excavation	HP-CS-202R	10/11/96	BDL
NA	Water source sample from fire hydrant	HP-FB-001	9/16/96	BDL

Table 6.2

Range	Location	Sample ID Number	Sampling Date	Conc. Off-Site Laboratory(ppm)
NA	Backfill soil sample	HP-BF-001	9/18/96	BRL
NA	Spent carbon from on-site water treatment unit	HP-CC-001	10/14/96	BRL
NA	Effluent water sample from on-site water treatment unit	HP-WE-001	9/27/96	BRL

NA: Not Applicable
BDL: Below Detection Limits
BRL: Below Regulatory Limits

7.0 OFF-SITE DISPOSAL OF MATERIAL

During Phase I, Stockpile Removal at Range A, all TSCA regulated soils destined for off-site disposal facilities were transported by Dart Trucking, a licensed waste hauler. Two truck loads containing approximately 44 tons of PCB-contaminated soil were transported to USPCI - Grayback Mountain facility located in Clive, Utáh. All non-TSCA regulated soils destined for off-site disposal facilities were transported by HILCO Trucking. Ten truck loads containing approximately 205 tons of <50 mg/kg PCB-contaminated soil were transported to Waste Management Corporation, Piedmont Landfill and Recycling Center in Kernersville, North Carolina.

During Phase II, PCB Removal at Ranges A, B, and D, all TSCA regulated soils destined for off-site disposal facilities were transported by Robbie D. Wood, a licensed waste hauler. Fifty-two truck loads containing approximately 1,233 tons of >50 mg/kg PCB-contaminated soil were transported to Chemical Waste Management in Emelle, Alabama. All non-TSCA regulated soils destined for off-site disposal facilities were transported by HILCO Trucking. One hundred and thirty four truck loads containing approximately 3,317 tons of <50 mg/kg PCB-contaminated soil were transported to Browning-Ferris Industries Sampson County Landfill in Roseboro, North Carolina. A summary of the loads for off-site TSCA regulated waste disposal is presented in Table 7.1 and non-TSCA regulated waste disposal is presented in Table 7.2. All transportation and disposal was performed in accordance with state and federal regulations.

After loading, the trucks were weighed with portable scales to ensure maximum load capacities were within their legal haul limits. The trucks were brushed to remove soil and debris from the vehicle tires and bed, the manifests were signed by HPDTA personnel, and the trucks released for travel to the disposal facility. Copies of the waste manifests are included in this report as Appendix C and disposal certifications are located in Appendix D.

Following water treatment activities, the activated carbon was sampled and characterized for disposal purposes. The carbon was determined to be non-TSCA regulated and was returned to General Carbon for thermal reactivation. The carbon was transported by Titan Express within the two 2,000-pound units during November, 1996. A copy of the bill of lading is provided in Appendix C.

Table 7.1
Summary of TSCA Regulated PCB Soil Disposal

Date	Manifest No.	Alstate No.	Act. Tons	Range	Destination
Phase I					
4/21/96	96111	N/A	23.2	A	USPCI/Laidlaw
4/21/96	96112	N/A	20.44	A	USPCI/Laidlaw
Phase II					
9/17/96	00001	CWMA 832302	24.08	B	CWM, Inc., Emelle, AL
9/17/96	00002	CWMA 832303	23.52	B	CWM, Inc., Emelle, AL
9/17/96	00003	CWMA 832304	20.2	B	CWM, Inc., Emelle, AL
9/17/96	00004	CWMA 832305	24.88	B	CWM, Inc., Emelle, AL
9/17/96	00005	CWMA 832306	26.74	B	CWM, Inc., Emelle, AL
9/17/96	00006	CWMA 832307	23.76	B	CWM, Inc., Emelle, AL
9/17/96	00007	CWMA 832308	23.85	B	CWM, Inc., Emelle, AL
9/17/96	00008	CWMA 832309	24.39	B	CWM, Inc., Emelle, AL
9/17/96	00009	CWMA 832310	23.65	B	CWM, Inc., Emelle, AL
9/17/96	00010	CWMA 832311	24.35	B	CWM, Inc., Emelle, AL
9/17/96	00011	CWMA 832312	23.8	B	CWM, Inc., Emelle, AL
9/23/96	00012	CWMA 832352	23.98	D	CWM, Inc., Emelle, AL
9/23/96	00013	CWMA 832353	20.28	B	CWM, Inc., Emelle, AL
9/23/96	00014	CWMA 832354	20.92	B	CWM, Inc., Emelle, AL
9/23/96	00015	CWMA 832355	24.16	A	CWM, Inc., Emelle, AL
9/23/96	00016	CWMA 832356	22.66	A	CWM, Inc., Emelle, AL
9/23/96	00017	CWMA 832357	23.3	A	CWM, Inc., Emelle, AL
9/23/96	00018	CWMA 832358	22.61	A	CWM, Inc., Emelle, AL
9/23/96	00019	CWMA 832359	21.39	A	CWM, Inc., Emelle, AL
9/23/96	00020	CWMA 832360	24.01	A	CWM, Inc., Emelle, AL
9/23/96	00021	CWMA 832361	24.63	A	CWM, Inc., Emelle, AL
9/24/96	00022	CWMA 832342	25.99	A	CWM, Inc., Emelle, AL
9/24/96	00023	CWMA 832343	23.71	A	CWM, Inc., Emelle, AL
9/24/96	00024	CWMA 832344	24.35	A	CWM, Inc., Emelle, AL
9/24/96	00025	CWMA 832345	23.89	A	CWM, Inc., Emelle, AL
9/24/96	00026	CWMA 832346	24.07	A	CWM, Inc., Emelle, AL
9/24/96	00027	CWMA 832347	24.26	A	CWM, Inc., Emelle, AL
9/24/96	00028	CWMA 832348	23.35	A	CWM, Inc., Emelle, AL
9/26/96	00029	CWMA 832349	24.01	A	CWM, Inc., Emelle, AL
9/26/96	00030	CWMA 832350	23.93	A	CWM, Inc., Emelle, AL
9/26/96	00031	CWMA 832351	24.07	A	CWM, Inc., Emelle, AL
9/26/96	00032	CWMA 832327	23.27	A	CWM, Inc., Emelle, AL
9/26/96	00033	CWMA 832328	23.56	A	CWM, Inc., Emelle, AL

Table 7.1
Summary of TSCA Regulated PCB Soil Disposal

Date	Manifest No.	Alstate No.	Act. Tons	Range	Destination
9/26/96	00034	CWMA 832329	24.18	A	CWM, Inc., Emelle, AL
9/26/96	00035	CWMA 832330	25.41	A	CWM, Inc., Emelle, AL
9/26/96	00036	CWMA 832331	25.93	A	CWM, Inc., Emelle, AL
9/27/96	00037	CWMA 832332	24.38	D	CWM, Inc., Emelle, AL
9/27/96	00038	CWMA 832333	23.28	A	CWM, Inc., Emelle, AL
9/27/96	00039	CWMA 832334	24.52	A	CWM, Inc., Emelle, AL
9/27/96	00040	CWMA 832335	24.62	A	CWM, Inc., Emelle, AL
9/27/96	00041	CWMA 832336	23.83	D/A	CWM, Inc., Emelle, AL
9/27/96	00042	CWMA 832337	22.64	A	CWM, Inc., Emelle, AL
9/27/96	00043	CWMA 832338	25.06	A	CWM, Inc., Emelle, AL
9/28/96	00044	CWMA 832339	23.09	A	CWM, Inc., Emelle, AL
9/28/96	00045	CWMA 832340	17.19	A	CWM, Inc., Emelle, AL
9/28/96	00046	CWMA 832341	24.36	A	CWM, Inc., Emelle, AL
9/29/96	00047	CWMA 832313	23.06	A	CWM, Inc., Emelle, AL
9/30/96	00049	CWMA 832314	24.61	A	CWM, Inc., Emelle, AL
10/1/96	00048	CWMA 832326	27.82	A	CWM, Inc., Emelle, AL
10/1/96	00051	CWMA 832316	22.3	A	CWM, Inc., Emelle, AL
10/2/96	00050	CWMA 832315	22.91	A	CWM, Inc., Emelle, AL
10/3/96	00051B	CWMA 832325	24.42	A	CWM, Inc., Emelle, AL
TOTAL			1276.86		

Table 7.2
Summary of Non-TSCA Regulated PCB Soil Disposal

Date	Manifest No.	BFI No.	Act. Tons	Range	Destination
Phase I					
4/21/96	39147	N/A	21.07	A	WMI Piedmont LF
4/21/96	39142	N/A	22.25	A	WMI Piedmont LF
4/21/96	39143	N/A	14.78	A	WMI Piedmont LF
4/21/96	39144	N/A	23.91	A	WMI Piedmont LF
4/21/96	39146	N/A	26.88	A	WMI Piedmont LF
4/21/96	39134	N/A	17.27	A	WMI Piedmont LF
4/21/96	39136	N/A	18.51	A	WMI Piedmont LF
4/21/96	39145	N/A	17.36	A	WMI Piedmont LF
4/21/96	39135	N/A	22.3	A	WMI Piedmont LF
4/21/96	39137	N/A	20.51	A	WMI Piedmont LF
Phase II					
9/19/96	009638	229182	22.2	B	BFI, Sampson CO LF
9/19/96	009639	229185	22.54	B	BFI, Sampson CO LF
9/19/96	009640	229192	19.15	B	BFI, Sampson CO LF
9/19/96	009641	229223	22.04	B	BFI, Sampson CO LF
9/19/96	009642	229193	23.54	B	BFI, Sampson CO LF
9/19/96	009643	229221	22.95	B	BFI, Sampson CO LF
9/19/96	009644	229224	23.4	B	BFI, Sampson CO LF
9/19/96	009645	229238	24.38	B	BFI, Sampson CO LF
9/19/96	009646	229281	23.97	B	BFI, Sampson CO LF
9/19/96	009647	229222	24	B	BFI, Sampson CO LF
9/19/96	009648	229220	24.07	B	BFI, Sampson CO LF
9/19/96	009649	229183	23.59	B	BFI, Sampson CO LF
9/19/96	009650	229184	22.69	B	BFI, Sampson CO LF
9/20/96	009651	229498	31.38	B	BFI, Sampson CO LF
9/20/96	009652	229534	26.97	B	BFI, Sampson CO LF
9/20/96	009653	229506	24.51	B	BFI, Sampson CO LF
9/20/96	009654	229507	27.92	B	BFI, Sampson CO LF
9/20/96	009657	229508	22.03	B	BFI, Sampson CO LF
9/20/96	009736	229462	18.72	B	BFI, Sampson CO LF
9/20/96	009737	229464	19.29	B	BFI, Sampson CO LF
9/20/96	009738	229453	22.63	B	BFI, Sampson CO LF
9/20/96	009739	229455	20.41	B	BFI, Sampson CO LF
9/20/96	009740	229503	27.89	B	BFI, Sampson CO LF
9/20/96	009741	229494	25.68	B	BFI, Sampson CO LF
9/23/96	009655	230144	25.02	D	BFI, Sampson CO LF

Table 7.2
Summary of Non-TSCA Regulated PCB Soil Disposal

Date	Manifest No.	BFI No.	Act. Tons	Range	Destination
9/20/96	009656	230141	22.65	D	BFI, Sampson CO LF
9/20/96	009742	2301454	21.11	D	BFI, Sampson CO LF
9/23/96	009743	230152	24.43	B	BFI, Sampson CO LF
9/20/96	009744	230146	20.19	B	BFI, Sampson CO LF
9/20/96	009745	230156	17.79	B	BFI, Sampson CO LF
9/23/96	009746	230157	21.89	B	BFI, Sampson CO LF
9/20/96	009747	230164	25.14	B	BFI, Sampson CO LF
9/23/96	009748	230165	25.7	B	BFI, Sampson CO LF
9/24/96	009749	247737	22.89	D	BFI, Sampson CO LF
9/24/96	009750	247737	22.74	D	BFI, Sampson CO LF
9/24/96	009751	247737	26.94	D	BFI, Sampson CO LF
9/24/96	009752	147737	29.02	D	BFI, Sampson CO LF
9/24/96	009753	147737	27.06	D	BFI, Sampson CO LF
9/24/96	009754	147737	26.41	D	BFI, Sampson CO LF
9/24/96	009755	147737	24.96	D	BFI, Sampson CO LF
9/24/96	009756	147737	25.84	D	BFI, Sampson CO LF
9/25/96	009757	230225	26.86	D	BFI, Sampson CO LF
9/25/96	009759	230221	25.87	D	BFI, Sampson CO LF
9/25/96	009757	230226	27.22	D	BFI, Sampson CO LF
9/25/96	009760	230227	27.9	D	BFI, Sampson CO LF
9/25/96	009761	230211	23.34	D	BFI, Sampson CO LF
9/25/96	009762	230212	26.69	D	BFI, Sampson CO LF
9/25/96	009763	230223	24.87	D	BFI, Sampson CO LF
9/25/96	009764	230224	25.78	D	BFI, Sampson CO LF
9/26/96	009765	230590	20.8	D	BFI, Sampson CO LF
9/26/96	009766	230591	25.99	D	BFI, Sampson CO LF
9/26/96	009767	230600	23.01	D	BFI, Sampson CO LF
9/26/96	009768	230598	22.73	D	BFI, Sampson CO LF
9/26/96	009769	230599	23.67	D	BFI, Sampson CO LF
9/26/96	009770	230625	25.39	D	BFI, Sampson CO LF
9/26/96	009771	230607	27.81	D/B	BFI, Sampson CO LF
9/26/96	009772	230624	24.71	D	BFI, Sampson CO LF
9/27/96	009773	247737	22.2	D	BFI, Sampson CO LF
9/27/96	009774	247737	21.89	D	BFI, Sampson CO LF
9/27/96	009775	247737	26.59	D	BFI, Sampson CO LF
9/27/96	009776	247737	26.45	D	BFI, Sampson CO LF
9/27/96	009777	247737	26.38	D	BFI, Sampson CO LF

Table 7.2
Summary of Non-TSCA Regulated PCB Soil Disposal

Date	Manifest No.	BFI No.	Act. Tons	Range	Destination
9/27/96	009778	230670	24.17	D	BFI, Sampson CO LF
9/27/96	009779	230669	24.78	D	BFI, Sampson CO LF
9/27/96	009780	230678	26.09	D	BFI, Sampson CO LF
9/27/96	009781	230679	29.81	D	BFI, Sampson CO LF
9/27/96	009782	230771	23.81	D	BFI, Sampson CO LF
9/27/96	009783	230708	24.15	D	BFI, Sampson CO LF
9/27/96	009784	230709	22.06	D	BFI, Sampson CO LF
9/27/96	009785	230728	27.47	D	BFI, Sampson CO LF
9/27/96	009786	230727	21.24	D	BFI, Sampson CO LF
9/27/96	009787	230713	25.24	D	BFI, Sampson CO LF
9/27/96	009789	230714	25.31	D	BFI, Sampson CO LF
9/30/96	009790	230850	26.22	A	BFI, Sampson CO LF
9/30/96	009791	230851	25.37	D	BFI, Sampson CO LF
9/30/96	009792	230856	19.62	D	BFI, Sampson CO LF
9/30/96	009793	230857	25.99	D	BFI, Sampson CO LF
9/30/96	009794	230855	24.32	D	BFI, Sampson CO LF
9/30/96	009795	230883	25.53	D	BFI, Sampson CO LF
9/30/96	009796	230884	24.12	D	BFI, Sampson CO LF
9/30/96	009797	230972	24.61	D	BFI, Sampson CO LF
10/1/96	009586	226852	25.24	D	BFI, Sampson CO LF
10/1/96	009587	226853	23.7	D	BFI, Sampson CO LF
10/1/96	009588	226865	25.84	D	BFI, Sampson CO LF
10/1/96	009589	226902	23.55	D	BFI, Sampson CO LF
10/1/96	009590	226903	24.8	D	BFI, Sampson CO LF
10/1/96	009591	226900	27.54	D	BFI, Sampson CO LF
10/1/96	009592	226875	25.51	D	BFI, Sampson CO LF
10/1/96	009788	226850	23.38	D	BFI, Sampson CO LF
10/1/96	009798	226849	25.35	A	BFI, Sampson CO LF
10/1/96	009799	226851	23.22	A	BFI, Sampson CO LF
10/1/96	010502	226882	22.58	A	BFI, Sampson CO LF
10/1/96	010503	226892	24.16	A	BFI, Sampson CO LF
10/1/96	010504	226931	30.32	A	BFI, Sampson CO LF
10/1/96	010505	226930	26.95	A	BFI, Sampson CO LF
10/1/96	010506	226933	25.49	D	BFI, Sampson CO LF
10/2/96	010510	227172	23.96	D	BFI, Sampson CO LF
10/2/96	010511	227173	26.44	D	BFI, Sampson CO LF
10/2/96	010512	227169	26.94	A	BFI, Sampson CO LF

Table 7.2
Summary of Non-TSCA Regulated PCB Soil Disposal

Date	Manifest No.	BFI No.	Act. Tons	Range	Destination
10/2/96	010513	227174	27.1	D	BFI, Sampson CO LF
10/2/96	010514	227170	27.34	A	BFI, Sampson CO LF
10/2/96	010515	227168	24.32	A	BFI, Sampson CO LF
10/2/96	010516	227185	29.86	A	BFI, Sampson CO LF
10/2/96	010517	227178	20.84	A	BFI, Sampson CO LF
10/2/96	010518	227186	27.46	A	BFI, Sampson CO LF
10/2/96	010519	227179	23.88	A	BFI, Sampson CO LF
10/2/96	010520	227235	25.75	A	BFI, Sampson CO LF
10/2/96	010521	227225	26.23	A	BFI, Sampson CO LF
10/2/96	010522	227224	27.14	A	BFI, Sampson CO LF
10/2/96	010523	227305	22.69	A	BFI, Sampson CO LF
10/3/96	009800	227406	26.44	A	BFI, Sampson CO LF
10/3/96	010567	227407	24.34	A	BFI, Sampson CO LF
10/3/96	010568	227408	25.2	D	BFI, Sampson CO LF
10/3/96	010569	227411	25.04	A	BFI, Sampson CO LF
10/3/96	010570	227426	24.45	A	BFI, Sampson CO LF
10/3/96	010571	227427	29.75	A	BFI, Sampson CO LF
10/3/96	010572	227438	28.01	A	BFI, Sampson CO LF
10/3/96	010573	227439	21.18	A	BFI, Sampson CO LF
10/3/96	010574	227437	27.72	A	BFI, Sampson CO LF
10/3/96	010575	227444	28.14	A	BFI, Sampson CO LF
10/3/96	010576	227443	23.82	A	BFI, Sampson CO LF
10/3/96	010577	227533	27.03	A	BFI, Sampson CO LF
10/3/96	010578	227410	25.82	A	BFI, Sampson CO LF
10/4/96	010507	227588	22.1	A	BFI, Sampson CO LF
10/4/96	010508	227589	21.02	A	BFI, Sampson CO LF
10/4/96	010509	227593	27.01	A	BFI, Sampson CO LF
10/4/96	010524	227594	22.58	A	BFI, Sampson CO LF
10/4/96	010525	227595	23.09	A	BFI, Sampson CO LF
10/4/96	010526	227596	23.6	A	BFI, Sampson CO LF
10/4/96	010527	227599	27.78	A	BFI, Sampson CO LF
10/4/96	010528	227605	28.15	A	BFI, Sampson CO LF
10/4/96	010529	227621	25.77	A	BFI, Sampson CO LF
10/4/96	010530	227622	24.71	A	BFI, Sampson CO LF
10/15/96	010531	231259	24.77	D/A	BFI, Sampson CO LF
TOTAL			3521.73		

8.0 QUALITY CONTROL SUMMARY

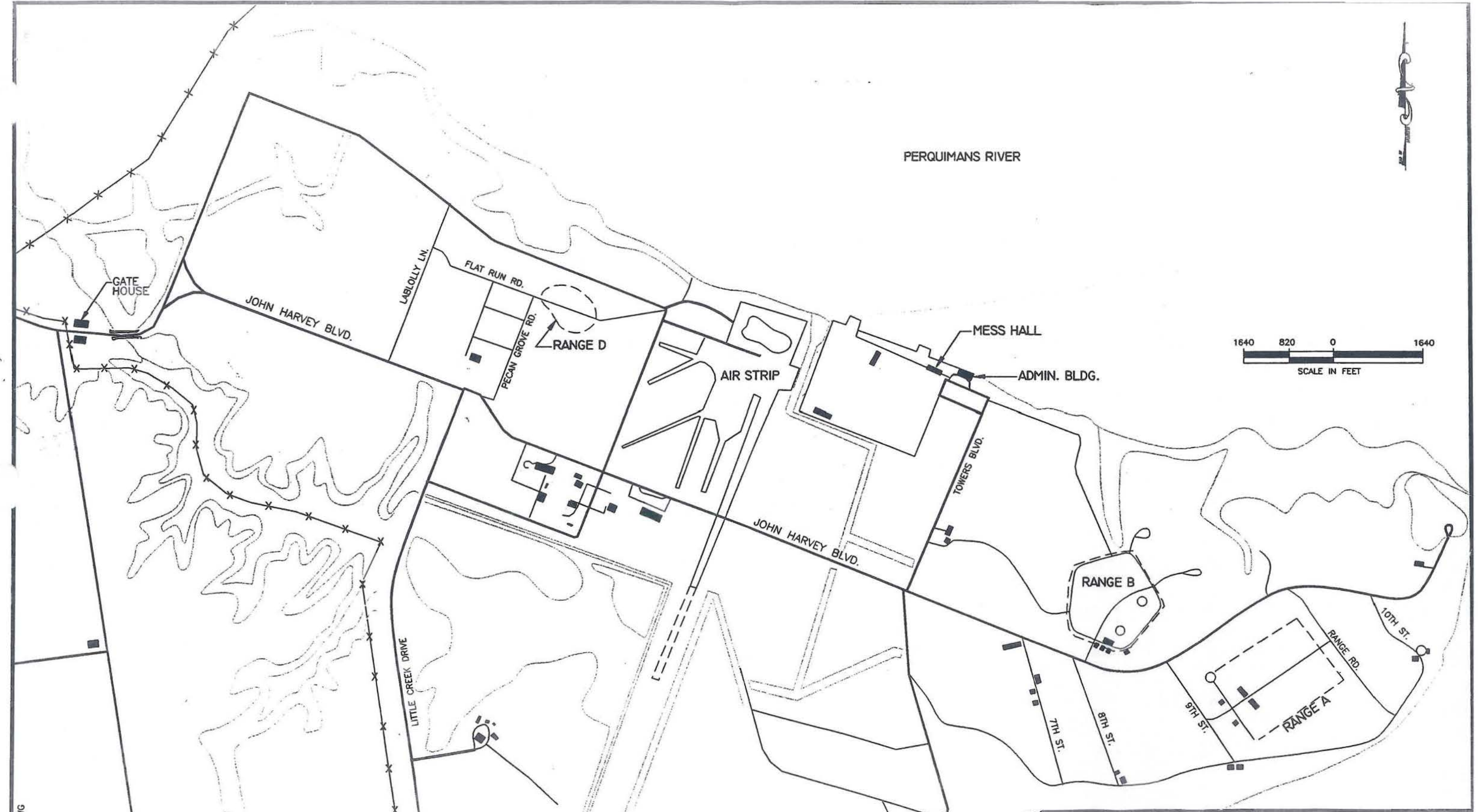
No Quality Control (QC) problems were noted during the performance of this project. QC meetings were conducted as part of the weekly production meeting and the minutes recorded and submitted to the NTR by the Site Supervisor. Daily QC issues/inspections were recorded in the Daily Report to the Inspector. The minutes to the QC meetings are included in Appendix E.

Additional submittals forwarded to the NTR and their frequency of submission were as follows:

- Daily Sign-in Log
- Daily Health and Safety Report
- Daily Cost Report
- Monthly Progress Report
- Field Sampling Test Results - as received
- Confirmation Sample Test Results - as received

Appendix A

As-Built Drawings



C:\OHM\18641\JAMES.DWG

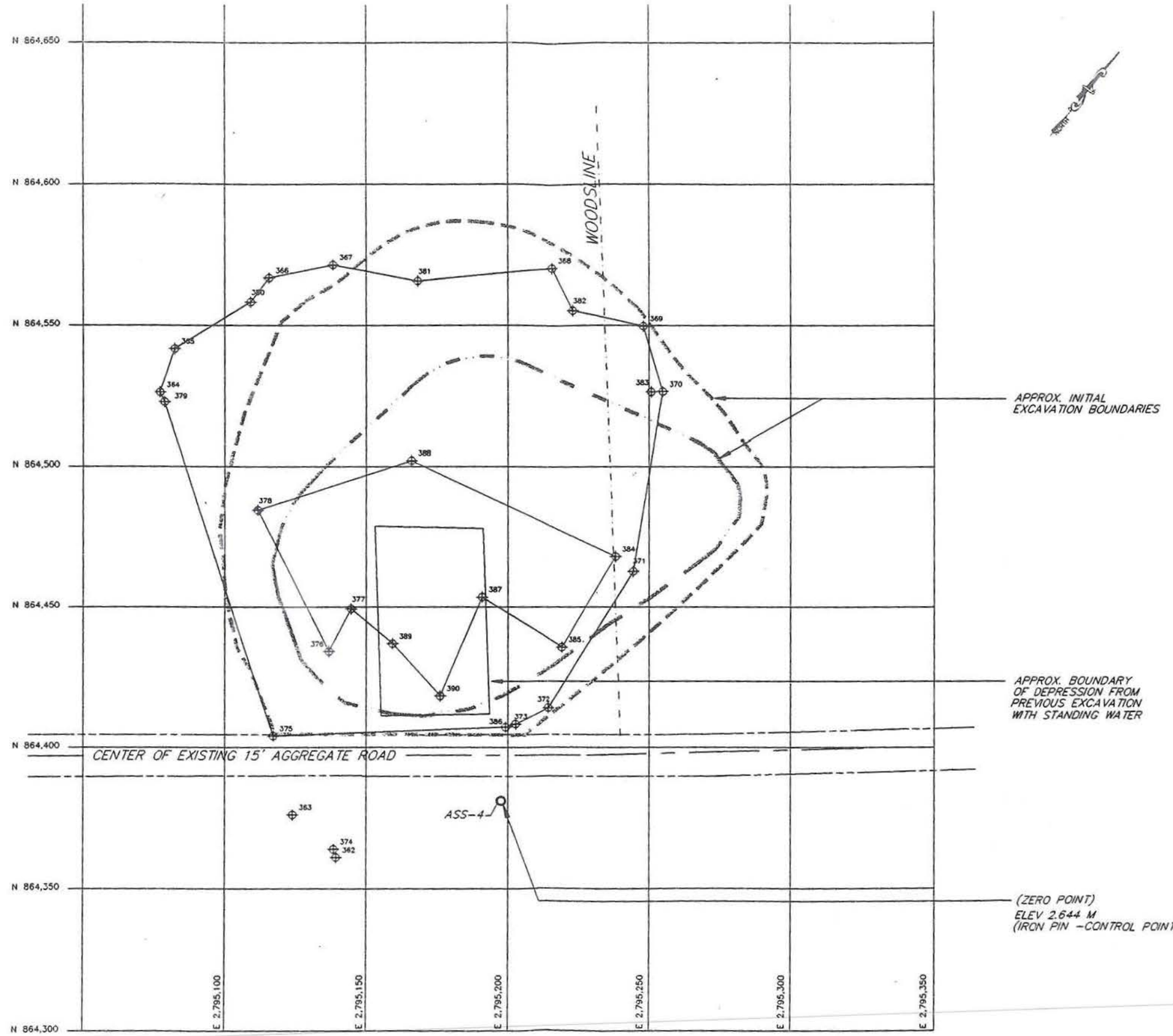
OHM Remediation Services Corp.
NORCROSS, GEORGIA
A SUBSIDIARY OF OHM CORPORATION

DRAWN BY	J. COLLINS	4/9/96
CHECKED BY	J. DUNN	4/9/96
APPROVED BY		
REV. 0	SHEET # –	PROJECT NO. 18641

FIGURE 1.1
VICINITY AND SITE LOCATION MAP
HARVEY POINT DEFENSE
TESTING ACTIVITY
D.O. #110

PREPARED FOR
LANTDIV

NO.	NORTHING	EASTING	ELEV.
361	864,381.044	2,795,197.626	8.67
362	864,381.012	2,795,137.352	7.77
363	864,376.058	2,795,123.934	7.41
364	864,526.218	2,795,076.999	6.71
365	864,541.688	2,795,082.174	7.46
366	864,566.841	2,795,115.637	7.51
367	864,571.490	2,795,138.329	7.61
368	864,570.414	2,795,215.574	7.61
369	864,549.731	2,795,248.021	7.61
370	864,526.443	2,795,254.885	7.56
371	864,462.672	2,795,244.417	8.50
372	864,414.014	2,795,214.314	8.64
373	864,408.264	2,795,202.628	6.63
374	864,363.902	2,795,138.486	6.85
375	864,404.004	2,795,117.078	6.79
376	864,434.074	2,795,136.824	6.68
377	864,449.312	2,795,144.738	5.20
378	864,484.494	2,795,111.770	6.84
379	864,522.793	2,795,078.603	5.67
380	864,558.282	2,795,109.264	6.55
381	864,565.746	2,795,168.272	6.74
382	864,555.302	2,795,223.083	5.74
383	864,526.355	2,795,250.787	6.29
384	864,467.942	2,795,238.168	7.16
385	864,435.625	2,795,219.159	6.65
386	864,407.108	2,795,199.245	6.55
387	864,453.505	2,795,190.998	6.63
388	864,502.139	2,795,166.024	7.56
389	864,438.847	2,795,159.238	4.83
390	864,418.227	2,795,176.281	5.37



NOTES:

1. INITIAL EXCAVATION WILL BE ONE FOOT BELOW EXISTING GROUND SURFACE WHICH INCLUDES REMOVING ONE FOOT FROM PREVIOUSLY EXCAVATED AREAS.
2. INITIAL EXCAVATION BOUNDARIES NEED TO BE VERIFIED USING FIELD TEST KITS.

LEGEND

5.38

>50 ppm BOUNDARY (INITIAL)

10 - 50 ppm BOUNDARY (INITIAL)

APPROXIMATE EDGE OF ROAD

20 0 20 40

SCALE 1"=20'-0"

D:\OHM\LANTDIV\HARVEY\18641\FIG2.DWG

OHM Remediation Services Corp.
Norcross, Georgia
A Subsidiary of OHM Corporation

SUBMITTED: PROJECT MANAGER DATE:
APPROVED: SR. PROJECT ENGINEER DATE:
APPROVED: DEPT. MANAGER DATE:

AT FULL SCALE (IF NOT 2"-SCALE ACCORDINGLY)
CADD FILE:
DRAWN: J. LANGE
DESIGNED:
CHECKED:
CHECKED:

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

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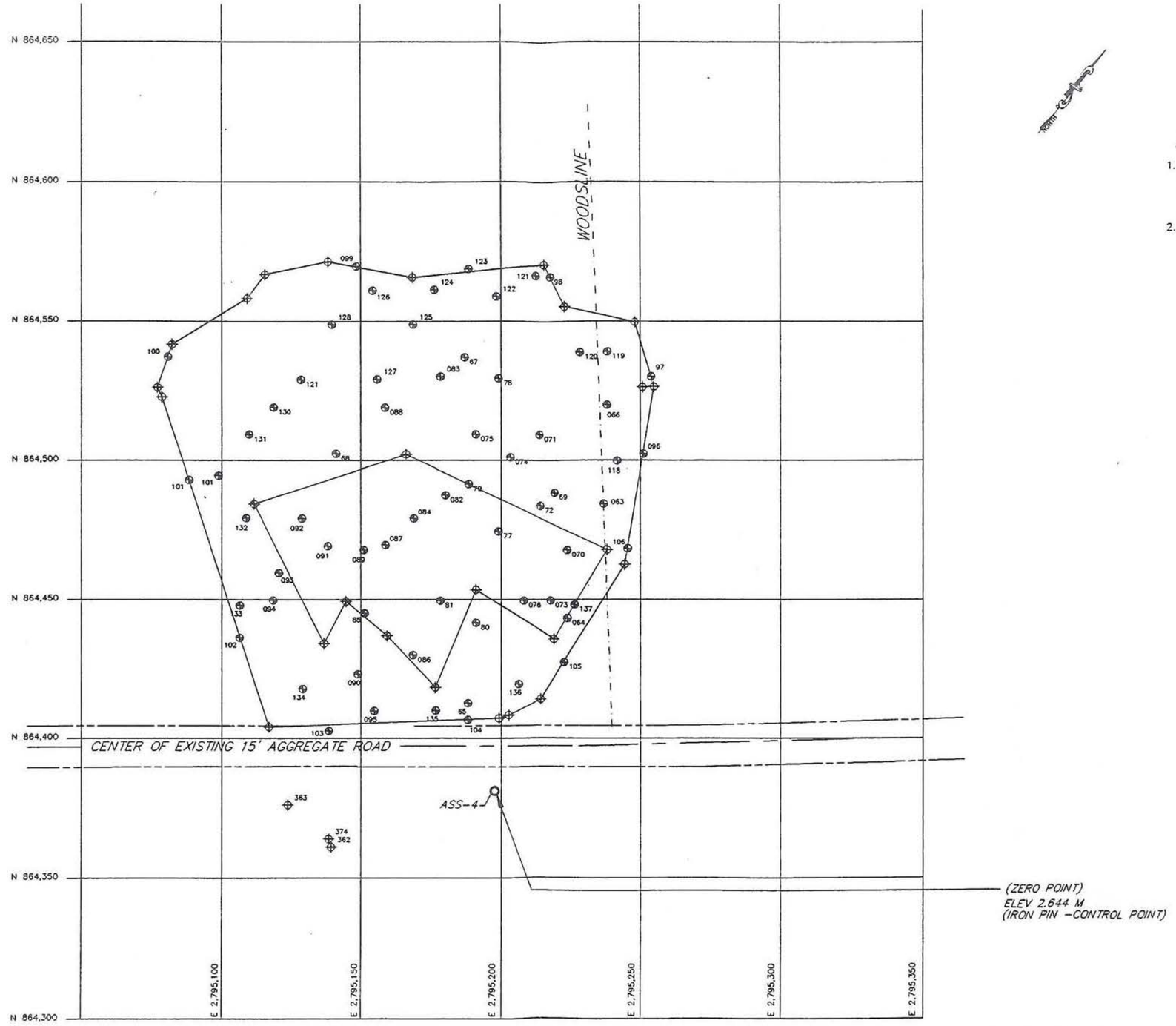
DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION
NAVAL STATION NORFOLK, VIRGINIA
LANTDIV RAC CONTRACT N62470-93-D-3032 DELIVERY ORDER NO. 0110
RANGE A HARVEY POINT DEFENSE TESTING ACTIVITY

TOPOGRAPHIC SURVEY - RANGE A

HARVEY POINT DEFENSE TESTING ACTIVITY

FIGURE NO. 2
SHEET NUMBER: _ of _
DATE:



NOTES:

1. INITIAL EXCAVATION WILL BE ONE FOOT BELOW EXISTING GROUND SURFACE WHICH INCLUDES REMOVING ONE FOOT FROM PREVIOUSLY EXCAVATED AREAS.
2. INITIAL EXCAVATION BOUNDARIES NEED TO BE VERIFIED USING FIELD TEST KITS.

LEGEND

>50 ppm BOUNDARY (INITIAL)

10 - 50 ppm BOUNDARY (INITIAL)

APPROXIMATE EDGE OF ROAD

20 0 20 40

SCALE 1"=20'-0"

D:\OHM\LANTDIV\HARVEY\18641\FIG2A.DWG

OHM Remediation Services Corp.
Norcross, Georgia
A Subsidiary of OHM Corporation

SUBMITTED: _____ DATE: _____ (PROJECT MANAGER)
APPROVED: _____ DATE: _____ (SR. PROJECT ENGINEER)
APPROVED: _____ DATE: _____ (DEPT. MANAGER)

AT FULL SCALE (IF NOT 2"-SCALE ACCORDINGLY)
CADD FILE:
DRAWN: J. LANGE
DESIGNED:
CHECKED:
CHECKED:

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

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DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ATLANTIC DIVISION

NAVAL STATION — NORFOLK, VIRGINA

LANTDIV RAC CONTRACT N62470-93-D-3032 — DELIVERY ORDER NO. 0110

RANGE A — HARVEY POINT DEFENSE TESTING ACTIVITY

TOPOGRAPHIC SURVEY - RANGE A

HARVEY POINT DEFENSE TESTING ACTIVITY

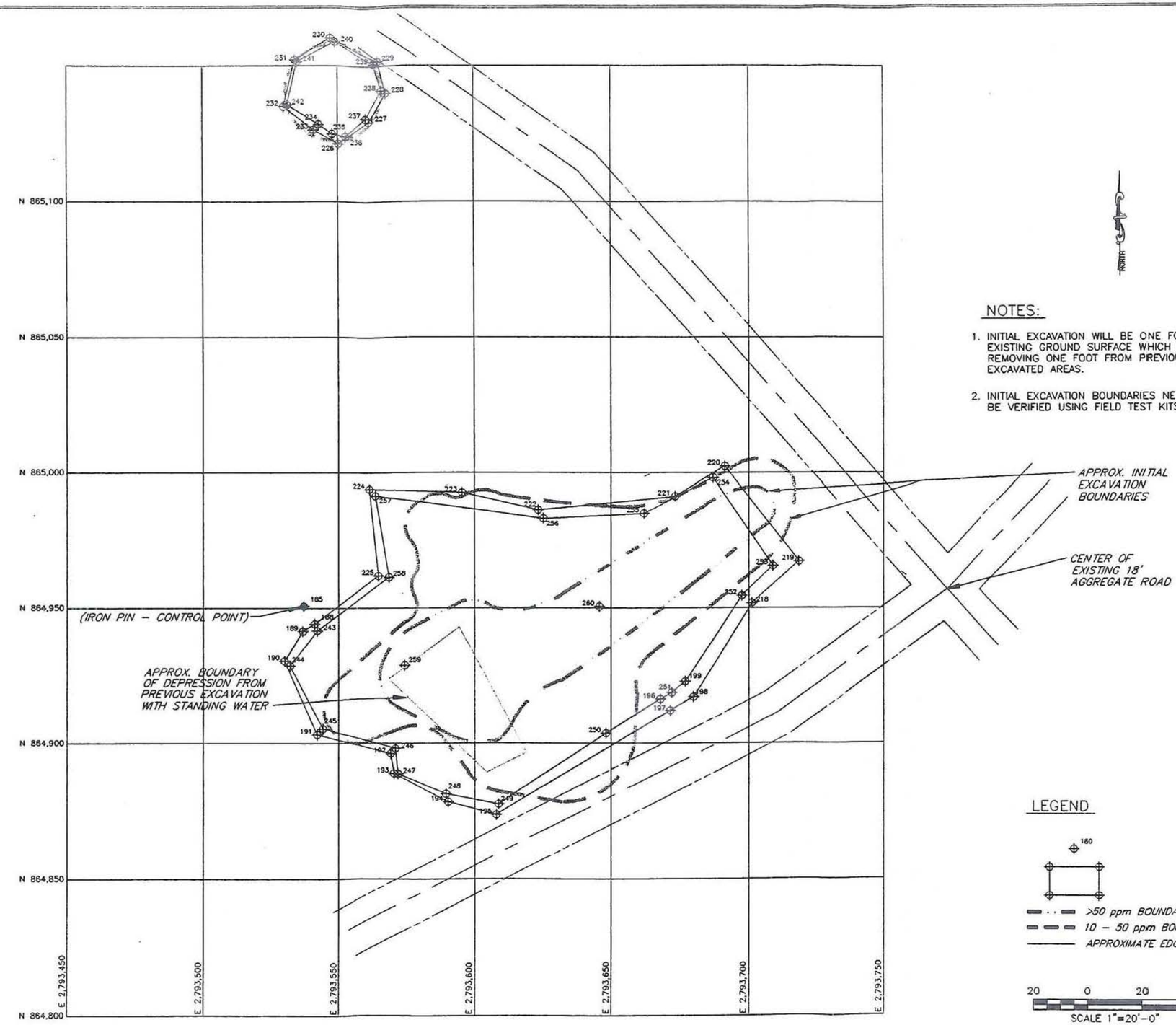
FIGURE NO. 2A

SHEET NUMBER: _ of

DATE: 11/4/96

NO.	NORTHING	EASTING	ELEV.
184	864,163.321	2,793,220.191	8.07
185	864,950.720	2,793,537.205	7.92
186	864,108.142	2,793,434.419	5.71
187	864,163.293	2,793,220.180	8.06
188	864,944.149	2,793,541.156	7.87
189	864,941.383	2,793,536.867	7.63
190	864,930.427	2,793,530.058	7.56
191	864,903.198	2,793,542.137	7.00
192	864,898.126	2,793,569.492	6.43
193	864,888.735	2,793,570.631	6.54
194	864,878.314	2,793,590.326	6.32
195	864,873.536	2,793,607.994	6.51
196	864,916.194	2,793,667.821	5.66
197	864,911.951	2,793,671.404	5.95
198	864,917.035	2,793,679.816	6.38
199	864,922.788	2,793,676.819	5.89
218	864,951.747	2,793,701.122	5.73
219	864,967.281	2,793,718.454	4.60
220	865,002.334	2,793,691.161	4.24
221	864,991.350	2,793,673.261	5.31
222	864,986.341	2,793,623.413	6.28
223	864,992.724	2,793,595.485	6.56
224	864,994.023	2,793,561.586	7.69
225	864,961.967	2,793,564.951	7.25
226	865,121.361	2,793,550.279	5.67
227	865,129.489	2,793,561.780	4.15
228	865,139.925	2,793,568.008	2.90
229	865,151.665	2,793,565.062	4.34
230	865,160.233	2,793,547.409	4.27
231	865,152.132	2,793,534.347	2.82
232	865,134.935	2,793,530.158	6.01
233	865,128.425	2,793,541.233	6.21
234	865,128.466	2,793,543.044	5.29
235	865,124.993	2,793,547.981	5.19
236	865,123.976	2,793,552.945	5.11
237	865,130.658	2,793,560.564	3.29
238	865,140.900	2,793,566.366	2.33
239	865,150.888	2,793,563.436	3.22
240	865,158.881	2,793,549.008	3.65
241	865,151.416	2,793,535.101	2.42
242	865,135.556	2,793,531.538	5.31
243	864,941.608	2,793,542.163	6.19
244	864,928.646	2,793,532.180	6.26
245	864,905.312	2,793,544.213	5.81
246	864,898.043	2,793,571.218	5.82
247	864,888.626	2,793,572.209	5.83
248	864,881.275	2,793,589.554	5.20

NO.	NORTHING	EASTING	ELEV.
249	864,877.418	2,793,608.804	5.58
250	864,903.634	2,793,648.119	4.77
251	864,918.564	2,793,671.957	5.20
252	864,954.509	2,793,697.416	4.43
253	864,965.602	2,793,708.826	3.32
254	864,998.184	2,793,686.875	3.35
255	864,985.108	2,793,661.986	4.83
256	864,983.257	2,793,625.279	5.36
257	864,991.577	2,793,583.824	6.66
258	864,961.451	2,793,568.890	5.83
259	864,928.785	2,793,574.613	4.08
260	864,950.508	2,793,645.766	4.39



NOTES:

1. INITIAL EXCAVATION WILL BE ONE FOOT BELOW EXISTING GROUND SURFACE WHICH INCLUDES REMOVING ONE FOOT FROM PREVIOUSLY EXCAVATED AREAS.
2. INITIAL EXCAVATION BOUNDARIES NEED TO BE VERIFIED USING FIELD TEST KITS.

D:\OHM\LANTDIV\HARVEY\18641\FIG3.DWG

OHM Remediation Services Corp.
Norcross, Georgia
A Subsidiary of OHM Corporation

SUBMITTED: _____ PROJECT MANAGER DATE: _____
APPROVED: _____ SR. PROJECT ENGINEER DATE: _____
APPROVED: _____ DEPT. MANAGER DATE: _____

AT FULL SCALE (IF NOT 2" – SCALE ACCORDINGLY)
CADD FILE: _____
DRAWN: J. LANGE
DESIGNED: _____
CHECKED: _____
CHECKED: _____

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

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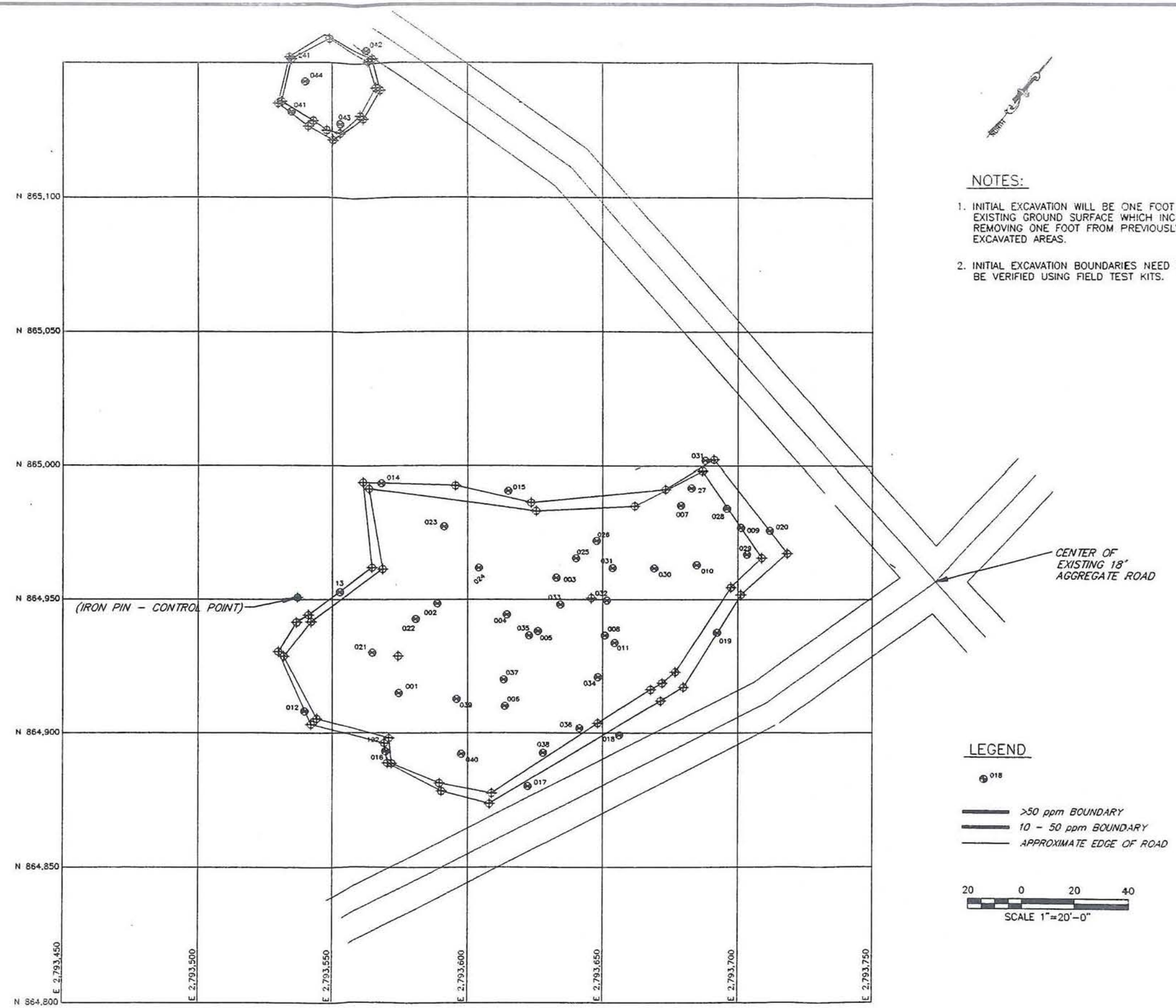
DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION
NAVAL STATION — NORFOLK, VIRGINIA
LANTDIV RAC CONTRACT N62470-93-D-3032 — DELIVERY ORDER NO. 0110
RANGE A — HARVEY POINT DEFENSE TESTING ACTIVITY

TOPOGRAPHIC SURVEY – RANGE B
HARVEY POINT DEFENSE TESTING ACTIVITY

FIGURE NO. 3
SHEET NUMBER: _ of
DATE: 11/4/96



NOTES:

1. INITIAL EXCAVATION WILL BE ONE FOOT BELOW EXISTING GROUND SURFACE WHICH INCLUDES REMOVING ONE FOOT FROM PREVIOUSLY EXCAVATED AREAS.
2. INITIAL EXCAVATION BOUNDARIES NEED TO BE VERIFIED USING FIELD TEST KITS.

D:\OHM\LANTDIV\HARVEY\18641\FIG3A.DWG

OHM Remediation Services Corp.
Norcross, Georgia
A Subsidiary of OHM Corporation

SUBMITTED: PROJECT MANAGER DATE:
APPROVED: SR. PROJECT ENGINEER DATE:
APPROVED: DEPT. MANAGER DATE:

AT FULL SCALE (IF NOT 2"-SCALE ACCORDINGLY)
CADD FILE:
DRAWN: J. LANGE
DESIGNED: -
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REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

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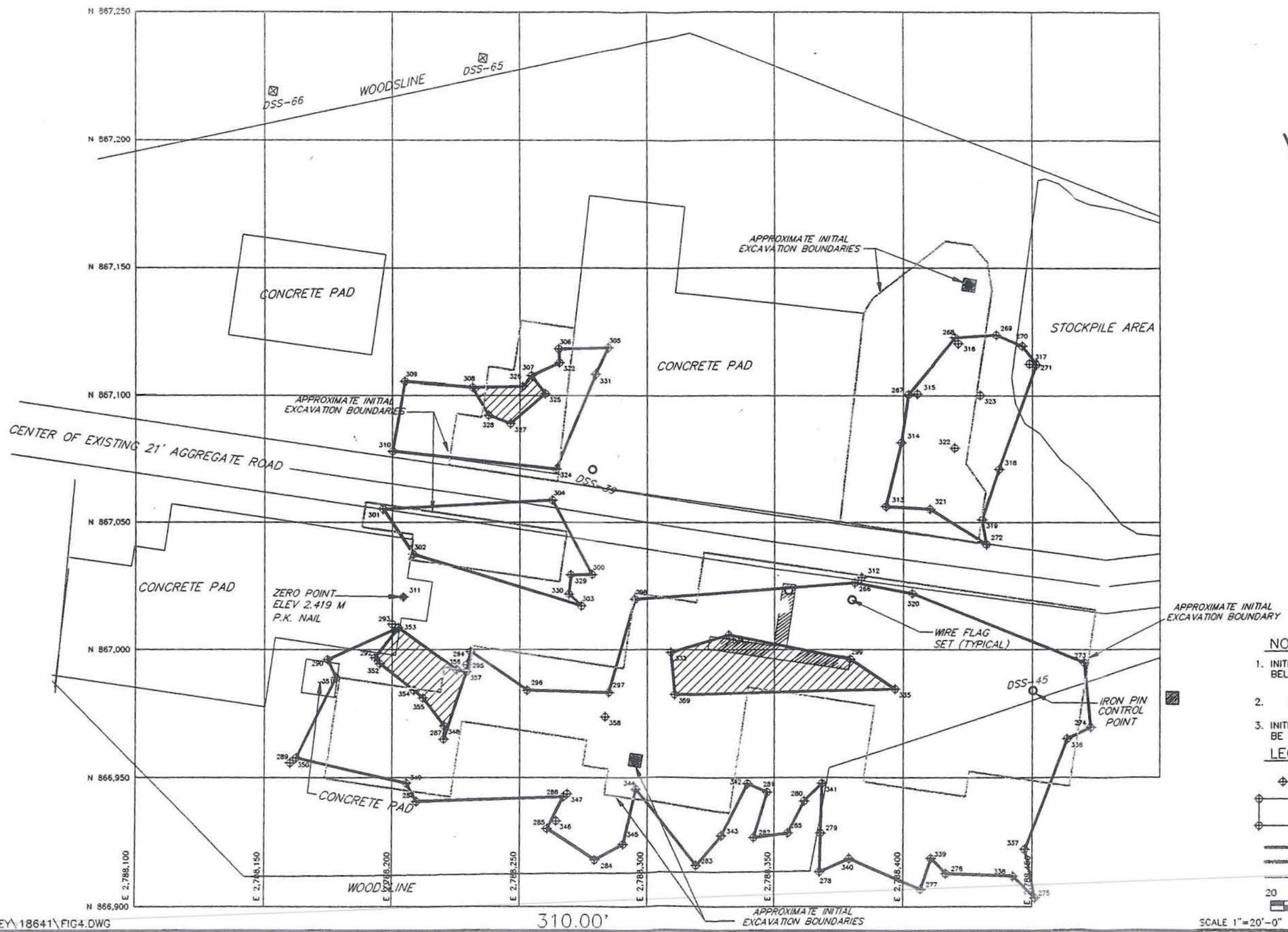
DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION
NAVAL STATION — NORFOLK, VIRGINIA
LANTDIV RAC CONTRACT N62470-93-D-3032 — DELIVERY ORDER NO. 0110
RANGE A — HARVEY POINT DEFENSE TESTING ACTIVITY

TOPOGRAPHIC SURVEY - RANGE B
HARVEY POINT DEFENSE TESTING ACTIVITY

FIGURE NO. 3A
SHEET NUMBER: - of
DATE: 11/4/96



NOTES:

1. INITIAL EXCAVATION WILL BE ONE FOOT BELOW EXISTING GROUND SURFACE.
2. REFERS TO 5'x5' INITIAL EXCAVATION.
3. INITIAL EXCAVATION BOUNDARIES NEED TO BE VERIFIED USING FIELD TEST KITS.

LEGEND

5.38 >50 ppm

>50 ppm BOUNDARY (INITIAL)

10 - 50 ppm BOUNDARY (INITIAL)

APPROXIMATE EDGE OF ROAD

20 0 20 40

SCALE 1"=20'-0"

D:\OHM\LANTDIV\HARVEY\18641\FIG4.DWG

OHM Remediation Services Corp.
Norcross, Georgia
A Subsidiary of OHM Corporation

SUBMITTED: _____ PROJECT MANAGER DATE: _____
APPROVED: _____ SR. PROJECT ENGINEER DATE: _____
APPROVED: _____ DEPT. MANAGER DATE: _____

AT FULL SCALE (IF NOT 2" - SCALE ACCORDINGLY)
CADD FILE: _____
DRAWN: J. LANGE
DESIGNED: _____
CHECKED: _____
CHECKED: _____

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

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DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ATLANTIC DIVISION

NAVAL STATION — NORFOLK, VIRGINIA

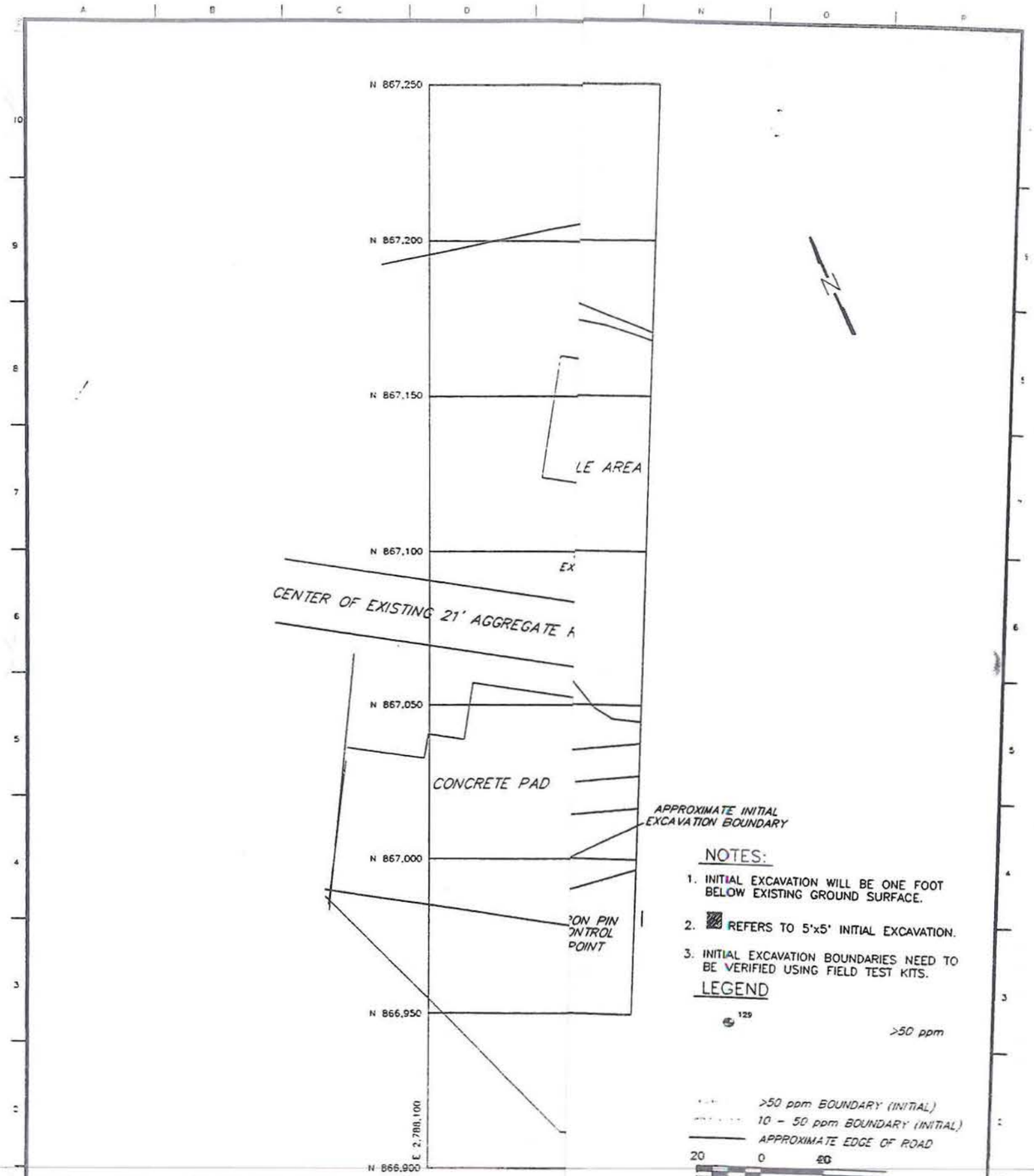
LANTDIV RAC CONTRACT N62470-93-D-3032 — DELIVERY ORDER NO. 0110

TOPOGRAPHIC SURVEY - RANGE D

HARVEY POINT DEFENSE TESTING AREA

FIGURE NO. 4

SHEET NUMBER:



NOTES:

1. INITIAL EXCAVATION WILL BE ONE FOOT BELOW EXISTING GROUND SURFACE.
2. REFERS TO 5'x5' INITIAL EXCAVATION.
3. INITIAL EXCAVATION BOUNDARIES NEED TO BE VERIFIED USING FIELD TEST KITS.

LEGEND

129 >50 ppm

>50 ppm BOUNDARY (INITIAL)

10 - 50 ppm BOUNDARY (INITIAL)

APPROXIMATE EDGE OF ROAD

20 0 20

SCALE 1"=20'-0"

D:\OHM\LANTDIV\HARVEY\18641\FIG4.DWG

OHM Remediation Services Corp.
Norcross, Georgia
A Subsidiary of OHM Corporation

SUBMITTED: PROJECT MANAGER DATE:
APPROVED: SR. PROJECT ENGINEER DATE:
APPROVED: DEPT. MANAGER DATE:

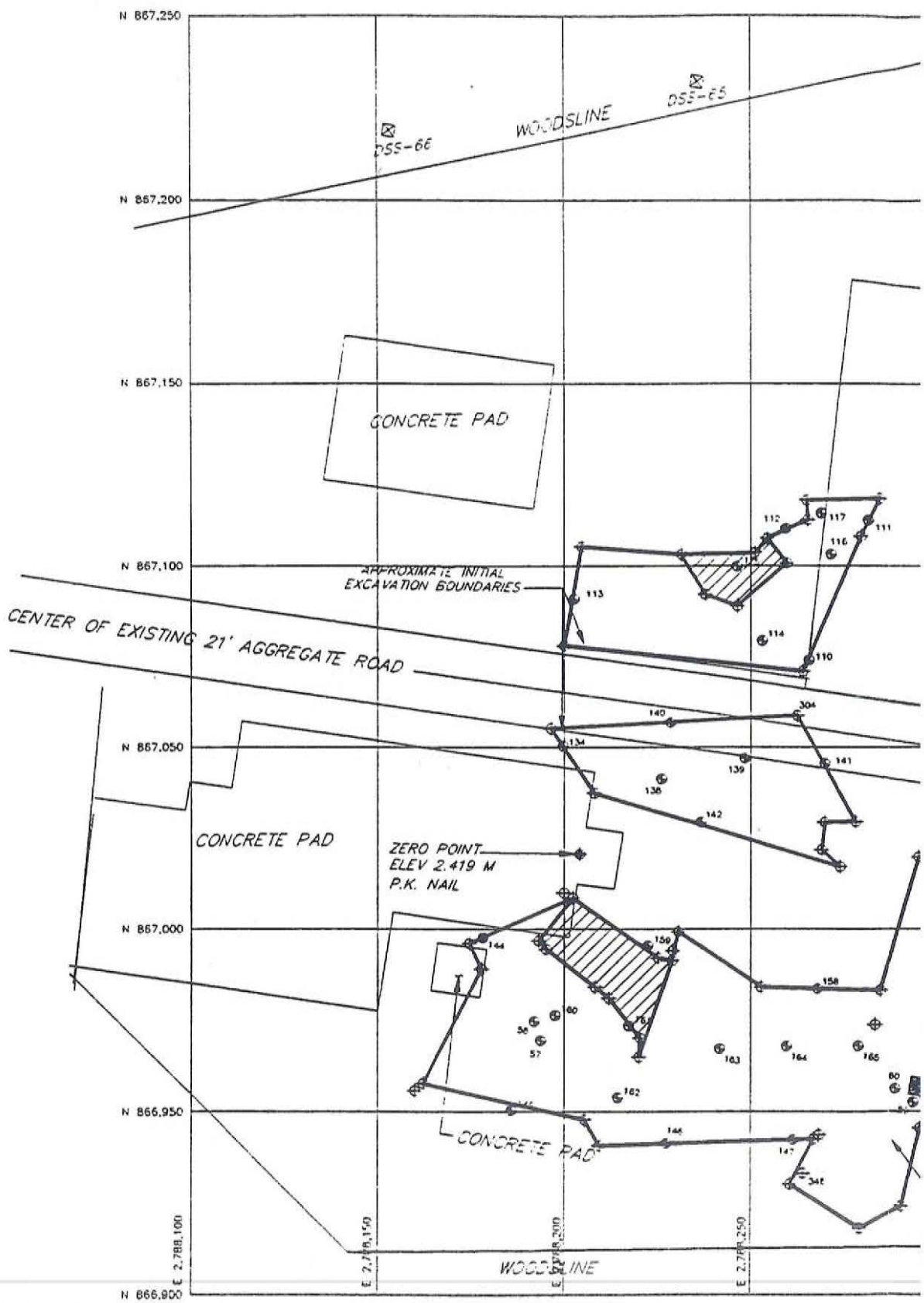
AT FULL SCALE (IF NOT 1"-SCALE ACCORDINGLY)
CADD FILE:
DRAWN: J. LANGE
DESIGNED:
CHECKED:
CHECKED:

ZONE | REV.

RAPHIC SURVEY - RANGE D

RVEY POINT DEFENSE
TESTING ACTIVITY

FIGURE NO. 4A
SHEET NUMBER: _ of
DATE: 11/4/96



D:\OHM\LANTDIV\HARVEY\18641\FIG4.DWG

OHM Remediation Services Corp.
Norcross, Georgia
A Subsidiary of OHM Corporation

SUBMITTED: _____ DATE: _____
PROJECT MANAGER
APPROVED: _____ DATE: _____
SR. PROJECT ENGINEER
APPROVED: _____ DATE: _____
DEPT. MANAGER

AT FULL SCALE
(IF NOT 1"=SCALE ACCORDINGLY)
CADD FILE: _____
DRAWN: J. LANGE
DESIGNED: _____
CHECKED _____
CHECKED _____

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP

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Appendix B

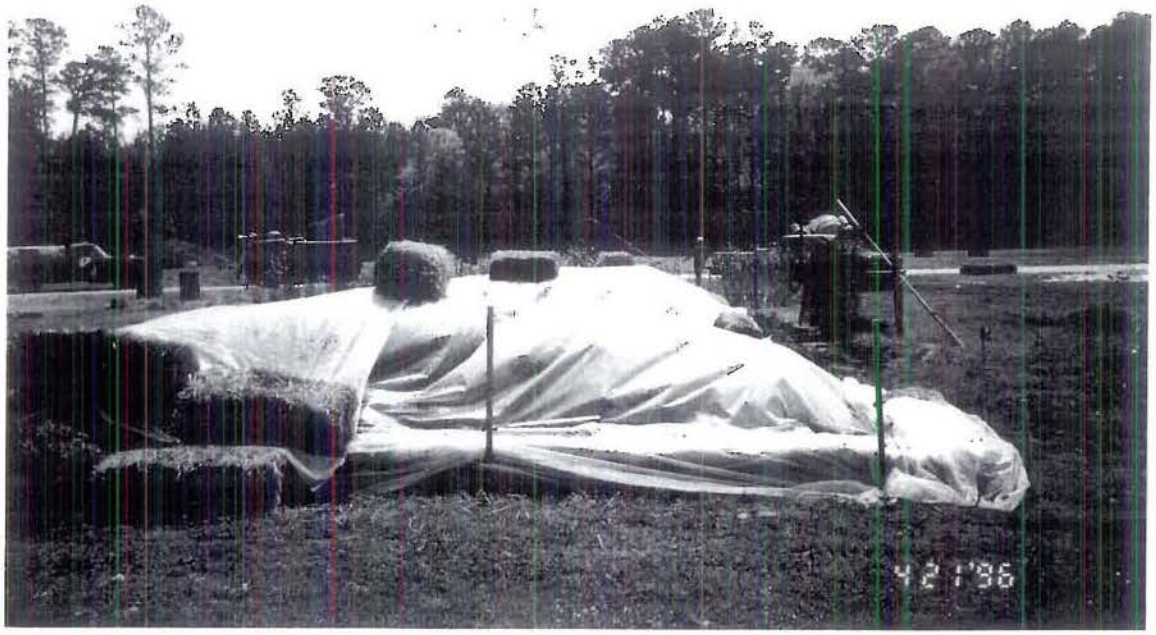
Photographic Documentation

Project No. 18641 Date: 4/20/96
Contract No. N62470-93-D-3032
Delivery Order: 110
Location: Range A
Description: Emptying non-hazardous drums into the non-hazardous stockpile

Project No. 18641 Date: 4/21/96
Contract No. N62470-93-D-3032
Delivery Order: 110
Location: Range A
Description: Load-out of non-hazardous stockpiles

Project No. 18641 Date: 4/21/96
Contract No. N62470-93-D-3032
Delivery Order: 110
Location: Range A
Description: Load-out of hazardous soils

Project No. 18641 Date: 4/21/96
Contract No. N62470-93-D-3032
Delivery Order: 110
Location: Range A
Description: Decontamination of equipment



Project No. 18641 Date: 4/21/96
Contract No. N62470-93-D-3032
Delivery Order: 110
Location: Range A
Description: Hazardous and non-hazardous soil left on site; material was removed duri ng Phase II activities

Project No. 18641 Date: 4/21/96
Contract No. N62470-93-D-3032
Delivery Order: 110
Location: Range A
Description: Non-hazardous stockpile area after removal activities

Project No. 18641 Date: 9/15/96
Contract No. N62470-93-D-3032
Delivery Order: 110
Location: Range B
Description: Range B pond after being pumped down using an 8,000 gallon truck w/pump

Project No. 18641 Date: 9/15/96
Contract No. N62470-93-D-3032
Delivery Order: 110
Location: Water Treatment System
Description: Off-loading of water from Range B into 50,000 gallon water containment pond

Project No. 18641 Date: 9/15/96
Contract No. N62470-93-D-3032
Delivery Order: 110
Location: Range B
Description: Excavation of hazardous soils

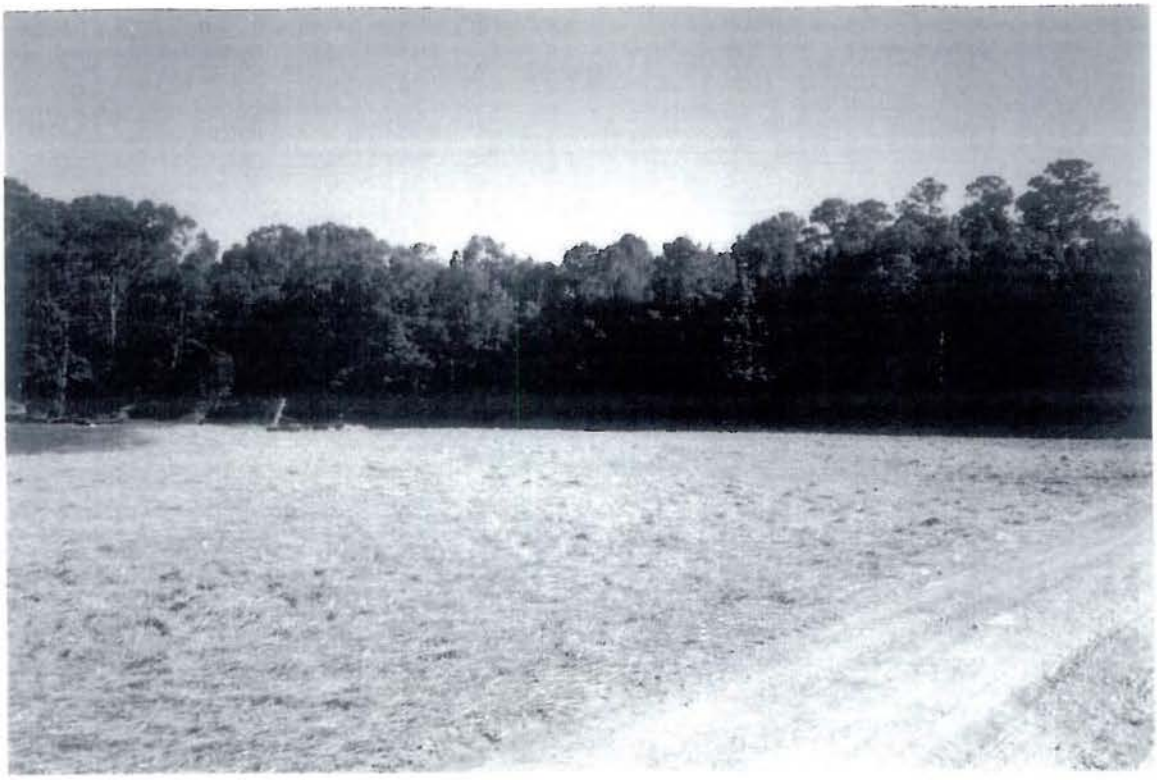
Project No. 18641 Date: 9/22/96
Contract No. N62470-93-D-3032
Delivery Order: 110
Location: Range B
Description: Load-out of non-hazardous soils

Project No. 18641 Date: 10/1/96
Contract No. N62470-93-D-3032
Delivery Order: 110
Location: Range B
Description: Final grading of Range B with a dozer

Project No. 18641 Date: 9/21/96
Contract No. N62470-93-D-3032
Delivery Order: 110
Location: Range A
Description: Stockpiling of hazardous soils from Range A

Project No. 18641 Date: 9/22/96
Contract No. N62470-93-D-3032
Delivery Order: 110
Location: Range A
Description: Load-out of hazardous soils from Range A

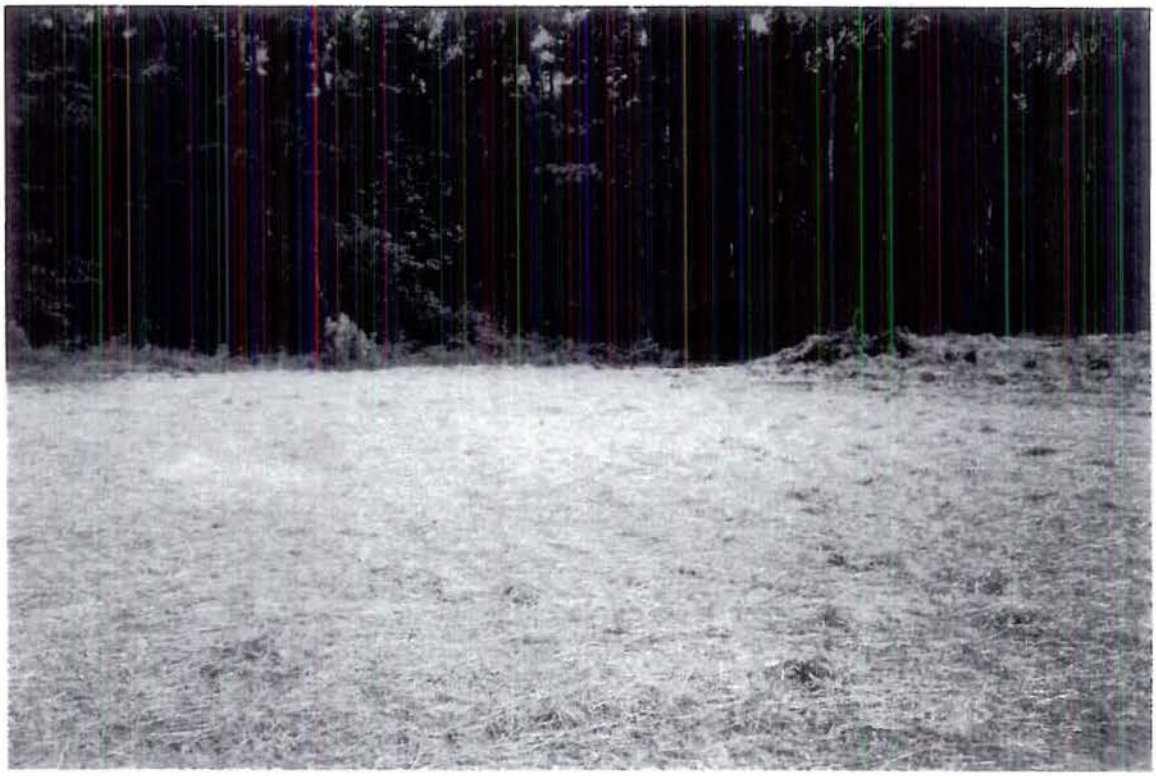
Project No. 18641 Date: 10/8/96
Contract No. N62470-93-D-3032
Delivery Order: 110
Location: Range A
Description: Starting to grade Range A with a dozer



Project No. 18641 Date:10/13/96
Contract No. N62470-93-D-3032
Delivery Order: 110
Location: Range A
Description: Area after site restoration activities were completed

Project No. 18641 Date: 9/21/96
Contract No. N62470-93-D-3032
Delivery Order: 110
Location: Range D
Description: Stockpiling hazardous soils

Project No. 18641 Date: 9/23/96
Contract No. N62470-93-D-3032
Delivery Order: 110
Location: Range D
Description: Load-out of non-hazardous soils



Project No. 18641 Date: 10/16/96
Contract No. N62470-93-D-3032
Delivery Order: 110
Location: Range D
Description: Area after final site restoration activities completed on the north side of road

Project No. 18641 Date: 10/16/96
Contract No. N62470-93-D-3032
Delivery Order: 110
Location: Range D
Description: Area after final site restoration activities completed on the south side of road

Appendix C
Soil Analytical Data Detections
Towers Road Disposal Areas
Harvey Point Defense Testing Activity
Hertford, North Carolina

Station ID	2nd Street Disposal Area				5th Street Disposal Area			
Sample ID	2-1	2-2	2-3	2-4	5-1	5-2	5-3	5-4
Sample Date	01/10/12	01/10/12	01/10/12	01/10/12	01/10/12	01/10/12	01/10/12	01/10/12
Volatile Organic Compounds (mg/kg)								
1,2,3-Trichlorobenzene	ND	ND	ND	ND	ND	ND	ND	0.0195 J
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND	ND	ND	0.696
1,3-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	0.733
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	1.18
2-Butanone	ND	0.00938 J	ND	0.00998 J	0.0243	0.00599 J	0.00892 J	ND
Acetone	0.0365 J	0.0658	0.016 J	0.0274 J	0.0856	0.0451 J	0.0406 J	0.0786 J
Benzene	0.00346	0.00601	ND	ND	ND	ND	ND	ND
Bromomethane	ND	0.00348 J	ND	ND	ND	ND	ND	ND
Carbon disulfide	ND	ND	ND	ND	0.000812 J	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND	0.102
Chloromethane	ND	0.00701	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	ND	ND	ND	ND	ND	0.00303 J	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	0.00749 J
Isopropylbenzene	ND	ND	ND	ND	ND	ND	ND	0.00457 J
m,p-Xylene	ND	ND	ND	ND	ND	ND	ND	0.0112 J
Methyl acetate	ND	ND	ND	ND	ND	ND	ND	0.1 J
Methylene chloride	ND	ND	0.0016 J	0.0024 J	0.00179 J	0.00118 J	0.000904 J	0.0262 J
Toluene	0.00115	0.00246 J	ND	ND	ND	ND	ND	0.00873 J
Metals (mg/kg)								
Aluminum	14,100	13,600	13,300	18,800	11,300	21,600	12,000	17,700
Antimony	4.5	3.11	ND	ND	ND	0.762	1.33	3.75
Arsenic	29.6	4.35	2.73	0.862	1.03	3.37	1.83	3.79
Barium	105	101	40.3	60.3	35.3	104	73.8	66.5
Beryllium	0.0442 J	0.0477 J	0.0437 J	0.0448 J	0.0358 J	0.052 J	0.0528 J	0.0412 J
Cadmium	3.15	2.7	0.0219 J	0.0336 J	0.0307 J	2.1	2.29	7.35
Calcium	7,960	8,590	450	1,010	891	1,730	1,590	22,800
Chromium	43.1	25.1	17.1	36.1	15.6	35.7	36.2	58.3
Cobalt	5.68	3.85	2.79	4.37	2.47	4.72	3.25	3.39
Copper	138	178	5.52	10.2	4.8	58.9	31.1	148
Iron	12,700	18,900	8,400	10,400	6,050	36,200	9,920	36,300
Lead	112	202	3.52	5.36	6.51	243	372	692
Magnesium	3,970	2,080	2,150	3,090	1,250	2,180	1,650	1,840
Manganese	229	231	43.5	89.3	53.2	141	136	235
Mercury	0.312	1.74	0.00368 J	0.038	0.0143	0.0512	1.64	2.31
Nickel	11.7	23.2	8.77	23.2	7.51	31.4	28.3	28.2
Potassium	938	927	642	1,240	487	712	473	372
Selenium	0.291	ND	ND	0.235	ND	0.323	0.223 J	0.236
Silver	8.8	1.62	ND	0.0224 J	ND	0.0808 J	0.0704 J	0.153
Sodium	160	112	111	85.2	46.5	157	89.3	86.1
Thallium	0.0632 J	0.0636 J	0.0437 J	0.101 J	0.0715 J	0.104 J	0.0821 J	0.0471 J
Vanadium	18.9	21.2	19	34.5	16.1	25.3	15.3	9.89
Zinc	481	439	16.3	27.2	17.6	168	343	2,550

Notes:
Analyte Detected
ND - Analyte not detected
J - Reported value is estimated
mg/kg - milligram per kilogram

Appendix C
Groundwater Analytical Data Detections
Towers Road Disposal Areas
Harvey Point Defense Testing Activity
Hertford, North Carolina

Station ID	2nd Street Disposal Area				5th Street Disposal Area			
Sample ID	2-1	2-2	2-3	2-4	5-1	5-2	5-3	5-4
Sample Date	01/10/12	01/10/12	01/10/12	01/10/12	01/10/12	01/10/12	01/10/12	01/10/12
Volatile Organic Compounds (ug/l)								
1,1-Dichloroethane	0.21 J	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	0.7 J	ND	ND
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND	0.16 J	ND	ND
Acetone	1.55 J	2.15 J	1.63 J	1.34 J	1.33 J	1.34	1.22 J	1.15 J
Benzene	ND	ND	ND	ND	ND	0.25	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	0.52	ND	ND
Dichlorodifluoromethane	ND	ND	4.5 J	ND	ND	45.6	ND	ND
Isopropylbenzene	0.11 J	ND	ND	ND	ND	ND	ND	ND
MTBE	1.03	ND	ND	ND	ND	9.96	0.59 J	2.01
Methylene Chloride	0.54 J	0.68 J	0.55 J	0.69 J	0.24 J	0.79	0.61 J	0.62 J
Trichlorofluoromethane	ND	ND	0.68 J	ND	ND	ND	ND	ND
Vinyl Chloride	ND	ND	0.18 J	ND	ND	13.6	ND	ND
Metals (ug/l)								
Aluminum	24,400	246,000	149,000	101,000	28,900	190,000	107,000	64,700
Antimony	0.6 J	0.7 J	0.5 J	ND	ND	ND	2.3 J	0.5 J
Arsenic	8.5	64.1	53.6	47.6	3.1 J	71.7	17.1	11.1
Barium	172	1,520	578	415	153	768	499	276
Beryllium	0.3 J	0.55 J	0.55 J	0.55 J	0.5 J	ND	0.55	0.55 J
Cadmium	0.5 J	2.7 J	0.6 J	0.3 J	ND	0.9	3.1 J	1.1 J
Calcium	28,700	124,000	49,800	23,800	21,200	60,800	35,200	25,600
Chromium	58.9	495	311	184	45.2	367	160	107
Cobalt	17.3	150	82.5	27.8	67.2	27.1	85.1	39.8
Copper	32.3	399	138	59.3	21.8	16.3	18.5	59.9
Iron	21,200	237,000	158,000	110,000	24,000	206,000	85,100	54,800
Lead	15.3	233	80.7	53.9	12.7	99.9	46.5	94.6
Magnesium	15,900	144,000	48,300	22,000	16,100	62,100	30,300	23,400
Manganese	299	2,880	2,500	2,880	1,300	3,500	1,860	932
Mercury	0.0584 J	1.75	0.167	0.364 J	0.0274 J	0.0198 J	1.27	0.347
Nickel	45.5	338	179	78	37.2	30.4	96.5	72.3
Potassium	4,710	28,500	15,600	9,850	4,760	18,900	8,340	6,880
Selenium	1.1 J	5.1	2.6 J	1.7 J	ND	3.2 J	2.6 J	1.4 J
Silver	1.2 J	1.6 J	0.5 J	ND	ND	ND	ND	ND
Sodium	26,100	63,100	49,300	14,300	23,700	38,700	34,700	12,000
Thallium	ND	1.9 J	0.9 J	0.6 J	ND	1.1 J	0.5 J	0.3 J
Vanadium	65.3	645	381	242	72	43.1	22.4	155
Zinc	96.9	932	306	181	52.5	415	433	251

Notes:
Analyte Detected
ND - Analyte not detected
J - Reported value is estimated
ug/l - microgram per liter

Laboratory Report of Analysis

To: Randolph Lathrop
IEC, LLC
11506 Allecingie Parkway
Suite 1A
Richmond, VA 23235

Report Number: **31200103**

Client Project: **HPDTA**

Dear Randolph Lathrop,

Enclosed are the results of the analytical services performed under the referenced project for the received samples and associated QC as applicable. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of five years in the event they are required for future reference. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. Any samples submitted to our laboratory will be retained for a maximum of thirty (30) days from the date of this report unless other arrangements are requested.

If there are any questions about the report or services performed during this project, please call Barbara A. Hager at (910) 350-1903. We will be happy to answer any questions or concerns which you may have.

Thank you for using SGS North America Inc. for your analytical services. We look forward to working with you again on any additional analytical needs.

Sincerely,
SGS North America Inc.

Barbara A. Hager Date
Project Manager
barbara.hager@sgs.com

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Laboratory Qualifiers

Report Definitions

DL	Method, Instrument, or Estimated Detection Limit per Analytical Method
CL	Control Limits for the recovery result of a parameter
LOQ	Reporting Limit
DF	Dilution Factor
RPD	Relative Percent Difference
LCS(D)	Laboratory Control Spike (Duplicate)
MS(D)	Matrix Spike (Duplicate)
MB	Method Blank

Qualifier Definitions

*	Recovery or RPD outside of control limits
B	Analyte was detected in the Lab Method Blank at a level above the LOQ
U	Undetected (Reported as ND or < DL)
V	Recovery is below quality control limit. The data has been validated based on a favorable signal-to-noise and detection limit
A	Amount detected is less than the Lower Method Calibration Limit
J	Estimated Concentration.
O	The recovery of this analyte in the OPR is above the Method QC Limits and the reported concentration in the sample may be biased high
E	Amount detected is greater than the Upper Calibration Limit
S	The amount of analyte present has saturated the detector. This situation results in an underestimation of the affected analyte(s)
Q	Indicates the presence of a quantitative interference. This situation may result in an underestimation of the affected analyte(s)
I	Indicates the presence of a qualitative interference that could cause a false positive or an overestimation of the affected analyte(s)
DPE	Indicates the presence of a peak in the polychlorinated diphenylether channel that could cause a false positive or an overestimation of the affected analyte(s)
TIC	Tentatively Identified Compound
EMPC	Estimated Maximum possible Concentration due to ion ratio failure
ND	Not Detected
K	Result is estimated due to ion ratio failure in High Resolution PCB Analysis
P	RPD > 40% between results of dual columns
D	Spike or surrogate was diluted out in order to achieve a parameter result within instrument calibration range

Samples requiring manual integrations for various congeners and/or standards are marked and dated by the analyst. A code definition is provided below:

M1	Mis-identified peak
M2	Software did not integrate peak
M3	Incorrect baseline construction (i.e. not all of peak included; two peaks integrated as one)
M4	Pattern integration required (i.e. DRO, GRO, PCB, Toxaphene and Technical Chlordane)
M5	Other - Explained in case narrative

Note Results pages that include a value for "Solids (%)" have been adjusted for moisture content.

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Sample Summary

Client Sample ID	Lab Sample ID	Collected	Received	Matrix
2nd-1	31200103001	01/10/2012 09:40	01/13/2012 10:15	Water
2nd-2	31200103002	01/10/2012 10:10	01/13/2012 10:15	Water
2nd-3	31200103003	01/10/2012 10:50	01/13/2012 10:15	Water
2nd-4	31200103004	01/10/2012 11:40	01/13/2012 10:15	Water
2nd-1-2	31200103005	01/10/2012 09:40	01/13/2012 10:15	Soil-Solid as dry weight
2nd-2-2	31200103006	01/10/2012 10:10	01/13/2012 10:15	Soil-Solid as dry weight
2nd-3-2	31200103007	01/10/2012 10:50	01/13/2012 10:15	Soil-Solid as dry weight
2nd-4-2	31200103008	01/10/2012 11:40	01/13/2012 10:15	Soil-Solid as dry weight
2nd-drum	31200103009	01/11/2012 14:40	01/13/2012 10:15	Soil-Solid as dry weight
Trip Blanks (Not on COC)	31200103010	01/10/2012 00:00	01/13/2012 10:15	Water

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Detectable Results Summary

Client Sample ID: **2nd-1**
Lab Sample ID: 31200103001-D

	Parameter	Result	Units	
SW-846 6010C	Zinc	0.0969	mg/L	
	Barium	0.172	mg/L	
	Manganese	0.299	mg/L	
	Iron	21.2	mg/L	
	Chromium	0.0589	mg/L	
	Magnesium	15.9	mg/L	
	Aluminum	24.4	mg/L	
	Calcium	28.7	mg/L	
	Sodium	26.1	mg/L	
	Potassium	4.71	mg/L	
SW-846 6020A	Beryllium	0.000300	mg/L	J
	Vanadium	0.0653	mg/L	
	Cobalt	0.0173	mg/L	
	Nickel	0.0455	mg/L	
	Copper	0.0323	mg/L	
	Arsenic	0.00850	mg/L	
	Selenium	0.00110	mg/L	J
	Silver	0.00120	mg/L	J
	Cadmium	0.000500	mg/L	J
	Antimony	0.000600	mg/L	J
	Lead	0.0153	mg/L	
SW-846 7470A	Mercury	0.0000584	mg/L	J
SW-846 8260B	1,1-Dichloroethane	0.210	ug/L	J
	Acetone	1.55	ug/L	J
	Isopropylbenzene (Cumene)	0.110	ug/L	J
	Methylene chloride	0.540	ug/L	J
	tert-Butyl methyl ether (MTBE)	1.03	ug/L	

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Detectable Results Summary

Client Sample ID: **2nd-2**
Lab Sample ID: 31200103002-D

	Parameter	Result	Units	
SW-846 6010C	Zinc	0.932	mg/L	
	Barium	1.52	mg/L	
	Manganese	2.88	mg/L	
	Iron	237	mg/L	
	Chromium	0.495	mg/L	
	Magnesium	144	mg/L	
	Aluminum	246	mg/L	
	Calcium	124	mg/L	
	Sodium	63.1	mg/L	
	Potassium	28.5	mg/L	
SW-846 6020A	Beryllium	0.000550	mg/L	J
	Vanadium	0.645	mg/L	
	Cobalt	0.150	mg/L	
	Nickel	0.338	mg/L	
	Copper	0.399	mg/L	
	Arsenic	0.0641	mg/L	
	Selenium	0.00510	mg/L	
	Silver	0.00160	mg/L	J
	Cadmium	0.00270	mg/L	J
	Antimony	0.000700	mg/L	J
	Thallium	0.00190	mg/L	J
	Lead	0.233	mg/L	
SW-846 7470A	Mercury	0.00175	mg/L	
SW-846 8260B	Acetone	2.15	ug/L	J
	Methylene chloride	0.680	ug/L	J

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Detectable Results Summary

Client Sample ID: **2nd-3**
Lab Sample ID: 31200103003-D

	Parameter	Result	Units	
SW-846 6010C	Zinc	0.306	mg/L	
	Barium	0.578	mg/L	
	Manganese	2.50	mg/L	
	Iron	158	mg/L	
	Chromium	0.311	mg/L	
	Magnesium	48.3	mg/L	
	Aluminum	149	mg/L	
	Calcium	49.8	mg/L	
	Sodium	49.3	mg/L	
	Potassium	15.6	mg/L	
SW-846 6020A	Beryllium	0.000550	mg/L	J
	Vanadium	0.381	mg/L	
	Cobalt	0.0825	mg/L	
	Nickel	0.179	mg/L	
	Copper	0.138	mg/L	
	Arsenic	0.0536	mg/L	
	Selenium	0.00260	mg/L	J
	Silver	0.000500	mg/L	J
	Cadmium	0.000600	mg/L	J
	Antimony	0.000500	mg/L	J
	Thallium	0.000900	mg/L	J
	Lead	0.0807	mg/L	
SW-846 7470A	Mercury	0.000167	mg/L	
SW-846 8260B	Acetone	1.63	ug/L	J
	Dichlorodifluoromethane	4.50	ug/L	J
	Methylene chloride	0.550	ug/L	J
	Trichlorofluoromethane	0.680	ug/L	J
	Vinyl chloride	0.180	ug/L	J

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Detectable Results Summary

Client Sample ID: **2nd-4**
Lab Sample ID: 31200103004-D

	Parameter	Result	Units	
SW-846 6010C	Zinc	0.181	mg/L	
	Barium	0.415	mg/L	
	Manganese	2.88	mg/L	
	Iron	110	mg/L	
	Chromium	0.184	mg/L	
	Magnesium	22.0	mg/L	
	Aluminum	101	mg/L	
	Calcium	23.8	mg/L	
	Sodium	14.3	mg/L	
	Potassium	9.85	mg/L	
SW-846 6020A	Beryllium	0.000550	mg/L	J
	Vanadium	0.242	mg/L	
	Cobalt	0.0278	mg/L	
	Nickel	0.0780	mg/L	
	Copper	0.0593	mg/L	
	Arsenic	0.0476	mg/L	
	Selenium	0.00170	mg/L	J
	Cadmium	0.000300	mg/L	J
	Thallium	0.000600	mg/L	J
	Lead	0.0539	mg/L	
SW-846 7470A	Mercury	0.0000364	mg/L	J
SW-846 8260B	Acetone	1.34	ug/L	J
	Methylene chloride	0.690	ug/L	J

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Detectable Results Summary

Client Sample ID: **2nd-1-2**
Lab Sample ID: 31200103005-E

	Parameter	Result	Units	
SW-846 6010C	Zinc	481	mg/kg	
	Barium	105	mg/kg	
	Manganese	229	mg/kg	
	Iron	12700	mg/kg	
	Chromium	43.1	mg/kg	
	Magnesium	3970	mg/kg	
	Aluminum	14100	mg/kg	
	Calcium	7960	mg/kg	
	Sodium	160	mg/kg	
	Potassium	938	mg/kg	
SW-846 6020A	Antimony	4.50	mg/kg	
	Arsenic	29.6	mg/kg	
	Beryllium	0.0442	mg/kg	J
	Cadmium	3.15	mg/kg	
	Cobalt	5.68	mg/kg	
	Copper	138	mg/kg	
	Lead	112	mg/kg	
	Nickel	11.7	mg/kg	
	Selenium	0.291	mg/kg	
	Silver	8.77	mg/kg	
	Thallium	0.0632	mg/kg	J
	Vanadium	18.9	mg/kg	
SW-846 7471B	Mercury	0.312	mg/kg	
SW-846 8260B	Acetone	36.5	ug/Kg	J
	Benzene	3.46	ug/Kg	J
	Toluene	1.15	ug/Kg	J

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Detectable Results Summary

Client Sample ID: **2nd-2-2**
Lab Sample ID: 31200103006-E

	Parameter	Result	Units	
SW-846 6010C	Zinc	439	mg/kg	
	Barium	101	mg/kg	
	Manganese	231	mg/kg	
	Iron	18900	mg/kg	
	Chromium	25.1	mg/kg	
	Magnesium	2080	mg/kg	
	Aluminum	13600	mg/kg	
	Calcium	8590	mg/kg	
	Sodium	112	mg/kg	
	Potassium	927	mg/kg	
SW-846 6020A	Antimony	3.11	mg/kg	
	Arsenic	4.35	mg/kg	
	Beryllium	0.0477	mg/kg	J
	Cadmium	2.70	mg/kg	
	Cobalt	3.85	mg/kg	
	Copper	178	mg/kg	
	Lead	202	mg/kg	
	Nickel	23.2	mg/kg	
	Silver	1.62	mg/kg	
	Thallium	0.0636	mg/kg	J
	Vanadium	21.2	mg/kg	
SW-846 7471B	Mercury	1.74	mg/kg	
SW-846 8260B	2-Butanone	9.38	ug/Kg	J
	Acetone	65.8	ug/Kg	
	Benzene	6.01	ug/Kg	
	Bromomethane	3.48	ug/Kg	J
	Chloromethane	7.01	ug/Kg	
	Toluene	2.46	ug/Kg	J

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Detectable Results Summary

Client Sample ID: **2nd-3-2**
Lab Sample ID: 31200103007-E

	Parameter	Result	Units	
SW-846 6010C	Zinc	16.3	mg/kg	
	Barium	40.3	mg/kg	
	Manganese	43.5	mg/kg	
	Iron	8400	mg/kg	
	Chromium	17.1	mg/kg	
	Magnesium	2150	mg/kg	
	Aluminum	13300	mg/kg	
	Calcium	450	mg/kg	
	Sodium	111	mg/kg	
	Potassium	642	mg/kg	
SW-846 6020A	Arsenic	2.73	mg/kg	
	Beryllium	0.0437	mg/kg	J
	Cadmium	0.0219	mg/kg	J
	Cobalt	2.79	mg/kg	
	Copper	5.52	mg/kg	
	Lead	3.52	mg/kg	
	Nickel	8.77	mg/kg	
	Thallium	0.0437	mg/kg	J
	Vanadium	19.0	mg/kg	
SW-846 7471B	Mercury	0.00368	mg/kg	J
SW-846 8260B	Acetone	16.0	ug/Kg	J
	Methylene chloride	1.60	ug/Kg	J

Client Sample ID: **2nd-4-2**
Lab Sample ID: 31200103008-E

	Parameter	Result	Units	
SW-846 6010C	Zinc	27.2	mg/kg	
	Barium	60.3	mg/kg	
	Manganese	89.3	mg/kg	
	Iron	10400	mg/kg	
	Chromium	36.1	mg/kg	
	Magnesium	3090	mg/kg	
	Aluminum	18800	mg/kg	
	Calcium	1010	mg/kg	
	Sodium	85.2	mg/kg	
	Potassium	1240	mg/kg	
SW-846 6020A	Arsenic	0.862	mg/kg	
	Beryllium	0.0448	mg/kg	J
	Cadmium	0.0336	mg/kg	J
	Cobalt	4.37	mg/kg	
	Copper	10.2	mg/kg	
	Lead	5.36	mg/kg	
	Nickel	23.2	mg/kg	
	Selenium	0.235	mg/kg	
	Silver	0.0224	mg/kg	J
	Thallium	0.101	mg/kg	J
	Vanadium	34.5	mg/kg	
SW-846 7471B	Mercury	0.0380	mg/kg	
SW-846 8260B	2-Butanone	9.98	ug/Kg	J
	Acetone	27.4	ug/Kg	J
	Methylene chloride	2.40	ug/Kg	J

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Detectable Results Summary

Client Sample ID: **2nd-drum**
Lab Sample ID: 31200103009-E

	Parameter	Result	Units	
SW-846 6010C	Zinc	688	mg/kg	
	Barium	152	mg/kg	
	Manganese	524	mg/kg	
	Iron	44200	mg/kg	
	Chromium	34.1	mg/kg	
	Magnesium	1900	mg/kg	
	Aluminum	17100	mg/kg	
	Calcium	7600	mg/kg	
	Sodium	143	mg/kg	
	Potassium	1100	mg/kg	
SW-846 6020A	Antimony	5.61	mg/kg	
	Arsenic	6.36	mg/kg	
	Beryllium	0.0575	mg/kg	J
	Cadmium	3.40	mg/kg	
	Cobalt	7.25	mg/kg	
	Copper	252	mg/kg	
	Lead	460	mg/kg	
	Nickel	32.7	mg/kg	
	Selenium	0.370	mg/kg	
	Silver	0.907	mg/kg	
	Thallium	0.115	mg/kg	J
	Vanadium	24.1	mg/kg	
SW-846 7471B	Mercury	2.50	mg/kg	
SW-846 8260B	2-Butanone	30.9	ug/Kg	J
	Acetone	376	ug/Kg	
	Benzene	6.91	ug/Kg	J
	Chloromethane	10.8	ug/Kg	
	Methylene chloride	2.07	ug/Kg	J
	Toluene	15.3	ug/Kg	

Client Sample ID: **Trip Blanks (Not on COC)**
Lab Sample ID: 31200103010-A

	Parameter	Result	Units	
SW-846 8260B	Acetone	0.970	ug/L	J
	Methylene chloride	0.400	ug/L	J

Quality Control Samples

Client Sample ID: **MB for HBN 19122 [MXX/1746]**
Lab Sample ID: 54382

	Parameter	Result	Units	
SW-846 6010C	Zinc	0.00269	mg/L	J
	Barium	0.00577	mg/L	J
	Potassium	0.0134	mg/L	J
SW-846 6020A	Copper	0.00220	mg/L	J

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Detectable Results Summary

Client Sample ID: **MB for HBN 19135 [MXX/1747]**
Lab Sample ID: 54434

	Parameter	Result	Units	
SW-846 6010C	Barium	0.469	mg/kg	J
	Sodium	4.08	mg/kg	J
SW-846 6020A	Cobalt	0.00980	mg/kg	J
	Nickel	0.471	mg/kg	
	Silver	0.0294	mg/kg	J
	Vanadium	0.0882	mg/kg	J

Client Sample ID: **MB-S for HBN 19230 [VXX/2646]**
Lab Sample ID: 54810

	Parameter	Result	Units	
SW-846 8260B	Methylene chloride	1.60	ug/Kg	J

Client Sample ID: **MB for HBN 19239 [MXX/1752]**
Lab Sample ID: 54866

	Parameter	Result	Units	
SW-846 7470A	Mercury	0.0000233	mg/L	J

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Results of **2nd-1**

Client Sample ID: **2nd-1**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103001-A
Lab Project ID: 31200103

Collection Date: 01/10/2012 09:40
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
1,1,1-Trichloroethane	ND	U	0.123	1.00	ug/L	1	01/17/2012 15:46
1,1,2,2-Tetrachloroethane	ND	U	0.156	1.00	ug/L	1	01/17/2012 15:46
1,1,2-Trichloroethane	ND	U	0.126	1.00	ug/L	1	01/17/2012 15:46
1,1-Dichloroethane	**0.210**	J	0.165	1.00	ug/L	1	01/17/2012 15:46
1,1-Dichloroethene	ND	U	0.212	1.00	ug/L	1	01/17/2012 15:46
1,2,3-Trichlorobenzene	ND	U	0.110	1.00	ug/L	1	01/17/2012 15:46
1,2,4-Trichlorobenzene	ND	U	0.0913	1.00	ug/L	1	01/17/2012 15:46
1,2-Dibromo-3-chloropropane	ND	U	0.748	5.00	ug/L	1	01/17/2012 15:46
1,2-Dibromoethane	ND	U	0.120	1.00	ug/L	1	01/17/2012 15:46
1,2-Dichlorobenzene	ND	U	0.137	1.00	ug/L	1	01/17/2012 15:46
1,2-Dichloroethane	ND	U	0.167	1.00	ug/L	1	01/17/2012 15:46
1,2-Dichloropropane	ND	U	0.163	1.00	ug/L	1	01/17/2012 15:46
1,3,5-Trimethylbenzene	ND	U	0.113	1.00	ug/L	1	01/17/2012 15:46
1,3-Dichlorobenzene	ND	U	0.103	1.00	ug/L	1	01/17/2012 15:46
1,4 Dioxane	ND	U	14.4	100	ug/L	1	01/17/2012 15:46
1,4-Dichlorobenzene	ND	U	0.130	1.00	ug/L	1	01/17/2012 15:46
2-Butanone	ND	U	0.723	25.0	ug/L	1	01/17/2012 15:46
2-Hexanone	ND	U	0.728	5.00	ug/L	1	01/17/2012 15:46
4-Methyl-2-pentanone	ND	U	0.558	5.00	ug/L	1	01/17/2012 15:46
Acetone	**1.55**	J	0.864	25.0	ug/L	1	01/17/2012 15:46
Benzene	ND	U	0.113	1.00	ug/L	1	01/17/2012 15:46
Bromochloromethane	ND	U	0.211	1.00	ug/L	1	01/17/2012 15:46
Bromodichloromethane	ND	U	0.110	1.00	ug/L	1	01/17/2012 15:46
Bromoform	ND	U	0.0974	1.00	ug/L	1	01/17/2012 15:46
Bromomethane	ND	U	0.237	1.00	ug/L	1	01/17/2012 15:46
Carbon disulfide	ND	U	0.106	1.00	ug/L	1	01/17/2012 15:46
Carbon tetrachloride	ND	U	0.101	1.00	ug/L	1	01/17/2012 15:46
Chlorobenzene	ND	U	0.116	1.00	ug/L	1	01/17/2012 15:46
Chloroethane	ND	U	0.311	1.00	ug/L	1	01/17/2012 15:46
Chloroform	ND	U	0.139	1.00	ug/L	1	01/17/2012 15:46
Chloromethane	ND	U	0.448	1.00	ug/L	1	01/17/2012 15:46
Cyclohexane	ND	U	0.163	1.00	ug/L	1	01/17/2012 15:46
Dibromochloromethane	ND	U	0.134	1.00	ug/L	1	01/17/2012 15:46
Dichlorodifluoromethane	ND	U	0.171	5.00	ug/L	1	01/17/2012 15:46
cis-1,3-Dichloropropene	ND	U	0.0767	1.00	ug/L	1	01/17/2012 15:46
trans-1,3-Dichloropropene	ND	U	0.0862	1.00	ug/L	1	01/17/2012 15:46
Ethyl Benzene	ND	U	0.0877	1.00	ug/L	1	01/17/2012 15:46
Isopropylbenzene (Cumene)	**0.110**	J	0.0869	1.00	ug/L	1	01/17/2012 15:46
Methyl Acetate	ND	U	1.00	10.0	ug/L	1	01/17/2012 15:46
Methylcyclohexane	ND	U	0.108	1.00	ug/L	1	01/17/2012 15:46
Methylene chloride	**0.540**	J	0.152	5.00	ug/L	1	01/17/2012 15:46
Styrene	ND	U	0.102	1.00	ug/L	1	01/17/2012 15:46
Tetrachloroethene	ND	U	0.155	1.00	ug/L	1	01/17/2012 15:46

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Results of **2nd-1**

Client Sample ID: **2nd-1**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103001-A
Lab Project ID: 31200103

Collection Date: 01/10/2012 09:40
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Toluene	ND	U	0.133	1.00	ug/L	1	01/17/2012 15:46
Trichloroethene	ND	U	0.125	1.00	ug/L	1	01/17/2012 15:46
Trichlorofluoromethane	ND	U	0.137	1.00	ug/L	1	01/17/2012 15:46
Trichlorotrifluoroethane	ND	U	0.123	1.00	ug/L	1	01/17/2012 15:46
Vinyl chloride	ND	U	0.124	1.00	ug/L	1	01/17/2012 15:46
cis-1,2-Dichloroethene	ND	U	0.136	1.00	ug/L	1	01/17/2012 15:46
m,p-Xylene	ND	U	0.182	2.00	ug/L	1	01/17/2012 15:46
o-Xylene	ND	U	0.0874	1.00	ug/L	1	01/17/2012 15:46
tert-Butyl methyl ether (MTBE)	**1.03**		0.144	1.00	ug/L	1	01/17/2012 15:46
trans-1,2-Dichloroethene	ND	U	0.223	1.00	ug/L	1	01/17/2012 15:46
Surrogates							
1,2-Dichloroethane-d4	110			64.0-140	%	1	01/17/2012 15:46
4-Bromofluorobenzene	99.0			85.0-115	%	1	01/17/2012 15:46
Toluene d8	88.0			82.0-117	%	1	01/17/2012 15:46

Batch Information

Analytical Batch: **VMS1830**
Analytical Method: **SW-846 8260B**
Instrument: **MSD4**
Analyst: **DVO**
Analytical Date/Time: **01/17/2012 15:46**

Prep Batch: **VXX2625**
Prep Method: **SW-846 5030B**
Prep Date/Time: **01/17/2012 08:00**
Prep Initial Wt./Vol.: **40 mL**
Prep Extract Vol: **40 mL**

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Results of **2nd-1**

Client Sample ID: **2nd-1**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103001-D
Lab Project ID: 31200103

Collection Date: 01/10/2012 09:40
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 6010C**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Zinc	**0.0969**		0.00226	0.0200	mg/L	1	01/16/2012 19:34
Barium	**0.172**		0.000394	0.100	mg/L	1	01/16/2012 19:34
Manganese	**0.299**		0.00152	0.0100	mg/L	1	01/16/2012 19:34
Iron	**21.2**		0.222	1.00	mg/L	10	01/17/2012 15:24
Chromium	**0.0589**		0.00147	0.0100	mg/L	1	01/16/2012 19:34
Magnesium	**15.9**		0.302	1.00	mg/L	10	01/17/2012 15:24
Aluminum	**24.4**		0.315	1.00	mg/L	10	01/17/2012 15:24
Calcium	**28.7**		0.236	1.00	mg/L	10	01/17/2012 15:24
Sodium	**26.1**		0.132	2.00	mg/L	10	01/17/2012 15:24
Potassium	**4.71**		0.0126	0.200	mg/L	1	01/16/2012 19:34

Batch Information

Analytical Batch: **MIP1395**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/16/2012 19:34**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

Analytical Batch: **MIP1397**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/17/2012 15:24**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

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Results of **2nd-1**

Client Sample ID: **2nd-1**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103001-D
Lab Project ID: 31200103

Collection Date: 01/10/2012 09:40
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 7470A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Mercury	**0.0000584**	J	0.0000190	0.000150	mg/L	1	01/19/2012 14:41

Batch Information

Analytical Batch: **MHG1189**
Analytical Method: **SW-846 7470A**
Instrument: **HG2**
Analyst: **NTM**
Analytical Date/Time: **01/19/2012 14:41**

Prep Batch: **MXX1752**
Prep Method: **SW-846 7470A PREP**
Prep Date/Time: **01/19/2012 10:36**
Prep Initial Wt./Vol.: **40 mL**
Prep Extract Vol: **57 mL**

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Results of **2nd-1**

Client Sample ID: **2nd-1**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103001-D
Lab Project ID: 31200103

Collection Date: 01/10/2012 09:40
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 6020A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Beryllium	**0.000300**	J	0.000297	0.00250	mg/L	5	01/18/2012 11:53
Vanadium	**0.0653**		0.000661	0.00500	mg/L	10	01/18/2012 11:56
Cobalt	**0.0173**		0.000358	0.00500	mg/L	10	01/18/2012 11:56
Nickel	**0.0455**		0.00135	0.00500	mg/L	10	01/18/2012 11:56
Copper	**0.0323**		0.000860	0.00500	mg/L	10	01/18/2012 11:56
Arsenic	**0.00850**		0.000712	0.00500	mg/L	10	01/18/2012 11:56
Selenium	**0.00110**	J	0.000824	0.00500	mg/L	10	01/18/2012 16:47
Silver	**0.00120**	J	0.000374	0.00500	mg/L	10	01/18/2012 11:56
Cadmium	**0.000500**	J	0.000278	0.00500	mg/L	10	01/18/2012 11:56
Antimony	**0.000600**	J	0.000437	0.00500	mg/L	10	01/18/2012 11:56
Thallium	ND	U	0.000297	0.00500	mg/L	10	01/18/2012 11:56
Lead	**0.0153**		0.000640	0.00500	mg/L	10	01/18/2012 11:56

Batch Information

Analytical Batch: **MMS1143**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 11:53**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

Analytical Batch: **MMS1144**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 16:47**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

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Results of **2nd-2**

Client Sample ID: **2nd-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103002-A
Lab Project ID: 31200103

Collection Date: 01/10/2012 10:10
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
1,1,1-Trichloroethane	ND	U	0.123	1.00	ug/L	1	01/17/2012 16:11
1,1,2,2-Tetrachloroethane	ND	U	0.156	1.00	ug/L	1	01/17/2012 16:11
1,1,2-Trichloroethane	ND	U	0.126	1.00	ug/L	1	01/17/2012 16:11
1,1-Dichloroethane	ND	U	0.165	1.00	ug/L	1	01/17/2012 16:11
1,1-Dichloroethene	ND	U	0.212	1.00	ug/L	1	01/17/2012 16:11
1,2,3-Trichlorobenzene	ND	U	0.110	1.00	ug/L	1	01/17/2012 16:11
1,2,4-Trichlorobenzene	ND	U	0.0913	1.00	ug/L	1	01/17/2012 16:11
1,2-Dibromo-3-chloropropane	ND	U	0.748	5.00	ug/L	1	01/17/2012 16:11
1,2-Dibromoethane	ND	U	0.120	1.00	ug/L	1	01/17/2012 16:11
1,2-Dichlorobenzene	ND	U	0.137	1.00	ug/L	1	01/17/2012 16:11
1,2-Dichloroethane	ND	U	0.167	1.00	ug/L	1	01/17/2012 16:11
1,2-Dichloropropane	ND	U	0.163	1.00	ug/L	1	01/17/2012 16:11
1,3,5-Trimethylbenzene	ND	U	0.113	1.00	ug/L	1	01/17/2012 16:11
1,3-Dichlorobenzene	ND	U	0.103	1.00	ug/L	1	01/17/2012 16:11
1,4 Dioxane	ND	U	14.4	100	ug/L	1	01/17/2012 16:11
1,4-Dichlorobenzene	ND	U	0.130	1.00	ug/L	1	01/17/2012 16:11
2-Butanone	ND	U	0.723	25.0	ug/L	1	01/17/2012 16:11
2-Hexanone	ND	U	0.728	5.00	ug/L	1	01/17/2012 16:11
4-Methyl-2-pentanone	ND	U	0.558	5.00	ug/L	1	01/17/2012 16:11
Acetone	**2.15**	J	0.864	25.0	ug/L	1	01/17/2012 16:11
Benzene	ND	U	0.113	1.00	ug/L	1	01/17/2012 16:11
Bromochloromethane	ND	U	0.211	1.00	ug/L	1	01/17/2012 16:11
Bromodichloromethane	ND	U	0.110	1.00	ug/L	1	01/17/2012 16:11
Bromoform	ND	U	0.0974	1.00	ug/L	1	01/17/2012 16:11
Bromomethane	ND	U	0.237	1.00	ug/L	1	01/17/2012 16:11
Carbon disulfide	ND	U	0.106	1.00	ug/L	1	01/17/2012 16:11
Carbon tetrachloride	ND	U	0.101	1.00	ug/L	1	01/17/2012 16:11
Chlorobenzene	ND	U	0.116	1.00	ug/L	1	01/17/2012 16:11
Chloroethane	ND	U	0.311	1.00	ug/L	1	01/17/2012 16:11
Chloroform	ND	U	0.139	1.00	ug/L	1	01/17/2012 16:11
Chloromethane	ND	U	0.448	1.00	ug/L	1	01/17/2012 16:11
Cyclohexane	ND	U	0.163	1.00	ug/L	1	01/17/2012 16:11
Dibromochloromethane	ND	U	0.134	1.00	ug/L	1	01/17/2012 16:11
Dichlorodifluoromethane	ND	U	0.171	5.00	ug/L	1	01/17/2012 16:11
cis-1,3-Dichloropropene	ND	U	0.0767	1.00	ug/L	1	01/17/2012 16:11
trans-1,3-Dichloropropene	ND	U	0.0862	1.00	ug/L	1	01/17/2012 16:11
Ethyl Benzene	ND	U	0.0877	1.00	ug/L	1	01/17/2012 16:11
Isopropylbenzene (Cumene)	ND	U	0.0869	1.00	ug/L	1	01/17/2012 16:11
Methyl Acetate	ND	U	1.00	10.0	ug/L	1	01/17/2012 16:11
Methylcyclohexane	ND	U	0.108	1.00	ug/L	1	01/17/2012 16:11
Methylene chloride	**0.680**	J	0.152	5.00	ug/L	1	01/17/2012 16:11
Styrene	ND	U	0.102	1.00	ug/L	1	01/17/2012 16:11
Tetrachloroethene	ND	U	0.155	1.00	ug/L	1	01/17/2012 16:11

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Results of **2nd-2**

Client Sample ID: **2nd-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103002-A
Lab Project ID: 31200103

Collection Date: 01/10/2012 10:10
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Toluene	ND	U	0.133	1.00	ug/L	1	01/17/2012 16:11
Trichloroethene	ND	U	0.125	1.00	ug/L	1	01/17/2012 16:11
Trichlorofluoromethane	ND	U	0.137	1.00	ug/L	1	01/17/2012 16:11
Trichlorotrifluoroethane	ND	U	0.123	1.00	ug/L	1	01/17/2012 16:11
Vinyl chloride	ND	U	0.124	1.00	ug/L	1	01/17/2012 16:11
cis-1,2-Dichloroethene	ND	U	0.136	1.00	ug/L	1	01/17/2012 16:11
m,p-Xylene	ND	U	0.182	2.00	ug/L	1	01/17/2012 16:11
o-Xylene	ND	U	0.0874	1.00	ug/L	1	01/17/2012 16:11
tert-Butyl methyl ether (MTBE)	ND	U	0.144	1.00	ug/L	1	01/17/2012 16:11
trans-1,2-Dichloroethene	ND	U	0.223	1.00	ug/L	1	01/17/2012 16:11
Surrogates							
1,2-Dichloroethane-d4	109			64.0-140	%	1	01/17/2012 16:11
4-Bromofluorobenzene	100			85.0-115	%	1	01/17/2012 16:11
Toluene d8	97.0			82.0-117	%	1	01/17/2012 16:11

Batch Information

Analytical Batch: **VMS1830**
Analytical Method: **SW-846 8260B**
Instrument: **MSD4**
Analyst: **DVO**
Analytical Date/Time: **01/17/2012 16:11**

Prep Batch: **VXX2625**
Prep Method: **SW-846 5030B**
Prep Date/Time: **01/17/2012 08:00**
Prep Initial Wt./Vol.: **40 mL**
Prep Extract Vol: **40 mL**

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Results of **2nd-2**

Client Sample ID: **2nd-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103002-D
Lab Project ID: 31200103

Collection Date: 01/10/2012 10:10
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 6010C**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Zinc	**0.932**		0.00226	0.0200	mg/L	1	01/16/2012 19:55
Barium	**1.52**		0.000394	0.100	mg/L	1	01/16/2012 19:55
Manganese	**2.88**		0.0152	0.100	mg/L	10	01/17/2012 15:32
Iron	**237**		2.22	10.0	mg/L	100	01/17/2012 15:36
Chromium	**0.495**		0.00147	0.0100	mg/L	1	01/16/2012 19:55
Magnesium	**144**		3.02	10.0	mg/L	100	01/17/2012 15:36
Aluminum	**246**		3.15	10.0	mg/L	100	01/17/2012 15:36
Calcium	**124**		2.36	10.0	mg/L	100	01/17/2012 15:36
Sodium	**63.1**		1.32	20.0	mg/L	100	01/17/2012 15:36
Potassium	**28.5**		0.126	2.00	mg/L	10	01/17/2012 15:32

Batch Information

Analytical Batch: **MIP1395**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/16/2012 19:55**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

Analytical Batch: **MIP1397**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/17/2012 15:32**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

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Results of **2nd-2**

Client Sample ID: **2nd-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103002-D
Lab Project ID: 31200103

Collection Date: 01/10/2012 10:10
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 7470A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Mercury	**0.00175**		0.0000190	0.000150	mg/L	1	01/19/2012 14:43

Batch Information

Analytical Batch: **MHG1189**
Analytical Method: **SW-846 7470A**
Instrument: **HG2**
Analyst: **NTM**
Analytical Date/Time: **01/19/2012 14:43**

Prep Batch: **MXX1752**
Prep Method: **SW-846 7470A PREP**
Prep Date/Time: **01/19/2012 10:36**
Prep Initial Wt./Vol.: **40 mL**
Prep Extract Vol: **57 mL**

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Results of **2nd-2**

Client Sample ID: **2nd-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103002-D
Lab Project ID: 31200103

Collection Date: 01/10/2012 10:10
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 6020A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Beryllium	**0.000550**	J	0.000297	0.00250	mg/L	5	01/18/2012 11:59
Vanadium	**0.645**		0.00661	0.0500	mg/L	100	01/18/2012 16:53
Cobalt	**0.150**		0.00358	0.0500	mg/L	100	01/18/2012 16:53
Nickel	**0.338**		0.0135	0.0500	mg/L	100	01/18/2012 16:53
Copper	**0.399**		0.00860	0.0500	mg/L	100	01/18/2012 16:53
Arsenic	**0.0641**		0.000712	0.00500	mg/L	10	01/18/2012 12:03
Selenium	**0.00510**		0.000824	0.00500	mg/L	10	01/18/2012 16:50
Silver	**0.00160**	J	0.000374	0.00500	mg/L	10	01/18/2012 12:03
Cadmium	**0.00270**	J	0.000278	0.00500	mg/L	10	01/18/2012 12:03
Antimony	**0.000700**	J	0.000437	0.00500	mg/L	10	01/18/2012 12:03
Thallium	**0.00190**	J	0.000297	0.00500	mg/L	10	01/18/2012 12:03
Lead	**0.233**		0.00640	0.0500	mg/L	100	01/18/2012 16:53

Batch Information

Analytical Batch: **MMS1143**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 11:59**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

Analytical Batch: **MMS1144**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 16:53**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

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Results of **2nd-3**

Client Sample ID: **2nd-3**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103003-A
Lab Project ID: 31200103

Collection Date: 01/10/2012 10:50
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
1,1,1-Trichloroethane	ND	U	0.123	1.00	ug/L	1	01/17/2012 16:36
1,1,2,2-Tetrachloroethane	ND	U	0.156	1.00	ug/L	1	01/17/2012 16:36
1,1,2-Trichloroethane	ND	U	0.126	1.00	ug/L	1	01/17/2012 16:36
1,1-Dichloroethane	ND	U	0.165	1.00	ug/L	1	01/17/2012 16:36
1,1-Dichloroethene	ND	U	0.212	1.00	ug/L	1	01/17/2012 16:36
1,2,3-Trichlorobenzene	ND	U	0.110	1.00	ug/L	1	01/17/2012 16:36
1,2,4-Trichlorobenzene	ND	U	0.0913	1.00	ug/L	1	01/17/2012 16:36
1,2-Dibromo-3-chloropropane	ND	U	0.748	5.00	ug/L	1	01/17/2012 16:36
1,2-Dibromoethane	ND	U	0.120	1.00	ug/L	1	01/17/2012 16:36
1,2-Dichlorobenzene	ND	U	0.137	1.00	ug/L	1	01/17/2012 16:36
1,2-Dichloroethane	ND	U	0.167	1.00	ug/L	1	01/17/2012 16:36
1,2-Dichloropropane	ND	U	0.163	1.00	ug/L	1	01/17/2012 16:36
1,3,5-Trimethylbenzene	ND	U	0.113	1.00	ug/L	1	01/17/2012 16:36
1,3-Dichlorobenzene	ND	U	0.103	1.00	ug/L	1	01/17/2012 16:36
1,4 Dioxane	ND	U	14.4	100	ug/L	1	01/17/2012 16:36
1,4-Dichlorobenzene	ND	U	0.130	1.00	ug/L	1	01/17/2012 16:36
2-Butanone	ND	U	0.723	25.0	ug/L	1	01/17/2012 16:36
2-Hexanone	ND	U	0.728	5.00	ug/L	1	01/17/2012 16:36
4-Methyl-2-pentanone	ND	U	0.558	5.00	ug/L	1	01/17/2012 16:36
Acetone	**1.63**	J	0.864	25.0	ug/L	1	01/17/2012 16:36
Benzene	ND	U	0.113	1.00	ug/L	1	01/17/2012 16:36
Bromochloromethane	ND	U	0.211	1.00	ug/L	1	01/17/2012 16:36
Bromodichloromethane	ND	U	0.110	1.00	ug/L	1	01/17/2012 16:36
Bromoform	ND	U	0.0974	1.00	ug/L	1	01/17/2012 16:36
Bromomethane	ND	U	0.237	1.00	ug/L	1	01/17/2012 16:36
Carbon disulfide	ND	U	0.106	1.00	ug/L	1	01/17/2012 16:36
Carbon tetrachloride	ND	U	0.101	1.00	ug/L	1	01/17/2012 16:36
Chlorobenzene	ND	U	0.116	1.00	ug/L	1	01/17/2012 16:36
Chloroethane	ND	U	0.311	1.00	ug/L	1	01/17/2012 16:36
Chloroform	ND	U	0.139	1.00	ug/L	1	01/17/2012 16:36
Chloromethane	ND	U	0.448	1.00	ug/L	1	01/17/2012 16:36
Cyclohexane	ND	U	0.163	1.00	ug/L	1	01/17/2012 16:36
Dibromochloromethane	ND	U	0.134	1.00	ug/L	1	01/17/2012 16:36
Dichlorodifluoromethane	**4.50**	J	0.171	5.00	ug/L	1	01/17/2012 16:36
cis-1,3-Dichloropropene	ND	U	0.0767	1.00	ug/L	1	01/17/2012 16:36
trans-1,3-Dichloropropene	ND	U	0.0862	1.00	ug/L	1	01/17/2012 16:36
Ethyl Benzene	ND	U	0.0877	1.00	ug/L	1	01/17/2012 16:36
Isopropylbenzene (Cumene)	ND	U	0.0869	1.00	ug/L	1	01/17/2012 16:36
Methyl Acetate	ND	U	1.00	10.0	ug/L	1	01/17/2012 16:36
Methylcyclohexane	ND	U	0.108	1.00	ug/L	1	01/17/2012 16:36
Methylene chloride	**0.550**	J	0.152	5.00	ug/L	1	01/17/2012 16:36
Styrene	ND	U	0.102	1.00	ug/L	1	01/17/2012 16:36
Tetrachloroethene	ND	U	0.155	1.00	ug/L	1	01/17/2012 16:36

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Results of **2nd-3**

Client Sample ID: **2nd-3**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103003-A
Lab Project ID: 31200103

Collection Date: 01/10/2012 10:50
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Toluene	ND	U	0.133	1.00	ug/L	1	01/17/2012 16:36
Trichloroethene	ND	U	0.125	1.00	ug/L	1	01/17/2012 16:36
Trichlorofluoromethane	**0.680**	J	0.137	1.00	ug/L	1	01/17/2012 16:36
Trichlorotrifluoroethane	ND	U	0.123	1.00	ug/L	1	01/17/2012 16:36
Vinyl chloride	**0.180**	J	0.124	1.00	ug/L	1	01/17/2012 16:36
cis-1,2-Dichloroethene	ND	U	0.136	1.00	ug/L	1	01/17/2012 16:36
m,p-Xylene	ND	U	0.182	2.00	ug/L	1	01/17/2012 16:36
o-Xylene	ND	U	0.0874	1.00	ug/L	1	01/17/2012 16:36
tert-Butyl methyl ether (MTBE)	ND	U	0.144	1.00	ug/L	1	01/17/2012 16:36
trans-1,2-Dichloroethene	ND	U	0.223	1.00	ug/L	1	01/17/2012 16:36
Surrogates							
1,2-Dichloroethane-d4	109			64.0-140	%	1	01/17/2012 16:36
4-Bromofluorobenzene	98.0			85.0-115	%	1	01/17/2012 16:36
Toluene d8	96.0			82.0-117	%	1	01/17/2012 16:36

Batch Information

Analytical Batch: **VMS1830**
Analytical Method: **SW-846 8260B**
Instrument: **MSD4**
Analyst: **DVO**
Analytical Date/Time: **01/17/2012 16:36**

Prep Batch: **VXX2625**
Prep Method: **SW-846 5030B**
Prep Date/Time: **01/17/2012 08:00**
Prep Initial Wt./Vol.: **40 mL**
Prep Extract Vol: **40 mL**

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Results of **2nd-3**

Client Sample ID: **2nd-3**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103003-D
Lab Project ID: 31200103

Collection Date: 01/10/2012 10:50
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 6010C**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Zinc	**0.306**		0.00226	0.0200	mg/L	1	01/16/2012 20:02
Barium	**0.578**		0.000394	0.100	mg/L	1	01/16/2012 20:02
Manganese	**2.50**		0.0152	0.100	mg/L	10	01/17/2012 15:40
Iron	**158**		2.22	10.0	mg/L	100	01/17/2012 15:44
Chromium	**0.311**		0.00147	0.0100	mg/L	1	01/16/2012 20:02
Magnesium	**48.3**		0.302	1.00	mg/L	10	01/17/2012 15:40
Aluminum	**149**		3.15	10.0	mg/L	100	01/17/2012 15:44
Calcium	**49.8**		0.236	1.00	mg/L	10	01/17/2012 15:40
Sodium	**49.3**		0.132	2.00	mg/L	10	01/17/2012 15:40
Potassium	**15.6**		0.126	2.00	mg/L	10	01/17/2012 15:40

Batch Information

Analytical Batch: **MIP1395**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/16/2012 20:02**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

Analytical Batch: **MIP1397**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/17/2012 15:40**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

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Results of **2nd-3**

Client Sample ID: **2nd-3**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103003-D
Lab Project ID: 31200103

Collection Date: 01/10/2012 10:50
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 7470A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Mercury	**0.000167**		0.0000190	0.000150	mg/L	1	01/19/2012 14:45

Batch Information

Analytical Batch: **MHG1189**
Analytical Method: **SW-846 7470A**
Instrument: **HG2**
Analyst: **NTM**
Analytical Date/Time: **01/19/2012 14:45**

Prep Batch: **MXX1752**
Prep Method: **SW-846 7470A PREP**
Prep Date/Time: **01/19/2012 10:36**
Prep Initial Wt./Vol.: **40 mL**
Prep Extract Vol: **57 mL**

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Results of **2nd-3**

Client Sample ID: **2nd-3**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103003-D
Lab Project ID: 31200103

Collection Date: 01/10/2012 10:50
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 6020A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Beryllium	**0.000550**	J	0.000297	0.00250	mg/L	5	01/18/2012 12:06
Vanadium	**0.381**		0.00661	0.0500	mg/L	100	01/18/2012 17:00
Cobalt	**0.0825**		0.000358	0.00500	mg/L	10	01/18/2012 12:09
Nickel	**0.179**		0.0135	0.0500	mg/L	100	01/18/2012 17:00
Copper	**0.138**		0.00860	0.0500	mg/L	100	01/18/2012 17:00
Arsenic	**0.0536**		0.000712	0.00500	mg/L	10	01/18/2012 12:09
Selenium	**0.00260**	J	0.000824	0.00500	mg/L	10	01/18/2012 16:57
Silver	**0.000500**	J	0.000374	0.00500	mg/L	10	01/18/2012 12:09
Cadmium	**0.000600**	J	0.000278	0.00500	mg/L	10	01/18/2012 12:09
Antimony	**0.000500**	J	0.000437	0.00500	mg/L	10	01/18/2012 12:09
Thallium	**0.000900**	J	0.000297	0.00500	mg/L	10	01/18/2012 12:09
Lead	**0.0807**		0.000640	0.00500	mg/L	10	01/18/2012 12:09

Batch Information

Analytical Batch: **MMS1143**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 12:06**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

Analytical Batch: **MMS1144**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 17:00**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

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Results of **2nd-4**

Client Sample ID: **2nd-4**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103004-A
Lab Project ID: 31200103

Collection Date: 01/10/2012 11:40
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
1,1,1-Trichloroethane	ND	U	0.123	1.00	ug/L	1	01/17/2012 17:01
1,1,2,2-Tetrachloroethane	ND	U	0.156	1.00	ug/L	1	01/17/2012 17:01
1,1,2-Trichloroethane	ND	U	0.126	1.00	ug/L	1	01/17/2012 17:01
1,1-Dichloroethane	ND	U	0.165	1.00	ug/L	1	01/17/2012 17:01
1,1-Dichloroethene	ND	U	0.212	1.00	ug/L	1	01/17/2012 17:01
1,2,3-Trichlorobenzene	ND	U	0.110	1.00	ug/L	1	01/17/2012 17:01
1,2,4-Trichlorobenzene	ND	U	0.0913	1.00	ug/L	1	01/17/2012 17:01
1,2-Dibromo-3-chloropropane	ND	U	0.748	5.00	ug/L	1	01/17/2012 17:01
1,2-Dibromoethane	ND	U	0.120	1.00	ug/L	1	01/17/2012 17:01
1,2-Dichlorobenzene	ND	U	0.137	1.00	ug/L	1	01/17/2012 17:01
1,2-Dichloroethane	ND	U	0.167	1.00	ug/L	1	01/17/2012 17:01
1,2-Dichloropropane	ND	U	0.163	1.00	ug/L	1	01/17/2012 17:01
1,3,5-Trimethylbenzene	ND	U	0.113	1.00	ug/L	1	01/17/2012 17:01
1,3-Dichlorobenzene	ND	U	0.103	1.00	ug/L	1	01/17/2012 17:01
1,4 Dioxane	ND	U	14.4	100	ug/L	1	01/17/2012 17:01
1,4-Dichlorobenzene	ND	U	0.130	1.00	ug/L	1	01/17/2012 17:01
2-Butanone	ND	U	0.723	25.0	ug/L	1	01/17/2012 17:01
2-Hexanone	ND	U	0.728	5.00	ug/L	1	01/17/2012 17:01
4-Methyl-2-pentanone	ND	U	0.558	5.00	ug/L	1	01/17/2012 17:01
Acetone	**1.34**	J	0.864	25.0	ug/L	1	01/17/2012 17:01
Benzene	ND	U	0.113	1.00	ug/L	1	01/17/2012 17:01
Bromochloromethane	ND	U	0.211	1.00	ug/L	1	01/17/2012 17:01
Bromodichloromethane	ND	U	0.110	1.00	ug/L	1	01/17/2012 17:01
Bromoform	ND	U	0.0974	1.00	ug/L	1	01/17/2012 17:01
Bromomethane	ND	U	0.237	1.00	ug/L	1	01/17/2012 17:01
Carbon disulfide	ND	U	0.106	1.00	ug/L	1	01/17/2012 17:01
Carbon tetrachloride	ND	U	0.101	1.00	ug/L	1	01/17/2012 17:01
Chlorobenzene	ND	U	0.116	1.00	ug/L	1	01/17/2012 17:01
Chloroethane	ND	U	0.311	1.00	ug/L	1	01/17/2012 17:01
Chloroform	ND	U	0.139	1.00	ug/L	1	01/17/2012 17:01
Chloromethane	ND	U	0.448	1.00	ug/L	1	01/17/2012 17:01
Cyclohexane	ND	U	0.163	1.00	ug/L	1	01/17/2012 17:01
Dibromochloromethane	ND	U	0.134	1.00	ug/L	1	01/17/2012 17:01
Dichlorodifluoromethane	ND	U	0.171	5.00	ug/L	1	01/17/2012 17:01
cis-1,3-Dichloropropene	ND	U	0.0767	1.00	ug/L	1	01/17/2012 17:01
trans-1,3-Dichloropropene	ND	U	0.0862	1.00	ug/L	1	01/17/2012 17:01
Ethyl Benzene	ND	U	0.0877	1.00	ug/L	1	01/17/2012 17:01
Isopropylbenzene (Cumene)	ND	U	0.0869	1.00	ug/L	1	01/17/2012 17:01
Methyl Acetate	ND	U	1.00	10.0	ug/L	1	01/17/2012 17:01
Methylcyclohexane	ND	U	0.108	1.00	ug/L	1	01/17/2012 17:01
Methylene chloride	**0.690**	J	0.152	5.00	ug/L	1	01/17/2012 17:01
Styrene	ND	U	0.102	1.00	ug/L	1	01/17/2012 17:01
Tetrachloroethene	ND	U	0.155	1.00	ug/L	1	01/17/2012 17:01

Print Date: 01/20/2012

N.C. Certification # 481

Results of **2nd-4**

Client Sample ID: **2nd-4**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103004-A
Lab Project ID: 31200103

Collection Date: 01/10/2012 11:40
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Toluene	ND	U	0.133	1.00	ug/L	1	01/17/2012 17:01
Trichloroethene	ND	U	0.125	1.00	ug/L	1	01/17/2012 17:01
Trichlorofluoromethane	ND	U	0.137	1.00	ug/L	1	01/17/2012 17:01
Trichlorotrifluoroethane	ND	U	0.123	1.00	ug/L	1	01/17/2012 17:01
Vinyl chloride	ND	U	0.124	1.00	ug/L	1	01/17/2012 17:01
cis-1,2-Dichloroethene	ND	U	0.136	1.00	ug/L	1	01/17/2012 17:01
m,p-Xylene	ND	U	0.182	2.00	ug/L	1	01/17/2012 17:01
o-Xylene	ND	U	0.0874	1.00	ug/L	1	01/17/2012 17:01
tert-Butyl methyl ether (MTBE)	ND	U	0.144	1.00	ug/L	1	01/17/2012 17:01
trans-1,2-Dichloroethene	ND	U	0.223	1.00	ug/L	1	01/17/2012 17:01
Surrogates							
1,2-Dichloroethane-d4	110			64.0-140	%	1	01/17/2012 17:01
4-Bromofluorobenzene	98.0			85.0-115	%	1	01/17/2012 17:01
Toluene d8	98.0			82.0-117	%	1	01/17/2012 17:01

Batch Information

Analytical Batch: **VMS1830**
Analytical Method: **SW-846 8260B**
Instrument: **MSD4**
Analyst: **DVO**
Analytical Date/Time: **01/17/2012 17:01**

Prep Batch: **VXX2625**
Prep Method: **SW-846 5030B**
Prep Date/Time: **01/17/2012 08:00**
Prep Initial Wt./Vol.: **40 mL**
Prep Extract Vol: **40 mL**

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Results of **2nd-4**

Client Sample ID: **2nd-4**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103004-D
Lab Project ID: 31200103

Collection Date: 01/10/2012 11:40
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 6010C**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Zinc	**0.181**		0.00226	0.0200	mg/L	1	01/16/2012 20:08
Barium	**0.415**		0.000394	0.100	mg/L	1	01/16/2012 20:08
Manganese	**2.88**		0.0152	0.100	mg/L	10	01/17/2012 15:48
Iron	**110**		2.22	10.0	mg/L	100	01/17/2012 15:52
Chromium	**0.184**		0.00147	0.0100	mg/L	1	01/16/2012 20:08
Magnesium	**22.0**		0.302	1.00	mg/L	10	01/17/2012 15:48
Aluminum	**101**		3.15	10.0	mg/L	100	01/17/2012 15:52
Calcium	**23.8**		0.236	1.00	mg/L	10	01/17/2012 15:48
Sodium	**14.3**		0.132	2.00	mg/L	10	01/17/2012 15:48
Potassium	**9.85**		0.126	2.00	mg/L	10	01/17/2012 15:48

Batch Information

Analytical Batch: **MIP1395**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/16/2012 20:08**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

Analytical Batch: **MIP1397**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/17/2012 15:48**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

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Results of **2nd-4**

Client Sample ID: **2nd-4**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103004-D
Lab Project ID: 31200103

Collection Date: 01/10/2012 11:40
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 7470A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Mercury	**0.0000364**	J	0.0000190	0.000150	mg/L	1	01/19/2012 14:47

Batch Information

Analytical Batch: **MHG1189**
Analytical Method: **SW-846 7470A**
Instrument: **HG2**
Analyst: **NTM**
Analytical Date/Time: **01/19/2012 14:47**

Prep Batch: **MXX1752**
Prep Method: **SW-846 7470A PREP**
Prep Date/Time: **01/19/2012 10:36**
Prep Initial Wt./Vol.: **40 mL**
Prep Extract Vol: **57 mL**

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Results of **2nd-4**

Client Sample ID: **2nd-4**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103004-D
Lab Project ID: 31200103

Collection Date: 01/10/2012 11:40
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 6020A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Beryllium	**0.000550**	J	0.000297	0.00250	mg/L	5	01/18/2012 12:13
Vanadium	**0.242**		0.00661	0.0500	mg/L	100	01/18/2012 17:07
Cobalt	**0.0278**		0.000358	0.00500	mg/L	10	01/18/2012 12:16
Nickel	**0.0780**		0.00135	0.00500	mg/L	10	01/18/2012 12:16
Copper	**0.0593**		0.000860	0.00500	mg/L	10	01/18/2012 12:16
Arsenic	**0.0476**		0.000712	0.00500	mg/L	10	01/18/2012 12:16
Selenium	**0.00170**	J	0.000824	0.00500	mg/L	10	01/18/2012 17:03
Silver	ND	U	0.000374	0.00500	mg/L	10	01/18/2012 12:16
Cadmium	**0.000300**	J	0.000278	0.00500	mg/L	10	01/18/2012 12:16
Antimony	ND	U	0.000437	0.00500	mg/L	10	01/18/2012 12:16
Thallium	**0.000600**	J	0.000297	0.00500	mg/L	10	01/18/2012 12:16
Lead	**0.0539**		0.000640	0.00500	mg/L	10	01/18/2012 12:16

Batch Information

Analytical Batch: **MMS1143**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 12:13**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

Analytical Batch: **MMS1144**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 17:07**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

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Results of **2nd-1-2**

Client Sample ID: **2nd-1-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103005-B
Lab Project ID: 31200103

Collection Date: 01/10/2012 09:40
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 77.60

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
1,1,1-Trichloroethane	ND	U	0.706	4.54	ug/Kg	1	01/20/2012 13:50
1,1,2,2-Tetrachloroethane	ND	U	1.03	4.54	ug/Kg	1	01/20/2012 13:50
1,1,2-Trichloroethane	ND	U	0.944	4.54	ug/Kg	1	01/20/2012 13:50
1,1-Dichloroethane	ND	U	0.783	4.54	ug/Kg	1	01/20/2012 13:50
1,1-Dichloroethene	ND	U	0.819	4.54	ug/Kg	1	01/20/2012 13:50
1,2,3-Trichlorobenzene	ND	U	1.26	4.54	ug/Kg	1	01/20/2012 13:50
1,2,4-Trichlorobenzene	ND	U	1.08	4.54	ug/Kg	1	01/20/2012 13:50
1,2-Dibromo-3-chloropropane	ND	U	5.27	27.2	ug/Kg	1	01/20/2012 13:50
1,2-Dibromoethane	ND	U	0.688	4.54	ug/Kg	1	01/20/2012 13:50
1,2-Dichlorobenzene	ND	U	1.17	4.54	ug/Kg	1	01/20/2012 13:50
1,2-Dichloroethane	ND	U	0.804	4.54	ug/Kg	1	01/20/2012 13:50
1,2-Dichloropropane	ND	U	0.730	4.54	ug/Kg	1	01/20/2012 13:50
1,3-Dichlorobenzene	ND	U	1.05	4.54	ug/Kg	1	01/20/2012 13:50
1,4 Dioxane	ND	U	61.8	454	ug/Kg	1	01/20/2012 13:50
1,4-Dichlorobenzene	ND	U	0.998	4.54	ug/Kg	1	01/20/2012 13:50
2-Butanone	ND	U	1.42	22.7	ug/Kg	1	01/20/2012 13:50
2-Hexanone	ND	U	1.77	11.3	ug/Kg	1	01/20/2012 13:50
4-Methyl-2-pentanone	ND	U	2.91	11.3	ug/Kg	1	01/20/2012 13:50
Acetone	**36.5**	J	1.13	45.4	ug/Kg	1	01/20/2012 13:50
Benzene	**3.46**	J	0.810	4.54	ug/Kg	1	01/20/2012 13:50
Bromochloromethane	ND	U	0.792	4.54	ug/Kg	1	01/20/2012 13:50
Bromodichloromethane	ND	U	0.738	4.54	ug/Kg	1	01/20/2012 13:50
Bromoform	ND	U	0.607	4.54	ug/Kg	1	01/20/2012 13:50
Bromomethane	ND	U	1.60	4.54	ug/Kg	1	01/20/2012 13:50
Carbon disulfide	ND	U	0.784	4.54	ug/Kg	1	01/20/2012 13:50
Carbon tetrachloride	ND	U	0.789	4.54	ug/Kg	1	01/20/2012 13:50
Chlorobenzene	ND	U	0.702	4.54	ug/Kg	1	01/20/2012 13:50
Chloroethane	ND	U	0.417	4.54	ug/Kg	1	01/20/2012 13:50
Chloroform	ND	U	0.737	4.54	ug/Kg	1	01/20/2012 13:50
Chloromethane	ND	U	0.658	4.54	ug/Kg	1	01/20/2012 13:50
Cyclohexane	ND	U	0.844	4.54	ug/Kg	1	01/20/2012 13:50
Dibromochloromethane	ND	U	0.768	4.54	ug/Kg	1	01/20/2012 13:50
Dichlorodifluoromethane	ND	U	0.660	4.54	ug/Kg	1	01/20/2012 13:50
cis-1,3-Dichloropropene	ND	U	0.781	4.54	ug/Kg	1	01/20/2012 13:50
trans-1,3-Dichloropropene	ND	U	0.813	4.54	ug/Kg	1	01/20/2012 13:50
Ethyl Benzene	ND	U	0.750	4.54	ug/Kg	1	01/20/2012 13:50
Isopropylbenzene (Cumene)	ND	U	0.874	4.54	ug/Kg	1	01/20/2012 13:50
Methyl Acetate	ND	U	8.03	45.4	ug/Kg	1	01/20/2012 13:50
Methylcyclohexane	ND	U	0.785	4.54	ug/Kg	1	01/20/2012 13:50
Methylene chloride	ND	U	0.633	18.1	ug/Kg	1	01/20/2012 13:50
Styrene	ND	U	0.895	4.54	ug/Kg	1	01/20/2012 13:50
Tetrachloroethene	ND	U	0.682	4.54	ug/Kg	1	01/20/2012 13:50
Toluene	**1.15**	J	0.735	4.54	ug/Kg	1	01/20/2012 13:50

Print Date: 01/20/2012

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Results of **2nd-1-2**

Client Sample ID: **2nd-1-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103005-B
Lab Project ID: 31200103

Collection Date: 01/10/2012 09:40
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 77.60

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Trichloroethene	ND	U	0.759	4.54	ug/Kg	1	01/20/2012 13:50
Trichlorofluoromethane	ND	U	0.684	4.54	ug/Kg	1	01/20/2012 13:50
Trichlorotrifluoroethane	ND	U	4.54	4.54	ug/Kg	1	01/20/2012 13:50
Vinyl chloride	ND	U	0.668	4.54	ug/Kg	1	01/20/2012 13:50
cis-1,2-Dichloroethene	ND	U	0.703	4.54	ug/Kg	1	01/20/2012 13:50
m,p-Xylene	ND	U	1.61	9.07	ug/Kg	1	01/20/2012 13:50
o-Xylene	ND	U	0.916	4.54	ug/Kg	1	01/20/2012 13:50
tert-Butyl methyl ether (MTBE)	ND	U	0.773	4.54	ug/Kg	1	01/20/2012 13:50
trans-1,2-Dichloroethene	ND	U	0.781	4.54	ug/Kg	1	01/20/2012 13:50
Surrogates							
1,2-Dichloroethane-d4	125			55.0-173	%	1	01/20/2012 13:50
4-Bromofluorobenzene	70.0			23.0-141	%	1	01/20/2012 13:50
Toluene d8	90.0			57.0-134	%	1	01/20/2012 13:50

Batch Information

Analytical Batch: **VMS1848**
Analytical Method: **SW-846 8260B**
Instrument: **MSD9**
Analyst: **DVO**
Analytical Date/Time: **01/20/2012 13:50**

Prep Batch: **VXX2653**
Prep Method: **SW-846 5035 SL**
Prep Date/Time: **01/13/2012 08:00**
Prep Initial Wt./Vol.: **7.1 g**
Prep Extract Vol: **5 mL**

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Results of **2nd-1-2**

Client Sample ID: **2nd-1-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103005-E
Lab Project ID: 31200103

Collection Date: 01/10/2012 09:40
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 77.60

Results by **SW-846 6010C**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Zinc	**481**		14.1	25.3	mg/kg	10	01/17/2012 13:10
Barium	**105**		0.165	12.6	mg/kg	1	01/16/2012 17:25
Manganese	**229**		3.46	12.6	mg/kg	10	01/17/2012 13:10
Iron	**12700**		1190	1260	mg/kg	100	01/17/2012 13:14
Chromium	**43.1**		0.182	1.26	mg/kg	1	01/16/2012 17:25
Magnesium	**3970**		62.4	126	mg/kg	10	01/17/2012 13:10
Aluminum	**14100**		267	1260	mg/kg	100	01/17/2012 13:14
Calcium	**7960**		890	1260	mg/kg	100	01/17/2012 13:14
Sodium	**160**		2.36	25.3	mg/kg	1	01/16/2012 17:25
Potassium	**938**		26.1	253	mg/kg	10	01/17/2012 13:10

Batch Information

Analytical Batch: **MIP1395**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/16/2012 17:25**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.51 g**
Prep Extract Vol: **50 mL**

Analytical Batch: **MIP1397**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/17/2012 13:10**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.51 g**
Prep Extract Vol: **50 mL**

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Results of **2nd-1-2**

Client Sample ID: **2nd-1-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103005-E
Lab Project ID: 31200103

Collection Date: 01/10/2012 09:40
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 77.60

Results by **SW-846 7471B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Mercury	**0.312**		0.00104	0.0230	mg/kg	1	01/18/2012 11:15

Batch Information

Analytical Batch: **MHG1188**
Analytical Method: **SW-846 7471B**
Instrument: **HG2**
Analyst: **NTM**
Analytical Date/Time: **01/18/2012 11:15**

Prep Batch: **MXX1748**
Prep Method: **SW-846 7471B PREP**
Prep Date/Time: **01/18/2012 08:43**
Prep Initial Wt./Vol.: **.56 g**
Prep Extract Vol: **50 mL**

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Results of **2nd-1-2**

Client Sample ID: **2nd-1-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103005-E
Lab Project ID: 31200103

Collection Date: 01/10/2012 09:40
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 77.60

Results by **SW-846 6020A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Antimony	**4.50**		0.0682	0.126	mg/kg	10	01/18/2012 13:48
Arsenic	**29.6**		1.10	1.26	mg/kg	100	01/18/2012 18:25
Beryllium	**0.0442**	J	0.0112	0.0632	mg/kg	5	01/18/2012 13:45
Cadmium	**3.15**		0.0225	0.126	mg/kg	10	01/18/2012 13:48
Cobalt	**5.68**		0.00316	0.126	mg/kg	10	01/18/2012 18:22
Copper	**138**		1.30	12.6	mg/kg	100	01/19/2012 10:50
Lead	**112**		0.165	1.26	mg/kg	100	01/18/2012 18:25
Nickel	**11.7**		0.0801	0.126	mg/kg	10	01/18/2012 18:22
Selenium	**0.291**		0.172	0.253	mg/kg	10	01/18/2012 18:22
Silver	**8.77**		0.0246	0.126	mg/kg	10	01/18/2012 13:48
Thallium	**0.0632**	J	0.0309	0.126	mg/kg	10	01/18/2012 13:48
Vanadium	**18.9**		0.426	1.26	mg/kg	100	01/18/2012 18:25

Batch Information

Analytical Batch: **MMS1143**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 13:48**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.51 g**
Prep Extract Vol: **50 mL**

Analytical Batch: **MMS1144**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 18:25**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.51 g**
Prep Extract Vol: **50 mL**

Analytical Batch: **MMS1145**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/19/2012 10:50**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.51 g**
Prep Extract Vol: **50 mL**

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Results of **2nd-2-2**

Client Sample ID: **2nd-2-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103006-B
Lab Project ID: 31200103

Collection Date: 01/10/2012 10:10
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 80.00

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
1,1,1-Trichloroethane	ND	U	0.761	4.89	ug/Kg	1	01/20/2012 14:17
1,1,2,2-Tetrachloroethane	ND	U	1.11	4.89	ug/Kg	1	01/20/2012 14:17
1,1,2-Trichloroethane	ND	U	1.02	4.89	ug/Kg	1	01/20/2012 14:17
1,1-Dichloroethane	ND	U	0.844	4.89	ug/Kg	1	01/20/2012 14:17
1,1-Dichloroethene	ND	U	0.883	4.89	ug/Kg	1	01/20/2012 14:17
1,2,3-Trichlorobenzene	ND	U	1.36	4.89	ug/Kg	1	01/20/2012 14:17
1,2,4-Trichlorobenzene	ND	U	1.16	4.89	ug/Kg	1	01/20/2012 14:17
1,2-Dibromo-3-chloropropane	ND	U	5.68	29.3	ug/Kg	1	01/20/2012 14:17
1,2-Dibromoethane	ND	U	0.741	4.89	ug/Kg	1	01/20/2012 14:17
1,2-Dichlorobenzene	ND	U	1.26	4.89	ug/Kg	1	01/20/2012 14:17
1,2-Dichloroethane	ND	U	0.867	4.89	ug/Kg	1	01/20/2012 14:17
1,2-Dichloropropane	ND	U	0.787	4.89	ug/Kg	1	01/20/2012 14:17
1,3-Dichlorobenzene	ND	U	1.13	4.89	ug/Kg	1	01/20/2012 14:17
1,4 Dioxane	ND	U	66.6	489	ug/Kg	1	01/20/2012 14:17
1,4-Dichlorobenzene	ND	U	1.08	4.89	ug/Kg	1	01/20/2012 14:17
2-Butanone	**9.38**	J	1.53	24.5	ug/Kg	1	01/20/2012 14:17
2-Hexanone	ND	U	1.91	12.2	ug/Kg	1	01/20/2012 14:17
4-Methyl-2-pentanone	ND	U	3.14	12.2	ug/Kg	1	01/20/2012 14:17
Acetone	**65.8**		1.21	48.9	ug/Kg	1	01/20/2012 14:17
Benzene	**6.01**		0.873	4.89	ug/Kg	1	01/20/2012 14:17
Bromochloromethane	ND	U	0.854	4.89	ug/Kg	1	01/20/2012 14:17
Bromodichloromethane	ND	U	0.795	4.89	ug/Kg	1	01/20/2012 14:17
Bromoform	ND	U	0.654	4.89	ug/Kg	1	01/20/2012 14:17
Bromomethane	**3.48**	J	1.72	4.89	ug/Kg	1	01/20/2012 14:17
Carbon disulfide	ND	U	0.845	4.89	ug/Kg	1	01/20/2012 14:17
Carbon tetrachloride	ND	U	0.851	4.89	ug/Kg	1	01/20/2012 14:17
Chlorobenzene	ND	U	0.757	4.89	ug/Kg	1	01/20/2012 14:17
Chloroethane	ND	U	0.450	4.89	ug/Kg	1	01/20/2012 14:17
Chloroform	ND	U	0.794	4.89	ug/Kg	1	01/20/2012 14:17
Chloromethane	**7.01**		0.709	4.89	ug/Kg	1	01/20/2012 14:17
Cyclohexane	ND	U	0.910	4.89	ug/Kg	1	01/20/2012 14:17
Dibromochloromethane	ND	U	0.828	4.89	ug/Kg	1	01/20/2012 14:17
Dichlorodifluoromethane	ND	U	0.711	4.89	ug/Kg	1	01/20/2012 14:17
cis-1,3-Dichloropropene	ND	U	0.842	4.89	ug/Kg	1	01/20/2012 14:17
trans-1,3-Dichloropropene	ND	U	0.876	4.89	ug/Kg	1	01/20/2012 14:17
Ethyl Benzene	ND	U	0.809	4.89	ug/Kg	1	01/20/2012 14:17
Isopropylbenzene (Cumene)	ND	U	0.942	4.89	ug/Kg	1	01/20/2012 14:17
Methyl Acetate	ND	U	8.66	48.9	ug/Kg	1	01/20/2012 14:17
Methylcyclohexane	ND	U	0.846	4.89	ug/Kg	1	01/20/2012 14:17
Methylene chloride	ND	U	0.683	19.6	ug/Kg	1	01/20/2012 14:17
Styrene	ND	U	0.964	4.89	ug/Kg	1	01/20/2012 14:17
Tetrachloroethene	ND	U	0.736	4.89	ug/Kg	1	01/20/2012 14:17
Toluene	**2.46**	J	0.792	4.89	ug/Kg	1	01/20/2012 14:17

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Results of **2nd-2-2**

Client Sample ID: **2nd-2-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103006-B
Lab Project ID: 31200103

Collection Date: 01/10/2012 10:10
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 80.00

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Trichloroethene	ND	U	0.819	4.89	ug/Kg	1	01/20/2012 14:17
Trichlorofluoromethane	ND	U	0.737	4.89	ug/Kg	1	01/20/2012 14:17
Trichlorotrifluoroethane	ND	U	4.89	4.89	ug/Kg	1	01/20/2012 14:17
Vinyl chloride	ND	U	0.720	4.89	ug/Kg	1	01/20/2012 14:17
cis-1,2-Dichloroethene	ND	U	0.758	4.89	ug/Kg	1	01/20/2012 14:17
m,p-Xylene	ND	U	1.73	9.78	ug/Kg	1	01/20/2012 14:17
o-Xylene	ND	U	0.988	4.89	ug/Kg	1	01/20/2012 14:17
tert-Butyl methyl ether (MTBE)	ND	U	0.833	4.89	ug/Kg	1	01/20/2012 14:17
trans-1,2-Dichloroethene	ND	U	0.842	4.89	ug/Kg	1	01/20/2012 14:17
Surrogates							
1,2-Dichloroethane-d4	119			55.0-173	%	1	01/20/2012 14:17
4-Bromofluorobenzene	78.0			23.0-141	%	1	01/20/2012 14:17
Toluene d8	94.0			57.0-134	%	1	01/20/2012 14:17

Batch Information

Analytical Batch: **VMS1848**
Analytical Method: **SW-846 8260B**
Instrument: **MSD9**
Analyst: **DVO**
Analytical Date/Time: **01/20/2012 14:17**

Prep Batch: **VXX2653**
Prep Method: **SW-846 5035 SL**
Prep Date/Time: **01/13/2012 08:00**
Prep Initial Wt./Vol.: **6.39 g**
Prep Extract Vol: **5 mL**

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Results of **2nd-2-2**

Client Sample ID: **2nd-2-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103006-E
Lab Project ID: 31200103

Collection Date: 01/10/2012 10:10
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 80.00

Results by **SW-846 6010C**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Zinc	**439**		11.9	21.2	mg/kg	10	01/17/2012 13:18
Barium	**101**		0.139	10.6	mg/kg	1	01/16/2012 17:32
Manganese	**231**		2.90	10.6	mg/kg	10	01/17/2012 13:18
Iron	**18900**		996	1060	mg/kg	100	01/17/2012 13:22
Chromium	**25.1**		0.153	1.06	mg/kg	1	01/16/2012 17:32
Magnesium	**2080**		52.3	106	mg/kg	10	01/17/2012 13:18
Aluminum	**13600**		224	1060	mg/kg	100	01/17/2012 13:22
Calcium	**8590**		747	1060	mg/kg	100	01/17/2012 13:22
Sodium	**112**		1.98	21.2	mg/kg	1	01/16/2012 17:32
Potassium	**927**		21.9	212	mg/kg	10	01/17/2012 13:18

Batch Information

Analytical Batch: **MIP1395**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/16/2012 17:32**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.59 g**
Prep Extract Vol: **50 mL**

Analytical Batch: **MIP1397**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/17/2012 13:18**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.59 g**
Prep Extract Vol: **50 mL**

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Results of **2nd-2-2**

Client Sample ID: **2nd-2-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103006-E
Lab Project ID: 31200103

Collection Date: 01/10/2012 10:10
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 80.00

Results by **SW-846 7471B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Mercury	**1.74**		0.0106	0.236	mg/kg	10	01/18/2012 11:29

Batch Information

Analytical Batch: **MHG1188**
Analytical Method: **SW-846 7471B**
Instrument: **HG2**
Analyst: **NTM**
Analytical Date/Time: **01/18/2012 11:29**

Prep Batch: **MXX1748**
Prep Method: **SW-846 7471B PREP**
Prep Date/Time: **01/18/2012 08:43**
Prep Initial Wt./Vol.: **.53 g**
Prep Extract Vol: **50 mL**

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Results of **2nd-2-2**

Client Sample ID: **2nd-2-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103006-E
Lab Project ID: 31200103

Collection Date: 01/10/2012 10:10
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 80.00

Results by **SW-846 6020A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Antimony	**3.11**		0.0572	0.106	mg/kg	10	01/18/2012 13:55
Arsenic	**4.35**		0.0922	0.106	mg/kg	10	01/18/2012 18:29
Beryllium	**0.0477**	J	0.00943	0.0530	mg/kg	5	01/18/2012 13:51
Cadmium	**2.70**		0.0189	0.106	mg/kg	10	01/18/2012 13:55
Cobalt	**3.85**		0.00265	0.106	mg/kg	10	01/18/2012 18:29
Copper	**178**		10.9	106	mg/kg	1000	01/19/2012 10:59
Lead	**202**		1.39	10.6	mg/kg	1000	01/19/2012 10:59
Nickel	**23.2**		0.672	1.06	mg/kg	100	01/19/2012 10:56
Selenium	ND	U	0.144	0.212	mg/kg	10	01/18/2012 18:29
Silver	**1.62**		0.0207	0.106	mg/kg	10	01/18/2012 13:55
Thallium	**0.0636**	J	0.0260	0.106	mg/kg	10	01/18/2012 13:55
Vanadium	**21.2**		0.357	1.06	mg/kg	100	01/19/2012 10:56

Batch Information

Analytical Batch: **MMS1143**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 13:55**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.59 g**
Prep Extract Vol: **50 mL**

Analytical Batch: **MMS1144**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 18:29**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.59 g**
Prep Extract Vol: **50 mL**

Analytical Batch: **MMS1145**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/19/2012 10:59**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.59 g**
Prep Extract Vol: **50 mL**

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Results of **2nd-3-2**

Client Sample ID: **2nd-3-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103007-B
Lab Project ID: 31200103

Collection Date: 01/10/2012 10:50
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 77.50

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
1,1,1-Trichloroethane	ND	U	0.938	6.03	ug/Kg	1	01/20/2012 12:56
1,1,2,2-Tetrachloroethane	ND	U	1.36	6.03	ug/Kg	1	01/20/2012 12:56
1,1,2-Trichloroethane	ND	U	1.25	6.03	ug/Kg	1	01/20/2012 12:56
1,1-Dichloroethane	ND	U	1.04	6.03	ug/Kg	1	01/20/2012 12:56
1,1-Dichloroethene	ND	U	1.09	6.03	ug/Kg	1	01/20/2012 12:56
1,2,3-Trichlorobenzene	ND	U	1.68	6.03	ug/Kg	1	01/20/2012 12:56
1,2,4-Trichlorobenzene	ND	U	1.43	6.03	ug/Kg	1	01/20/2012 12:56
1,2-Dibromo-3-chloropropane	ND	U	7.00	36.2	ug/Kg	1	01/20/2012 12:56
1,2-Dibromoethane	ND	U	0.914	6.03	ug/Kg	1	01/20/2012 12:56
1,2-Dichlorobenzene	ND	U	1.55	6.03	ug/Kg	1	01/20/2012 12:56
1,2-Dichloroethane	ND	U	1.07	6.03	ug/Kg	1	01/20/2012 12:56
1,2-Dichloropropane	ND	U	0.970	6.03	ug/Kg	1	01/20/2012 12:56
1,3-Dichlorobenzene	ND	U	1.40	6.03	ug/Kg	1	01/20/2012 12:56
1,4 Dioxane	ND	U	82.1	603	ug/Kg	1	01/20/2012 12:56
1,4-Dichlorobenzene	ND	U	1.33	6.03	ug/Kg	1	01/20/2012 12:56
2-Butanone	ND	U	1.88	30.1	ug/Kg	1	01/20/2012 12:56
2-Hexanone	ND	U	2.35	15.1	ug/Kg	1	01/20/2012 12:56
4-Methyl-2-pentanone	ND	U	3.87	15.1	ug/Kg	1	01/20/2012 12:56
Acetone	**16.0**	J	1.49	60.3	ug/Kg	1	01/20/2012 12:56
Benzene	ND	U	1.08	6.03	ug/Kg	1	01/20/2012 12:56
Bromochloromethane	ND	U	1.05	6.03	ug/Kg	1	01/20/2012 12:56
Bromodichloromethane	ND	U	0.980	6.03	ug/Kg	1	01/20/2012 12:56
Bromoform	ND	U	0.806	6.03	ug/Kg	1	01/20/2012 12:56
Bromomethane	ND	U	2.12	6.03	ug/Kg	1	01/20/2012 12:56
Carbon disulfide	ND	U	1.04	6.03	ug/Kg	1	01/20/2012 12:56
Carbon tetrachloride	ND	U	1.05	6.03	ug/Kg	1	01/20/2012 12:56
Chlorobenzene	ND	U	0.933	6.03	ug/Kg	1	01/20/2012 12:56
Chloroethane	ND	U	0.554	6.03	ug/Kg	1	01/20/2012 12:56
Chloroform	ND	U	0.979	6.03	ug/Kg	1	01/20/2012 12:56
Chloromethane	ND	U	0.874	6.03	ug/Kg	1	01/20/2012 12:56
Cyclohexane	ND	U	1.12	6.03	ug/Kg	1	01/20/2012 12:56
Dibromochloromethane	ND	U	1.02	6.03	ug/Kg	1	01/20/2012 12:56
Dichlorodifluoromethane	ND	U	0.876	6.03	ug/Kg	1	01/20/2012 12:56
cis-1,3-Dichloropropene	ND	U	1.04	6.03	ug/Kg	1	01/20/2012 12:56
trans-1,3-Dichloropropene	ND	U	1.08	6.03	ug/Kg	1	01/20/2012 12:56
Ethyl Benzene	ND	U	0.997	6.03	ug/Kg	1	01/20/2012 12:56
Isopropylbenzene (Cumene)	ND	U	1.16	6.03	ug/Kg	1	01/20/2012 12:56
Methyl Acetate	ND	U	10.7	60.3	ug/Kg	1	01/20/2012 12:56
Methylcyclohexane	ND	U	1.04	6.03	ug/Kg	1	01/20/2012 12:56
Methylene chloride	**1.60**	J	0.841	24.1	ug/Kg	1	01/20/2012 12:56
Styrene	ND	U	1.19	6.03	ug/Kg	1	01/20/2012 12:56
Tetrachloroethene	ND	U	0.906	6.03	ug/Kg	1	01/20/2012 12:56
Toluene	ND	U	0.976	6.03	ug/Kg	1	01/20/2012 12:56

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Results of **2nd-3-2**

Client Sample ID: **2nd-3-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103007-B
Lab Project ID: 31200103

Collection Date: 01/10/2012 10:50
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 77.50

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Trichloroethene	ND	U	1.01	6.03	ug/Kg	1	01/20/2012 12:56
Trichlorofluoromethane	ND	U	0.909	6.03	ug/Kg	1	01/20/2012 12:56
Trichlorotrifluoroethane	ND	U	6.03	6.03	ug/Kg	1	01/20/2012 12:56
Vinyl chloride	ND	U	0.887	6.03	ug/Kg	1	01/20/2012 12:56
cis-1,2-Dichloroethene	ND	U	0.934	6.03	ug/Kg	1	01/20/2012 12:56
m,p-Xylene	ND	U	2.13	12.1	ug/Kg	1	01/20/2012 12:56
o-Xylene	ND	U	1.22	6.03	ug/Kg	1	01/20/2012 12:56
tert-Butyl methyl ether (MTBE)	ND	U	1.03	6.03	ug/Kg	1	01/20/2012 12:56
trans-1,2-Dichloroethene	ND	U	1.04	6.03	ug/Kg	1	01/20/2012 12:56
Surrogates							
1,2-Dichloroethane-d4	116			55.0-173	%	1	01/20/2012 12:56
4-Bromofluorobenzene	99.0			23.0-141	%	1	01/20/2012 12:56
Toluene d8	100			57.0-134	%	1	01/20/2012 12:56

Batch Information

Analytical Batch: **VMS1848**
Analytical Method: **SW-846 8260B**
Instrument: **MSD9**
Analyst: **DVO**
Analytical Date/Time: **01/20/2012 12:56**

Prep Batch: **VXX2653**
Prep Method: **SW-846 5035 SL**
Prep Date/Time: **01/13/2012 08:00**
Prep Initial Wt./Vol.: **5.35 g**
Prep Extract Vol: **5 mL**

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Results of **2nd-3-2**

Client Sample ID: **2nd-3-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103007-E
Lab Project ID: 31200103

Collection Date: 01/10/2012 10:50
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 77.50

Results by **SW-846 6010C**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Zinc	**16.3**		1.22	2.19	mg/kg	1	01/16/2012 17:39
Barium	**40.3**		0.143	10.9	mg/kg	1	01/16/2012 17:39
Manganese	**43.5**		0.299	1.09	mg/kg	1	01/16/2012 17:39
Iron	**8400**		1030	1090	mg/kg	100	01/17/2012 13:35
Chromium	**17.1**		0.157	1.09	mg/kg	1	01/16/2012 17:39
Magnesium	**2150**		54.0	109	mg/kg	10	01/17/2012 13:26
Aluminum	**13300**		231	1090	mg/kg	100	01/17/2012 13:35
Calcium	**450**		7.71	10.9	mg/kg	1	01/16/2012 17:39
Sodium	**111**		2.04	21.9	mg/kg	1	01/16/2012 17:39
Potassium	**642**		22.6	219	mg/kg	10	01/17/2012 13:26

Batch Information

Analytical Batch: **MIP1395**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/16/2012 17:39**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.59 g**
Prep Extract Vol: **50 mL**

Analytical Batch: **MIP1397**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/17/2012 13:35**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.59 g**
Prep Extract Vol: **50 mL**

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Results of **2nd-3-2**

Client Sample ID: **2nd-3-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103007-E
Lab Project ID: 31200103

Collection Date: 01/10/2012 10:50
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 77.50

Results by **SW-846 7471B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Mercury	**0.00368**	J	0.00112	0.0248	mg/kg	1	01/18/2012 11:19

Batch Information

Analytical Batch: **MHG1188**
Analytical Method: **SW-846 7471B**
Instrument: **HG2**
Analyst: **NTM**
Analytical Date/Time: **01/18/2012 11:19**

Prep Batch: **MXX1748**
Prep Method: **SW-846 7471B PREP**
Prep Date/Time: **01/18/2012 08:43**
Prep Initial Wt./Vol.: **.52 g**
Prep Extract Vol: **50 mL**

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Results of **2nd-3-2**

Client Sample ID: **2nd-3-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103007-E
Lab Project ID: 31200103

Collection Date: 01/10/2012 10:50
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 77.50

Results by **SW-846 6020A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Antimony	ND	U	0.0590	0.109	mg/kg	10	01/18/2012 14:01
Arsenic	**2.73**		0.0951	0.109	mg/kg	10	01/19/2012 11:09
Beryllium	**0.0437**	J	0.00973	0.0546	mg/kg	5	01/18/2012 13:58
Cadmium	**0.0219**	J	0.0195	0.109	mg/kg	10	01/18/2012 14:01
Cobalt	**2.79**		0.00273	0.109	mg/kg	10	01/19/2012 11:09
Copper	**5.52**		0.113	1.09	mg/kg	10	01/19/2012 11:09
Lead	**3.52**		0.0143	0.109	mg/kg	10	01/18/2012 14:01
Nickel	**8.77**		0.0693	0.109	mg/kg	10	01/19/2012 11:09
Selenium	ND	U	0.149	0.219	mg/kg	10	01/19/2012 11:09
Silver	ND	U	0.0213	0.109	mg/kg	10	01/18/2012 14:01
Thallium	**0.0437**	J	0.0268	0.109	mg/kg	10	01/18/2012 14:01
Vanadium	**19.0**		0.368	1.09	mg/kg	100	01/19/2012 11:12

Batch Information

Analytical Batch: **MMS1143**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 14:01**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.59 g**
Prep Extract Vol: **50 mL**

Analytical Batch: **MMS1145**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/19/2012 11:09**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.59 g**
Prep Extract Vol: **50 mL**

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Results of **2nd-4-2**

Client Sample ID: **2nd-4-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103008-A
Lab Project ID: 31200103

Collection Date: 01/10/2012 11:40
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 78.30

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
1,1,1-Trichloroethane	ND	U	0.820	5.27	ug/Kg	1	01/19/2012 18:59
1,1,2,2-Tetrachloroethane	ND	U	1.19	5.27	ug/Kg	1	01/19/2012 18:59
1,1,2-Trichloroethane	ND	U	1.10	5.27	ug/Kg	1	01/19/2012 18:59
1,1-Dichloroethane	ND	U	0.909	5.27	ug/Kg	1	01/19/2012 18:59
1,1-Dichloroethene	ND	U	0.951	5.27	ug/Kg	1	01/19/2012 18:59
1,2,3-Trichlorobenzene	ND	U	1.46	5.27	ug/Kg	1	01/19/2012 18:59
1,2,4-Trichlorobenzene	ND	U	1.25	5.27	ug/Kg	1	01/19/2012 18:59
1,2-Dibromo-3-chloropropane	ND	U	6.12	31.6	ug/Kg	1	01/19/2012 18:59
1,2-Dibromoethane	ND	U	0.799	5.27	ug/Kg	1	01/19/2012 18:59
1,2-Dichlorobenzene	ND	U	1.36	5.27	ug/Kg	1	01/19/2012 18:59
1,2-Dichloroethane	ND	U	0.933	5.27	ug/Kg	1	01/19/2012 18:59
1,2-Dichloropropane	ND	U	0.848	5.27	ug/Kg	1	01/19/2012 18:59
1,3-Dichlorobenzene	ND	U	1.22	5.27	ug/Kg	1	01/19/2012 18:59
1,4 Dioxane	ND	U	71.7	527	ug/Kg	1	01/19/2012 18:59
1,4-Dichlorobenzene	ND	U	1.16	5.27	ug/Kg	1	01/19/2012 18:59
2-Butanone	**9.98**	J	1.64	26.3	ug/Kg	1	01/19/2012 18:59
2-Hexanone	ND	U	2.05	13.2	ug/Kg	1	01/19/2012 18:59
4-Methyl-2-pentanone	ND	U	3.38	13.2	ug/Kg	1	01/19/2012 18:59
Acetone	**27.4**	J	1.31	52.7	ug/Kg	1	01/19/2012 18:59
Benzene	ND	U	0.941	5.27	ug/Kg	1	01/19/2012 18:59
Bromochloromethane	ND	U	0.920	5.27	ug/Kg	1	01/19/2012 18:59
Bromodichloromethane	ND	U	0.856	5.27	ug/Kg	1	01/19/2012 18:59
Bromoform	ND	U	0.705	5.27	ug/Kg	1	01/19/2012 18:59
Bromomethane	ND	U	1.85	5.27	ug/Kg	1	01/19/2012 18:59
Carbon disulfide	ND	U	0.910	5.27	ug/Kg	1	01/19/2012 18:59
Carbon tetrachloride	ND	U	0.917	5.27	ug/Kg	1	01/19/2012 18:59
Chlorobenzene	ND	U	0.815	5.27	ug/Kg	1	01/19/2012 18:59
Chloroethane	ND	U	0.485	5.27	ug/Kg	1	01/19/2012 18:59
Chloroform	ND	U	0.855	5.27	ug/Kg	1	01/19/2012 18:59
Chloromethane	ND	U	0.764	5.27	ug/Kg	1	01/19/2012 18:59
Cyclohexane	ND	U	0.980	5.27	ug/Kg	1	01/19/2012 18:59
Dibromochloromethane	ND	U	0.892	5.27	ug/Kg	1	01/19/2012 18:59
Dichlorodifluoromethane	ND	U	0.766	5.27	ug/Kg	1	01/19/2012 18:59
cis-1,3-Dichloropropene	ND	U	0.907	5.27	ug/Kg	1	01/19/2012 18:59
trans-1,3-Dichloropropene	ND	U	0.944	5.27	ug/Kg	1	01/19/2012 18:59
Ethyl Benzene	ND	U	0.871	5.27	ug/Kg	1	01/19/2012 18:59
Isopropylbenzene (Cumene)	ND	U	1.01	5.27	ug/Kg	1	01/19/2012 18:59
Methyl Acetate	ND	U	9.32	52.7	ug/Kg	1	01/19/2012 18:59
Methylcyclohexane	ND	U	0.911	5.27	ug/Kg	1	01/19/2012 18:59
Methylene chloride	**2.40**	J	0.735	21.1	ug/Kg	1	01/19/2012 18:59
Styrene	ND	U	1.04	5.27	ug/Kg	1	01/19/2012 18:59
Tetrachloroethene	ND	U	0.792	5.27	ug/Kg	1	01/19/2012 18:59
Toluene	ND	U	0.853	5.27	ug/Kg	1	01/19/2012 18:59

Print Date: 01/20/2012

N.C. Certification # 481

Results of **2nd-4-2**

Client Sample ID: **2nd-4-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103008-A
Lab Project ID: 31200103

Collection Date: 01/10/2012 11:40
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 78.30

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Trichloroethene	ND	U	0.882	5.27	ug/Kg	1	01/19/2012 18:59
Trichlorofluoromethane	ND	U	0.794	5.27	ug/Kg	1	01/19/2012 18:59
Trichlorotrifluoroethane	ND	U	5.27	5.27	ug/Kg	1	01/19/2012 18:59
Vinyl chloride	ND	U	0.775	5.27	ug/Kg	1	01/19/2012 18:59
cis-1,2-Dichloroethene	ND	U	0.816	5.27	ug/Kg	1	01/19/2012 18:59
m,p-Xylene	ND	U	1.86	10.5	ug/Kg	1	01/19/2012 18:59
o-Xylene	ND	U	1.06	5.27	ug/Kg	1	01/19/2012 18:59
tert-Butyl methyl ether (MTBE)	ND	U	0.898	5.27	ug/Kg	1	01/19/2012 18:59
trans-1,2-Dichloroethene	ND	U	0.907	5.27	ug/Kg	1	01/19/2012 18:59
Surrogates							
1,2-Dichloroethane-d4	118			55.0-173	%	1	01/19/2012 18:59
4-Bromofluorobenzene	99.0			23.0-141	%	1	01/19/2012 18:59
Toluene d8	96.0			57.0-134	%	1	01/19/2012 18:59

Batch Information

Analytical Batch: **VMS1844**
Analytical Method: **SW-846 8260B**
Instrument: **MSD4**
Analyst: **DVO**
Analytical Date/Time: **01/19/2012 18:59**

Prep Batch: **VXX2646**
Prep Method: **SW-846 5035 SL**
Prep Date/Time: **01/13/2012 08:00**
Prep Initial Wt./Vol.: **6.06 g**
Prep Extract Vol: **5 mL**

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Results of **2nd-4-2**

Client Sample ID: **2nd-4-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103008-E
Lab Project ID: 31200103

Collection Date: 01/10/2012 11:40
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 78.30

Results by **SW-846 6010C**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Zinc	**27.2**		1.25	2.24	mg/kg	1	01/16/2012 17:46
Barium	**60.3**		0.147	11.2	mg/kg	1	01/16/2012 17:46
Manganese	**89.3**		0.307	1.12	mg/kg	1	01/16/2012 17:46
Iron	**10400**		1050	1120	mg/kg	100	01/17/2012 13:51
Chromium	**36.1**		0.161	1.12	mg/kg	1	01/16/2012 17:46
Magnesium	**3090**		55.3	112	mg/kg	10	01/17/2012 13:47
Aluminum	**18800**		236	1120	mg/kg	100	01/17/2012 13:51
Calcium	**1010**		79.0	112	mg/kg	10	01/17/2012 13:47
Sodium	**85.2**		2.09	22.4	mg/kg	1	01/16/2012 17:46
Potassium	**1240**		23.2	224	mg/kg	10	01/17/2012 13:47

Batch Information

Analytical Batch: **MIP1395**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/16/2012 17:46**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.57 g**
Prep Extract Vol: **50 mL**

Analytical Batch: **MIP1397**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/17/2012 13:51**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.57 g**
Prep Extract Vol: **50 mL**

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Results of **2nd-4-2**

Client Sample ID: **2nd-4-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103008-E
Lab Project ID: 31200103

Collection Date: 01/10/2012 11:40
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 78.30

Results by **SW-846 7471B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Mercury	**0.0380**		0.000974	0.0216	mg/kg	1	01/18/2012 11:21

Batch Information

Analytical Batch: **MHG1188**
Analytical Method: **SW-846 7471B**
Instrument: **HG2**
Analyst: **NTM**
Analytical Date/Time: **01/18/2012 11:21**

Prep Batch: **MXX1748**
Prep Method: **SW-846 7471B PREP**
Prep Date/Time: **01/18/2012 08:43**
Prep Initial Wt./Vol.: **.59 g**
Prep Extract Vol: **50 mL**

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Results of **2nd-4-2**

Client Sample ID: **2nd-4-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103008-E
Lab Project ID: 31200103

Collection Date: 01/10/2012 11:40
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 78.30

Results by **SW-846 6020A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Aluminum	ND	U	1.02	5.60	mg/kg	5	01/18/2012 14:04
Arsenic	**0.862**		0.0974	0.112	mg/kg	10	01/19/2012 11:15
Beryllium	**0.0448**	J	0.00997	0.0560	mg/kg	5	01/18/2012 14:04
Cadmium	**0.0336**	J	0.0199	0.112	mg/kg	10	01/18/2012 14:08
Cobalt	**4.37**		0.00280	0.112	mg/kg	10	01/19/2012 11:15
Copper	**10.2**		0.115	1.12	mg/kg	10	01/19/2012 11:15
Lead	**5.36**		0.0147	0.112	mg/kg	10	01/18/2012 14:08
Nickel	**23.2**		0.710	1.12	mg/kg	100	01/19/2012 11:18
Selenium	**0.235**		0.152	0.224	mg/kg	10	01/19/2012 11:15
Silver	**0.0224**	J	0.0218	0.112	mg/kg	10	01/18/2012 14:08
Thallium	**0.101**	J	0.0274	0.112	mg/kg	10	01/18/2012 14:08
Vanadium	**34.5**		0.377	1.12	mg/kg	100	01/19/2012 11:18

Batch Information

Analytical Batch: **MMS1143**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 14:04**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.57 g**
Prep Extract Vol: **50 mL**

Analytical Batch: **MMS1145**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/19/2012 11:15**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.57 g**
Prep Extract Vol: **50 mL**

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Results of **2nd-drum**

Client Sample ID: **2nd-drum**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103009-B
Lab Project ID: 31200103

Collection Date: 01/11/2012 14:40
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 72.50

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
1,1,1-Trichloroethane	ND	U	1.28	8.23	ug/Kg	1	01/20/2012 13:24
1,1,2,2-Tetrachloroethane	ND	U	1.86	8.23	ug/Kg	1	01/20/2012 13:24
1,1,2-Trichloroethane	ND	U	1.71	8.23	ug/Kg	1	01/20/2012 13:24
1,1-Dichloroethane	ND	U	1.42	8.23	ug/Kg	1	01/20/2012 13:24
1,1-Dichloroethene	ND	U	1.49	8.23	ug/Kg	1	01/20/2012 13:24
1,2,3-Trichlorobenzene	ND	U	2.29	8.23	ug/Kg	1	01/20/2012 13:24
1,2,4-Trichlorobenzene	ND	U	1.96	8.23	ug/Kg	1	01/20/2012 13:24
1,2-Dibromo-3-chloropropane	ND	U	9.56	49.4	ug/Kg	1	01/20/2012 13:24
1,2-Dibromoethane	ND	U	1.25	8.23	ug/Kg	1	01/20/2012 13:24
1,2-Dichlorobenzene	ND	U	2.12	8.23	ug/Kg	1	01/20/2012 13:24
1,2-Dichloroethane	ND	U	1.46	8.23	ug/Kg	1	01/20/2012 13:24
1,2-Dichloropropane	ND	U	1.32	8.23	ug/Kg	1	01/20/2012 13:24
1,3-Dichlorobenzene	ND	U	1.91	8.23	ug/Kg	1	01/20/2012 13:24
1,4 Dioxane	ND	U	112	823	ug/Kg	1	01/20/2012 13:24
1,4-Dichlorobenzene	ND	U	1.81	8.23	ug/Kg	1	01/20/2012 13:24
2-Butanone	**30.9**	J	2.57	41.1	ug/Kg	1	01/20/2012 13:24
2-Hexanone	ND	U	3.21	20.6	ug/Kg	1	01/20/2012 13:24
4-Methyl-2-pentanone	ND	U	5.28	20.6	ug/Kg	1	01/20/2012 13:24
Acetone	**376**		2.04	82.3	ug/Kg	1	01/20/2012 13:24
Benzene	**6.91**	J	1.47	8.23	ug/Kg	1	01/20/2012 13:24
Bromochloromethane	ND	U	1.44	8.23	ug/Kg	1	01/20/2012 13:24
Bromodichloromethane	ND	U	1.34	8.23	ug/Kg	1	01/20/2012 13:24
Bromoform	ND	U	1.10	8.23	ug/Kg	1	01/20/2012 13:24
Bromomethane	ND	U	2.90	8.23	ug/Kg	1	01/20/2012 13:24
Carbon disulfide	ND	U	1.42	8.23	ug/Kg	1	01/20/2012 13:24
Carbon tetrachloride	ND	U	1.43	8.23	ug/Kg	1	01/20/2012 13:24
Chlorobenzene	ND	U	1.27	8.23	ug/Kg	1	01/20/2012 13:24
Chloroethane	ND	U	0.757	8.23	ug/Kg	1	01/20/2012 13:24
Chloroform	ND	U	1.34	8.23	ug/Kg	1	01/20/2012 13:24
Chloromethane	**10.8**		1.19	8.23	ug/Kg	1	01/20/2012 13:24
Cyclohexane	ND	U	1.53	8.23	ug/Kg	1	01/20/2012 13:24
Dibromochloromethane	ND	U	1.39	8.23	ug/Kg	1	01/20/2012 13:24
Dichlorodifluoromethane	ND	U	1.20	8.23	ug/Kg	1	01/20/2012 13:24
cis-1,3-Dichloropropene	ND	U	1.42	8.23	ug/Kg	1	01/20/2012 13:24
trans-1,3-Dichloropropene	ND	U	1.47	8.23	ug/Kg	1	01/20/2012 13:24
Ethyl Benzene	ND	U	1.36	8.23	ug/Kg	1	01/20/2012 13:24
Isopropylbenzene (Cumene)	ND	U	1.58	8.23	ug/Kg	1	01/20/2012 13:24
Methyl Acetate	ND	U	14.6	82.3	ug/Kg	1	01/20/2012 13:24
Methylcyclohexane	ND	U	1.42	8.23	ug/Kg	1	01/20/2012 13:24
Methylene chloride	**2.07**	J	1.15	32.9	ug/Kg	1	01/20/2012 13:24
Styrene	ND	U	1.62	8.23	ug/Kg	1	01/20/2012 13:24
Tetrachloroethene	ND	U	1.24	8.23	ug/Kg	1	01/20/2012 13:24
Toluene	**15.3**		1.33	8.23	ug/Kg	1	01/20/2012 13:24

Print Date: 01/20/2012

N.C. Certification # 481

Results of **2nd-drum**

Client Sample ID: **2nd-drum**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103009-B
Lab Project ID: 31200103

Collection Date: 01/11/2012 14:40
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 72.50

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Trichloroethene	ND	U	1.38	8.23	ug/Kg	1	01/20/2012 13:24
Trichlorofluoromethane	ND	U	1.24	8.23	ug/Kg	1	01/20/2012 13:24
Trichlorotrifluoroethane	ND	U	8.23	8.23	ug/Kg	1	01/20/2012 13:24
Vinyl chloride	ND	U	1.21	8.23	ug/Kg	1	01/20/2012 13:24
cis-1,2-Dichloroethene	ND	U	1.28	8.23	ug/Kg	1	01/20/2012 13:24
m,p-Xylene	ND	U	2.91	16.5	ug/Kg	1	01/20/2012 13:24
o-Xylene	ND	U	1.66	8.23	ug/Kg	1	01/20/2012 13:24
tert-Butyl methyl ether (MTBE)	ND	U	1.40	8.23	ug/Kg	1	01/20/2012 13:24
trans-1,2-Dichloroethene	ND	U	1.42	8.23	ug/Kg	1	01/20/2012 13:24
Surrogates							
1,2-Dichloroethane-d4	121			55.0-173	%	1	01/20/2012 13:24
4-Bromofluorobenzene	81.0			23.0-141	%	1	01/20/2012 13:24
Toluene d8	94.0			57.0-134	%	1	01/20/2012 13:24

Batch Information

Analytical Batch: **VMS1848**
Analytical Method: **SW-846 8260B**
Instrument: **MSD9**
Analyst: **DVO**
Analytical Date/Time: **01/20/2012 13:24**

Prep Batch: **VXX2653**
Prep Method: **SW-846 5035 SL**
Prep Date/Time: **01/13/2012 08:00**
Prep Initial Wt./Vol.: **4.19 g**
Prep Extract Vol: **5 mL**

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Results of **2nd-drum**

Client Sample ID: **2nd-drum**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103009-E
Lab Project ID: 31200103

Collection Date: 01/11/2012 14:40
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 72.50

Results by **SW-846 6010C**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Zinc	**688**		14.3	25.5	mg/kg	10	01/17/2012 13:55
Barium	**152**		0.167	12.8	mg/kg	1	01/16/2012 17:52
Manganese	**524**		3.50	12.8	mg/kg	10	01/17/2012 13:55
Iron	**44200**		1200	1280	mg/kg	100	01/17/2012 13:59
Chromium	**34.1**		0.184	1.28	mg/kg	1	01/16/2012 17:52
Magnesium	**1900**		63.1	128	mg/kg	10	01/17/2012 13:55
Aluminum	**17100**		269	1280	mg/kg	100	01/17/2012 13:59
Calcium	**7600**		900	1280	mg/kg	100	01/17/2012 13:59
Sodium	**143**		2.39	25.5	mg/kg	1	01/16/2012 17:52
Potassium	**1100**		26.4	255	mg/kg	10	01/17/2012 13:55

Batch Information

Analytical Batch: **MIP1395**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/16/2012 17:52**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.54 g**
Prep Extract Vol: **50 mL**

Analytical Batch: **MIP1397**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/17/2012 13:55**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.54 g**
Prep Extract Vol: **50 mL**

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Results of **2nd-drum**

Client Sample ID: **2nd-drum**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103009-E
Lab Project ID: 31200103

Collection Date: 01/11/2012 14:40
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 72.50

Results by **SW-846 7471B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Mercury	**2.50**		0.0115	0.255	mg/kg	10	01/18/2012 11:31

Batch Information

Analytical Batch: **MHG1188**
Analytical Method: **SW-846 7471B**
Instrument: **HG2**
Analyst: **NTM**
Analytical Date/Time: **01/18/2012 11:31**

Prep Batch: **MXX1748**
Prep Method: **SW-846 7471B PREP**
Prep Date/Time: **01/18/2012 08:43**
Prep Initial Wt./Vol.: **.54 g**
Prep Extract Vol: **50 mL**

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Results of **2nd-drum**

Client Sample ID: **2nd-drum**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103009-E
Lab Project ID: 31200103

Collection Date: 01/11/2012 14:40
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 72.50

Results by **SW-846 6020A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Antimony	**5.61**		0.0689	0.128	mg/kg	10	01/18/2012 14:14
Arsenic	**6.36**		0.111	0.128	mg/kg	10	01/19/2012 11:21
Beryllium	**0.0575**	J	0.0114	0.0638	mg/kg	5	01/18/2012 14:11
Cadmium	**3.40**		0.0227	0.128	mg/kg	10	01/18/2012 14:14
Cobalt	**7.25**		0.00319	0.128	mg/kg	10	01/19/2012 11:21
Copper	**252**		13.2	128	mg/kg	1000	01/19/2012 11:27
Lead	**460**		1.67	12.8	mg/kg	1000	01/19/2012 11:27
Nickel	**32.7**		0.810	1.28	mg/kg	100	01/19/2012 11:24
Selenium	**0.370**		0.174	0.255	mg/kg	10	01/19/2012 11:21
Silver	**0.907**		0.0249	0.128	mg/kg	10	01/18/2012 14:14
Thallium	**0.115**	J	0.0313	0.128	mg/kg	10	01/18/2012 14:14
Vanadium	**24.1**		0.430	1.28	mg/kg	100	01/19/2012 11:24

Batch Information

Analytical Batch: **MMS1143**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 14:14**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.54 g**
Prep Extract Vol: **50 mL**

Analytical Batch: **MMS1145**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/19/2012 11:21**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.54 g**
Prep Extract Vol: **50 mL**

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Results of **Trip Blanks (Not on COC)**

Client Sample ID: **Trip Blanks (Not on COC)**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103010-A
Lab Project ID: 31200103

Collection Date: 01/10/2012 00:00
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
1,1,1-Trichloroethane	ND	U	0.123	1.00	ug/L	1	01/17/2012 13:16
1,1,2,2-Tetrachloroethane	ND	U	0.156	1.00	ug/L	1	01/17/2012 13:16
1,1,2-Trichloroethane	ND	U	0.126	1.00	ug/L	1	01/17/2012 13:16
1,1-Dichloroethane	ND	U	0.165	1.00	ug/L	1	01/17/2012 13:16
1,1-Dichloroethene	ND	U	0.212	1.00	ug/L	1	01/17/2012 13:16
1,2,3-Trichlorobenzene	ND	U	0.110	1.00	ug/L	1	01/17/2012 13:16
1,2,4-Trichlorobenzene	ND	U	0.0913	1.00	ug/L	1	01/17/2012 13:16
1,2-Dibromo-3-chloropropane	ND	U	0.748	5.00	ug/L	1	01/17/2012 13:16
1,2-Dibromoethane	ND	U	0.120	1.00	ug/L	1	01/17/2012 13:16
1,2-Dichlorobenzene	ND	U	0.137	1.00	ug/L	1	01/17/2012 13:16
1,2-Dichloroethane	ND	U	0.167	1.00	ug/L	1	01/17/2012 13:16
1,2-Dichloropropane	ND	U	0.163	1.00	ug/L	1	01/17/2012 13:16
1,3,5-Trimethylbenzene	ND	U	0.113	1.00	ug/L	1	01/17/2012 13:16
1,3-Dichlorobenzene	ND	U	0.103	1.00	ug/L	1	01/17/2012 13:16
1,4 Dioxane	ND	U	14.4	100	ug/L	1	01/17/2012 13:16
1,4-Dichlorobenzene	ND	U	0.130	1.00	ug/L	1	01/17/2012 13:16
2-Butanone	ND	U	0.723	25.0	ug/L	1	01/17/2012 13:16
2-Hexanone	ND	U	0.728	5.00	ug/L	1	01/17/2012 13:16
4-Methyl-2-pentanone	ND	U	0.558	5.00	ug/L	1	01/17/2012 13:16
Acetone	**0.970**	J	0.864	25.0	ug/L	1	01/17/2012 13:16
Benzene	ND	U	0.113	1.00	ug/L	1	01/17/2012 13:16
Bromochloromethane	ND	U	0.211	1.00	ug/L	1	01/17/2012 13:16
Bromodichloromethane	ND	U	0.110	1.00	ug/L	1	01/17/2012 13:16
Bromoform	ND	U	0.0974	1.00	ug/L	1	01/17/2012 13:16
Bromomethane	ND	U	0.237	1.00	ug/L	1	01/17/2012 13:16
Carbon disulfide	ND	U	0.106	1.00	ug/L	1	01/17/2012 13:16
Carbon tetrachloride	ND	U	0.101	1.00	ug/L	1	01/17/2012 13:16
Chlorobenzene	ND	U	0.116	1.00	ug/L	1	01/17/2012 13:16
Chloroethane	ND	U	0.311	1.00	ug/L	1	01/17/2012 13:16
Chloroform	ND	U	0.139	1.00	ug/L	1	01/17/2012 13:16
Chloromethane	ND	U	0.448	1.00	ug/L	1	01/17/2012 13:16
Cyclohexane	ND	U	0.163	1.00	ug/L	1	01/17/2012 13:16
Dibromochloromethane	ND	U	0.134	1.00	ug/L	1	01/17/2012 13:16
Dichlorodifluoromethane	ND	U	0.171	5.00	ug/L	1	01/17/2012 13:16
cis-1,3-Dichloropropene	ND	U	0.0767	1.00	ug/L	1	01/17/2012 13:16
trans-1,3-Dichloropropene	ND	U	0.0862	1.00	ug/L	1	01/17/2012 13:16
Ethyl Benzene	ND	U	0.0877	1.00	ug/L	1	01/17/2012 13:16
Isopropylbenzene (Cumene)	ND	U	0.0869	1.00	ug/L	1	01/17/2012 13:16
Methyl Acetate	ND	U	1.00	10.0	ug/L	1	01/17/2012 13:16
Methylcyclohexane	ND	U	0.108	1.00	ug/L	1	01/17/2012 13:16
Methylene chloride	**0.400**	J	0.152	5.00	ug/L	1	01/17/2012 13:16
Styrene	ND	U	0.102	1.00	ug/L	1	01/17/2012 13:16
Tetrachloroethene	ND	U	0.155	1.00	ug/L	1	01/17/2012 13:16

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Results of **Trip Blanks (Not on COC)**

Client Sample ID: **Trip Blanks (Not on COC)**
Client Project ID: **HPDTA**
Lab Sample ID: 31200103010-A
Lab Project ID: 31200103

Collection Date: 01/10/2012 00:00
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Toluene	ND	U	0.133	1.00	ug/L	1	01/17/2012 13:16
Trichloroethene	ND	U	0.125	1.00	ug/L	1	01/17/2012 13:16
Trichlorofluoromethane	ND	U	0.137	1.00	ug/L	1	01/17/2012 13:16
Trichlorotrifluoroethane	ND	U	0.123	1.00	ug/L	1	01/17/2012 13:16
Vinyl chloride	ND	U	0.124	1.00	ug/L	1	01/17/2012 13:16
cis-1,2-Dichloroethene	ND	U	0.136	1.00	ug/L	1	01/17/2012 13:16
m,p-Xylene	ND	U	0.182	2.00	ug/L	1	01/17/2012 13:16
o-Xylene	ND	U	0.0874	1.00	ug/L	1	01/17/2012 13:16
tert-Butyl methyl ether (MTBE)	ND	U	0.144	1.00	ug/L	1	01/17/2012 13:16
trans-1,2-Dichloroethene	ND	U	0.223	1.00	ug/L	1	01/17/2012 13:16
Surrogates							
1,2-Dichloroethane-d4	109			64.0-140	%	1	01/17/2012 13:16
4-Bromofluorobenzene	98.0			85.0-115	%	1	01/17/2012 13:16
Toluene d8	98.0			82.0-117	%	1	01/17/2012 13:16

Batch Information

Analytical Batch: **VMS1830**
Analytical Method: **SW-846 8260B**
Instrument: **MSD4**
Analyst: **DVO**
Analytical Date/Time: **01/17/2012 13:16**

Prep Batch: **VXX2625**
Prep Method: **SW-846 5030B**
Prep Date/Time: **01/17/2012 08:00**
Prep Initial Wt./Vol.: **40 mL**
Prep Extract Vol: **40 mL**

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Batch Summary

Analytical Method: SW-846 8260B

Prep Method: SW-846 5030B
Prep Batch: VXX2625
Prep Date: 01/17/2012 08:17

Client Sample ID	Lab Sample ID	Analysis Date	Analytical Batch	Instrument	Analyst
LCS for HBN 19159 [VXX/2625]	54500	01/17/2012 09:32	VMS1830	MSD4	DVO
LCSD for HBN 19159 [VXX/2625]	54501	01/17/2012 09:56	VMS1830	MSD4	DVO
MB for HBN 19159 [VXX/2625]	54502	01/17/2012 11:37	VMS1830	MSD4	DVO
Trip Blanks (Not on COC)	31200103010	01/17/2012 13:16	VMS1830	MSD4	DVO
2nd-1	31200103001	01/17/2012 15:46	VMS1830	MSD4	DVO
2nd-2	31200103002	01/17/2012 16:11	VMS1830	MSD4	DVO
2nd-3	31200103003	01/17/2012 16:36	VMS1830	MSD4	DVO
2nd-4	31200103004	01/17/2012 17:01	VMS1830	MSD4	DVO
IDW-1-WATER(54442MS)	54705	01/17/2012 19:32	VMS1830	MSD4	DVO
IDW-1-WATER(54442MSD)	54706	01/17/2012 19:57	VMS1830	MSD4	DVO

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Method Blank

Blank ID: MB for HBN 19159 [VXX/2625]
Blank Lab ID: 54502
QC for Samples:
31200103001, 31200103002, 31200103003, 31200103004, 31200103010

Matrix: Water

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
Dichlorodifluoromethane	ND	U	0.171	5.00	ug/L	1
Chloromethane	ND	U	0.448	1.00	ug/L	1
Methyl Acetate	ND	U	1.00	10.0	ug/L	1
Trichlorotrifluoroethane	ND	U	0.123	1.00	ug/L	1
Cyclohexane	ND	U	0.163	1.00	ug/L	1
Vinyl chloride	ND	U	0.124	1.00	ug/L	1
Methylcyclohexane	ND	U	0.108	1.00	ug/L	1
Bromomethane	ND	U	0.237	1.00	ug/L	1
Chloroethane	ND	U	0.311	1.00	ug/L	1
Trichlorofluoromethane	ND	U	0.137	1.00	ug/L	1
1,1-Dichloroethene	ND	U	0.212	1.00	ug/L	1
Acetone	ND	U	0.864	25.0	ug/L	1
Methylene chloride	ND	U	0.152	5.00	ug/L	1
trans-1,2-Dichloroethene	ND	U	0.223	1.00	ug/L	1
tert-Butyl methyl ether (MTBE)	ND	U	0.144	1.00	ug/L	1
1,1-Dichloroethane	ND	U	0.165	1.00	ug/L	1
cis-1,2-Dichloroethene	ND	U	0.136	1.00	ug/L	1
2-Butanone	ND	U	0.723	25.0	ug/L	1
Bromochloromethane	ND	U	0.211	1.00	ug/L	1
Chloroform	ND	U	0.139	1.00	ug/L	1
1,1,1-Trichloroethane	ND	U	0.123	1.00	ug/L	1
Carbon tetrachloride	ND	U	0.101	1.00	ug/L	1
Benzene	ND	U	0.113	1.00	ug/L	1
1,2-Dichloroethane	ND	U	0.167	1.00	ug/L	1
Trichloroethene	ND	U	0.125	1.00	ug/L	1
1,2-Dichloropropane	ND	U	0.163	1.00	ug/L	1
Bromodichloromethane	ND	U	0.110	1.00	ug/L	1
1,4 Dioxane	ND	U	14.4	100	ug/L	1
cis-1,3-Dichloropropene	ND	U	0.0767	1.00	ug/L	1
4-Methyl-2-pentanone	ND	U	0.558	5.00	ug/L	1
Toluene	ND	U	0.133	1.00	ug/L	1
trans-1,3-Dichloropropene	ND	U	0.0862	1.00	ug/L	1
Carbon disulfide	ND	U	0.106	1.00	ug/L	1
1,1,2-Trichloroethane	ND	U	0.126	1.00	ug/L	1
Tetrachloroethene	ND	U	0.155	1.00	ug/L	1
2-Hexanone	ND	U	0.728	5.00	ug/L	1
Dibromochloromethane	ND	U	0.134	1.00	ug/L	1
1,2-Dibromoethane	ND	U	0.120	1.00	ug/L	1
Chlorobenzene	ND	U	0.116	1.00	ug/L	1
Bromoform	ND	U	0.0974	1.00	ug/L	1
1,1,2,2-Tetrachloroethane	ND	U	0.156	1.00	ug/L	1

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Method Blank

Blank ID: MB for HBN 19159 [VXX/2625]
Matrix: Water
Blank Lab ID: 54502
QC for Samples:
31200103001, 31200103002, 31200103003, 31200103004, 31200103010

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
Ethyl Benzene	ND	U	0.0877	1.00	ug/L	1
m,p-Xylene	ND	U	0.182	2.00	ug/L	1
Styrene	ND	U	0.102	1.00	ug/L	1
o-Xylene	ND	U	0.0874	1.00	ug/L	1
Isopropylbenzene (Cumene)	ND	U	0.0869	1.00	ug/L	1
1,3,5-Trimethylbenzene	ND	U	0.113	1.00	ug/L	1
1,3-Dichlorobenzene	ND	U	0.103	1.00	ug/L	1
1,4-Dichlorobenzene	ND	U	0.130	1.00	ug/L	1
1,2-Dichlorobenzene	ND	U	0.137	1.00	ug/L	1
1,2-Dibromo-3-chloropropane	ND	U	0.748	5.00	ug/L	1
1,2,4-Trichlorobenzene	ND	U	0.0913	1.00	ug/L	1
1,2,3-Trichlorobenzene	ND	U	0.110	1.00	ug/L	1
Surrogates						
1,2-Dichloroethane-d4	109			64.0-140	%	1
Toluene d8	97.0			82.0-117	%	1
4-Bromofluorobenzene	97.0			85.0-115	%	1

Batch Information

Analytical Batch: VMS1830
Analytical Method: SW-846 8260B
Instrument: MSD4
Analyst: DVO
Analytical Date/Time: 1/17/2012 11:37:00AM

Prep Batch: VXX2625
Prep Method: SW-846 5030B
Prep Date/Time: 1/17/2012 8:17:18AM
Prep Initial Wt./Vol.: 40 mL
Prep Extract Vol: 40 mL

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Blank Spike Summary

Blank Spike ID: LCS for HBN 19159 [VXX/2625]
Blank Spike Lab ID: 54500
Date Analyzed: 01/17/2012 09:32

Spike Duplicate ID: LCSD for HBN 19159 [VXX/2625]
Spike Duplicate Lab ID: 54501
Date Analyzed: 01/17/2012 09:56
Matrix: Water

QC for Samples: 31200103001, 31200103002, 31200103003, 31200103004, 31200103010

Results by **SW-846 8260B**

	Blank Spike (ug/L)			Spike Duplicate (ug/L)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Dichlorodifluoromethane	5.00	5.38	108	5.00	5.06	101	33.0-170	6.1	30.00
Chloromethane	5.00	5.68	114	5.00	5.42	108	57.0-132	4.7	30.00
Vinyl chloride	5.00	5.51	110	5.00	5.28	106	59.0-138	4.3	30.00
Bromomethane	5.00	5.51	110	5.00	5.02	100	51.0-134	9.3	30.00
Chloroethane	5.00	6.17	123	5.00	6.16	123	64.0-145	0.16	30.00
Trichlorofluoromethane	5.00	5.87	117	5.00	5.68	114	64.0-133	3.3	30.00
1,1-Dichloroethene	5.00	4.60	92	5.00	4.87	97	71.0-128	5.7	30.00
Acetone	25.0	26.3	105	25.0	28.5	114	52.0-140	8.0	30.00
Methylene chloride	5.00	4.64	93	5.00	4.96	99	70.0-113	6.7	30.00
trans-1,2-Dichloroethene	5.00	4.57	91	5.00	4.89	98	57.0-138	6.8	30.00
tert-Butyl methyl ether (MTBE)	5.00	4.88	98	5.00	5.14	103	47.0-142	5.2	30.00
1,1-Dichloroethane	5.00	4.89	98	5.00	5.12	102	68.0-133	4.6	30.00
cis-1,2-Dichloroethene	5.00	4.66	93	5.00	5.06	101	73.0-128	8.2	30.00
2-Butanone	25.0	23.5	94	25.0	25.3	101	58.0-134	7.4	30.00
Bromochloromethane	5.00	4.65	93	5.00	5.08	102	73.0-128	8.8	30.00
Chloroform	5.00	4.81	96	5.00	5.05	101	74.0-124	4.9	30.00
1,1,1-Trichloroethane	5.00	4.60	92	5.00	4.89	98	76.0-119	6.1	30.00
Carbon tetrachloride	5.00	4.34	87	5.00	4.54	91	75.0-120	4.5	30.00
Benzene	5.00	4.53	91	5.00	4.89	98	76.0-124	7.6	30.00
1,2-Dichloroethane	5.00	5.15	103	5.00	5.40	108	76.0-119	4.7	30.00
Trichloroethene	5.00	4.43	89	5.00	4.73	95	74.0-121	6.6	30.00
1,2-Dichloropropane	5.00	4.53	91	5.00	4.73	95	74.0-124	4.3	30.00
Bromodichloromethane	5.00	4.81	96	5.00	5.04	101	72.0-120	4.7	30.00
cis-1,3-Dichloropropene	5.00	4.50	90	5.00	4.77	95	73.0-122	5.8	30.00
4-Methyl-2-pentanone	25.0	22.8	91	25.0	24.5	98	65.0-124	7.2	30.00
Toluene	5.00	4.60	92	5.00	4.90	98	75.0-123	6.3	30.00
trans-1,3-Dichloropropene	5.00	4.29	86	5.00	4.52	90	70.0-125	5.2	30.00
Carbon disulfide	5.00	5.39	108	5.00	5.59	112	65.0-132	3.6	30.00
1,1,2-Trichloroethane	5.00	4.57	91	5.00	5.07	101	76.0-121	10	30.00
Tetrachloroethene	5.00	4.41	88	5.00	4.72	94	59.0-112	6.8	30.00
2-Hexanone	25.0	22.4	90	25.0	24.4	97	56.0-133	8.5	30.00
Dibromochloromethane	5.00	4.24	85	5.00	4.69	94	67.0-122	10	30.00
1,2-Dibromoethane	5.00	4.44	89	5.00	4.78	96	74.0-119	7.4	30.00
Chlorobenzene	5.00	4.33	87	5.00	4.82	96	74.0-120	11	30.00

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Blank Spike Summary

Blank Spike ID: LCS for HBN 19159 [VXX/2625]
Blank Spike Lab ID: 54500
Date Analyzed: 01/17/2012 09:32

Spike Duplicate ID: LCSD for HBN 19159 [VXX/2625]
Spike Duplicate Lab ID: 54501
Date Analyzed: 01/17/2012 09:56
Matrix: Water

QC for Samples: 31200103001, 31200103002, 31200103003, 31200103004, 31200103010

Results by **SW-846 8260B**

	Blank Spike (ug/L)			Spike Duplicate (ug/L)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Bromoform	5.00	3.91	78	5.00	4.12	82	62.0-127	5.2	30.00
1,1,2,2-Tetrachloroethane	5.00	4.77	95	5.00	5.22	104	68.0-129	9.0	30.00
Ethyl Benzene	5.00	4.62	92	5.00	4.83	97	76.0-123	4.4	30.00
m,p-Xylene	10.0	9.22	92	10.0	9.76	98	76.0-124	5.7	30.00
Styrene	5.00	4.48	90	5.00	4.82	96	76.0-121	7.3	30.00
o-Xylene	5.00	4.44	89	5.00	4.79	96	75.0-124	7.6	30.00
Isopropylbenzene (Cumene)	5.00	4.66	93	5.00	5.01	100	77.0-120	7.2	30.00
1,3,5-Trimethylbenzene	5.00	4.81	96	5.00	5.03	101	76.0-122	4.5	30.00
1,3-Dichlorobenzene	5.00	4.55	91	5.00	4.96	99	75.0-120	8.6	30.00
1,4-Dichlorobenzene	5.00	4.50	90	5.00	4.84	97	70.0-125	7.3	30.00
1,2-Dichlorobenzene	5.00	4.66	93	5.00	4.85	97	76.0-118	4.0	30.00
1,2-Dibromo-3-chloropropane	30.0	27.6	92	30.0	30.5	102	62.0-130	10	30.00
1,2,4-Trichlorobenzene	5.00	4.44	89	5.00	4.72	94	72.0-119	6.1	30.00
1,2,3-Trichlorobenzene	5.00	4.53	91	5.00	4.76	95	68.0-123	5.0	30.00
Surrogates									
1,2-Dichloroethane-d4			107			108	64.0-140		
Toluene d8			98			99	82.0-117		
4-Bromofluorobenzene			98			100	85.0-115		

Batch Information

Analytical Batch: **VMS1830**
Analytical Method: **SW-846 8260B**
Instrument: **MSD4**
Analyst: **DVO**

Prep Batch: **VXX2625**
Prep Method: **SW-846 5030B**
Prep Date/Time: **01/17/2012 08:17**
Spike Init Wt./Vol.: **40 mL** Extract Vol: **40 mL**
Dupe Init Wt./Vol.: **40 mL** Extract Vol: **40 mL**

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Batch Summary

Analytical Method: SW-846 8260B

Prep Method: SW-846 5035 SL
Prep Batch: VXX2646
Prep Date: 01/19/2012 08:37

Client Sample ID	Lab Sample ID	Analysis Date	Analytical Batch	Instrument	Analyst
LCS-S for HBN 19230 [VXX/2646]	54808	01/19/2012 13:19	VMS1844	MSD4	DVO
LCSD-S for HBN 19230 [VXX/2646	54809	01/19/2012 13:45	VMS1844	MSD4	DVO
MB-S for HBN 19230 [VXX/2646]	54810	01/19/2012 15:30	VMS1844	MSD4	DVO
2nd-4-2	31200103008	01/19/2012 18:59	VMS1844	MSD4	DVO
5th-2-1(54320DUP)	54910	01/19/2012 19:51	VMS1844	MSD4	DVO
5th-1-2(54319MS)	54911	01/19/2012 20:17	VMS1844	MSD4	DVO

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Method Blank

Blank ID: MB-S for HBN 19230 [VXX/2646]
Blank Lab ID: 54810
QC for Samples:
31200103008

Matrix: Soil-Solid as dry weight

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
Dichlorodifluoromethane	ND	U	0.727	5.00	ug/Kg	1
Chloromethane	ND	U	0.725	5.00	ug/Kg	1
Vinyl chloride	ND	U	0.736	5.00	ug/Kg	1
Bromomethane	ND	U	1.76	5.00	ug/Kg	1
Chloroethane	ND	U	0.460	5.00	ug/Kg	1
Trichlorofluoromethane	ND	U	0.754	5.00	ug/Kg	1
1,1-Dichloroethene	ND	U	0.903	5.00	ug/Kg	1
Acetone	ND	U	1.24	50.0	ug/Kg	1
Methylene chloride	**1.60**	J	0.698	20.0	ug/Kg	1
trans-1,2-Dichloroethene	ND	U	0.861	5.00	ug/Kg	1
tert-Butyl methyl ether (MTBE)	ND	U	0.852	5.00	ug/Kg	1
1,1-Dichloroethane	ND	U	0.863	5.00	ug/Kg	1
cis-1,2-Dichloroethene	ND	U	0.775	5.00	ug/Kg	1
2-Butanone	ND	U	1.56	25.0	ug/Kg	1
Bromochloromethane	ND	U	0.873	5.00	ug/Kg	1
Chloroform	ND	U	0.812	5.00	ug/Kg	1
1,1,1-Trichloroethane	ND	U	0.778	5.00	ug/Kg	1
Carbon tetrachloride	ND	U	0.870	5.00	ug/Kg	1
Benzene	ND	U	0.893	5.00	ug/Kg	1
1,2-Dichloroethane	ND	U	0.886	5.00	ug/Kg	1
Trichloroethene	ND	U	0.837	5.00	ug/Kg	1
1,2-Dichloropropane	ND	U	0.805	5.00	ug/Kg	1
Bromodichloromethane	ND	U	0.813	5.00	ug/Kg	1
1,4 Dioxane	ND	U	68.1	500	ug/Kg	1
cis-1,3-Dichloropropene	ND	U	0.861	5.00	ug/Kg	1
4-Methyl-2-pentanone	ND	U	3.21	12.5	ug/Kg	1
Toluene	ND	U	0.810	5.00	ug/Kg	1
trans-1,3-Dichloropropene	ND	U	0.896	5.00	ug/Kg	1
Carbon disulfide	ND	U	0.864	5.00	ug/Kg	1
1,1,2-Trichloroethane	ND	U	1.04	5.00	ug/Kg	1
Tetrachloroethene	ND	U	0.752	5.00	ug/Kg	1
2-Hexanone	ND	U	1.95	12.5	ug/Kg	1
Dibromochloromethane	ND	U	0.847	5.00	ug/Kg	1
1,2-Dibromoethane	ND	U	0.758	5.00	ug/Kg	1
Chlorobenzene	ND	U	0.774	5.00	ug/Kg	1
Bromoform	ND	U	0.669	5.00	ug/Kg	1
1,1,2,2-Tetrachloroethane	ND	U	1.13	5.00	ug/Kg	1
Ethyl Benzene	ND	U	0.827	5.00	ug/Kg	1
m,p-Xylene	ND	U	1.77	10.0	ug/Kg	1
Styrene	ND	U	0.986	5.00	ug/Kg	1
o-Xylene	ND	U	1.01	5.00	ug/Kg	1

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Method Blank

Blank ID: MB-S for HBN 19230 [VXX/2646]
Blank Lab ID: 54810
QC for Samples:
31200103008

Matrix: Soil-Solid as dry weight

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
Isopropylbenzene (Cumene)	ND	U	0.963	5.00	ug/Kg	1
1,3-Dichlorobenzene	ND	U	1.16	5.00	ug/Kg	1
1,4-Dichlorobenzene	ND	U	1.10	5.00	ug/Kg	1
1,2-Dichlorobenzene	ND	U	1.29	5.00	ug/Kg	1
1,2-Dibromo-3-chloropropane	ND	U	5.81	30.0	ug/Kg	1
1,2,4-Trichlorobenzene	ND	U	1.19	5.00	ug/Kg	1
1,2,3-Trichlorobenzene	ND	U	1.39	5.00	ug/Kg	1
Cyclohexane	ND	U	0.930	5.00	ug/Kg	1
Methyl Acetate	ND	U	8.85	50.0	ug/Kg	1
Methylcyclohexane	ND	U	0.865	5.00	ug/Kg	1
Trichlorotrifluoroethane	ND	U	5.00	5.00	ug/Kg	1
Surrogates						
1,2-Dichloroethane-d4	107			55.0-173	%	1
Toluene d8	99.0			57.0-134	%	1
4-Bromofluorobenzene	99.0			23.0-141	%	1

Batch Information

Analytical Batch: VMS1844
Analytical Method: SW-846 8260B
Instrument: MSD4
Analyst: DVO
Analytical Date/Time: 1/19/2012 3:30:00PM

Prep Batch: VXX2646
Prep Method: SW-846 5035 SL
Prep Date/Time: 1/19/2012 8:37:52AM
Prep Initial Wt./Vol.: 5 g
Prep Extract Vol: 5 mL

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Blank Spike Summary

Blank Spike ID: LCS-S for HBN 19230 [VXX/2646]
Blank Spike Lab ID: 54808
Date Analyzed: 01/19/2012 13:19

Spike Duplicate ID: LCSD-S for HBN 19230 [VXX/2646
Spike Duplicate Lab ID: 54809
Matrix: Soil-Solid as dry weight

QC for Samples: 31200103008

Results by **SW-846 8260B**

	Blank Spike (ug/Kg)			Spike Duplicate (ug/Kg)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Dichlorodifluoromethane	30.0	30.6	102	30.0	30.4	101	52.0-133	0.66	30.00
Chloromethane	30.0	38.1	**127***	30.0	37.1	124	64.0-126	2.7	30.00
Vinyl chloride	30.0	32.5	108	30.0	32.4	108	69.0-120	0.31	30.00
Bromomethane	30.0	44.8	149	30.0	42.9	143	41.0-160	4.3	30.00
Chloroethane	30.0	31.7	106	30.0	30.9	103	69.0-126	2.6	30.00
Trichlorofluoromethane	30.0	30.0	100	30.0	28.8	96	72.0-123	4.1	30.00
1,1-Dichloroethene	30.0	29.0	97	30.0	27.5	92	78.0-113	5.3	30.00
Acetone	75.0	91.2	122	75.0	90.7	121	0.00-243	0.55	30.00
Methylene chloride	30.0	29.2	97	30.0	28.2	94	40.0-156	3.5	30.00
trans-1,2-Dichloroethene	30.0	28.8	96	30.0	27.5	92	78.0-111	4.6	30.00
tert-Butyl methyl ether (MTBE)	30.0	30.1	100	30.0	29.1	97	68.0-138	3.4	30.00
1,1-Dichloroethane	30.0	29.0	97	30.0	27.8	93	71.0-121	4.2	30.00
cis-1,2-Dichloroethene	30.0	29.0	97	30.0	27.8	93	80.0-114	4.2	30.00
2-Butanone	75.0	87.3	116	75.0	82.5	110	31.0-189	5.7	30.00
Bromochloromethane	30.0	29.3	98	30.0	28.8	96	81.0-115	1.7	30.00
Chloroform	30.0	28.0	93	30.0	26.6	89	76.0-114	5.1	30.00
1,1,1-Trichloroethane	30.0	27.9	93	30.0	27.1	90	79.0-117	2.9	30.00
Carbon tetrachloride	30.0	24.8	83	30.0	24.3	**81***	82.0-119	2.0	30.00
Benzene	30.0	29.2	97	30.0	28.6	95	82.0-113	2.1	30.00
1,2-Dichloroethane	30.0	29.8	99	30.0	28.3	94	72.0-126	5.2	30.00
Trichloroethene	30.0	28.3	94	30.0	28.1	94	82.0-108	0.71	30.00
1,2-Dichloropropane	30.0	28.8	96	30.0	28.6	95	78.0-116	0.70	30.00
Bromodichloromethane	30.0	26.0	87	30.0	25.6	85	79.0-122	1.6	30.00
cis-1,3-Dichloropropene	30.0	27.7	92	30.0	27.4	91	75.0-127	1.1	30.00
4-Methyl-2-pentanone	75.0	82.5	110	75.0	77.5	103	57.0-159	6.3	30.00
Toluene	30.0	30.0	100	30.0	29.7	99	83.0-111	1.0	30.00
trans-1,3-Dichloropropene	30.0	26.4	88	30.0	25.8	86	75.0-134	2.3	30.00
Carbon disulfide	30.0	27.3	91	30.0	26.8	89	72.0-116	1.8	30.00
1,1,2-Trichloroethane	30.0	31.3	104	30.0	30.1	100	73.0-121	3.9	30.00
Tetrachloroethene	30.0	31.4	105	30.0	30.7	102	60.0-118	2.3	30.00
2-Hexanone	75.0	88.7	118	75.0	82.9	110	41.0-171	6.8	30.00
Dibromochloromethane	30.0	25.6	85	30.0	25.2	84	77.0-126	1.6	30.00
1,2-Dibromoethane	30.0	31.7	106	30.0	29.9	100	76.0-125	5.8	30.00
Chlorobenzene	30.0	30.7	102	30.0	30.4	101	78.0-109	0.98	30.00

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Blank Spike Summary

Blank Spike ID: LCS-S for HBN 19230 [VXX/2646]
Blank Spike Lab ID: 54808
Date Analyzed: 01/19/2012 13:19

Spike Duplicate ID: LCSD-S for HBN 19230 [VXX/2646
Spike Duplicate Lab ID: 54809
Matrix: Soil-Solid as dry weight

QC for Samples: 31200103008

Results by **SW-846 8260B**

	Blank Spike (ug/Kg)			Spike Duplicate (ug/Kg)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Bromoform	30.0	23.5	78	30.0	22.6	75	72.0-134	3.9	30.00
1,1,2,2-Tetrachloroethane	30.0	32.6	109	30.0	31.2	104	76.0-129	4.4	30.00
Ethyl Benzene	30.0	30.6	102	30.0	29.9	100	72.0-115	2.3	30.00
m,p-Xylene	60.0	60.9	101	60.0	60.4	101	73.0-114	0.82	30.00
Styrene	30.0	30.7	102	30.0	30.2	101	74.0-114	1.6	30.00
o-Xylene	30.0	30.5	102	30.0	30.4	101	74.0-113	0.33	30.00
Isopropylbenzene (Cumene)	30.0	31.0	103	30.0	30.6	102	72.0-115	1.3	30.00
1,3-Dichlorobenzene	30.0	31.0	103	30.0	30.5	102	75.0-110	1.6	30.00
1,4-Dichlorobenzene	30.0	31.5	105	30.0	31.1	104	76.0-110	1.3	30.00
1,2-Dichlorobenzene	30.0	30.6	102	30.0	30.4	101	77.0-109	0.66	30.00
1,2-Dibromo-3-chloropropane	180	179	99	180	163	91	54.0-166	9.4	30.00
1,2,4-Trichlorobenzene	30.0	32.0	107	30.0	32.6	109	76.0-115	1.9	30.00
1,2,3-Trichlorobenzene	30.0	32.3	108	30.0	31.7	106	78.0-115	1.9	30.00
Surrogates									
1,2-Dichloroethane-d4			106			102	55.0-173		
Toluene d8			99			99	57.0-134		
4-Bromofluorobenzene			100			102	23.0-141		

Batch Information

Analytical Batch: **VMS1844**
Analytical Method: **SW-846 8260B**
Instrument: **MSD4**
Analyst: **DVO**

Prep Batch: **VXX2646**
Prep Method: **SW-846 5035 SL**
Prep Date/Time: **01/19/2012 08:37**
Spike Init Wt./Vol.: **5 g** Extract Vol: **5 mL**
Dupe Init Wt./Vol.: **5 g** Extract Vol: **5 mL**

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Batch Summary

Analytical Method: SW-846 8260B

Prep Method: SW-846 5035 SL
Prep Batch: VXX2653
Prep Date: 01/20/2012 08:50

Client Sample ID	Lab Sample ID	Analysis Date	Analytical Batch	Instrument	Analyst
LCS-S for HBN 19260 [VXX/2653]	54937	01/20/2012 10:15	VMS1848	MSD9	DVO
LCSD-S for HBN 19260 [VXX/2653	54938	01/20/2012 10:43	VMS1848	MSD9	DVO
MB-S for HBN 19260 [VXX/2653]	54939	01/20/2012 12:30	VMS1848	MSD9	DVO
2nd-3-2	31200103007	01/20/2012 12:56	VMS1848	MSD9	DVO
2nd-drum	31200103009	01/20/2012 13:24	VMS1848	MSD9	DVO
2nd-1-2	31200103005	01/20/2012 13:50	VMS1848	MSD9	DVO
2nd-2-2	31200103006	01/20/2012 14:17	VMS1848	MSD9	DVO
2nd-3-2(54331DUP)	54975	01/20/2012 14:56	VMS1848	MSD9	DVO
2nd-1-2(54329MS)	54976	01/20/2012 15:23	VMS1848	MSD9	DVO

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Method Blank

Blank ID: MB-S for HBN 19260 [VXX/2653]
Blank Lab ID: 54939
QC for Samples:
31200103005, 31200103006, 31200103007, 31200103009

Matrix: Soil-Solid as dry weight

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
Dichlorodifluoromethane	ND	U	0.727	5.00	ug/Kg	1
Chloromethane	ND	U	0.725	5.00	ug/Kg	1
Vinyl chloride	ND	U	0.736	5.00	ug/Kg	1
Bromomethane	ND	U	1.76	5.00	ug/Kg	1
Chloroethane	ND	U	0.460	5.00	ug/Kg	1
Trichlorofluoromethane	ND	U	0.754	5.00	ug/Kg	1
1,1-Dichloroethene	ND	U	0.903	5.00	ug/Kg	1
Acetone	ND	U	1.24	50.0	ug/Kg	1
Methylene chloride	ND	U	0.698	20.0	ug/Kg	1
trans-1,2-Dichloroethene	ND	U	0.861	5.00	ug/Kg	1
tert-Butyl methyl ether (MTBE)	ND	U	0.852	5.00	ug/Kg	1
1,1-Dichloroethane	ND	U	0.863	5.00	ug/Kg	1
cis-1,2-Dichloroethene	ND	U	0.775	5.00	ug/Kg	1
2-Butanone	ND	U	1.56	25.0	ug/Kg	1
Bromochloromethane	ND	U	0.873	5.00	ug/Kg	1
Chloroform	ND	U	0.812	5.00	ug/Kg	1
1,1,1-Trichloroethane	ND	U	0.778	5.00	ug/Kg	1
Carbon tetrachloride	ND	U	0.870	5.00	ug/Kg	1
Benzene	ND	U	0.893	5.00	ug/Kg	1
1,2-Dichloroethane	ND	U	0.886	5.00	ug/Kg	1
Trichloroethene	ND	U	0.837	5.00	ug/Kg	1
1,2-Dichloropropane	ND	U	0.805	5.00	ug/Kg	1
Bromodichloromethane	ND	U	0.813	5.00	ug/Kg	1
1,4 Dioxane	ND	U	68.1	500	ug/Kg	1
cis-1,3-Dichloropropene	ND	U	0.861	5.00	ug/Kg	1
4-Methyl-2-pentanone	ND	U	3.21	12.5	ug/Kg	1
Toluene	ND	U	0.810	5.00	ug/Kg	1
trans-1,3-Dichloropropene	ND	U	0.896	5.00	ug/Kg	1
Carbon disulfide	ND	U	0.864	5.00	ug/Kg	1
1,1,2-Trichloroethane	ND	U	1.04	5.00	ug/Kg	1
Tetrachloroethene	ND	U	0.752	5.00	ug/Kg	1
2-Hexanone	ND	U	1.95	12.5	ug/Kg	1
Dibromochloromethane	ND	U	0.847	5.00	ug/Kg	1
1,2-Dibromoethane	ND	U	0.758	5.00	ug/Kg	1
Chlorobenzene	ND	U	0.774	5.00	ug/Kg	1
Bromoform	ND	U	0.669	5.00	ug/Kg	1
1,1,2,2-Tetrachloroethane	ND	U	1.13	5.00	ug/Kg	1
Ethyl Benzene	ND	U	0.827	5.00	ug/Kg	1
m,p-Xylene	ND	U	1.77	10.0	ug/Kg	1
Styrene	ND	U	0.986	5.00	ug/Kg	1
o-Xylene	ND	U	1.01	5.00	ug/Kg	1

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Method Blank

Blank ID: MB-S for HBN 19260 [VXX/2653]
Blank Lab ID: 54939
QC for Samples:
31200103005, 31200103006, 31200103007, 31200103009

Matrix: Soil-Solid as dry weight

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
Isopropylbenzene (Cumene)	ND	U	0.963	5.00	ug/Kg	1
1,3-Dichlorobenzene	ND	U	1.16	5.00	ug/Kg	1
1,4-Dichlorobenzene	ND	U	1.10	5.00	ug/Kg	1
1,2-Dichlorobenzene	ND	U	1.29	5.00	ug/Kg	1
1,2-Dibromo-3-chloropropane	ND	U	5.81	30.0	ug/Kg	1
1,2,4-Trichlorobenzene	ND	U	1.19	5.00	ug/Kg	1
1,2,3-Trichlorobenzene	ND	U	1.39	5.00	ug/Kg	1
Cyclohexane	ND	U	0.930	5.00	ug/Kg	1
Methyl Acetate	ND	U	8.85	50.0	ug/Kg	1
Methylcyclohexane	ND	U	0.865	5.00	ug/Kg	1
Trichlorotrifluoroethane	ND	U	5.00	5.00	ug/Kg	1
Surrogates						
1,2-Dichloroethane-d4	106			55.0-173	%	1
Toluene d8	101			57.0-134	%	1
4-Bromofluorobenzene	97.0			23.0-141	%	1

Batch Information

Analytical Batch: VMS1848
Analytical Method: SW-846 8260B
Instrument: MSD9
Analyst: DVO
Analytical Date/Time: 1/20/2012 12:30:00PM

Prep Batch: VXX2653
Prep Method: SW-846 5035 SL
Prep Date/Time: 1/20/2012 8:50:07AM
Prep Initial Wt./Vol.: 5 g
Prep Extract Vol: 5 mL

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Blank Spike Summary

Blank Spike ID: LCS-S for HBN 19260 [VXX/2653]
Blank Spike Lab ID: 54937
Date Analyzed: 01/20/2012 10:15

Spike Duplicate ID: LCSD-S for HBN 19260 [VXX/2653
Spike Duplicate Lab ID: 54938
Matrix: Soil-Solid as dry weight

QC for Samples: 31200103005, 31200103006, 31200103007, 31200103009

Results by **SW-846 8260B**

	Blank Spike (ug/Kg)			Spike Duplicate (ug/Kg)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Dichlorodifluoromethane	30.0	28.3	94	30.0	29.0	97	52.0-133	2.4	30.00
Chloromethane	30.0	32.4	108	30.0	32.9	110	64.0-126	1.5	30.00
Vinyl chloride	30.0	30.7	102	30.0	30.5	102	69.0-120	0.65	30.00
Bromomethane	30.0	30.1	100	30.0	31.8	106	41.0-160	5.5	30.00
Chloroethane	30.0	31.4	105	30.0	32.5	108	69.0-126	3.4	30.00
Trichlorofluoromethane	30.0	29.8	99	30.0	29.8	99	72.0-123	0.0	30.00
1,1-Dichloroethene	30.0	28.7	96	30.0	27.9	93	78.0-113	2.8	30.00
Acetone	75.0	80.1	107	75.0	76.1	101	0.00-243	5.1	30.00
Methylene chloride	30.0	28.9	96	30.0	28.6	95	40.0-156	1.0	30.00
trans-1,2-Dichloroethene	30.0	28.3	94	30.0	30.2	101	78.0-111	6.5	30.00
tert-Butyl methyl ether (MTBE)	30.0	30.2	101	30.0	30.0	100	68.0-138	0.66	30.00
1,1-Dichloroethane	30.0	29.4	98	30.0	29.6	99	71.0-121	0.68	30.00
cis-1,2-Dichloroethene	30.0	30.2	101	30.0	28.7	96	80.0-114	5.1	30.00
2-Butanone	75.0	79.6	106	75.0	74.7	100	31.0-189	6.4	30.00
Bromochloromethane	30.0	30.6	102	30.0	28.3	94	81.0-115	7.8	30.00
Chloroform	30.0	29.2	97	30.0	28.0	93	76.0-114	4.2	30.00
1,1,1-Trichloroethane	30.0	31.0	103	30.0	28.8	96	79.0-117	7.4	30.00
Carbon tetrachloride	30.0	30.8	103	30.0	28.8	96	82.0-119	6.7	30.00
Benzene	30.0	30.2	101	30.0	29.0	97	82.0-113	4.1	30.00
1,2-Dichloroethane	30.0	29.3	98	30.0	29.1	97	72.0-126	0.68	30.00
Trichloroethene	30.0	29.4	98	30.0	28.7	96	82.0-108	2.4	30.00
1,2-Dichloropropane	30.0	30.1	100	30.0	28.8	96	78.0-116	4.4	30.00
Bromodichloromethane	30.0	32.0	107	30.0	31.6	105	79.0-122	1.3	30.00
cis-1,3-Dichloropropene	30.0	30.5	102	30.0	30.0	100	75.0-127	1.7	30.00
4-Methyl-2-pentanone	75.0	81.7	109	75.0	77.7	104	57.0-159	5.0	30.00
Toluene	30.0	30.4	101	30.0	29.5	98	83.0-111	3.0	30.00
trans-1,3-Dichloropropene	30.0	30.5	102	30.0	29.2	97	75.0-134	4.4	30.00
Carbon disulfide	30.0	29.0	97	30.0	28.4	95	72.0-116	2.1	30.00
1,1,2-Trichloroethane	30.0	30.5	102	30.0	29.0	97	73.0-121	5.0	30.00
Tetrachloroethene	30.0	30.0	100	30.0	27.8	93	60.0-118	7.6	30.00
2-Hexanone	75.0	83.2	111	75.0	76.1	101	41.0-171	8.9	30.00
Dibromochloromethane	30.0	30.8	103	30.0	29.0	97	77.0-126	6.0	30.00
1,2-Dibromoethane	30.0	30.0	100	30.0	29.1	97	76.0-125	3.0	30.00
Chlorobenzene	30.0	29.3	98	30.0	28.1	94	78.0-109	4.2	30.00

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Blank Spike Summary

Blank Spike ID: LCS-S for HBN 19260 [VXX/2653]
Blank Spike Lab ID: 54937
Date Analyzed: 01/20/2012 10:15

Spike Duplicate ID: LCSD-S for HBN 19260 [VXX/2653
Spike Duplicate Lab ID: 54938
Matrix: Soil-Solid as dry weight

QC for Samples: 31200103005, 31200103006, 31200103007, 31200103009

Results by **SW-846 8260B**

	Blank Spike (ug/Kg)			Spike Duplicate (ug/Kg)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Bromoform	30.0	31.1	104	30.0	30.1	100	72.0-134	3.3	30.00
1,1,2,2-Tetrachloroethane	30.0	30.8	103	30.0	30.7	102	76.0-129	0.33	30.00
Ethyl Benzene	30.0	30.1	100	30.0	28.8	96	72.0-115	4.4	30.00
m,p-Xylene	60.0	59.6	99	60.0	57.8	96	73.0-114	3.1	30.00
Styrene	30.0	30.3	101	30.0	29.1	97	74.0-114	4.0	30.00
o-Xylene	30.0	30.1	100	30.0	28.5	95	74.0-113	5.5	30.00
Isopropylbenzene (Cumene)	30.0	29.8	99	30.0	28.7	96	72.0-115	3.8	30.00
1,3-Dichlorobenzene	30.0	29.3	98	30.0	28.9	96	75.0-110	1.4	30.00
1,4-Dichlorobenzene	30.0	29.1	97	30.0	29.0	97	76.0-110	0.34	30.00
1,2-Dichlorobenzene	30.0	29.3	98	30.0	29.5	98	77.0-109	0.68	30.00
1,2-Dibromo-3-chloropropane	180	181	101	180	173	96	54.0-166	4.5	30.00
1,2,4-Trichlorobenzene	30.0	30.2	101	30.0	29.4	98	76.0-115	2.7	30.00
1,2,3-Trichlorobenzene	30.0	30.8	103	30.0	29.3	98	78.0-115	5.0	30.00
Surrogates									
1,2-Dichloroethane-d4			105			103	55.0-173		
Toluene d8			102			101	57.0-134		
4-Bromofluorobenzene			100			97	23.0-141		

Batch Information

Analytical Batch: **VMS1848**
Analytical Method: **SW-846 8260B**
Instrument: **MSD9**
Analyst: **DVO**

Prep Batch: **VXX2653**
Prep Method: **SW-846 5035 SL**
Prep Date/Time: **01/20/2012 08:50**
Spike Init Wt./Vol.: **5 g** Extract Vol: **5 mL**
Dupe Init Wt./Vol.: **5 g** Extract Vol: **5 mL**

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Matrix Spike Summary

Original Sample ID: 31200103005 (2nd-1-2)
MS Sample ID: 54976
MSD Sample ID:

Analysis Date: 01/20/2012 13:50
Analysis Date: 01/20/2012 15:23
Analysis Date:
Matrix: Soil-Solid as dry weight

QC for Samples: 31200103005, 31200103006, 31200103007, 31200103009

Results by **SW-846 8260B**

		Matrix Spike (ug/Kg)			Spike Duplicate (ug/Kg)					
Parameter	Sample	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
1,1,1-Trichloroethane	ND	31.3	31.7	101				78.0-121		
1,1,2,2-Tetrachloroethane	ND	31.3	42.8	137 *				76.0-136		
1,1,2-Trichloroethane	ND	31.3	43.7	139 *				65.0-128		
1,1-Dichloroethane	ND	31.3	31.2	100				72.0-139		
1,1-Dichloroethene	ND	31.3	29.3	94				72.0-135		
1,2,3-Trichlorobenzene	ND	31.3	9.90	32 *				61.0-126		
1,2,4-Trichlorobenzene	ND	31.3	11.8	38 *				61.0-125		
1,2-Dibromo-3-chloropropane	ND	188	295	157				43.0-229		
1,2-Dibromoethane	ND	31.3	40.4	129				78.0-148		
1,2-Dichlorobenzene	ND	31.3	27.0	86				58.0-148		
1,2-Dichloroethane	ND	31.3	34.2	109				73.0-146		
1,2-Dichloropropane	ND	31.3	32.1	103				76.0-136		
1,3-Dichlorobenzene	ND	31.3	26.1	83				55.0-145		
1,4-Dichlorobenzene	ND	31.3	24.8	79				53.0-146		
2-Butanone	ND	78.4	92.1	118				41.0-256		
2-Hexanone	ND	78.4	115	147 *				42.0-111		
4-Methyl-2-pentanone	ND	78.4	136	174 *				6.90-166		
Acetone	36.5	78.4	98.6	126				6.80-355		
Benzene	3.46	31.3	34.9	111				75.0-133		
Bromochloromethane	ND	31.3	32.7	105				85.0-136		
Bromodichloromethane	ND	31.3	31.2	100				77.0-140		
Bromoform	ND	31.3	34.6	110				75.0-151		
Bromomethane	ND	31.3	27.6	88				30.0-127		
Carbon disulfide	ND	31.3	22.6	72				64.0-145		
Carbon tetrachloride	ND	31.3	30.2	97				64.0-142		
Chlorobenzene	ND	31.3	28.4	91				66.0-135		
Chloroethane	ND	31.3	32.4	103				21.0-182		
Chloroform	ND	31.3	31.0	99				71.0-143		
Chloromethane	ND	31.3	39.2	125				69.0-138		
Dibromochloromethane	ND	31.3	36.9	118				78.0-141		
Dichlorodifluoromethane	ND	31.3	34.6	111				82.0-130		
cis-1,3-Dichloropropene	ND	31.3	27.6	88				72.0-146		
trans-1,3-Dichloropropene	ND	31.3	25.0	80				45.0-144		
Ethyl Benzene	ND	31.3	51.4	164 *				74.0-126		
Isopropylbenzene (Cumene)	ND	31.3	43.8	140 *				74.0-123		
Methylene chloride	ND	31.3	33.2	106				49.0-155		
Styrene	ND	31.3	36.8	117				73.0-123		
Tetrachloroethene	ND	31.3	34.7	111				46.0-153		

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Matrix Spike Summary

Original Sample ID: 31200103005 (2nd-1-2)
MS Sample ID: 54976
MSD Sample ID:

Analysis Date: 01/20/2012 13:50
Analysis Date: 01/20/2012 15:23
Analysis Date:
Matrix: Soil-Solid as dry weight

QC for Samples: 31200103005, 31200103006, 31200103007, 31200103009

Results by **SW-846 8260B**

		Matrix Spike (ug/Kg)			Spike Duplicate (ug/Kg)					
Parameter	Sample	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Toluene	1.15	31.3	29.8	95				66.0-128		
Trichloroethene	ND	31.3	26.9	86				35.0-136		
Trichlorofluoromethane	ND	31.3	33.0	105				77.0-132		
Vinyl chloride	ND	31.3	33.4	107				68.0-137		
cis-1,2-Dichloroethene	ND	31.3	29.2	93				77.0-134		
m,p-Xylene	ND	62.6	97.0	155 *				80.0-118		
o-Xylene	ND	31.3	48.7	155 *				80.0-121		
tert-Butyl methyl ether (MTBE)	ND	31.3	38.8	124				67.0-135		
trans-1,2-Dichloroethene	ND	31.3	27.1	86				72.0-135		
Surrogates										
1,2-Dichloroethane-d4				119				55.0-173		
4-Bromofluorobenzene				81				23.0-141		
Toluene d8				95				57.0-134		

Batch Information

Analytical Batch: **VMS1848**
Analytical Method: **SW-846 8260B**
Instrument: **MSD9**
Analyst: **DVO**

Prep Batch: **VXX2653**
Prep Method: **SW-846 5035 SL**
Prep Date/Time: **01/13/2012 08:00**
MS Init Wt./Vol.: **6.17 g** Extract Vol.: **5 mL**
MSD Init Wt./Vol.: Extract Vol.:

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Duplicate Sample Summary

Original Sample ID: 31200103007-B
Duplicate Sample ID: 54975

Analysis Date: 01/20/2012 12:56
Analysis Date: 01/20/2012 14:56
Matrix: Soil-Solid as dry weight

QC for Samples: 31200103005, 31200103006, 31200103007, 31200103009

Results by **SW-846 8260B**

PARAMETER	Original (ug/Kg)	Duplicate (ug/Kg)	RPD (%)	RPD CL
1,1,1-Trichloroethane	ND	ND	0	30.00
1,1,2,2-Tetrachloroethane	ND	ND	0	30.00
1,1,2-Trichloroethane	ND	ND	0	30.00
1,1-Dichloroethane	ND	ND	0	30.00
1,1-Dichloroethene	ND	ND	0	30.00
1,2,3-Trichlorobenzene	ND	ND	0	30.00
1,2,4-Trichlorobenzene	ND	ND	0	30.00
1,2-Dibromo-3-chloropropane	ND	ND	0	30.00
1,2-Dibromoethane	ND	ND	0	30.00
1,2-Dichlorobenzene	ND	ND	0	30.00
1,2-Dichloroethane	ND	ND	0	30.00
1,2-Dichloropropane	ND	ND	0	30.00
1,3-Dichlorobenzene	ND	ND	0	30.00
1,4 Dioxane	ND	ND	0	30.00
1,4-Dichlorobenzene	ND	ND	0	30.00
2-Butanone	ND	ND	0	30.00
2-Hexanone	ND	ND	0	30.00
4-Methyl-2-pentanone	ND	ND	0	30.00
Acetone	16.0	22.4	**34***	30.00
Benzene	ND	ND	0	30.00
Bromochloromethane	ND	ND	0	30.00
Bromodichloromethane	ND	ND	0	30.00
Bromoform	ND	ND	0	30.00
Bromomethane	ND	ND	0	30.00
Carbon disulfide	ND	ND	0	30.00
Carbon tetrachloride	ND	ND	0	30.00
Chlorobenzene	ND	ND	0	30.00
Chloroethane	ND	ND	0	30.00
Chloroform	ND	ND	0	30.00
Chloromethane	ND	ND	0	30.00
cis-1,2-Dichloroethene	ND	ND	0	30.00
cis-1,3-Dichloropropene	ND	ND	0	30.00
Cyclohexane	ND	ND	0	30.00
Dibromochloromethane	ND	ND	0	30.00
Dichlorodifluoromethane	ND	ND	0	30.00
Ethyl Benzene	ND	ND	0	30.00
Isopropylbenzene (Cumene)	ND	ND	0	30.00
m,p-Xylene	ND	ND	0	30.00
Methyl Acetate	ND	ND	0	30.00
Methylcyclohexane	ND	ND	0	30.00

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Duplicate Sample Summary

Original Sample ID: 31200103007-B
Duplicate Sample ID: 54975

Analysis Date: 01/20/2012 12:56
Analysis Date: 01/20/2012 14:56
Matrix: Soil-Solid as dry weight

QC for Samples: 31200103005, 31200103006, 31200103007, 31200103009

Results by **SW-846 8260B**

PARAMETER	Original (ug/Kg)	Duplicate (ug/Kg)	RPD (%)	RPD CL
Methylene chloride	1.60	1.38	15	30.00
o-Xylene	ND	ND	0	30.00
Styrene	ND	ND	0	30.00
tert-Butyl methyl ether (MTBE)	ND	ND	0	30.00
Tetrachloroethene	ND	ND	0	30.00
Toluene	ND	ND	0	30.00
trans-1,2-Dichloroethene	ND	ND	0	30.00
trans-1,3-Dichloropropene	ND	ND	0	30.00
Trichloroethene	ND	ND	0	30.00
Trichlorofluoromethane	ND	ND	0	30.00
Trichlorotrifluoroethane	ND	ND	0	30.00
Vinyl chloride	ND	ND	0	30.00
Surrogates				
1,2-Dichloroethane-d4	116	119	20	
4-Bromofluorobenzene	99.0	97.0	24	
Toluene d8	100	100	22	

Batch Information

Analytical Batch: VMS1848
Analytical Method: SW-846 8260B
Instrument: MSD9
Analyst: DVO

Prep Batch: VXX2653
Prep Method: SW-846 5035 SL
Prep Date/Time: 01/13/2012 08:00

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Batch Summary

Analytical Method: SW-846 6010C

Prep Method: SW-846 3010A
Prep Batch: MXX1746
Prep Date: 01/16/2012 08:39

Client Sample ID	Lab Sample ID	Analysis Date	Analytical Batch	Instrument	Analyst
MB for HBN 19122 [MXX/1746]	54382	01/16/2012 18:06	MIP1395	ICP1	PSW
LCS for HBN 19122 [MXX/1746]	54383	01/16/2012 18:13	MIP1395	ICP1	PSW
LCSD for HBN 19122 [MXX/1746]	54384	01/16/2012 18:33	MIP1395	ICP1	PSW
Effluent(53848MS)	54385	01/16/2012 18:47	MIP1395	ICP1	PSW
Effluent(53848MSD)	54386	01/16/2012 18:54	MIP1395	ICP1	PSW
2nd-1	31200103001	01/16/2012 19:34	MIP1395	ICP1	PSW
2nd-2	31200103002	01/16/2012 19:55	MIP1395	ICP1	PSW
2nd-3	31200103003	01/16/2012 20:02	MIP1395	ICP1	PSW
2nd-4	31200103004	01/16/2012 20:08	MIP1395	ICP1	PSW
GAB(54263DUP)	54387	01/17/2012 10:24	MIP1396	ICP1	PSW
Effluent(53848MS)	54385	01/17/2012 14:19	MIP1397	ICP1	PSW
Effluent(53848MS)	54385	01/17/2012 14:23	MIP1397	ICP1	PSW
Effluent(53848MSD)	54386	01/17/2012 14:36	MIP1397	ICP1	PSW
Effluent(53848MSD)	54386	01/17/2012 14:40	MIP1397	ICP1	PSW
2nd-1	31200103001	01/17/2012 15:24	MIP1397	ICP1	PSW
2nd-2	31200103002	01/17/2012 15:32	MIP1397	ICP1	PSW
2nd-2	31200103002	01/17/2012 15:36	MIP1397	ICP1	PSW
2nd-3	31200103003	01/17/2012 15:40	MIP1397	ICP1	PSW
2nd-3	31200103003	01/17/2012 15:44	MIP1397	ICP1	PSW
2nd-4	31200103004	01/17/2012 15:48	MIP1397	ICP1	PSW
2nd-4	31200103004	01/17/2012 15:52	MIP1397	ICP1	PSW

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Method Blank

Blank ID: MB for HBN 19122 [MXX/1746]
Blank Lab ID: 54382
QC for Samples:
31200103001, 31200103002, 31200103003, 31200103004

Matrix: Water

Results by **SW-846 6010C**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
Zinc	**0.00269**	J	0.00226	0.0200	mg/L	1
Barium	**0.00577**	J	0.000394	0.100	mg/L	1
Manganese	ND	U	0.00152	0.0100	mg/L	1
Iron	ND	U	0.0222	0.100	mg/L	1
Chromium	ND	U	0.00147	0.0100	mg/L	1
Magnesium	ND	U	0.0302	0.100	mg/L	1
Aluminum	ND	U	0.0315	0.100	mg/L	1
Calcium	ND	U	0.0236	0.100	mg/L	1
Sodium	ND	U	0.0132	0.200	mg/L	1
Potassium	**0.0134**	J	0.0126	0.200	mg/L	1

Batch Information

Analytical Batch: MIP1395
Analytical Method: SW-846 6010C
Instrument: ICP1
Analyst: PSW
Analytical Date/Time: 1/16/2012 6:06:39PM

Prep Batch: MXX1746
Prep Method: SW-846 3010A
Prep Date/Time: 1/16/2012 8:39:07AM
Prep Initial Wt./Vol.: 50 mL
Prep Extract Vol: 50 mL

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Blank Spike Summary

Blank Spike ID: LCS for HBN 19122 [MXX/1746]
Blank Spike Lab ID: 54383
Date Analyzed: 01/16/2012 18:13

Spike Duplicate ID: LCSD for HBN 19122 [MXX/1746]
Spike Duplicate Lab ID: 54384
Date Analyzed: 01/16/2012 18:33
Matrix: Water

QC for Samples: 31200103001, 31200103002, 31200103003, 31200103004

Results by **SW-846 6010C**

	Blank Spike (mg/L)			Spike Duplicate (mg/L)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Zinc	0.400	0.351	88	0.400	0.363	91	80.0-120	3.4	20.00
Barium	2.00	1.82	91	2.00	1.87	93	80.0-120	2.7	20.00
Manganese	0.400	0.374	94	0.400	0.381	95	80.0-120	1.9	20.00
Iron	2.00	1.88	94	2.00	1.98	99	80.0-120	5.2	20.00
Chromium	0.400	0.365	91	0.400	0.373	93	80.0-120	2.2	20.00
Magnesium	2.00	1.90	95	2.00	1.95	97	80.0-120	2.6	20.00
Aluminum	2.00	1.84	92	2.00	1.90	95	80.0-120	3.2	20.00
Calcium	2.00	1.85	92	2.00	1.89	95	80.0-120	2.1	20.00
Sodium	2.00	1.87	93	2.00	1.92	96	80.0-120	2.6	20.00
Potassium	2.00	1.86	93	2.00	1.91	95	80.0-120	2.7	20.00

Batch Information

Analytical Batch: **MIP1395**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Spike Init Wt./Vol.: **50 mL** Extract Vol: **50 mL**
Dupe Init Wt./Vol.: **50 mL** Extract Vol: **50 mL**

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Batch Summary

Analytical Method: SW-846 6010C

Prep Method: SW-846 3050B
Prep Batch: MXX1747
Prep Date: 01/16/2012 09:06

Client Sample ID	Lab Sample ID	Analysis Date	Analytical Batch	Instrument	Analyst
MB for HBN 19135 [MXX/1747]	54434	01/16/2012 15:50	MIP1395	ICP1	PSW
LCS for HBN 19135 [MXX/1747]	54435	01/16/2012 15:57	MIP1395	ICP1	PSW
LCSD for HBN 19135 [MXX/1747]	54436	01/16/2012 16:03	MIP1395	ICP1	PSW
Tank 7-SS1 @ 6 feet(54284MS)	54438	01/16/2012 16:17	MIP1395	ICP1	PSW
Tank 7-SS1 @ 6 feet(54284MSD)	54439	01/16/2012 16:24	MIP1395	ICP1	PSW
2nd-1-2	31200103005	01/16/2012 17:25	MIP1395	ICP1	PSW
2nd-2-2	31200103006	01/16/2012 17:32	MIP1395	ICP1	PSW
2nd-3-2	31200103007	01/16/2012 17:39	MIP1395	ICP1	PSW
2nd-4-2	31200103008	01/16/2012 17:46	MIP1395	ICP1	PSW
2nd-drum	31200103009	01/16/2012 17:52	MIP1395	ICP1	PSW
2nd-drum(54337DUP)	54437	01/16/2012 17:59	MIP1395	ICP1	PSW
Tank 7-SS1 @ 6 feet(54284MS)	54438	01/17/2012 12:13	MIP1397	ICP1	PSW
Tank 7-SS1 @ 6 feet(54284MS)	54438	01/17/2012 12:17	MIP1397	ICP1	PSW
Tank 7-SS1 @ 6 feet(54284MSD)	54439	01/17/2012 12:21	MIP1397	ICP1	PSW
Tank 7-SS1 @ 6 feet(54284MSD)	54439	01/17/2012 12:25	MIP1397	ICP1	PSW
2nd-1-2	31200103005	01/17/2012 13:10	MIP1397	ICP1	PSW
2nd-1-2	31200103005	01/17/2012 13:14	MIP1397	ICP1	PSW
2nd-2-2	31200103006	01/17/2012 13:18	MIP1397	ICP1	PSW
2nd-2-2	31200103006	01/17/2012 13:22	MIP1397	ICP1	PSW
2nd-3-2	31200103007	01/17/2012 13:26	MIP1397	ICP1	PSW
2nd-3-2	31200103007	01/17/2012 13:35	MIP1397	ICP1	PSW
2nd-4-2	31200103008	01/17/2012 13:47	MIP1397	ICP1	PSW
2nd-4-2	31200103008	01/17/2012 13:51	MIP1397	ICP1	PSW
2nd-drum	31200103009	01/17/2012 13:55	MIP1397	ICP1	PSW
2nd-drum	31200103009	01/17/2012 13:59	MIP1397	ICP1	PSW
2nd-drum(54337DUP)	54437	01/17/2012 14:03	MIP1397	ICP1	PSW
2nd-drum(54337DUP)	54437	01/17/2012 14:07	MIP1397	ICP1	PSW

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Method Blank

Blank ID: MB for HBN 19135 [MXX/1747]
Blank Lab ID: 54434
QC for Samples:
31200103005, 31200103006, 31200103007, 31200103008, 31200103009

Matrix: Soil-Solid as dry weight

Results by **SW-846 6010C**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
Zinc	ND	U	1.10	1.96	mg/kg	1
Barium	**0.469**	J	0.128	9.80	mg/kg	1
Manganese	ND	U	0.269	0.980	mg/kg	1
Iron	ND	U	9.22	9.80	mg/kg	1
Chromium	ND	U	0.141	0.980	mg/kg	1
Magnesium	ND	U	4.84	9.80	mg/kg	1
Aluminum	ND	U	2.07	9.80	mg/kg	1
Calcium	ND	U	6.91	9.80	mg/kg	1
Sodium	**4.08**	J	1.83	19.6	mg/kg	1
Potassium	ND	U	2.03	19.6	mg/kg	1

Batch Information

Analytical Batch: MIP1395
Analytical Method: SW-846 6010C
Instrument: ICP1
Analyst: PSW
Analytical Date/Time: 1/16/2012 3:50:17PM

Prep Batch: MXX1747
Prep Method: SW-846 3050B
Prep Date/Time: 1/16/2012 9:06:31AM
Prep Initial Wt./Vol.: .51 g
Prep Extract Vol: 50 mL

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Blank Spike Summary

Blank Spike ID: LCS for HBN 19135 [MXX/1747]
Blank Spike Lab ID: 54435
Date Analyzed: 01/16/2012 15:57

Spike Duplicate ID: LCSD for HBN 19135 [MXX/1747]
Spike Duplicate Lab ID: 54436
Date Analyzed: 01/16/2012 16:03
Matrix: Soil-Solid as dry weight

QC for Samples: 31200103005, 31200103006, 31200103007, 31200103008, 31200103009

Results by **SW-846 6010C**

	Blank Spike (mg/kg)			Spike Duplicate (mg/kg)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Zinc	34.5	30.2	87	37.0	33.1	89	80.0-120	9.2	
Barium	172	156	90	185	171	92	80.0-120	9.2	
Manganese	34.5	31.8	92	37.0	35.2	95	80.0-120	10	
Iron	172	163	95	185	181	98	80.0-120	10	
Chromium	34.5	31.2	91	37.0	34.1	92	80.0-120	8.9	
Magnesium	172	160	93	185	179	97	80.0-120	11	
Aluminum	172	161	93	185	172	93	80.0-120	6.6	
Calcium	172	162	94	185	176	95	80.0-120	8.3	
Sodium	172	161	93	185	177	95	80.0-120	9.5	
Potassium	172	156	90	185	173	94	80.0-120	10	

Batch Information

Analytical Batch: **MIP1395**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Spike Init Wt./Vol.: **.58 g** Extract Vol: **50 mL**
Dupe Init Wt./Vol.: **.54 g** Extract Vol: **50 mL**

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Duplicate Sample Summary

Original Sample ID: 31200103009-E
Duplicate Sample ID: 54437

Analysis Date: 01/17/2012 13:59
Analysis Date: 01/17/2012 14:07
Matrix: Soil-Solid as dry weight

QC for Samples: 31200103005, 31200103006, 31200103007, 31200103008, 31200103009

Results by **SW-846 6010C**

PARAMETER	Original (mg/kg)	Duplicate (mg/kg)	RPD (%)	RPD CL
Aluminum	17100	16300	5.0	20.00
Barium	152	140	7.5	20.00
Calcium	7600	9280	20	20.00
Chromium	34.1	36.1	5.9	20.00
Iron	44200	25800	**52***	20.00
Magnesium	1900	2230	15	20.00
Manganese	524	461	13	20.00
Potassium	1100	1190	7.8	20.00
Sodium	143	132	8.3	20.00
Zinc	688	692	0.60	20.00

Batch Information

Analytical Batch: MIP1397
Analytical Method: SW-846 6010C
Instrument: ICP1
Analyst: PSW

Prep Batch: MXX1747
Prep Method: SW-846 3050B
Prep Date/Time: 01/16/2012 09:06

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Batch Summary

Analytical Method: SW-846 7470A

Prep Method: SW-846 7470A PREP
Prep Batch: MXX1752
Prep Date: 01/19/2012 10:36

Client Sample ID	Lab Sample ID	Analysis Date	Analytical Batch	Instrument	Analyst
LLC for HBN 19239 [MXX/1752]	54865	01/19/2012 14:07	MHG1189	HG2	NTM
MB for HBN 19239 [MXX/1752]	54866	01/19/2012 14:13	MHG1189	HG2	NTM
LCS for HBN 19239 [MXX/1752]	54867	01/19/2012 14:15	MHG1189	HG2	NTM
LCSD for HBN 19239 [MXX/1752]	54868	01/19/2012 14:17	MHG1189	HG2	NTM
E2658(54836MS)	54869	01/19/2012 14:22	MHG1189	HG2	NTM
E2658(54836MSD)	54870	01/19/2012 14:24	MHG1189	HG2	NTM
2nd-1	31200103001	01/19/2012 14:41	MHG1189	HG2	NTM
2nd-2	31200103002	01/19/2012 14:43	MHG1189	HG2	NTM
2nd-3	31200103003	01/19/2012 14:45	MHG1189	HG2	NTM
2nd-4	31200103004	01/19/2012 14:47	MHG1189	HG2	NTM

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Method Blank

Blank ID: MB for HBN 19239 [MXX/1752]
Blank Lab ID: 54866
QC for Samples:
31200103001, 31200103002, 31200103003, 31200103004

Matrix: Water

Results by **SW-846 7470A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
Mercury	**0.0000233**	J	0.0000190	0.000150	mg/L	1

Batch Information

Analytical Batch: MHG1189
Analytical Method: SW-846 7470A
Instrument: HG2
Analyst: NTM
Analytical Date/Time: 1/19/2012 2:13:54PM

Prep Batch: MXX1752
Prep Method: SW-846 7470A PREP
Prep Date/Time: 1/19/2012 10:36:27AM
Prep Initial Wt./Vol.: 40 mL
Prep Extract Vol: 57 mL

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Blank Spike Summary

Blank Spike ID: LCS for HBN 19239 [MXX/1752]
Blank Spike Lab ID: 54867
Date Analyzed: 01/19/2012 14:15

Spike Duplicate ID: LCSD for HBN 19239 [MXX/1752]
Spike Duplicate Lab ID: 54868
Date Analyzed: 01/19/2012 14:17
Matrix: Water

QC for Samples: 31200103001, 31200103002, 31200103003, 31200103004

Results by **SW-846 7470A**

	Blank Spike (mg/L)			Spike Duplicate (mg/L)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Mercury	0.00713	0.00785	110	0.00713	0.00784	110	80.0-120	0.13	20.00

Batch Information

Analytical Batch: **MHG1189**
Analytical Method: **SW-846 7470A**
Instrument: **HG2**
Analyst: **NTM**

Prep Batch: **MXX1752**
Prep Method: **SW-846 7470A PREP**
Prep Date/Time: **01/19/2012 10:36**
Spike Init Wt./Vol.: **40 mL** Extract Vol: **57 mL**
Dupe Init Wt./Vol.: **40 mL** Extract Vol: **57 mL**

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Batch Summary

Analytical Method: SW-846 7471B

Prep Method: SW-846 7471B PREP
Prep Batch: MXX1748
Prep Date: 01/18/2012 08:43

Client Sample ID	Lab Sample ID	Analysis Date	Analytical Batch	Instrument	Analyst
LLC for HBN 19197 [MXX/1748]	54621	01/18/2012 10:43	MHG1188	HG2	NTM
MB for HBN 19197 [MXX/1748]	54612	01/18/2012 10:50	MHG1188	HG2	NTM
LCS for HBN 19197 [MXX/1748]	54613	01/18/2012 10:52	MHG1188	HG2	NTM
LCSD for HBN 19197 [MXX/1748]	54614	01/18/2012 10:53	MHG1188	HG2	NTM
5th-1-2(54319MS)	54615	01/18/2012 10:58	MHG1188	HG2	NTM
5th-1-2(54319MSD)	54616	01/18/2012 11:00	MHG1188	HG2	NTM
5th-2-1(54320DUP)	54617	01/18/2012 11:04	MHG1188	HG2	NTM
2nd-1-2	31200103005	01/18/2012 11:15	MHG1188	HG2	NTM
2nd-3-2	31200103007	01/18/2012 11:19	MHG1188	HG2	NTM
2nd-4-2	31200103008	01/18/2012 11:21	MHG1188	HG2	NTM
2nd-2-2	31200103006	01/18/2012 11:29	MHG1188	HG2	NTM
2nd-drum	31200103009	01/18/2012 11:31	MHG1188	HG2	NTM

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Method Blank

Blank ID: MB for HBN 19197 [MXX/1748]
Blank Lab ID: 54612
QC for Samples:
31200103005, 31200103006, 31200103007, 31200103008, 31200103009

Matrix: Soil-Solid as dry weight

Results by **SW-846 7471B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
Mercury	ND	U	0.000804	0.0179	mg/kg	1

Batch Information

Analytical Batch: MHG1188
Analytical Method: SW-846 7471B
Instrument: HG2
Analyst: NTM
Analytical Date/Time: 1/18/2012 10:50:12AM

Prep Batch: MXX1748
Prep Method: SW-846 7471B PREP
Prep Date/Time: 1/18/2012 8:43:33AM
Prep Initial Wt./Vol.: .56 g
Prep Extract Vol: 50 mL

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Blank Spike Summary

Blank Spike ID: LCS for HBN 19197 [MXX/1748]
Blank Spike Lab ID: 54613
Date Analyzed: 01/18/2012 10:52

Spike Duplicate ID: LCSD for HBN 19197 [MXX/1748]
Spike Duplicate Lab ID: 54614
Date Analyzed: 01/18/2012 10:53
Matrix: Soil-Solid as dry weight

QC for Samples: 31200103005, 31200103006, 31200103007, 31200103008, 31200103009

Results by **SW-846 7471B**

	Blank Spike (mg/kg)			Spike Duplicate (mg/kg)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Mercury	0.490	0.507	103	0.439	0.450	103	80.0-120	12	20.00

Batch Information

Analytical Batch: **MHG1188**
Analytical Method: **SW-846 7471B**
Instrument: **HG2**
Analyst: **NTM**

Prep Batch: **MXX1748**
Prep Method: **SW-846 7471B PREP**
Prep Date/Time: **01/18/2012 08:43**
Spike Init Wt./Vol.: **.51 g** Extract Vol: **50 mL**
Dupe Init Wt./Vol.: **.57 g** Extract Vol: **50 mL**

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Batch Summary

Analytical Method: SW-846 6020A

Prep Method: SW-846 3010A
Prep Batch: MXX1746
Prep Date: 01/16/2012 08:39

Client Sample ID	Lab Sample ID	Analysis Date	Analytical Batch	Instrument	Analyst
MB for HBN 19122 [MXX/1746]	54382	01/18/2012 10:27	MMS1143	ICPMS2	PSW
MB for HBN 19122 [MXX/1746]	54382	01/18/2012 10:31	MMS1143	ICPMS2	PSW
LCS for HBN 19122 [MXX/1746]	54383	01/18/2012 10:34	MMS1143	ICPMS2	PSW
LCS for HBN 19122 [MXX/1746]	54383	01/18/2012 10:37	MMS1143	ICPMS2	PSW
LCSD for HBN 19122 [MXX/1746]	54384	01/18/2012 10:40	MMS1143	ICPMS2	PSW
LCSD for HBN 19122 [MXX/1746]	54384	01/18/2012 10:44	MMS1143	ICPMS2	PSW
Effluent(53848MS)	54385	01/18/2012 10:54	MMS1143	ICPMS2	PSW
2nd-1	31200103001	01/18/2012 11:53	MMS1143	ICPMS2	PSW
2nd-1	31200103001	01/18/2012 11:56	MMS1143	ICPMS2	PSW
2nd-2	31200103002	01/18/2012 11:59	MMS1143	ICPMS2	PSW
2nd-2	31200103002	01/18/2012 12:03	MMS1143	ICPMS2	PSW
2nd-3	31200103003	01/18/2012 12:06	MMS1143	ICPMS2	PSW
2nd-3	31200103003	01/18/2012 12:09	MMS1143	ICPMS2	PSW
2nd-4	31200103004	01/18/2012 12:13	MMS1143	ICPMS2	PSW
2nd-4	31200103004	01/18/2012 12:16	MMS1143	ICPMS2	PSW
MB for HBN 19122 [MXX/1746]	54382	01/18/2012 16:01	MMS1144	ICPMS2	PSW
2nd-1	31200103001	01/18/2012 16:47	MMS1144	ICPMS2	PSW
2nd-2	31200103002	01/18/2012 16:50	MMS1144	ICPMS2	PSW
2nd-2	31200103002	01/18/2012 16:53	MMS1144	ICPMS2	PSW
2nd-3	31200103003	01/18/2012 16:57	MMS1144	ICPMS2	PSW
2nd-3	31200103003	01/18/2012 17:00	MMS1144	ICPMS2	PSW
2nd-4	31200103004	01/18/2012 17:03	MMS1144	ICPMS2	PSW
2nd-4	31200103004	01/18/2012 17:07	MMS1144	ICPMS2	PSW

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Method Blank

Blank ID: MB for HBN 19122 [MXX/1746]
Blank Lab ID: 54382
QC for Samples:
31200103001, 31200103002, 31200103003, 31200103004

Matrix: Water

Results by **SW-846 6020A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
Beryllium	ND	U	0.000297	0.00250	mg/L	5
Vanadium	ND	U	0.000661	0.00500	mg/L	10
Cobalt	ND	U	0.000358	0.00500	mg/L	10
Nickel	ND	U	0.00135	0.00500	mg/L	10
Copper	**0.00220**	J	0.000860	0.00500	mg/L	10
Arsenic	ND	U	0.000712	0.00500	mg/L	10
Selenium	ND	U	0.000824	0.00500	mg/L	10
Silver	ND	U	0.000374	0.00500	mg/L	10
Cadmium	ND	U	0.000278	0.00500	mg/L	10
Antimony	ND	U	0.000437	0.00500	mg/L	10
Thallium	ND	U	0.000297	0.00500	mg/L	10
Lead	ND	U	0.000640	0.00500	mg/L	10

Batch Information

Analytical Batch: MMS1143
Analytical Method: SW-846 6020A
Instrument: ICPMS2
Analyst: PSW
Analytical Date/Time: 1/18/2012 10:27:46AM

Prep Batch: MXX1746
Prep Method: SW-846 3010A
Prep Date/Time: 1/16/2012 8:39:07AM
Prep Initial Wt./Vol.: 50 mL
Prep Extract Vol: 50 mL

Analytical Batch: MMS1144
Analytical Method: SW-846 6020A
Instrument: ICPMS2
Analyst: PSW
Analytical Date/Time: 1/18/2012 4:01:18PM

Prep Batch: MXX1746
Prep Method: SW-846 3010A
Prep Date/Time: 1/16/2012 8:39:07AM
Prep Initial Wt./Vol.: 50 mL
Prep Extract Vol: 50 mL

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Blank Spike Summary

Blank Spike ID: LCS for HBN 19122 [MXX/1746]
Blank Spike Lab ID: 54383
Date Analyzed: 01/18/2012 10:37

Spike Duplicate ID: LCSD for HBN 19122 [MXX/1746]
Spike Duplicate Lab ID: 54384
Date Analyzed: 01/18/2012 10:44
Matrix: Water

QC for Samples: 31200103001, 31200103002, 31200103003, 31200103004

Results by **SW-846 6020A**

	Blank Spike (mg/L)			Spike Duplicate (mg/L)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Beryllium	0.400	0.432	108	0.400	0.444	111	80.0-120	2.7	20.00
Cobalt	0.400	0.413	103	0.400	0.410	103	80.0-120	0.73	20.00
Nickel	0.400	0.416	104	0.400	0.434	108	80.0-120	4.2	20.00
Copper	0.400	0.442	111	0.400	0.465	116	80.0-120	5.1	20.00
Arsenic	0.400	0.434	109	0.400	0.434	109	80.0-120	0.0	20.00
Selenium	0.400	0.430	108	0.400	0.439	110	80.0-120	2.1	20.00
Silver	0.400	0.419	105	0.400	0.447	112	80.0-120	6.5	20.00
Cadmium	0.400	0.426	107	0.400	0.452	113	80.0-120	5.9	20.00
Antimony	0.400	0.423	106	0.400	0.446	112	80.0-120	5.3	20.00
Thallium	0.400	0.416	104	0.400	0.435	109	80.0-120	4.5	20.00
Lead	0.400	0.422	106	0.400	0.438	110	80.0-120	3.7	20.00

Batch Information

Analytical Batch: **MMS1143**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Spike Init Wt./Vol.: **50 mL** Extract Vol: **50 mL**
Dupe Init Wt./Vol.: **50 mL** Extract Vol: **50 mL**

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Batch Summary

Analytical Method: SW-846 6020A

Prep Method: SW-846 3050B
Prep Batch: MXX1747
Prep Date: 01/16/2012 09:06

Client Sample ID	Lab Sample ID	Analysis Date	Analytical Batch	Instrument	Analyst
MB for HBN 19135 [MXX/1747]	54434	01/18/2012 12:29	MMS1143	ICPMS2	PSW
LCS for HBN 19135 [MXX/1747]	54435	01/18/2012 12:36	MMS1143	ICPMS2	PSW
LCSD for HBN 19135 [MXX/1747]	54436	01/18/2012 12:42	MMS1143	ICPMS2	PSW
Tank 7-SS1 @ 6 feet(54284MS)	54438	01/18/2012 12:55	MMS1143	ICPMS2	PSW
2nd-1-2	31200103005	01/18/2012 13:45	MMS1143	ICPMS2	PSW
2nd-1-2	31200103005	01/18/2012 13:48	MMS1143	ICPMS2	PSW
2nd-2-2	31200103006	01/18/2012 13:51	MMS1143	ICPMS2	PSW
2nd-2-2	31200103006	01/18/2012 13:55	MMS1143	ICPMS2	PSW
2nd-3-2	31200103007	01/18/2012 13:58	MMS1143	ICPMS2	PSW
2nd-3-2	31200103007	01/18/2012 14:01	MMS1143	ICPMS2	PSW
2nd-4-2	31200103008	01/18/2012 14:04	MMS1143	ICPMS2	PSW
2nd-4-2	31200103008	01/18/2012 14:08	MMS1143	ICPMS2	PSW
2nd-drum	31200103009	01/18/2012 14:11	MMS1143	ICPMS2	PSW
2nd-drum	31200103009	01/18/2012 14:14	MMS1143	ICPMS2	PSW
2nd-drum(54337DUP)	54437	01/18/2012 14:24	MMS1143	ICPMS2	PSW
2nd-drum(54337DUP)	54437	01/18/2012 14:28	MMS1143	ICPMS2	PSW
MB for HBN 19135 [MXX/1747]	54434	01/18/2012 17:10	MMS1144	ICPMS2	PSW
LCS for HBN 19135 [MXX/1747]	54435	01/18/2012 17:20	MMS1144	ICPMS2	PSW
LCSD for HBN 19135 [MXX/1747]	54436	01/18/2012 17:23	MMS1144	ICPMS2	PSW
Tank 7-SS1 @ 6 feet(54284MS)	54438	01/18/2012 17:33	MMS1144	ICPMS2	PSW
2nd-1-2	31200103005	01/18/2012 18:22	MMS1144	ICPMS2	PSW
2nd-1-2	31200103005	01/18/2012 18:25	MMS1144	ICPMS2	PSW
2nd-2-2	31200103006	01/18/2012 18:29	MMS1144	ICPMS2	PSW
2nd-1-2	31200103005	01/19/2012 10:50	MMS1145	ICPMS2	PSW
2nd-2-2	31200103006	01/19/2012 10:56	MMS1145	ICPMS2	PSW
2nd-2-2	31200103006	01/19/2012 10:59	MMS1145	ICPMS2	PSW
2nd-3-2	31200103007	01/19/2012 11:09	MMS1145	ICPMS2	PSW
2nd-3-2	31200103007	01/19/2012 11:12	MMS1145	ICPMS2	PSW
2nd-4-2	31200103008	01/19/2012 11:15	MMS1145	ICPMS2	PSW
2nd-4-2	31200103008	01/19/2012 11:18	MMS1145	ICPMS2	PSW
2nd-drum	31200103009	01/19/2012 11:21	MMS1145	ICPMS2	PSW
2nd-drum	31200103009	01/19/2012 11:24	MMS1145	ICPMS2	PSW
2nd-drum	31200103009	01/19/2012 11:27	MMS1145	ICPMS2	PSW
2nd-drum(54337DUP)	54437	01/19/2012 11:30	MMS1145	ICPMS2	PSW
2nd-drum(54337DUP)	54437	01/19/2012 11:33	MMS1145	ICPMS2	PSW
2nd-drum(54337DUP)	54437	01/19/2012 11:36	MMS1145	ICPMS2	PSW

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Method Blank

Blank ID: MB for HBN 19135 [MXX/1747]
Blank Lab ID: 54434
QC for Samples:
31200103005, 31200103006, 31200103007, 31200103008, 31200103009

Matrix: Soil-Solid as dry weight

Results by **SW-846 6020A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
Antimony	ND	U	0.0529	0.0980	mg/kg	10
Arsenic	ND	U	0.0853	0.0980	mg/kg	10
Beryllium	ND	U	0.0175	0.0980	mg/kg	10
Cadmium	ND	U	0.0175	0.0980	mg/kg	10
Cobalt	**0.00980**	J	0.00245	0.0980	mg/kg	10
Copper	ND	U	0.101	0.980	mg/kg	10
Lead	ND	U	0.0128	0.0980	mg/kg	10
Nickel	**0.471**		0.0622	0.0980	mg/kg	10
Selenium	ND	U	0.133	0.196	mg/kg	10
Silver	**0.0294**	J	0.0191	0.0980	mg/kg	10
Thallium	ND	U	0.0240	0.0980	mg/kg	10
Vanadium	**0.0882**	J	0.0330	0.0980	mg/kg	10

Batch Information

Analytical Batch: MMS1143
Analytical Method: SW-846 6020A
Instrument: ICPMS2
Analyst: PSW
Analytical Date/Time: 1/18/2012 12:29:29PM

Prep Batch: MXX1747
Prep Method: SW-846 3050B
Prep Date/Time: 1/16/2012 9:06:31AM
Prep Initial Wt./Vol.: .51 g
Prep Extract Vol: 50 mL

Analytical Batch: MMS1144
Analytical Method: SW-846 6020A
Instrument: ICPMS2
Analyst: PSW
Analytical Date/Time: 1/18/2012 5:10:17PM

Prep Batch: MXX1747
Prep Method: SW-846 3050B
Prep Date/Time: 1/16/2012 9:06:31AM
Prep Initial Wt./Vol.: .51 g
Prep Extract Vol: 50 mL

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Blank Spike Summary

Blank Spike ID: LCS for HBN 19135 [MXX/1747]
Blank Spike Lab ID: 54435
Date Analyzed: 01/18/2012 17:20

Spike Duplicate ID: LCSD for HBN 19135 [MXX/1747]
Spike Duplicate Lab ID: 54436
Date Analyzed: 01/18/2012 17:23
Matrix: Soil-Solid as dry weight

QC for Samples: 31200103005, 31200103006, 31200103007, 31200103008, 31200103009

Results by **SW-846 6020A**

	Blank Spike (mg/kg)			Spike Duplicate (mg/kg)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Antimony	34.5	34.7	101	37.0	33.5	91	80.0-120	3.5	20.00
Arsenic	34.5	34.1	99	37.0	38.1	103	80.0-120	11	20.00
Beryllium	34.5	35.4	103	37.0	39.3	106	80.0-120	10	20.00
Cadmium	34.5	33.5	97	37.0	33.1	90	80.0-120	1.2	20.00
Cobalt	34.5	31.5	91	37.0	31.6	85	80.0-120	0.32	20.00
Copper	34.5	35.9	104	37.0	43.2	117	80.0-120	18	20.00
Lead	34.5	36.1	105	37.0	39.4	106	80.0-120	8.7	20.00
Nickel	34.5	34.3	100	37.0	31.9	86	80.0-120	7.3	20.00
Selenium	34.5	33.4	97	37.0	32.2	87	80.0-120	3.7	20.00
Silver	34.5	36.1	105	37.0	39.6	107	80.0-120	9.2	20.00
Thallium	34.5	35.3	103	37.0	38.4	104	80.0-120	8.4	20.00
Vanadium	34.5	32.3	94	37.0	32.0	87	80.0-120	0.93	20.00

Batch Information

Analytical Batch: **MMS1143**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Spike Init Wt./Vol.: **.58 g** Extract Vol: **50 mL**
Dupe Init Wt./Vol.: **.54 g** Extract Vol: **50 mL**

Analytical Batch: **MMS1144**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Spike Init Wt./Vol.: **.58 g** Extract Vol: **50 mL**
Dupe Init Wt./Vol.: **.54 g** Extract Vol: **50 mL**

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Duplicate Sample Summary

Original Sample ID: 31200103009-E
Duplicate Sample ID: 54437

Analysis Date: 01/19/2012 11:21
Analysis Date: 01/19/2012 11:30
Matrix: Soil-Solid as dry weight

QC for Samples: 31200103005, 31200103006, 31200103007, 31200103008, 31200103009

Results by **SW-846 6020A**

PARAMETER	Original (mg/kg)	Duplicate (mg/kg)	RPD (%)	RPD CL
Arsenic	6.36	5.62	12	20.00
Beryllium	0.0575	0.0517	11	20.00
Cadmium	3.40	3.37	0.82	20.00
Cobalt	7.25	7.48	3.2	20.00
Copper	252	222	12	20.00
Lead	460	391	16	20.00
Nickel	32.7	26.7	20	20.00
Selenium	0.370	0.391	5.1	20.00
Silver	0.907	0.793	13	20.00
Thallium	0.115	0.0919	**22***	20.00
Vanadium	24.1	23.9	1.1	20.00

Batch Information

Analytical Batch: MMS1145
Analytical Method: SW-846 6020A
Instrument: ICPMS2
Analyst: PSW

Prep Batch: MXX1747
Prep Method: SW-846 3050B
Prep Date/Time: 01/16/2012 09:06

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CHAIN OF CUSTODY RECORD
SGS Environmental Services Inc.

Locations Nationwide

Alaska North Carolina

Maryland New Jersey

www.us.sgs.com

CLIENT: Independent Environmental Consultants, LLC

CONTACT: Dolph Lathrop PHONE NO: 804.379.7133

PROJECT: HPDTA SITE/PWSID#: 2nd Street Trash Site

REPORTS TO: IEC

INVOICE TO: IEC QUOTE #: P.O. NUMBER:

SGS Reference #: 3/200103

page 1 of 1

LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX	# CONTAINERS	Preserv used E C = COMP G = GRAB	TAL Metals	TCL VOCs by 8260	REMARKS
	2nd-1	01/10/12	940	W S bow	5	G =	☒	☒	
	2nd-2	01/10/12	1010	W S 1/13	5	G =	☒	☒	
	2nd-3	01/10/12	1050	W S	5	G =	☒	☒	
	2nd-4	01/10/12	1140	W S	5	G =	☒	☒	
	2nd-1-2	01/10/12	940	S W bow	4	G =	☒	☒	
	2nd-2-2	01/10/12	1010	S W 1/13	4	G =	☒	☒	
	2nd-3-2	01/10/12	1050	S W	4	G =	☒	☒	
	2nd-4-2	01/10/12	1140	S W	4	G =	☒	☒	
	2nd-drum	01/11/12	2470	S	5	G =	☒	☒	

Collected/Relinquished By: (1)	Date	Time	Received By:
[signature]	1/12/12	2:00	
Relinquished By: (2)	Date	Time	Received By:
Relinquished By: (3)	Date	Time	Received By:
Relinquished By: (4)	Date	Time	Received For Laboratory By:
	1/13/12	10:15	[signature]

Shipping Carrier:

Shipping Ticket No:

Samples Received Cold? YES

Temperature °C: 2.0

Special Deliverable Requirements:

Chain of Custody Seal: (Circl INTACT BROKEN ABSE

Requested Turnaround Time and-or Special Instructions:

10 Day

- 200 W. Potter Drive Anchorage, AK 99518 Tel: (907) 562-2343 Fax: (907) 561-5301
- 3180 Peger Road Fairbanks, AK 99701 Tel: (907) 474-8656 Fax: (907) 474-9685
- 5500 Business Drive Wilmington, NC 28405 Tel: (910) 350-1903 Fax: (910) 350-1557

documents\forms\approved\F016_SGS_COC_electronic.xls
rev.01 01/13/2006

SGS North America Inc.

Sample Receipt Checklist (SRC)

Client: **IEC** Work Order No.: **31200103**

1. x Shipped
   ___ Hand Delivered

2. x COC Present on Receipt
   ___ No COC
   ___ Additional Transmittal Forms

3. x Custody Tape on Container
   ___ No Custody Tape

4. x Samples Intact
   ___ Samples Broken / Leaking

5. x Chilled on Receipt Actual Temp.(s) in °C: 2
   ___ Ambient on Receipt
   ___ Walk-in on Ice; Coming down to temp.
   ___ Received Outside of Temperature Specifications

6. x Sufficient Sample Submitted
   ___ Insufficient Sample Submitted

7. ___ Chlorine absent
   x HNO3 < 2
   ___ HCL < 2
   ___ Additional Preservatives verified (see notes)

8. x Received Within Holding Time
   ___ Not Received Within Holding Time

9. ___ No Discrepancies Noted
   x Discrepancies Noted
   ___ NCDENR notified of Descrepancies*

10. x No Headspace present in VOC vials
    ___ Headspace present in VOC vials >6mm

Notes:

Matrices incorrect on COC (reversed). Incorrect collection time for sample 2nd-drum on COC. Used collection time on sample container during log in.

Comments:

Inspected and Logged in by: TP

Date: Fri-1/13/12 00:00

*NCDENR must be notified when collection, holding time or preservation requirements are not met. MI_11.6

Laboratory Report of Analysis

To: Randolph Lathrop
IEC, LLC
11506 Allecingie Parkway
Suite 1A
Richmond, VA 23235

Report Number: **31200102**

Client Project: **HPDTA**

Dear Randolph Lathrop,

Enclosed are the results of the analytical services performed under the referenced project for the received samples and associated QC as applicable. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of five years in the event they are required for future reference. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. Any samples submitted to our laboratory will be retained for a maximum of thirty (30) days from the date of this report unless other arrangements are requested.

If there are any questions about the report or services performed during this project, please call Barbara A. Hager at (910) 350-1903. We will be happy to answer any questions or concerns which you may have.

Thank you for using SGS North America Inc. for your analytical services. We look forward to working with you again on any additional analytical needs.

Sincerely,
SGS North America Inc.

Barbara A. Hager Date
Project Manager
barbara.hager@sgs.com

Print Date: 01/20/2012 N.C. Certification # 481

Laboratory Qualifiers

Report Definitions

DL	Method, Instrument, or Estimated Detection Limit per Analytical Method
CL	Control Limits for the recovery result of a parameter
LOQ	Reporting Limit
DF	Dilution Factor
RPD	Relative Percent Difference
LCS(D)	Laboratory Control Spike (Duplicate)
MS(D)	Matrix Spike (Duplicate)
MB	Method Blank

Qualifier Definitions

*	Recovery or RPD outside of control limits
B	Analyte was detected in the Lab Method Blank at a level above the LOQ
U	Undetected (Reported as ND or < DL)
V	Recovery is below quality control limit. The data has been validated based on a favorable signal-to-noise and detection limit
A	Amount detected is less than the Lower Method Calibration Limit
J	Estimated Concentration.
O	The recovery of this analyte in the OPR is above the Method QC Limits and the reported concentration in the sample may be biased high
E	Amount detected is greater than the Upper Calibration Limit
S	The amount of analyte present has saturated the detector. This situation results in an underestimation of the affected analyte(s)
Q	Indicates the presence of a quantitative interference. This situation may result in an underestimation of the affected analyte(s)
I	Indicates the presence of a qualitative interference that could cause a false positive or an overestimation of the affected analyte(s)
DPE	Indicates the presence of a peak in the polychlorinated diphenylether channel that could cause a false positive or an overestimation of the affected analyte(s)
TIC	Tentatively Identified Compound
EMPC	Estimated Maximum possible Concentration due to ion ratio failure
ND	Not Detected
K	Result is estimated due to ion ratio failure in High Resolution PCB Analysis
P	RPD > 40% between results of dual columns
D	Spike or surrogate was diluted out in order to achieve a parameter result within instrument calibration range

Samples requiring manual integrations for various congeners and/or standards are marked and dated by the analyst. A code definition is provided below:

M1	Mis-identified peak
M2	Software did not integrate peak
M3	Incorrect baseline construction (i.e. not all of peak included; two peaks integrated as one)
M4	Pattern integration required (i.e. DRO, GRO, PCB, Toxaphene and Technical Chlordane)
M5	Other - Explained in case narrative

Note Results pages that include a value for "Solids (%)" have been adjusted for moisture content.

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Sample Summary

Client Sample ID	Lab Sample ID	Collected	Received	Matrix
5th-1	31200102001	01/10/2012 13:10	01/13/2012 10:15	Water
5th-2	31200102002	01/10/2012 13:50	01/13/2012 10:15	Water
5th-3	31200102003	01/10/2012 14:40	01/13/2012 10:15	Water
5th-4	31200102004	01/10/2012 15:40	01/13/2012 10:15	Water
5th-1-2	31200102005	01/10/2012 13:10	01/13/2012 10:15	Soil-Solid as dry weight
5th-2-1	31200102006	01/10/2012 13:50	01/13/2012 10:15	Soil-Solid as dry weight
5th-3-1	31200102007	01/10/2012 14:40	01/13/2012 10:15	Soil-Solid as dry weight
5th-4-1	31200102008	01/10/2012 15:40	01/13/2012 10:15	Soil-Solid as dry weight
Trip Blanks (Not on COC)	31200102009	01/10/2012 00:00	01/13/2012 10:15	Soil-Solid as dry weight

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Detectable Results Summary

Client Sample ID: **5th-1**
Lab Sample ID: 31200102001-D

	Parameter	Result	Units	
SW-846 6010C	Zinc	0.0525	mg/L	
	Barium	0.153	mg/L	
	Manganese	1.30	mg/L	
	Iron	24.0	mg/L	
	Chromium	0.0452	mg/L	
	Magnesium	16.1	mg/L	
	Aluminum	28.9	mg/L	
	Calcium	21.2	mg/L	
	Sodium	23.7	mg/L	
	Potassium	4.76	mg/L	
SW-846 6020A	Beryllium	0.000500	mg/L	J
	Vanadium	0.0720	mg/L	
	Cobalt	0.0672	mg/L	
	Nickel	0.0372	mg/L	
	Copper	0.0218	mg/L	
	Arsenic	0.00310	mg/L	J
	Lead	0.0127	mg/L	
SW-846 7470A	Mercury	0.0000274	mg/L	J
SW-846 8260B	Acetone	1.33	ug/L	J
	Methylene chloride	0.240	ug/L	J

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Detectable Results Summary

Client Sample ID: **5th-2**
Lab Sample ID: 31200102002-D

	Parameter	Result	Units	
SW-846 6010C	Zinc	0.415	mg/L	
	Barium	0.768	mg/L	
	Manganese	3.50	mg/L	
	Iron	206	mg/L	
	Chromium	0.367	mg/L	
	Magnesium	62.1	mg/L	
	Aluminum	190	mg/L	
	Calcium	60.8	mg/L	
	Sodium	38.7	mg/L	
	Potassium	18.9	mg/L	
SW-846 6020A	Vanadium	0.0431	mg/L	
	Cobalt	0.0271	mg/L	
	Nickel	0.0304	mg/L	
	Copper	0.0163	mg/L	
	Arsenic	0.0717	mg/L	
	Selenium	0.00320	mg/L	J
	Cadmium	0.000900	mg/L	J
	Thallium	0.00110	mg/L	J
	Lead	0.0999	mg/L	
SW-846 7470A	Mercury	0.0000198	mg/L	J
SW-846 8260B	1,2,4-Trichlorobenzene	0.160	ug/L	J
	1,2-Dichlorobenzene	0.700	ug/L	J
	Acetone	1.34	ug/L	J
	Benzene	0.250	ug/L	J
	Chlorobenzene	0.520	ug/L	J
	Dichlorodifluoromethane	45.6	ug/L	
	Methylene chloride	0.790	ug/L	J
	Vinyl chloride	13.6	ug/L	
	tert-Butyl methyl ether (MTBE)	9.96	ug/L	

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Detectable Results Summary

Client Sample ID: **5th-3**
Lab Sample ID: 31200102003-D

	Parameter	Result	Units	
SW-846 6010C	Zinc	0.433	mg/L	
	Barium	0.499	mg/L	
	Manganese	1.86	mg/L	
	Iron	85.1	mg/L	
	Chromium	0.160	mg/L	
	Magnesium	30.3	mg/L	
	Aluminum	107	mg/L	
	Calcium	35.2	mg/L	
	Sodium	34.7	mg/L	
	Potassium	8.34	mg/L	
SW-846 6020A	Beryllium	0.000550	mg/L	J
	Vanadium	0.0224	mg/L	
	Cobalt	0.0851	mg/L	
	Nickel	0.0965	mg/L	
	Copper	0.0185	mg/L	
	Arsenic	0.0171	mg/L	
	Selenium	0.00260	mg/L	J
	Cadmium	0.00310	mg/L	J
	Antimony	0.00230	mg/L	J
	Thallium	0.000500	mg/L	J
	Lead	0.0465	mg/L	
SW-846 7470A	Mercury	0.00127	mg/L	
SW-846 8260B	Acetone	1.22	ug/L	J
	Methylene chloride	0.610	ug/L	J
	tert-Butyl methyl ether (MTBE)	0.590	ug/L	J

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Detectable Results Summary

Client Sample ID: **5th-4**
Lab Sample ID: 31200102004-D

	Parameter	Result	Units	
SW-846 6010C	Zinc	0.251	mg/L	
	Barium	0.276	mg/L	
	Manganese	0.932	mg/L	
	Iron	54.8	mg/L	
	Chromium	0.107	mg/L	
	Magnesium	23.4	mg/L	
	Aluminum	64.7	mg/L	
	Calcium	25.6	mg/L	
	Sodium	12.0	mg/L	
	Potassium	6.88	mg/L	
SW-846 6020A	Beryllium	0.000550	mg/L	J
	Vanadium	0.155	mg/L	
	Cobalt	0.0398	mg/L	
	Nickel	0.0723	mg/L	
	Copper	0.0599	mg/L	
	Arsenic	0.0111	mg/L	
	Selenium	0.00140	mg/L	J
	Cadmium	0.00110	mg/L	J
	Antimony	0.000500	mg/L	J
	Thallium	0.000300	mg/L	J
	Lead	0.0946	mg/L	
SW-846 7470A	Mercury	0.000347	mg/L	
SW-846 8260B	Acetone	1.15	ug/L	J
	Methylene chloride	0.620	ug/L	J
	tert-Butyl methyl ether (MTBE)	2.01	ug/L	

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Detectable Results Summary

Client Sample ID: **5th-1-2**
Lab Sample ID: 31200102005-E

	Parameter	Result	Units	
SW-846 6010C	Zinc	17.6	mg/kg	
	Barium	35.3	mg/kg	
	Manganese	53.2	mg/kg	
	Iron	6050	mg/kg	
	Chromium	15.6	mg/kg	
	Magnesium	1250	mg/kg	
	Aluminum	11300	mg/kg	
	Calcium	891	mg/kg	
	Sodium	46.5	mg/kg	
	Potassium	487	mg/kg	
SW-846 6020A	Arsenic	1.03	mg/kg	
	Beryllium	0.0358	mg/kg	J
	Cadmium	0.0307	mg/kg	J
	Cobalt	2.47	mg/kg	
	Copper	4.80	mg/kg	
	Lead	6.51	mg/kg	
	Nickel	7.51	mg/kg	
	Thallium	0.0715	mg/kg	J
	Vanadium	16.1	mg/kg	
SW-846 7471B	Mercury	0.0143	mg/kg	J
SW-846 8260B	2-Butanone	24.3	ug/Kg	
	Acetone	85.6	ug/Kg	
	Carbon disulfide	0.812	ug/Kg	J
	Methylene chloride	1.79	ug/Kg	J

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Detectable Results Summary

Client Sample ID: **5th-2-1**
Lab Sample ID: 31200102006-E

	Parameter	Result	Units	
SW-846 6010C	Zinc	168	mg/kg	
	Barium	104	mg/kg	
	Manganese	141	mg/kg	
	Iron	36200	mg/kg	
	Chromium	35.7	mg/kg	
	Magnesium	2180	mg/kg	
	Aluminum	21600	mg/kg	
	Calcium	1730	mg/kg	
	Sodium	157	mg/kg	
	Potassium	712	mg/kg	
SW-846 6020A	Antimony	0.762	mg/kg	
	Arsenic	3.37	mg/kg	
	Beryllium	0.0520	mg/kg	J
	Cadmium	2.10	mg/kg	
	Cobalt	4.72	mg/kg	
	Copper	58.9	mg/kg	
	Lead	243	mg/kg	
	Nickel	31.4	mg/kg	
	Selenium	0.323	mg/kg	
	Silver	0.0808	mg/kg	J
	Thallium	0.104	mg/kg	J
	Vanadium	25.3	mg/kg	
SW-846 7471B	Mercury	0.0512	mg/kg	
SW-846 8260B	2-Butanone	5.99	ug/Kg	J
	Acetone	45.5	ug/Kg	J
	Dichlorodifluoromethane	3.03	ug/Kg	J
	Methylene chloride	1.18	ug/Kg	J

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Detectable Results Summary

Client Sample ID: **5th-3-1**
Lab Sample ID: 31200102007-E

	Parameter	Result	Units	
SW-846 6010C	Zinc	343	mg/kg	
	Barium	73.8	mg/kg	
	Manganese	136	mg/kg	
	Iron	9920	mg/kg	
	Chromium	36.2	mg/kg	
	Magnesium	1650	mg/kg	
	Aluminum	12000	mg/kg	
	Calcium	1590	mg/kg	
	Sodium	89.3	mg/kg	
	Potassium	473	mg/kg	
SW-846 6020A	Antimony	1.33	mg/kg	
	Arsenic	1.83	mg/kg	
	Beryllium	0.0528	mg/kg	J
	Cadmium	2.29	mg/kg	
	Cobalt	3.25	mg/kg	
	Copper	31.1	mg/kg	
	Lead	372	mg/kg	
	Nickel	28.3	mg/kg	
	Selenium	0.223	mg/kg	J
	Silver	0.0704	mg/kg	J
	Thallium	0.0821	mg/kg	J
	Vanadium	15.3	mg/kg	
SW-846 7471B	Mercury	1.64	mg/kg	
SW-846 8260B	2-Butanone	8.92	ug/Kg	J
	Acetone	40.6	ug/Kg	J
	Methylene chloride	0.904	ug/Kg	J

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Detectable Results Summary

Client Sample ID: **5th-4-1**
Lab Sample ID: 31200102008-E

	Parameter	Result	Units	
SW-846 6010C	Zinc	2550	mg/kg	
	Barium	66.5	mg/kg	
	Manganese	235	mg/kg	
	Iron	36300	mg/kg	
	Chromium	58.3	mg/kg	
	Magnesium	1840	mg/kg	
	Aluminum	17700	mg/kg	
	Calcium	22800	mg/kg	
	Sodium	86.1	mg/kg	
	Potassium	372	mg/kg	
SW-846 6020A	Antimony	3.75	mg/kg	
	Arsenic	3.79	mg/kg	
	Beryllium	0.0412	mg/kg	J
	Cadmium	7.35	mg/kg	
	Cobalt	3.39	mg/kg	
	Copper	148	mg/kg	
	Lead	692	mg/kg	
	Nickel	28.2	mg/kg	
	Selenium	0.236	mg/kg	
	Silver	0.153	mg/kg	
	Thallium	0.0471	mg/kg	J
	Vanadium	9.89	mg/kg	
SW-846 7471B	Mercury	2.31	mg/kg	
SW-846 8260B	1,2,3-Trichlorobenzene	19.5	ug/Kg	J
	1,2,4-Trichlorobenzene	696	ug/Kg	
	1,3-Dichlorobenzene	733	ug/Kg	
	1,4-Dichlorobenzene	1180	ug/Kg	
	Acetone	78.6	ug/Kg	J
	Chlorobenzene	102	ug/Kg	
	Ethyl Benzene	7.49	ug/Kg	J
	Isopropylbenzene (Cumene)	4.57	ug/Kg	J
	Methyl Acetate	100	ug/Kg	J
	Methylene chloride	26.2	ug/Kg	J
	Toluene	8.73	ug/Kg	J
	m,p-Xylene	11.2	ug/Kg	J

Client Sample ID: **Trip Blanks (Not on COC)**
Lab Sample ID: 31200102009-B

	Parameter	Result	Units	
SW-846 8260B	Methylene chloride	30.5	ug/Kg	J

Quality Control Samples

Client Sample ID: **MB for HBN 19122 [MXX/1746]**
Lab Sample ID: 54382

	Parameter	Result	Units	
SW-846 6010C	Zinc	0.00269	mg/L	J
	Barium	0.00577	mg/L	J
	Potassium	0.0134	mg/L	J
SW-846 6020A	Copper	0.00220	mg/L	J

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Detectable Results Summary

Client Sample ID: **MB for HBN 19135 [MXX/1747]**
Lab Sample ID: 54434

	Parameter	Result	Units	
SW-846 6010C	Barium	0.469	mg/kg	J
	Sodium	4.08	mg/kg	J
SW-846 6020A	Cobalt	0.00980	mg/kg	J
	Nickel	0.471	mg/kg	
	Silver	0.0294	mg/kg	J
	Vanadium	0.0882	mg/kg	J

Client Sample ID: **MB-S for HBN 19230 [VXX/2646]**
Lab Sample ID: 54810

	Parameter	Result	Units	
SW-846 8260B	Methylene chloride	1.60	ug/Kg	J

Client Sample ID: **MB for HBN 19239 [MXX/1752]**
Lab Sample ID: 54866

	Parameter	Result	Units	
SW-846 7470A	Mercury	0.0000233	mg/L	J

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Results of **5th-1**

Client Sample ID: **5th-1**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102001-A
Lab Project ID: 31200102

Collection Date: 01/10/2012 13:10
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
1,1,1-Trichloroethane	ND	U	0.123	1.00	ug/L	1	01/17/2012 14:06
1,1,2,2-Tetrachloroethane	ND	U	0.156	1.00	ug/L	1	01/17/2012 14:06
1,1,2-Trichloroethane	ND	U	0.126	1.00	ug/L	1	01/17/2012 14:06
1,1-Dichloroethane	ND	U	0.165	1.00	ug/L	1	01/17/2012 14:06
1,1-Dichloroethene	ND	U	0.212	1.00	ug/L	1	01/17/2012 14:06
1,2,3-Trichlorobenzene	ND	U	0.110	1.00	ug/L	1	01/17/2012 14:06
1,2,4-Trichlorobenzene	ND	U	0.0913	1.00	ug/L	1	01/17/2012 14:06
1,2-Dibromo-3-chloropropane	ND	U	0.748	5.00	ug/L	1	01/17/2012 14:06
1,2-Dibromoethane	ND	U	0.120	1.00	ug/L	1	01/17/2012 14:06
1,2-Dichlorobenzene	ND	U	0.137	1.00	ug/L	1	01/17/2012 14:06
1,2-Dichloroethane	ND	U	0.167	1.00	ug/L	1	01/17/2012 14:06
1,2-Dichloropropane	ND	U	0.163	1.00	ug/L	1	01/17/2012 14:06
1,3,5-Trimethylbenzene	ND	U	0.113	1.00	ug/L	1	01/17/2012 14:06
1,3-Dichlorobenzene	ND	U	0.103	1.00	ug/L	1	01/17/2012 14:06
1,4 Dioxane	ND	U	14.4	100	ug/L	1	01/17/2012 14:06
1,4-Dichlorobenzene	ND	U	0.130	1.00	ug/L	1	01/17/2012 14:06
2-Butanone	ND	U	0.723	25.0	ug/L	1	01/17/2012 14:06
2-Hexanone	ND	U	0.728	5.00	ug/L	1	01/17/2012 14:06
4-Methyl-2-pentanone	ND	U	0.558	5.00	ug/L	1	01/17/2012 14:06
Acetone	**1.33**	J	0.864	25.0	ug/L	1	01/17/2012 14:06
Benzene	ND	U	0.113	1.00	ug/L	1	01/17/2012 14:06
Bromochloromethane	ND	U	0.211	1.00	ug/L	1	01/17/2012 14:06
Bromodichloromethane	ND	U	0.110	1.00	ug/L	1	01/17/2012 14:06
Bromoform	ND	U	0.0974	1.00	ug/L	1	01/17/2012 14:06
Bromomethane	ND	U	0.237	1.00	ug/L	1	01/17/2012 14:06
Carbon disulfide	ND	U	0.106	1.00	ug/L	1	01/17/2012 14:06
Carbon tetrachloride	ND	U	0.101	1.00	ug/L	1	01/17/2012 14:06
Chlorobenzene	ND	U	0.116	1.00	ug/L	1	01/17/2012 14:06
Chloroethane	ND	U	0.311	1.00	ug/L	1	01/17/2012 14:06
Chloroform	ND	U	0.139	1.00	ug/L	1	01/17/2012 14:06
Chloromethane	ND	U	0.448	1.00	ug/L	1	01/17/2012 14:06
Cyclohexane	ND	U	0.163	1.00	ug/L	1	01/17/2012 14:06
Dibromochloromethane	ND	U	0.134	1.00	ug/L	1	01/17/2012 14:06
Dichlorodifluoromethane	ND	U	0.171	5.00	ug/L	1	01/17/2012 14:06
cis-1,3-Dichloropropene	ND	U	0.0767	1.00	ug/L	1	01/17/2012 14:06
trans-1,3-Dichloropropene	ND	U	0.0862	1.00	ug/L	1	01/17/2012 14:06
Ethyl Benzene	ND	U	0.0877	1.00	ug/L	1	01/17/2012 14:06
Isopropylbenzene (Cumene)	ND	U	0.0869	1.00	ug/L	1	01/17/2012 14:06
Methyl Acetate	ND	U	1.00	10.0	ug/L	1	01/17/2012 14:06
Methylcyclohexane	ND	U	0.108	1.00	ug/L	1	01/17/2012 14:06
Methylene chloride	**0.240**	J	0.152	5.00	ug/L	1	01/17/2012 14:06
Styrene	ND	U	0.102	1.00	ug/L	1	01/17/2012 14:06
Tetrachloroethene	ND	U	0.155	1.00	ug/L	1	01/17/2012 14:06

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Results of **5th-1**

Client Sample ID: **5th-1**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102001-A
Lab Project ID: 31200102

Collection Date: 01/10/2012 13:10
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Toluene	ND	U	0.133	1.00	ug/L	1	01/17/2012 14:06
Trichloroethene	ND	U	0.125	1.00	ug/L	1	01/17/2012 14:06
Trichlorofluoromethane	ND	U	0.137	1.00	ug/L	1	01/17/2012 14:06
Trichlorotrifluoroethane	ND	U	0.123	1.00	ug/L	1	01/17/2012 14:06
Vinyl chloride	ND	U	0.124	1.00	ug/L	1	01/17/2012 14:06
cis-1,2-Dichloroethene	ND	U	0.136	1.00	ug/L	1	01/17/2012 14:06
m,p-Xylene	ND	U	0.182	2.00	ug/L	1	01/17/2012 14:06
o-Xylene	ND	U	0.0874	1.00	ug/L	1	01/17/2012 14:06
tert-Butyl methyl ether (MTBE)	ND	U	0.144	1.00	ug/L	1	01/17/2012 14:06
trans-1,2-Dichloroethene	ND	U	0.223	1.00	ug/L	1	01/17/2012 14:06
Surrogates							
1,2-Dichloroethane-d4	109			64.0-140	%	1	01/17/2012 14:06
4-Bromofluorobenzene	99.0			85.0-115	%	1	01/17/2012 14:06
Toluene d8	97.0			82.0-117	%	1	01/17/2012 14:06

Batch Information

Analytical Batch: **VMS1830**
Analytical Method: **SW-846 8260B**
Instrument: **MSD4**
Analyst: **DVO**
Analytical Date/Time: **01/17/2012 14:06**

Prep Batch: **VXX2625**
Prep Method: **SW-846 5030B**
Prep Date/Time: **01/17/2012 08:00**
Prep Initial Wt./Vol.: **40 mL**
Prep Extract Vol: **40 mL**

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Results of **5th-1**

Client Sample ID: **5th-1**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102001-D
Lab Project ID: 31200102

Collection Date: 01/10/2012 13:10
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 6010C**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Zinc	**0.0525**		0.00226	0.0200	mg/L	1	01/16/2012 19:07
Barium	**0.153**		0.000394	0.100	mg/L	1	01/16/2012 19:07
Manganese	**1.30**		0.0152	0.100	mg/L	10	01/17/2012 14:44
Iron	**24.0**		0.222	1.00	mg/L	10	01/17/2012 14:44
Chromium	**0.0452**		0.00147	0.0100	mg/L	1	01/16/2012 19:07
Magnesium	**16.1**		0.302	1.00	mg/L	10	01/17/2012 14:44
Aluminum	**28.9**		0.315	1.00	mg/L	10	01/17/2012 14:44
Calcium	**21.2**		0.236	1.00	mg/L	10	01/17/2012 14:44
Sodium	**23.7**		0.132	2.00	mg/L	10	01/17/2012 14:44
Potassium	**4.76**		0.0126	0.200	mg/L	1	01/16/2012 19:07

Batch Information

Analytical Batch: **MIP1395**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/16/2012 19:07**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

Analytical Batch: **MIP1397**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/17/2012 14:44**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

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Results of **5th-1**

Client Sample ID: **5th-1**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102001-D
Lab Project ID: 31200102

Collection Date: 01/10/2012 13:10
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 7470A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Mercury	**0.0000274**	J	0.0000190	0.000150	mg/L	1	01/19/2012 14:29

Batch Information

Analytical Batch: **MHG1189**
Analytical Method: **SW-846 7470A**
Instrument: **HG2**
Analyst: **NTM**
Analytical Date/Time: **01/19/2012 14:29**

Prep Batch: **MXX1752**
Prep Method: **SW-846 7470A PREP**
Prep Date/Time: **01/19/2012 10:36**
Prep Initial Wt./Vol.: **40 mL**
Prep Extract Vol: **57 mL**

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Results of **5th-1**

Client Sample ID: **5th-1**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102001-D
Lab Project ID: 31200102

Collection Date: 01/10/2012 13:10
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 6020A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Beryllium	**0.000500**	J	0.000297	0.00250	mg/L	5	01/18/2012 11:20
Vanadium	**0.0720**		0.000661	0.00500	mg/L	10	01/18/2012 11:23
Cobalt	**0.0672**		0.000358	0.00500	mg/L	10	01/18/2012 11:23
Nickel	**0.0372**		0.00135	0.00500	mg/L	10	01/18/2012 11:23
Copper	**0.0218**		0.000860	0.00500	mg/L	10	01/18/2012 11:23
Arsenic	**0.00310**	J	0.000712	0.00500	mg/L	10	01/18/2012 11:23
Selenium	ND	U	0.000824	0.00500	mg/L	10	01/18/2012 11:23
Silver	ND	U	0.000374	0.00500	mg/L	10	01/18/2012 11:23
Cadmium	ND	U	0.000278	0.00500	mg/L	10	01/18/2012 11:23
Antimony	ND	U	0.000437	0.00500	mg/L	10	01/18/2012 11:23
Thallium	ND	U	0.000297	0.00500	mg/L	10	01/18/2012 11:23
Lead	**0.0127**		0.000640	0.00500	mg/L	10	01/18/2012 11:23

Batch Information

Analytical Batch: **MMS1143**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 11:20**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

Print Date: 01/20/2012

N.C. Certification # 481

Results of **5th-2**

Client Sample ID: **5th-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102002-A
Lab Project ID: 31200102

Collection Date: 01/10/2012 13:50
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
1,1,1-Trichloroethane	ND	U	0.123	1.00	ug/L	1	01/17/2012 14:31
1,1,2,2-Tetrachloroethane	ND	U	0.156	1.00	ug/L	1	01/17/2012 14:31
1,1,2-Trichloroethane	ND	U	0.126	1.00	ug/L	1	01/17/2012 14:31
1,1-Dichloroethane	ND	U	0.165	1.00	ug/L	1	01/17/2012 14:31
1,1-Dichloroethene	ND	U	0.212	1.00	ug/L	1	01/17/2012 14:31
1,2,3-Trichlorobenzene	ND	U	0.110	1.00	ug/L	1	01/17/2012 14:31
1,2,4-Trichlorobenzene	**0.160**	J	0.0913	1.00	ug/L	1	01/17/2012 14:31
1,2-Dibromo-3-chloropropane	ND	U	0.748	5.00	ug/L	1	01/17/2012 14:31
1,2-Dibromoethane	ND	U	0.120	1.00	ug/L	1	01/17/2012 14:31
1,2-Dichlorobenzene	**0.700**	J	0.137	1.00	ug/L	1	01/17/2012 14:31
1,2-Dichloroethane	ND	U	0.167	1.00	ug/L	1	01/17/2012 14:31
1,2-Dichloropropane	ND	U	0.163	1.00	ug/L	1	01/17/2012 14:31
1,3,5-Trimethylbenzene	ND	U	0.113	1.00	ug/L	1	01/17/2012 14:31
1,3-Dichlorobenzene	ND	U	0.103	1.00	ug/L	1	01/17/2012 14:31
1,4 Dioxane	ND	U	14.4	100	ug/L	1	01/17/2012 14:31
1,4-Dichlorobenzene	ND	U	0.130	1.00	ug/L	1	01/17/2012 14:31
2-Butanone	ND	U	0.723	25.0	ug/L	1	01/17/2012 14:31
2-Hexanone	ND	U	0.728	5.00	ug/L	1	01/17/2012 14:31
4-Methyl-2-pentanone	ND	U	0.558	5.00	ug/L	1	01/17/2012 14:31
Acetone	**1.34**	J	0.864	25.0	ug/L	1	01/17/2012 14:31
Benzene	**0.250**	J	0.113	1.00	ug/L	1	01/17/2012 14:31
Bromochloromethane	ND	U	0.211	1.00	ug/L	1	01/17/2012 14:31
Bromodichloromethane	ND	U	0.110	1.00	ug/L	1	01/17/2012 14:31
Bromoform	ND	U	0.0974	1.00	ug/L	1	01/17/2012 14:31
Bromomethane	ND	U	0.237	1.00	ug/L	1	01/17/2012 14:31
Carbon disulfide	ND	U	0.106	1.00	ug/L	1	01/17/2012 14:31
Carbon tetrachloride	ND	U	0.101	1.00	ug/L	1	01/17/2012 14:31
Chlorobenzene	**0.520**	J	0.116	1.00	ug/L	1	01/17/2012 14:31
Chloroethane	ND	U	0.311	1.00	ug/L	1	01/17/2012 14:31
Chloroform	ND	U	0.139	1.00	ug/L	1	01/17/2012 14:31
Chloromethane	ND	U	0.448	1.00	ug/L	1	01/17/2012 14:31
Cyclohexane	ND	U	0.163	1.00	ug/L	1	01/17/2012 14:31
Dibromochloromethane	ND	U	0.134	1.00	ug/L	1	01/17/2012 14:31
Dichlorodifluoromethane	**45.6**		0.171	5.00	ug/L	1	01/17/2012 14:31
cis-1,3-Dichloropropene	ND	U	0.0767	1.00	ug/L	1	01/17/2012 14:31
trans-1,3-Dichloropropene	ND	U	0.0862	1.00	ug/L	1	01/17/2012 14:31
Ethyl Benzene	ND	U	0.0877	1.00	ug/L	1	01/17/2012 14:31
Isopropylbenzene (Cumene)	ND	U	0.0869	1.00	ug/L	1	01/17/2012 14:31
Methyl Acetate	ND	U	1.00	10.0	ug/L	1	01/17/2012 14:31
Methylcyclohexane	ND	U	0.108	1.00	ug/L	1	01/17/2012 14:31
Methylene chloride	**0.790**	J	0.152	5.00	ug/L	1	01/17/2012 14:31
Styrene	ND	U	0.102	1.00	ug/L	1	01/17/2012 14:31
Tetrachloroethene	ND	U	0.155	1.00	ug/L	1	01/17/2012 14:31

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Results of **5th-2**

Client Sample ID: **5th-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102002-A
Lab Project ID: 31200102

Collection Date: 01/10/2012 13:50
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Toluene	ND	U	0.133	1.00	ug/L	1	01/17/2012 14:31
Trichloroethene	ND	U	0.125	1.00	ug/L	1	01/17/2012 14:31
Trichlorofluoromethane	ND	U	0.137	1.00	ug/L	1	01/17/2012 14:31
Trichlorotrifluoroethane	ND	U	0.123	1.00	ug/L	1	01/17/2012 14:31
Vinyl chloride	**13.6**		0.124	1.00	ug/L	1	01/17/2012 14:31
cis-1,2-Dichloroethene	ND	U	0.136	1.00	ug/L	1	01/17/2012 14:31
m,p-Xylene	ND	U	0.182	2.00	ug/L	1	01/17/2012 14:31
o-Xylene	ND	U	0.0874	1.00	ug/L	1	01/17/2012 14:31
tert-Butyl methyl ether (MTBE)	**9.96**		0.144	1.00	ug/L	1	01/17/2012 14:31
trans-1,2-Dichloroethene	ND	U	0.223	1.00	ug/L	1	01/17/2012 14:31
Surrogates							
1,2-Dichloroethane-d4	109			64.0-140	%	1	01/17/2012 14:31
4-Bromofluorobenzene	89.0			85.0-115	%	1	01/17/2012 14:31
Toluene d8	97.0			82.0-117	%	1	01/17/2012 14:31

Batch Information

Analytical Batch: **VMS1830**
Analytical Method: **SW-846 8260B**
Instrument: **MSD4**
Analyst: **DVO**
Analytical Date/Time: **01/17/2012 14:31**

Prep Batch: **VXX2625**
Prep Method: **SW-846 5030B**
Prep Date/Time: **01/17/2012 08:00**
Prep Initial Wt./Vol.: **40 mL**
Prep Extract Vol: **40 mL**

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Results of **5th-2**

Client Sample ID: **5th-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102002-D
Lab Project ID: 31200102

Collection Date: 01/10/2012 13:50
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 6010C**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Zinc	**0.415**		0.00226	0.0200	mg/L	1	01/16/2012 19:14
Barium	**0.768**		0.000394	0.100	mg/L	1	01/16/2012 19:14
Manganese	**3.50**		0.0152	0.100	mg/L	10	01/17/2012 14:52
Iron	**206**		2.22	10.0	mg/L	100	01/17/2012 14:56
Chromium	**0.367**		0.00147	0.0100	mg/L	1	01/16/2012 19:14
Magnesium	**62.1**		3.02	10.0	mg/L	100	01/17/2012 14:56
Aluminum	**190**		3.15	10.0	mg/L	100	01/17/2012 14:56
Calcium	**60.8**		2.36	10.0	mg/L	100	01/17/2012 14:56
Sodium	**38.7**		0.132	2.00	mg/L	10	01/17/2012 14:52
Potassium	**18.9**		0.126	2.00	mg/L	10	01/17/2012 14:52

Batch Information

Analytical Batch: **MIP1395**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/16/2012 19:14**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

Analytical Batch: **MIP1397**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/17/2012 14:52**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

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Results of **5th-2**

Client Sample ID: **5th-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102002-D
Lab Project ID: 31200102

Collection Date: 01/10/2012 13:50
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 7470A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Mercury	**0.0000198**	J	0.0000190	0.000150	mg/L	1	01/19/2012 14:30

Batch Information

Analytical Batch: **MHG1189**
Analytical Method: **SW-846 7470A**
Instrument: **HG2**
Analyst: **NTM**
Analytical Date/Time: **01/19/2012 14:30**

Prep Batch: **MXX1752**
Prep Method: **SW-846 7470A PREP**
Prep Date/Time: **01/19/2012 10:36**
Prep Initial Wt./Vol.: **40 mL**
Prep Extract Vol: **57 mL**

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Results of **5th-2**

Client Sample ID: **5th-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102002-D
Lab Project ID: 31200102

Collection Date: 01/10/2012 13:50
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 6020A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Vanadium	**0.0431**		0.000661	0.00500	mg/L	10	01/18/2012 16:27
Cobalt	**0.0271**		0.000358	0.00500	mg/L	10	01/18/2012 16:27
Nickel	**0.0304**		0.00135	0.00500	mg/L	10	01/18/2012 16:27
Copper	**0.0163**		0.000860	0.00500	mg/L	10	01/18/2012 16:27
Arsenic	**0.0717**		0.000712	0.00500	mg/L	10	01/18/2012 11:30
Selenium	**0.00320**	J	0.000824	0.00500	mg/L	10	01/18/2012 11:30
Silver	ND	U	0.000374	0.00500	mg/L	10	01/18/2012 11:30
Cadmium	**0.000900**	J	0.000278	0.00500	mg/L	10	01/18/2012 11:30
Antimony	ND	U	0.000437	0.00500	mg/L	10	01/18/2012 11:30
Thallium	**0.00110**	J	0.000297	0.00500	mg/L	10	01/18/2012 11:30
Lead	**0.0999**		0.000640	0.00500	mg/L	10	01/18/2012 11:30

Batch Information

Analytical Batch: **MMS1143**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 11:30**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

Analytical Batch: **MMS1144**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 16:27**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

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Results of **5th-3**

Client Sample ID: **5th-3**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102003-A
Lab Project ID: 31200102

Collection Date: 01/10/2012 14:40
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
1,1,1-Trichloroethane	ND	U	0.123	1.00	ug/L	1	01/17/2012 14:56
1,1,2,2-Tetrachloroethane	ND	U	0.156	1.00	ug/L	1	01/17/2012 14:56
1,1,2-Trichloroethane	ND	U	0.126	1.00	ug/L	1	01/17/2012 14:56
1,1-Dichloroethane	ND	U	0.165	1.00	ug/L	1	01/17/2012 14:56
1,1-Dichloroethene	ND	U	0.212	1.00	ug/L	1	01/17/2012 14:56
1,2,3-Trichlorobenzene	ND	U	0.110	1.00	ug/L	1	01/17/2012 14:56
1,2,4-Trichlorobenzene	ND	U	0.0913	1.00	ug/L	1	01/17/2012 14:56
1,2-Dibromo-3-chloropropane	ND	U	0.748	5.00	ug/L	1	01/17/2012 14:56
1,2-Dibromoethane	ND	U	0.120	1.00	ug/L	1	01/17/2012 14:56
1,2-Dichlorobenzene	ND	U	0.137	1.00	ug/L	1	01/17/2012 14:56
1,2-Dichloroethane	ND	U	0.167	1.00	ug/L	1	01/17/2012 14:56
1,2-Dichloropropane	ND	U	0.163	1.00	ug/L	1	01/17/2012 14:56
1,3,5-Trimethylbenzene	ND	U	0.113	1.00	ug/L	1	01/17/2012 14:56
1,3-Dichlorobenzene	ND	U	0.103	1.00	ug/L	1	01/17/2012 14:56
1,4 Dioxane	ND	U	14.4	100	ug/L	1	01/17/2012 14:56
1,4-Dichlorobenzene	ND	U	0.130	1.00	ug/L	1	01/17/2012 14:56
2-Butanone	ND	U	0.723	25.0	ug/L	1	01/17/2012 14:56
2-Hexanone	ND	U	0.728	5.00	ug/L	1	01/17/2012 14:56
4-Methyl-2-pentanone	ND	U	0.558	5.00	ug/L	1	01/17/2012 14:56
Acetone	**1.22**	J	0.864	25.0	ug/L	1	01/17/2012 14:56
Benzene	ND	U	0.113	1.00	ug/L	1	01/17/2012 14:56
Bromochloromethane	ND	U	0.211	1.00	ug/L	1	01/17/2012 14:56
Bromodichloromethane	ND	U	0.110	1.00	ug/L	1	01/17/2012 14:56
Bromoform	ND	U	0.0974	1.00	ug/L	1	01/17/2012 14:56
Bromomethane	ND	U	0.237	1.00	ug/L	1	01/17/2012 14:56
Carbon disulfide	ND	U	0.106	1.00	ug/L	1	01/17/2012 14:56
Carbon tetrachloride	ND	U	0.101	1.00	ug/L	1	01/17/2012 14:56
Chlorobenzene	ND	U	0.116	1.00	ug/L	1	01/17/2012 14:56
Chloroethane	ND	U	0.311	1.00	ug/L	1	01/17/2012 14:56
Chloroform	ND	U	0.139	1.00	ug/L	1	01/17/2012 14:56
Chloromethane	ND	U	0.448	1.00	ug/L	1	01/17/2012 14:56
Cyclohexane	ND	U	0.163	1.00	ug/L	1	01/17/2012 14:56
Dibromochloromethane	ND	U	0.134	1.00	ug/L	1	01/17/2012 14:56
Dichlorodifluoromethane	ND	U	0.171	5.00	ug/L	1	01/17/2012 14:56
cis-1,3-Dichloropropene	ND	U	0.0767	1.00	ug/L	1	01/17/2012 14:56
trans-1,3-Dichloropropene	ND	U	0.0862	1.00	ug/L	1	01/17/2012 14:56
Ethyl Benzene	ND	U	0.0877	1.00	ug/L	1	01/17/2012 14:56
Isopropylbenzene (Cumene)	ND	U	0.0869	1.00	ug/L	1	01/17/2012 14:56
Methyl Acetate	ND	U	1.00	10.0	ug/L	1	01/17/2012 14:56
Methylcyclohexane	ND	U	0.108	1.00	ug/L	1	01/17/2012 14:56
Methylene chloride	**0.610**	J	0.152	5.00	ug/L	1	01/17/2012 14:56
Styrene	ND	U	0.102	1.00	ug/L	1	01/17/2012 14:56
Tetrachloroethene	ND	U	0.155	1.00	ug/L	1	01/17/2012 14:56

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Results of **5th-3**

Client Sample ID: **5th-3**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102003-A
Lab Project ID: 31200102

Collection Date: 01/10/2012 14:40
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Toluene	ND	U	0.133	1.00	ug/L	1	01/17/2012 14:56
Trichloroethene	ND	U	0.125	1.00	ug/L	1	01/17/2012 14:56
Trichlorofluoromethane	ND	U	0.137	1.00	ug/L	1	01/17/2012 14:56
Trichlorotrifluoroethane	ND	U	0.123	1.00	ug/L	1	01/17/2012 14:56
Vinyl chloride	ND	U	0.124	1.00	ug/L	1	01/17/2012 14:56
cis-1,2-Dichloroethene	ND	U	0.136	1.00	ug/L	1	01/17/2012 14:56
m,p-Xylene	ND	U	0.182	2.00	ug/L	1	01/17/2012 14:56
o-Xylene	ND	U	0.0874	1.00	ug/L	1	01/17/2012 14:56
tert-Butyl methyl ether (MTBE)	**0.590**	J	0.144	1.00	ug/L	1	01/17/2012 14:56
trans-1,2-Dichloroethene	ND	U	0.223	1.00	ug/L	1	01/17/2012 14:56
Surrogates							
1,2-Dichloroethane-d4	108			64.0-140	%	1	01/17/2012 14:56
4-Bromofluorobenzene	97.0			85.0-115	%	1	01/17/2012 14:56
Toluene d8	97.0			82.0-117	%	1	01/17/2012 14:56

Batch Information

Analytical Batch: **VMS1830**
Analytical Method: **SW-846 8260B**
Instrument: **MSD4**
Analyst: **DVO**
Analytical Date/Time: **01/17/2012 14:56**

Prep Batch: **VXX2625**
Prep Method: **SW-846 5030B**
Prep Date/Time: **01/17/2012 08:00**
Prep Initial Wt./Vol.: **40 mL**
Prep Extract Vol: **40 mL**

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Results of **5th-3**

Client Sample ID: **5th-3**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102003-D
Lab Project ID: 31200102

Collection Date: 01/10/2012 14:40
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 6010C**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Zinc	**0.433**		0.00226	0.0200	mg/L	1	01/16/2012 19:21
Barium	**0.499**		0.000394	0.100	mg/L	1	01/16/2012 19:21
Manganese	**1.86**		0.0152	0.100	mg/L	10	01/17/2012 15:00
Iron	**85.1**		2.22	10.0	mg/L	100	01/17/2012 15:04
Chromium	**0.160**		0.00147	0.0100	mg/L	1	01/16/2012 19:21
Magnesium	**30.3**		0.302	1.00	mg/L	10	01/17/2012 15:00
Aluminum	**107**		3.15	10.0	mg/L	100	01/17/2012 15:04
Calcium	**35.2**		0.236	1.00	mg/L	10	01/17/2012 15:00
Sodium	**34.7**		0.132	2.00	mg/L	10	01/17/2012 15:00
Potassium	**8.34**		0.126	2.00	mg/L	10	01/17/2012 15:00

Batch Information

Analytical Batch: **MIP1395**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/16/2012 19:21**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

Analytical Batch: **MIP1397**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/17/2012 15:00**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

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Results of **5th-3**

Client Sample ID: **5th-3**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102003-D
Lab Project ID: 31200102

Collection Date: 01/10/2012 14:40
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 7470A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Mercury	**0.00127**		0.0000190	0.000150	mg/L	1	01/19/2012 14:32

Batch Information

Analytical Batch: **MHG1189**
Analytical Method: **SW-846 7470A**
Instrument: **HG2**
Analyst: **NTM**
Analytical Date/Time: **01/19/2012 14:32**

Prep Batch: **MXX1752**
Prep Method: **SW-846 7470A PREP**
Prep Date/Time: **01/19/2012 10:36**
Prep Initial Wt./Vol.: **40 mL**
Prep Extract Vol: **57 mL**

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Results of **5th-3**

Client Sample ID: **5th-3**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102003-D
Lab Project ID: 31200102

Collection Date: 01/10/2012 14:40
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 6020A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Beryllium	**0.000550**	J	0.000297	0.00250	mg/L	5	01/18/2012 11:33
Vanadium	**0.0224**		0.000661	0.00500	mg/L	10	01/18/2012 16:30
Cobalt	**0.0851**		0.000358	0.00500	mg/L	10	01/18/2012 11:36
Nickel	**0.0965**		0.00135	0.00500	mg/L	10	01/18/2012 11:36
Copper	**0.0185**		0.000860	0.00500	mg/L	10	01/18/2012 16:30
Arsenic	**0.0171**		0.000712	0.00500	mg/L	10	01/18/2012 11:36
Selenium	**0.00260**	J	0.000824	0.00500	mg/L	10	01/18/2012 11:36
Silver	ND	U	0.000374	0.00500	mg/L	10	01/18/2012 11:36
Cadmium	**0.00310**	J	0.000278	0.00500	mg/L	10	01/18/2012 11:36
Antimony	**0.00230**	J	0.000437	0.00500	mg/L	10	01/18/2012 11:36
Thallium	**0.000500**	J	0.000297	0.00500	mg/L	10	01/18/2012 11:36
Lead	**0.0465**		0.000640	0.00500	mg/L	10	01/18/2012 16:30

Batch Information

Analytical Batch: **MMS1143**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 11:33**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

Analytical Batch: **MMS1144**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 16:30**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

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Results of **5th-4**

Client Sample ID: **5th-4**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102004-A
Lab Project ID: 31200102

Collection Date: 01/10/2012 15:40
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
1,1,1-Trichloroethane	ND	U	0.123	1.00	ug/L	1	01/17/2012 15:21
1,1,2,2-Tetrachloroethane	ND	U	0.156	1.00	ug/L	1	01/17/2012 15:21
1,1,2-Trichloroethane	ND	U	0.126	1.00	ug/L	1	01/17/2012 15:21
1,1-Dichloroethane	ND	U	0.165	1.00	ug/L	1	01/17/2012 15:21
1,1-Dichloroethene	ND	U	0.212	1.00	ug/L	1	01/17/2012 15:21
1,2,3-Trichlorobenzene	ND	U	0.110	1.00	ug/L	1	01/17/2012 15:21
1,2,4-Trichlorobenzene	ND	U	0.0913	1.00	ug/L	1	01/17/2012 15:21
1,2-Dibromo-3-chloropropane	ND	U	0.748	5.00	ug/L	1	01/17/2012 15:21
1,2-Dibromoethane	ND	U	0.120	1.00	ug/L	1	01/17/2012 15:21
1,2-Dichlorobenzene	ND	U	0.137	1.00	ug/L	1	01/17/2012 15:21
1,2-Dichloroethane	ND	U	0.167	1.00	ug/L	1	01/17/2012 15:21
1,2-Dichloropropane	ND	U	0.163	1.00	ug/L	1	01/17/2012 15:21
1,3,5-Trimethylbenzene	ND	U	0.113	1.00	ug/L	1	01/17/2012 15:21
1,3-Dichlorobenzene	ND	U	0.103	1.00	ug/L	1	01/17/2012 15:21
1,4 Dioxane	ND	U	14.4	100	ug/L	1	01/17/2012 15:21
1,4-Dichlorobenzene	ND	U	0.130	1.00	ug/L	1	01/17/2012 15:21
2-Butanone	ND	U	0.723	25.0	ug/L	1	01/17/2012 15:21
2-Hexanone	ND	U	0.728	5.00	ug/L	1	01/17/2012 15:21
4-Methyl-2-pentanone	ND	U	0.558	5.00	ug/L	1	01/17/2012 15:21
Acetone	**1.15**	J	0.864	25.0	ug/L	1	01/17/2012 15:21
Benzene	ND	U	0.113	1.00	ug/L	1	01/17/2012 15:21
Bromochloromethane	ND	U	0.211	1.00	ug/L	1	01/17/2012 15:21
Bromodichloromethane	ND	U	0.110	1.00	ug/L	1	01/17/2012 15:21
Bromoform	ND	U	0.0974	1.00	ug/L	1	01/17/2012 15:21
Bromomethane	ND	U	0.237	1.00	ug/L	1	01/17/2012 15:21
Carbon disulfide	ND	U	0.106	1.00	ug/L	1	01/17/2012 15:21
Carbon tetrachloride	ND	U	0.101	1.00	ug/L	1	01/17/2012 15:21
Chlorobenzene	ND	U	0.116	1.00	ug/L	1	01/17/2012 15:21
Chloroethane	ND	U	0.311	1.00	ug/L	1	01/17/2012 15:21
Chloroform	ND	U	0.139	1.00	ug/L	1	01/17/2012 15:21
Chloromethane	ND	U	0.448	1.00	ug/L	1	01/17/2012 15:21
Cyclohexane	ND	U	0.163	1.00	ug/L	1	01/17/2012 15:21
Dibromochloromethane	ND	U	0.134	1.00	ug/L	1	01/17/2012 15:21
Dichlorodifluoromethane	ND	U	0.171	5.00	ug/L	1	01/17/2012 15:21
cis-1,3-Dichloropropene	ND	U	0.0767	1.00	ug/L	1	01/17/2012 15:21
trans-1,3-Dichloropropene	ND	U	0.0862	1.00	ug/L	1	01/17/2012 15:21
Ethyl Benzene	ND	U	0.0877	1.00	ug/L	1	01/17/2012 15:21
Isopropylbenzene (Cumene)	ND	U	0.0869	1.00	ug/L	1	01/17/2012 15:21
Methyl Acetate	ND	U	1.00	10.0	ug/L	1	01/17/2012 15:21
Methylcyclohexane	ND	U	0.108	1.00	ug/L	1	01/17/2012 15:21
Methylene chloride	**0.620**	J	0.152	5.00	ug/L	1	01/17/2012 15:21
Styrene	ND	U	0.102	1.00	ug/L	1	01/17/2012 15:21
Tetrachloroethene	ND	U	0.155	1.00	ug/L	1	01/17/2012 15:21

Print Date: 01/20/2012

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Results of **5th-4**

Client Sample ID: **5th-4**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102004-A
Lab Project ID: 31200102

Collection Date: 01/10/2012 15:40
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Toluene	ND	U	0.133	1.00	ug/L	1	01/17/2012 15:21
Trichloroethene	ND	U	0.125	1.00	ug/L	1	01/17/2012 15:21
Trichlorofluoromethane	ND	U	0.137	1.00	ug/L	1	01/17/2012 15:21
Trichlorotrifluoroethane	ND	U	0.123	1.00	ug/L	1	01/17/2012 15:21
Vinyl chloride	ND	U	0.124	1.00	ug/L	1	01/17/2012 15:21
cis-1,2-Dichloroethene	ND	U	0.136	1.00	ug/L	1	01/17/2012 15:21
m,p-Xylene	ND	U	0.182	2.00	ug/L	1	01/17/2012 15:21
o-Xylene	ND	U	0.0874	1.00	ug/L	1	01/17/2012 15:21
tert-Butyl methyl ether (MTBE)	**2.01**		0.144	1.00	ug/L	1	01/17/2012 15:21
trans-1,2-Dichloroethene	ND	U	0.223	1.00	ug/L	1	01/17/2012 15:21
Surrogates							
1,2-Dichloroethane-d4	109			64.0-140	%	1	01/17/2012 15:21
4-Bromofluorobenzene	98.0			85.0-115	%	1	01/17/2012 15:21
Toluene d8	97.0			82.0-117	%	1	01/17/2012 15:21

Batch Information

Analytical Batch: **VMS1830**
Analytical Method: **SW-846 8260B**
Instrument: **MSD4**
Analyst: **DVO**
Analytical Date/Time: **01/17/2012 15:21**

Prep Batch: **VXX2625**
Prep Method: **SW-846 5030B**
Prep Date/Time: **01/17/2012 08:00**
Prep Initial Wt./Vol.: **40 mL**
Prep Extract Vol: **40 mL**

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Results of **5th-4**

Client Sample ID: **5th-4**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102004-D
Lab Project ID: 31200102

Collection Date: 01/10/2012 15:40
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 6010C**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Zinc	**0.251**		0.00226	0.0200	mg/L	1	01/16/2012 19:28
Barium	**0.276**		0.000394	0.100	mg/L	1	01/16/2012 19:28
Manganese	**0.932**		0.00152	0.0100	mg/L	1	01/16/2012 19:28
Iron	**54.8**		2.22	10.0	mg/L	100	01/17/2012 15:12
Chromium	**0.107**		0.00147	0.0100	mg/L	1	01/16/2012 19:28
Magnesium	**23.4**		0.302	1.00	mg/L	10	01/17/2012 15:08
Aluminum	**64.7**		3.15	10.0	mg/L	100	01/17/2012 15:12
Calcium	**25.6**		0.236	1.00	mg/L	10	01/17/2012 15:08
Sodium	**12.0**		0.132	2.00	mg/L	10	01/17/2012 15:08
Potassium	**6.88**		0.126	2.00	mg/L	10	01/17/2012 15:08

Batch Information

Analytical Batch: **MIP1395**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/16/2012 19:28**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

Analytical Batch: **MIP1397**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/17/2012 15:12**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

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Results of **5th-4**

Client Sample ID: **5th-4**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102004-D
Lab Project ID: 31200102

Collection Date: 01/10/2012 15:40
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 7470A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Mercury	**0.000347**		0.0000190	0.000150	mg/L	1	01/19/2012 14:39

Batch Information

Analytical Batch: **MHG1189**
Analytical Method: **SW-846 7470A**
Instrument: **HG2**
Analyst: **NTM**
Analytical Date/Time: **01/19/2012 14:39**

Prep Batch: **MXX1752**
Prep Method: **SW-846 7470A PREP**
Prep Date/Time: **01/19/2012 10:36**
Prep Initial Wt./Vol.: **40 mL**
Prep Extract Vol: **57 mL**

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Results of **5th-4**

Client Sample ID: **5th-4**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102004-D
Lab Project ID: 31200102

Collection Date: 01/10/2012 15:40
Received Date: 01/13/2012 10:15
Matrix: Water

Results by **SW-846 6020A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Beryllium	**0.000550**	J	0.000297	0.00250	mg/L	5	01/18/2012 11:46
Vanadium	**0.155**		0.00661	0.0500	mg/L	100	01/18/2012 16:44
Cobalt	**0.0398**		0.000358	0.00500	mg/L	10	01/18/2012 11:50
Nickel	**0.0723**		0.00135	0.00500	mg/L	10	01/18/2012 11:50
Copper	**0.0599**		0.000860	0.00500	mg/L	10	01/18/2012 11:50
Arsenic	**0.0111**		0.000712	0.00500	mg/L	10	01/18/2012 11:50
Selenium	**0.00140**	J	0.000824	0.00500	mg/L	10	01/18/2012 16:40
Silver	ND	U	0.000374	0.00500	mg/L	10	01/18/2012 11:50
Cadmium	**0.00110**	J	0.000278	0.00500	mg/L	10	01/18/2012 11:50
Antimony	**0.000500**	J	0.000437	0.00500	mg/L	10	01/18/2012 11:50
Thallium	**0.000300**	J	0.000297	0.00500	mg/L	10	01/18/2012 11:50
Lead	**0.0946**		0.000640	0.00500	mg/L	10	01/18/2012 16:40

Batch Information

Analytical Batch: **MMS1143**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 11:46**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

Analytical Batch: **MMS1144**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 16:44**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Prep Initial Wt./Vol.: **50 mL**
Prep Extract Vol: **50 mL**

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Results of **5th-1-2**

Client Sample ID: **5th-1-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102005-A
Lab Project ID: 31200102

Collection Date: 01/10/2012 13:10
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 82.90

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
1,1,1-Trichloroethane	ND	U	0.702	4.51	ug/Kg	1	01/19/2012 16:22
1,1,2,2-Tetrachloroethane	ND	U	1.02	4.51	ug/Kg	1	01/19/2012 16:22
1,1,2-Trichloroethane	ND	U	0.939	4.51	ug/Kg	1	01/19/2012 16:22
1,1-Dichloroethane	ND	U	0.779	4.51	ug/Kg	1	01/19/2012 16:22
1,1-Dichloroethene	ND	U	0.815	4.51	ug/Kg	1	01/19/2012 16:22
1,2,3-Trichlorobenzene	ND	U	1.25	4.51	ug/Kg	1	01/19/2012 16:22
1,2,4-Trichlorobenzene	ND	U	1.07	4.51	ug/Kg	1	01/19/2012 16:22
1,2-Dibromo-3-chloropropane	ND	U	5.24	27.1	ug/Kg	1	01/19/2012 16:22
1,2-Dibromoethane	ND	U	0.684	4.51	ug/Kg	1	01/19/2012 16:22
1,2-Dichlorobenzene	ND	U	1.16	4.51	ug/Kg	1	01/19/2012 16:22
1,2-Dichloroethane	ND	U	0.800	4.51	ug/Kg	1	01/19/2012 16:22
1,2-Dichloropropane	ND	U	0.726	4.51	ug/Kg	1	01/19/2012 16:22
1,3-Dichlorobenzene	ND	U	1.05	4.51	ug/Kg	1	01/19/2012 16:22
1,4 Dioxane	ND	U	61.5	451	ug/Kg	1	01/19/2012 16:22
1,4-Dichlorobenzene	ND	U	0.993	4.51	ug/Kg	1	01/19/2012 16:22
2-Butanone	**24.3**		1.41	22.6	ug/Kg	1	01/19/2012 16:22
2-Hexanone	ND	U	1.76	11.3	ug/Kg	1	01/19/2012 16:22
4-Methyl-2-pentanone	ND	U	2.90	11.3	ug/Kg	1	01/19/2012 16:22
Acetone	**85.6**		1.12	45.1	ug/Kg	1	01/19/2012 16:22
Benzene	ND	U	0.806	4.51	ug/Kg	1	01/19/2012 16:22
Bromochloromethane	ND	U	0.788	4.51	ug/Kg	1	01/19/2012 16:22
Bromodichloromethane	ND	U	0.734	4.51	ug/Kg	1	01/19/2012 16:22
Bromoform	ND	U	0.604	4.51	ug/Kg	1	01/19/2012 16:22
Bromomethane	ND	U	1.59	4.51	ug/Kg	1	01/19/2012 16:22
Carbon disulfide	**0.812**	J	0.780	4.51	ug/Kg	1	01/19/2012 16:22
Carbon tetrachloride	ND	U	0.785	4.51	ug/Kg	1	01/19/2012 16:22
Chlorobenzene	ND	U	0.699	4.51	ug/Kg	1	01/19/2012 16:22
Chloroethane	ND	U	0.415	4.51	ug/Kg	1	01/19/2012 16:22
Chloroform	ND	U	0.733	4.51	ug/Kg	1	01/19/2012 16:22
Chloromethane	ND	U	0.654	4.51	ug/Kg	1	01/19/2012 16:22
Cyclohexane	ND	U	0.839	4.51	ug/Kg	1	01/19/2012 16:22
Dibromochloromethane	ND	U	0.764	4.51	ug/Kg	1	01/19/2012 16:22
Dichlorodifluoromethane	ND	U	0.656	4.51	ug/Kg	1	01/19/2012 16:22
cis-1,3-Dichloropropene	ND	U	0.777	4.51	ug/Kg	1	01/19/2012 16:22
trans-1,3-Dichloropropene	ND	U	0.809	4.51	ug/Kg	1	01/19/2012 16:22
Ethyl Benzene	ND	U	0.746	4.51	ug/Kg	1	01/19/2012 16:22
Isopropylbenzene (Cumene)	ND	U	0.869	4.51	ug/Kg	1	01/19/2012 16:22
Methyl Acetate	ND	U	7.99	45.1	ug/Kg	1	01/19/2012 16:22
Methylcyclohexane	ND	U	0.781	4.51	ug/Kg	1	01/19/2012 16:22
Methylene chloride	**1.79**	J	0.630	18.0	ug/Kg	1	01/19/2012 16:22
Styrene	ND	U	0.890	4.51	ug/Kg	1	01/19/2012 16:22
Tetrachloroethene	ND	U	0.679	4.51	ug/Kg	1	01/19/2012 16:22
Toluene	ND	U	0.731	4.51	ug/Kg	1	01/19/2012 16:22

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Results of **5th-1-2**

Client Sample ID: **5th-1-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102005-A
Lab Project ID: 31200102

Collection Date: 01/10/2012 13:10
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 82.90

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Trichloroethene	ND	U	0.755	4.51	ug/Kg	1	01/19/2012 16:22
Trichlorofluoromethane	ND	U	0.680	4.51	ug/Kg	1	01/19/2012 16:22
Trichlorotrifluoroethane	ND	U	4.51	4.51	ug/Kg	1	01/19/2012 16:22
Vinyl chloride	ND	U	0.664	4.51	ug/Kg	1	01/19/2012 16:22
cis-1,2-Dichloroethene	ND	U	0.699	4.51	ug/Kg	1	01/19/2012 16:22
m,p-Xylene	ND	U	1.60	9.02	ug/Kg	1	01/19/2012 16:22
o-Xylene	ND	U	0.911	4.51	ug/Kg	1	01/19/2012 16:22
tert-Butyl methyl ether (MTBE)	ND	U	0.769	4.51	ug/Kg	1	01/19/2012 16:22
trans-1,2-Dichloroethene	ND	U	0.777	4.51	ug/Kg	1	01/19/2012 16:22
Surrogates							
1,2-Dichloroethane-d4	111			55.0-173	%	1	01/19/2012 16:22
4-Bromofluorobenzene	102			23.0-141	%	1	01/19/2012 16:22
Toluene d8	98.0			57.0-134	%	1	01/19/2012 16:22

Batch Information

Analytical Batch: **VMS1844**
Analytical Method: **SW-846 8260B**
Instrument: **MSD4**
Analyst: **DVO**
Analytical Date/Time: **01/19/2012 16:22**

Prep Batch: **VXX2646**
Prep Method: **SW-846 5035 SL**
Prep Date/Time: **01/13/2012 08:00**
Prep Initial Wt./Vol.: **6.68 g**
Prep Extract Vol: **5 mL**

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Results of **5th-1-2**

Client Sample ID: **5th-1-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102005-E
Lab Project ID: 31200102

Collection Date: 01/10/2012 13:10
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 82.90

Results by **SW-846 6010C**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Zinc	**17.6**		1.14	2.04	mg/kg	1	01/16/2012 16:44
Barium	**35.3**		0.134	10.2	mg/kg	1	01/16/2012 16:44
Manganese	**53.2**		0.280	1.02	mg/kg	1	01/16/2012 16:44
Iron	**6050**		960	1020	mg/kg	100	01/17/2012 12:33
Chromium	**15.6**		0.147	1.02	mg/kg	1	01/16/2012 16:44
Magnesium	**1250**		50.5	102	mg/kg	10	01/17/2012 12:29
Aluminum	**11300**		216	1020	mg/kg	100	01/17/2012 12:33
Calcium	**891**		72.0	102	mg/kg	10	01/17/2012 12:29
Sodium	**46.5**		1.91	20.4	mg/kg	1	01/16/2012 16:44
Potassium	**487**		2.12	20.4	mg/kg	1	01/16/2012 16:44

Batch Information

Analytical Batch: **MIP1395**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/16/2012 16:44**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.59 g**
Prep Extract Vol: **50 mL**

Analytical Batch: **MIP1397**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/17/2012 12:33**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.59 g**
Prep Extract Vol: **50 mL**

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Results of **5th-1-2**

Client Sample ID: **5th-1-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102005-E
Lab Project ID: 31200102

Collection Date: 01/10/2012 13:10
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 82.90

Results by **SW-846 7471B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Mercury	**0.0143**	J	0.00102	0.0227	mg/kg	1	01/18/2012 10:56

Batch Information

Analytical Batch: **MHG1188**
Analytical Method: **SW-846 7471B**
Instrument: **HG2**
Analyst: **NTM**
Analytical Date/Time: **01/18/2012 10:56**

Prep Batch: **MXX1748**
Prep Method: **SW-846 7471B PREP**
Prep Date/Time: **01/18/2012 08:43**
Prep Initial Wt./Vol.: **.53 g**
Prep Extract Vol: **50 mL**

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Results of **5th-1-2**

Client Sample ID: **5th-1-2**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102005-E
Lab Project ID: 31200102

Collection Date: 01/10/2012 13:10
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 82.90

Results by **SW-846 6020A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Antimony	ND	U	0.0552	0.102	mg/kg	10	01/18/2012 17:39
Arsenic	**1.03**		0.0889	0.102	mg/kg	10	01/18/2012 13:15
Beryllium	**0.0358**	J	0.00909	0.0511	mg/kg	5	01/18/2012 13:12
Cadmium	**0.0307**	J	0.0182	0.102	mg/kg	10	01/18/2012 17:39
Cobalt	**2.47**		0.00255	0.102	mg/kg	10	01/18/2012 17:39
Copper	**4.80**		0.105	1.02	mg/kg	10	01/18/2012 13:15
Lead	**6.51**		0.0134	0.102	mg/kg	10	01/18/2012 13:15
Nickel	**7.51**		0.0648	0.102	mg/kg	10	01/18/2012 17:39
Selenium	ND	U	0.139	0.204	mg/kg	10	01/18/2012 17:39
Silver	ND	U	0.0199	0.102	mg/kg	10	01/18/2012 13:15
Thallium	**0.0715**	J	0.0250	0.102	mg/kg	10	01/18/2012 13:15
Vanadium	**16.1**		0.344	1.02	mg/kg	100	01/18/2012 17:43

Batch Information

Analytical Batch: **MMS1143**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 13:15**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.59 g**
Prep Extract Vol: **50 mL**

Analytical Batch: **MMS1144**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 17:39**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.59 g**
Prep Extract Vol: **50 mL**

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Results of **5th-2-1**

Client Sample ID: **5th-2-1**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102006-A
Lab Project ID: 31200102

Collection Date: 01/10/2012 13:50
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 80.20

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
1,1,1-Trichloroethane	ND	U	0.783	5.03	ug/Kg	1	01/19/2012 16:48
1,1,2,2-Tetrachloroethane	ND	U	1.14	5.03	ug/Kg	1	01/19/2012 16:48
1,1,2-Trichloroethane	ND	U	1.05	5.03	ug/Kg	1	01/19/2012 16:48
1,1-Dichloroethane	ND	U	0.868	5.03	ug/Kg	1	01/19/2012 16:48
1,1-Dichloroethene	ND	U	0.908	5.03	ug/Kg	1	01/19/2012 16:48
1,2,3-Trichlorobenzene	ND	U	1.40	5.03	ug/Kg	1	01/19/2012 16:48
1,2,4-Trichlorobenzene	ND	U	1.20	5.03	ug/Kg	1	01/19/2012 16:48
1,2-Dibromo-3-chloropropane	ND	U	5.84	30.2	ug/Kg	1	01/19/2012 16:48
1,2-Dibromoethane	ND	U	0.762	5.03	ug/Kg	1	01/19/2012 16:48
1,2-Dichlorobenzene	ND	U	1.30	5.03	ug/Kg	1	01/19/2012 16:48
1,2-Dichloroethane	ND	U	0.891	5.03	ug/Kg	1	01/19/2012 16:48
1,2-Dichloropropane	ND	U	0.810	5.03	ug/Kg	1	01/19/2012 16:48
1,3-Dichlorobenzene	ND	U	1.17	5.03	ug/Kg	1	01/19/2012 16:48
1,4 Dioxane	ND	U	68.5	503	ug/Kg	1	01/19/2012 16:48
1,4-Dichlorobenzene	ND	U	1.11	5.03	ug/Kg	1	01/19/2012 16:48
2-Butanone	**5.99**	J	1.57	25.1	ug/Kg	1	01/19/2012 16:48
2-Hexanone	ND	U	1.96	12.6	ug/Kg	1	01/19/2012 16:48
4-Methyl-2-pentanone	ND	U	3.23	12.6	ug/Kg	1	01/19/2012 16:48
Acetone	**45.5**	J	1.25	50.3	ug/Kg	1	01/19/2012 16:48
Benzene	ND	U	0.898	5.03	ug/Kg	1	01/19/2012 16:48
Bromochloromethane	ND	U	0.878	5.03	ug/Kg	1	01/19/2012 16:48
Bromodichloromethane	ND	U	0.818	5.03	ug/Kg	1	01/19/2012 16:48
Bromoform	ND	U	0.673	5.03	ug/Kg	1	01/19/2012 16:48
Bromomethane	ND	U	1.77	5.03	ug/Kg	1	01/19/2012 16:48
Carbon disulfide	ND	U	0.869	5.03	ug/Kg	1	01/19/2012 16:48
Carbon tetrachloride	ND	U	0.875	5.03	ug/Kg	1	01/19/2012 16:48
Chlorobenzene	ND	U	0.779	5.03	ug/Kg	1	01/19/2012 16:48
Chloroethane	ND	U	0.463	5.03	ug/Kg	1	01/19/2012 16:48
Chloroform	ND	U	0.817	5.03	ug/Kg	1	01/19/2012 16:48
Chloromethane	ND	U	0.729	5.03	ug/Kg	1	01/19/2012 16:48
Cyclohexane	ND	U	0.935	5.03	ug/Kg	1	01/19/2012 16:48
Dibromochloromethane	ND	U	0.852	5.03	ug/Kg	1	01/19/2012 16:48
Dichlorodifluoromethane	**3.03**	J	0.731	5.03	ug/Kg	1	01/19/2012 16:48
cis-1,3-Dichloropropene	ND	U	0.866	5.03	ug/Kg	1	01/19/2012 16:48
trans-1,3-Dichloropropene	ND	U	0.901	5.03	ug/Kg	1	01/19/2012 16:48
Ethyl Benzene	ND	U	0.832	5.03	ug/Kg	1	01/19/2012 16:48
Isopropylbenzene (Cumene)	ND	U	0.969	5.03	ug/Kg	1	01/19/2012 16:48
Methyl Acetate	ND	U	8.90	50.3	ug/Kg	1	01/19/2012 16:48
Methylcyclohexane	ND	U	0.870	5.03	ug/Kg	1	01/19/2012 16:48
Methylene chloride	**1.18**	J	0.702	20.1	ug/Kg	1	01/19/2012 16:48
Styrene	ND	U	0.992	5.03	ug/Kg	1	01/19/2012 16:48
Tetrachloroethene	ND	U	0.756	5.03	ug/Kg	1	01/19/2012 16:48
Toluene	ND	U	0.815	5.03	ug/Kg	1	01/19/2012 16:48

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Results of **5th-2-1**

Client Sample ID: **5th-2-1**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102006-A
Lab Project ID: 31200102

Collection Date: 01/10/2012 13:50
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 80.20

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Trichloroethene	ND	U	0.842	5.03	ug/Kg	1	01/19/2012 16:48
Trichlorofluoromethane	ND	U	0.758	5.03	ug/Kg	1	01/19/2012 16:48
Trichlorotrifluoroethane	ND	U	5.03	5.03	ug/Kg	1	01/19/2012 16:48
Vinyl chloride	ND	U	0.740	5.03	ug/Kg	1	01/19/2012 16:48
cis-1,2-Dichloroethene	ND	U	0.780	5.03	ug/Kg	1	01/19/2012 16:48
m,p-Xylene	ND	U	1.78	10.1	ug/Kg	1	01/19/2012 16:48
o-Xylene	ND	U	1.02	5.03	ug/Kg	1	01/19/2012 16:48
tert-Butyl methyl ether (MTBE)	ND	U	0.857	5.03	ug/Kg	1	01/19/2012 16:48
trans-1,2-Dichloroethene	ND	U	0.866	5.03	ug/Kg	1	01/19/2012 16:48
Surrogates							
1,2-Dichloroethane-d4	118			55.0-173	%	1	01/19/2012 16:48
4-Bromofluorobenzene	94.0			23.0-141	%	1	01/19/2012 16:48
Toluene d8	97.0			57.0-134	%	1	01/19/2012 16:48

Batch Information

Analytical Batch: **VMS1844**
Analytical Method: **SW-846 8260B**
Instrument: **MSD4**
Analyst: **DVO**
Analytical Date/Time: **01/19/2012 16:48**

Prep Batch: **VXX2646**
Prep Method: **SW-846 5035 SL**
Prep Date/Time: **01/13/2012 08:00**
Prep Initial Wt./Vol.: **6.2 g**
Prep Extract Vol: **5 mL**

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Results of **5th-2-1**

Client Sample ID: **5th-2-1**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102006-E
Lab Project ID: 31200102

Collection Date: 01/10/2012 13:50
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 80.20

Results by **SW-846 6010C**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Zinc	**168**		12.9	23.1	mg/kg	10	01/17/2012 12:37
Barium	**104**		0.151	11.5	mg/kg	1	01/16/2012 16:51
Manganese	**141**		3.16	11.5	mg/kg	10	01/17/2012 12:37
Iron	**36200**		1090	1150	mg/kg	100	01/17/2012 12:42
Chromium	**35.7**		0.166	1.15	mg/kg	1	01/16/2012 16:51
Magnesium	**2180**		57.0	115	mg/kg	10	01/17/2012 12:37
Aluminum	**21600**		244	1150	mg/kg	100	01/17/2012 12:42
Calcium	**1730**		81.4	115	mg/kg	10	01/17/2012 12:37
Sodium	**157**		2.16	23.1	mg/kg	1	01/16/2012 16:51
Potassium	**712**		23.9	231	mg/kg	10	01/17/2012 12:37

Batch Information

Analytical Batch: **MIP1395**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/16/2012 16:51**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.54 g**
Prep Extract Vol: **50 mL**

Analytical Batch: **MIP1397**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/17/2012 12:37**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.54 g**
Prep Extract Vol: **50 mL**

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Results of **5th-2-1**

Client Sample ID: **5th-2-1**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102006-E
Lab Project ID: 31200102

Collection Date: 01/10/2012 13:50
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 80.20

Results by **SW-846 7471B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Mercury	**0.0512**		0.00102	0.0227	mg/kg	1	01/18/2012 11:02

Batch Information

Analytical Batch: **MHG1188**
Analytical Method: **SW-846 7471B**
Instrument: **HG2**
Analyst: **NTM**
Analytical Date/Time: **01/18/2012 11:02**

Prep Batch: **MXX1748**
Prep Method: **SW-846 7471B PREP**
Prep Date/Time: **01/18/2012 08:43**
Prep Initial Wt./Vol.: **.55 g**
Prep Extract Vol: **50 mL**

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Results of **5th-2-1**

Client Sample ID: **5th-2-1**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102006-E
Lab Project ID: 31200102

Collection Date: 01/10/2012 13:50
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 80.20

Results by **SW-846 6020A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Antimony	**0.762**		0.0624	0.115	mg/kg	10	01/18/2012 17:46
Arsenic	**3.37**		0.100	0.115	mg/kg	10	01/18/2012 13:22
Beryllium	**0.0520**	J	0.0103	0.0577	mg/kg	5	01/18/2012 13:18
Cadmium	**2.10**		0.0206	0.115	mg/kg	10	01/18/2012 17:46
Cobalt	**4.72**		0.00289	0.115	mg/kg	10	01/18/2012 17:46
Copper	**58.9**		1.19	11.5	mg/kg	100	01/18/2012 17:49
Lead	**243**		1.51	11.5	mg/kg	1000	01/18/2012 17:59
Nickel	**31.4**		0.732	1.15	mg/kg	100	01/18/2012 17:49
Selenium	**0.323**		0.157	0.231	mg/kg	10	01/18/2012 17:46
Silver	**0.0808**	J	0.0225	0.115	mg/kg	10	01/18/2012 13:22
Thallium	**0.104**	J	0.0283	0.115	mg/kg	10	01/18/2012 13:22
Vanadium	**25.3**		0.389	1.15	mg/kg	100	01/18/2012 17:49

Batch Information

Analytical Batch: **MMS1143**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 13:22**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.54 g**
Prep Extract Vol: **50 mL**

Analytical Batch: **MMS1144**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 17:46**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.54 g**
Prep Extract Vol: **50 mL**

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Results of **5th-3-1**

Client Sample ID: **5th-3-1**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102007-A
Lab Project ID: 31200102

Collection Date: 01/10/2012 14:40
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 83.60

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
1,1,1-Trichloroethane	ND	U	0.711	4.57	ug/Kg	1	01/19/2012 17:14
1,1,2,2-Tetrachloroethane	ND	U	1.03	4.57	ug/Kg	1	01/19/2012 17:14
1,1,2-Trichloroethane	ND	U	0.950	4.57	ug/Kg	1	01/19/2012 17:14
1,1-Dichloroethane	ND	U	0.788	4.57	ug/Kg	1	01/19/2012 17:14
1,1-Dichloroethene	ND	U	0.825	4.57	ug/Kg	1	01/19/2012 17:14
1,2,3-Trichlorobenzene	ND	U	1.27	4.57	ug/Kg	1	01/19/2012 17:14
1,2,4-Trichlorobenzene	ND	U	1.09	4.57	ug/Kg	1	01/19/2012 17:14
1,2-Dibromo-3-chloropropane	ND	U	5.31	27.4	ug/Kg	1	01/19/2012 17:14
1,2-Dibromoethane	ND	U	0.692	4.57	ug/Kg	1	01/19/2012 17:14
1,2-Dichlorobenzene	ND	U	1.18	4.57	ug/Kg	1	01/19/2012 17:14
1,2-Dichloroethane	ND	U	0.809	4.57	ug/Kg	1	01/19/2012 17:14
1,2-Dichloropropane	ND	U	0.735	4.57	ug/Kg	1	01/19/2012 17:14
1,3-Dichlorobenzene	ND	U	1.06	4.57	ug/Kg	1	01/19/2012 17:14
1,4 Dioxane	ND	U	62.2	457	ug/Kg	1	01/19/2012 17:14
1,4-Dichlorobenzene	ND	U	1.00	4.57	ug/Kg	1	01/19/2012 17:14
2-Butanone	**8.92**	J	1.43	22.8	ug/Kg	1	01/19/2012 17:14
2-Hexanone	ND	U	1.78	11.4	ug/Kg	1	01/19/2012 17:14
4-Methyl-2-pentanone	ND	U	2.93	11.4	ug/Kg	1	01/19/2012 17:14
Acetone	**40.6**	J	1.13	45.7	ug/Kg	1	01/19/2012 17:14
Benzene	ND	U	0.816	4.57	ug/Kg	1	01/19/2012 17:14
Bromochloromethane	ND	U	0.797	4.57	ug/Kg	1	01/19/2012 17:14
Bromodichloromethane	ND	U	0.743	4.57	ug/Kg	1	01/19/2012 17:14
Bromoform	ND	U	0.611	4.57	ug/Kg	1	01/19/2012 17:14
Bromomethane	ND	U	1.61	4.57	ug/Kg	1	01/19/2012 17:14
Carbon disulfide	ND	U	0.789	4.57	ug/Kg	1	01/19/2012 17:14
Carbon tetrachloride	ND	U	0.795	4.57	ug/Kg	1	01/19/2012 17:14
Chlorobenzene	ND	U	0.707	4.57	ug/Kg	1	01/19/2012 17:14
Chloroethane	ND	U	0.420	4.57	ug/Kg	1	01/19/2012 17:14
Chloroform	ND	U	0.742	4.57	ug/Kg	1	01/19/2012 17:14
Chloromethane	ND	U	0.662	4.57	ug/Kg	1	01/19/2012 17:14
Cyclohexane	ND	U	0.850	4.57	ug/Kg	1	01/19/2012 17:14
Dibromochloromethane	ND	U	0.774	4.57	ug/Kg	1	01/19/2012 17:14
Dichlorodifluoromethane	ND	U	0.664	4.57	ug/Kg	1	01/19/2012 17:14
cis-1,3-Dichloropropene	ND	U	0.787	4.57	ug/Kg	1	01/19/2012 17:14
trans-1,3-Dichloropropene	ND	U	0.818	4.57	ug/Kg	1	01/19/2012 17:14
Ethyl Benzene	ND	U	0.755	4.57	ug/Kg	1	01/19/2012 17:14
Isopropylbenzene (Cumene)	ND	U	0.880	4.57	ug/Kg	1	01/19/2012 17:14
Methyl Acetate	ND	U	8.08	45.7	ug/Kg	1	01/19/2012 17:14
Methylcyclohexane	ND	U	0.790	4.57	ug/Kg	1	01/19/2012 17:14
Methylene chloride	**0.904**	J	0.638	18.3	ug/Kg	1	01/19/2012 17:14
Styrene	ND	U	0.901	4.57	ug/Kg	1	01/19/2012 17:14
Tetrachloroethene	ND	U	0.687	4.57	ug/Kg	1	01/19/2012 17:14
Toluene	ND	U	0.740	4.57	ug/Kg	1	01/19/2012 17:14

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Results of **5th-3-1**

Client Sample ID: **5th-3-1**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102007-A
Lab Project ID: 31200102

Collection Date: 01/10/2012 14:40
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 83.60

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Trichloroethene	ND	U	0.765	4.57	ug/Kg	1	01/19/2012 17:14
Trichlorofluoromethane	ND	U	0.689	4.57	ug/Kg	1	01/19/2012 17:14
Trichlorotrifluoroethane	ND	U	4.57	4.57	ug/Kg	1	01/19/2012 17:14
Vinyl chloride	ND	U	0.672	4.57	ug/Kg	1	01/19/2012 17:14
cis-1,2-Dichloroethene	ND	U	0.708	4.57	ug/Kg	1	01/19/2012 17:14
m,p-Xylene	ND	U	1.62	9.13	ug/Kg	1	01/19/2012 17:14
o-Xylene	ND	U	0.923	4.57	ug/Kg	1	01/19/2012 17:14
tert-Butyl methyl ether (MTBE)	ND	U	0.778	4.57	ug/Kg	1	01/19/2012 17:14
trans-1,2-Dichloroethene	ND	U	0.787	4.57	ug/Kg	1	01/19/2012 17:14
Surrogates							
1,2-Dichloroethane-d4	112			55.0-173	%	1	01/19/2012 17:14
4-Bromofluorobenzene	93.0			23.0-141	%	1	01/19/2012 17:14
Toluene d8	93.0			57.0-134	%	1	01/19/2012 17:14

Batch Information

Analytical Batch: **VMS1844**
Analytical Method: **SW-846 8260B**
Instrument: **MSD4**
Analyst: **DVO**
Analytical Date/Time: **01/19/2012 17:14**

Prep Batch: **VXX2646**
Prep Method: **SW-846 5035 SL**
Prep Date/Time: **01/13/2012 08:00**
Prep Initial Wt./Vol.: **6.55 g**
Prep Extract Vol: **5 mL**

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Results of **5th-3-1**

Client Sample ID: **5th-3-1**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102007-E
Lab Project ID: 31200102

Collection Date: 01/10/2012 14:40
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 83.60

Results by **SW-846 6010C**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Zinc	**343**		13.1	23.5	mg/kg	10	01/17/2012 12:54
Barium	**73.8**		0.154	11.7	mg/kg	1	01/16/2012 17:12
Manganese	**136**		3.21	11.7	mg/kg	10	01/17/2012 12:54
Iron	**9920**		1100	1170	mg/kg	100	01/17/2012 12:58
Chromium	**36.2**		0.169	1.17	mg/kg	1	01/16/2012 17:12
Magnesium	**1650**		58.0	117	mg/kg	10	01/17/2012 12:54
Aluminum	**12000**		248	1170	mg/kg	100	01/17/2012 12:58
Calcium	**1590**		82.7	117	mg/kg	10	01/17/2012 12:54
Sodium	**89.3**		2.19	23.5	mg/kg	1	01/16/2012 17:12
Potassium	**473**		2.43	23.5	mg/kg	1	01/16/2012 17:12

Batch Information

Analytical Batch: **MIP1395**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/16/2012 17:12**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.51 g**
Prep Extract Vol: **50 mL**

Analytical Batch: **MIP1397**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/17/2012 12:54**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.51 g**
Prep Extract Vol: **50 mL**

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Results of **5th-3-1**

Client Sample ID: **5th-3-1**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102007-E
Lab Project ID: 31200102

Collection Date: 01/10/2012 14:40
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 83.60

Results by **SW-846 7471B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Mercury	**1.64**		0.00979	0.218	mg/kg	10	01/18/2012 11:25

Batch Information

Analytical Batch: **MHG1188**
Analytical Method: **SW-846 7471B**
Instrument: **HG2**
Analyst: **NTM**
Analytical Date/Time: **01/18/2012 11:25**

Prep Batch: **MXX1748**
Prep Method: **SW-846 7471B PREP**
Prep Date/Time: **01/18/2012 08:43**
Prep Initial Wt./Vol.: **.55 g**
Prep Extract Vol: **50 mL**

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Results of **5th-3-1**

Client Sample ID: **5th-3-1**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102007-E
Lab Project ID: 31200102

Collection Date: 01/10/2012 14:40
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 83.60

Results by **SW-846 6020A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Antimony	**1.33**		0.0634	0.117	mg/kg	10	01/18/2012 18:02
Arsenic	**1.83**		0.102	0.117	mg/kg	10	01/18/2012 13:28
Beryllium	**0.0528**	J	0.0104	0.0587	mg/kg	5	01/18/2012 13:25
Cadmium	**2.29**		0.0209	0.117	mg/kg	10	01/18/2012 18:02
Cobalt	**3.25**		0.00293	0.117	mg/kg	10	01/18/2012 18:02
Copper	**31.1**		1.21	11.7	mg/kg	100	01/19/2012 10:44
Lead	**372**		1.54	11.7	mg/kg	1000	01/18/2012 18:09
Nickel	**28.3**		0.744	1.17	mg/kg	100	01/18/2012 18:06
Selenium	**0.223**	J	0.160	0.235	mg/kg	10	01/18/2012 18:02
Silver	**0.0704**	J	0.0229	0.117	mg/kg	10	01/18/2012 13:28
Thallium	**0.0821**	J	0.0287	0.117	mg/kg	10	01/18/2012 13:28
Vanadium	**15.3**		0.395	1.17	mg/kg	100	01/18/2012 18:06

Batch Information

Analytical Batch: **MMS1143**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 13:28**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.51 g**
Prep Extract Vol: **50 mL**

Analytical Batch: **MMS1144**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 18:02**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.51 g**
Prep Extract Vol: **50 mL**

Analytical Batch: **MMS1145**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/19/2012 10:44**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.51 g**
Prep Extract Vol: **50 mL**

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Results of **5th-4-1**

Client Sample ID: **5th-4-1**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102008-D
Lab Project ID: 31200102

Collection Date: 01/10/2012 15:40
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 80.00

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
1,1,1-Trichloroethane	ND	U	5.12	41.6	ug/Kg	50	01/17/2012 17:26
1,1,2,2-Tetrachloroethane	ND	U	6.49	41.6	ug/Kg	50	01/17/2012 17:26
1,1,2-Trichloroethane	ND	U	5.24	41.6	ug/Kg	50	01/17/2012 17:26
1,1-Dichloroethane	ND	U	6.86	41.6	ug/Kg	50	01/17/2012 17:26
1,1-Dichloroethene	ND	U	8.82	41.6	ug/Kg	50	01/17/2012 17:26
1,2,3-Trichlorobenzene	**19.5**	J	4.57	41.6	ug/Kg	50	01/17/2012 17:26
1,2,4-Trichlorobenzene	**696**		3.80	41.6	ug/Kg	50	01/17/2012 17:26
1,2-Dibromo-3-chloropropane	ND	U	31.1	208	ug/Kg	50	01/17/2012 17:26
1,2-Dibromoethane	ND	U	4.99	41.6	ug/Kg	50	01/17/2012 17:26
1,2-Dichlorobenzene	ND	U	5.70	41.6	ug/Kg	50	01/17/2012 17:26
1,2-Dichloroethane	ND	U	6.94	41.6	ug/Kg	50	01/17/2012 17:26
1,2-Dichloropropane	ND	U	6.78	41.6	ug/Kg	50	01/17/2012 17:26
1,3-Dichlorobenzene	**733**		4.28	41.6	ug/Kg	50	01/17/2012 17:26
1,4 Dioxane	ND	U	599	4160	ug/Kg	50	01/17/2012 17:26
1,4-Dichlorobenzene	**1180**		5.41	41.6	ug/Kg	50	01/17/2012 17:26
2-Butanone	ND	U	30.1	1040	ug/Kg	50	01/17/2012 17:26
2-Hexanone	ND	U	30.3	208	ug/Kg	50	01/17/2012 17:26
4-Methyl-2-pentanone	ND	U	23.2	208	ug/Kg	50	01/17/2012 17:26
Acetone	**78.6**	J	35.9	1040	ug/Kg	50	01/17/2012 17:26
Benzene	ND	U	4.70	41.6	ug/Kg	50	01/17/2012 17:26
Bromochloromethane	ND	U	8.77	41.6	ug/Kg	50	01/17/2012 17:26
Bromodichloromethane	ND	U	4.57	41.6	ug/Kg	50	01/17/2012 17:26
Bromoform	ND	U	4.05	41.6	ug/Kg	50	01/17/2012 17:26
Bromomethane	ND	U	9.86	41.6	ug/Kg	50	01/17/2012 17:26
Carbon disulfide	ND	U	4.41	41.6	ug/Kg	50	01/17/2012 17:26
Carbon tetrachloride	ND	U	4.20	41.6	ug/Kg	50	01/17/2012 17:26
Chlorobenzene	**102**		4.82	41.6	ug/Kg	50	01/17/2012 17:26
Chloroethane	ND	U	12.9	41.6	ug/Kg	50	01/17/2012 17:26
Chloroform	ND	U	5.78	41.6	ug/Kg	50	01/17/2012 17:26
Chloromethane	ND	U	18.6	41.6	ug/Kg	50	01/17/2012 17:26
Cyclohexane	ND	U	6.78	41.6	ug/Kg	50	01/17/2012 17:26
Dibromochloromethane	ND	U	5.57	41.6	ug/Kg	50	01/17/2012 17:26
Dichlorodifluoromethane	ND	U	7.11	208	ug/Kg	50	01/17/2012 17:26
cis-1,3-Dichloropropene	ND	U	3.19	41.6	ug/Kg	50	01/17/2012 17:26
trans-1,3-Dichloropropene	ND	U	3.58	41.6	ug/Kg	50	01/17/2012 17:26
Ethyl Benzene	**7.49**	J	3.65	41.6	ug/Kg	50	01/17/2012 17:26
Isopropylbenzene (Cumene)	**4.57**	J	3.61	41.6	ug/Kg	50	01/17/2012 17:26
Methyl Acetate	**100**	J	41.6	416	ug/Kg	50	01/17/2012 17:26
Methylcyclohexane	ND	U	4.49	41.6	ug/Kg	50	01/17/2012 17:26
Methylene chloride	**26.2**	J	6.32	208	ug/Kg	50	01/17/2012 17:26
Styrene	ND	U	4.24	41.6	ug/Kg	50	01/17/2012 17:26
Tetrachloroethene	ND	U	6.45	41.6	ug/Kg	50	01/17/2012 17:26
Toluene	**8.73**	J	5.53	41.6	ug/Kg	50	01/17/2012 17:26

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Results of **5th-4-1**

Client Sample ID: **5th-4-1**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102008-D
Lab Project ID: 31200102

Collection Date: 01/10/2012 15:40
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 80.00

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Trichloroethene	ND	U	5.20	41.6	ug/Kg	50	01/17/2012 17:26
Trichlorofluoromethane	ND	U	5.70	41.6	ug/Kg	50	01/17/2012 17:26
Trichlorotrifluoroethane	ND	U	5.12	41.6	ug/Kg	50	01/17/2012 17:26
Vinyl chloride	ND	U	5.16	41.6	ug/Kg	50	01/17/2012 17:26
cis-1,2-Dichloroethene	ND	U	5.66	41.6	ug/Kg	50	01/17/2012 17:26
m,p-Xylene	**11.2**	J	7.57	83.2	ug/Kg	50	01/17/2012 17:26
o-Xylene	ND	U	3.63	41.6	ug/Kg	50	01/17/2012 17:26
tert-Butyl methyl ether (MTBE)	ND	U	5.99	41.6	ug/Kg	50	01/17/2012 17:26
trans-1,2-Dichloroethene	ND	U	9.27	41.6	ug/Kg	50	01/17/2012 17:26
Surrogates							
1,2-Dichloroethane-d4	110			55.0-173	%	50	01/17/2012 17:26
4-Bromofluorobenzene	99.0			23.0-141	%	50	01/17/2012 17:26
Toluene d8	98.0			57.0-134	%	50	01/17/2012 17:26

Batch Information

Analytical Batch: **VMS1830**
Analytical Method: **SW-846 8260B**
Instrument: **MSD4**
Analyst: **DVO**
Analytical Date/Time: **01/17/2012 17:26**

Prep Batch: **VXX2639**
Prep Method: **SW-846 5035 SM**
Prep Date/Time: **01/17/2012 08:00**
Prep Initial Wt./Vol.: **7.51 g**
Prep Extract Vol: **5 mL**

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Results of **5th-4-1**

Client Sample ID: **5th-4-1**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102008-E
Lab Project ID: 31200102

Collection Date: 01/10/2012 15:40
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 80.00

Results by **SW-846 6010C**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Zinc	**2550**		132	236	mg/kg	100	01/17/2012 13:06
Barium	**66.5**		0.154	11.8	mg/kg	1	01/16/2012 17:18
Manganese	**235**		3.23	11.8	mg/kg	10	01/17/2012 13:02
Iron	**36300**		1110	1180	mg/kg	100	01/17/2012 13:06
Chromium	**58.3**		0.170	1.18	mg/kg	1	01/16/2012 17:18
Magnesium	**1840**		58.2	118	mg/kg	10	01/17/2012 13:02
Aluminum	**17700**		249	1180	mg/kg	100	01/17/2012 13:06
Calcium	**22800**		831	1180	mg/kg	100	01/17/2012 13:06
Sodium	**86.1**		2.20	23.6	mg/kg	1	01/16/2012 17:18
Potassium	**372**		2.44	23.6	mg/kg	1	01/16/2012 17:18

Batch Information

Analytical Batch: **MIP1395**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/16/2012 17:18**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.53 g**
Prep Extract Vol: **50 mL**

Analytical Batch: **MIP1397**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**
Analytical Date/Time: **01/17/2012 13:06**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.53 g**
Prep Extract Vol: **50 mL**

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Results of **5th-4-1**

Client Sample ID: **5th-4-1**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102008-E
Lab Project ID: 31200102

Collection Date: 01/10/2012 15:40
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 80.00

Results by **SW-846 7471B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Mercury	**2.31**		0.0108	0.240	mg/kg	10	01/18/2012 11:27

Batch Information

Analytical Batch: **MHG1188**
Analytical Method: **SW-846 7471B**
Instrument: **HG2**
Analyst: **NTM**
Analytical Date/Time: **01/18/2012 11:27**

Prep Batch: **MXX1748**
Prep Method: **SW-846 7471B PREP**
Prep Date/Time: **01/18/2012 08:43**
Prep Initial Wt./Vol.: **.52 g**
Prep Extract Vol: **50 mL**

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Results of **5th-4-1**

Client Sample ID: **5th-4-1**
Client Project ID: **HPDTA**
Lab Sample ID: 31200102008-E
Lab Project ID: 31200102

Collection Date: 01/10/2012 15:40
Received Date: 01/13/2012 10:15
Matrix: Soil-Solid as dry weight
Solids (%): 80.00

Results by **SW-846 6020A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
Antimony	**3.75**		0.0636	0.118	mg/kg	10	01/18/2012 18:12
Arsenic	**3.79**		0.103	0.118	mg/kg	10	01/18/2012 13:35
Beryllium	**0.0412**	J	0.0105	0.0589	mg/kg	5	01/18/2012 13:31
Cadmium	**7.35**		0.0210	0.118	mg/kg	10	01/18/2012 18:12
Cobalt	**3.39**		0.00295	0.118	mg/kg	10	01/18/2012 18:12
Copper	**148**		1.21	11.8	mg/kg	100	01/19/2012 10:47
Lead	**692**		1.54	11.8	mg/kg	1000	01/18/2012 18:19
Nickel	**28.2**		0.747	1.18	mg/kg	100	01/18/2012 18:15
Selenium	**0.236**		0.160	0.236	mg/kg	10	01/18/2012 18:12
Silver	**0.153**		0.0230	0.118	mg/kg	10	01/18/2012 13:35
Thallium	**0.0471**	J	0.0289	0.118	mg/kg	10	01/18/2012 13:35
Vanadium	**9.89**		0.0397	0.118	mg/kg	10	01/18/2012 18:12

Batch Information

Analytical Batch: **MMS1143**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 13:35**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.53 g**
Prep Extract Vol: **50 mL**

Analytical Batch: **MMS1144**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/18/2012 18:12**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.53 g**
Prep Extract Vol: **50 mL**

Analytical Batch: **MMS1145**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**
Analytical Date/Time: **01/19/2012 10:47**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Prep Initial Wt./Vol.: **.53 g**
Prep Extract Vol: **50 mL**

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Batch Summary

Analytical Method: SW-846 8260B

Prep Method: SW-846 5030B
Prep Batch: VXX2625
Prep Date: 01/17/2012 08:17

Client Sample ID	Lab Sample ID	Analysis Date	Analytical Batch	Instrument	Analyst
LCS for HBN 19159 [VXX/2625]	54500	01/17/2012 09:32	VMS1830	MSD4	DVO
LCSD for HBN 19159 [VXX/2625]	54501	01/17/2012 09:56	VMS1830	MSD4	DVO
MB for HBN 19159 [VXX/2625]	54502	01/17/2012 11:37	VMS1830	MSD4	DVO
5th-1	31200102001	01/17/2012 14:06	VMS1830	MSD4	DVO
5th-2	31200102002	01/17/2012 14:31	VMS1830	MSD4	DVO
5th-3	31200102003	01/17/2012 14:56	VMS1830	MSD4	DVO
5th-4	31200102004	01/17/2012 15:21	VMS1830	MSD4	DVO
IDW-1-WATER(54442MS)	54705	01/17/2012 19:32	VMS1830	MSD4	DVO
IDW-1-WATER(54442MSD)	54706	01/17/2012 19:57	VMS1830	MSD4	DVO

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Method Blank

Blank ID: MB for HBN 19159 [VXX/2625]
Blank Lab ID: 54502
QC for Samples:
31200102001, 31200102002, 31200102003, 31200102004

Matrix: Water

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
Dichlorodifluoromethane	ND	U	0.171	5.00	ug/L	1
Chloromethane	ND	U	0.448	1.00	ug/L	1
Methyl Acetate	ND	U	1.00	10.0	ug/L	1
Trichlorotrifluoroethane	ND	U	0.123	1.00	ug/L	1
Cyclohexane	ND	U	0.163	1.00	ug/L	1
Vinyl chloride	ND	U	0.124	1.00	ug/L	1
Methylcyclohexane	ND	U	0.108	1.00	ug/L	1
Bromomethane	ND	U	0.237	1.00	ug/L	1
Chloroethane	ND	U	0.311	1.00	ug/L	1
Trichlorofluoromethane	ND	U	0.137	1.00	ug/L	1
1,1-Dichloroethene	ND	U	0.212	1.00	ug/L	1
Acetone	ND	U	0.864	25.0	ug/L	1
Methylene chloride	ND	U	0.152	5.00	ug/L	1
trans-1,2-Dichloroethene	ND	U	0.223	1.00	ug/L	1
tert-Butyl methyl ether (MTBE)	ND	U	0.144	1.00	ug/L	1
1,1-Dichloroethane	ND	U	0.165	1.00	ug/L	1
cis-1,2-Dichloroethene	ND	U	0.136	1.00	ug/L	1
2-Butanone	ND	U	0.723	25.0	ug/L	1
Bromochloromethane	ND	U	0.211	1.00	ug/L	1
Chloroform	ND	U	0.139	1.00	ug/L	1
1,1,1-Trichloroethane	ND	U	0.123	1.00	ug/L	1
Carbon tetrachloride	ND	U	0.101	1.00	ug/L	1
Benzene	ND	U	0.113	1.00	ug/L	1
1,2-Dichloroethane	ND	U	0.167	1.00	ug/L	1
Trichloroethene	ND	U	0.125	1.00	ug/L	1
1,2-Dichloropropane	ND	U	0.163	1.00	ug/L	1
Bromodichloromethane	ND	U	0.110	1.00	ug/L	1
1,4 Dioxane	ND	U	14.4	100	ug/L	1
cis-1,3-Dichloropropene	ND	U	0.0767	1.00	ug/L	1
4-Methyl-2-pentanone	ND	U	0.558	5.00	ug/L	1
Toluene	ND	U	0.133	1.00	ug/L	1
trans-1,3-Dichloropropene	ND	U	0.0862	1.00	ug/L	1
Carbon disulfide	ND	U	0.106	1.00	ug/L	1
1,1,2-Trichloroethane	ND	U	0.126	1.00	ug/L	1
Tetrachloroethene	ND	U	0.155	1.00	ug/L	1
2-Hexanone	ND	U	0.728	5.00	ug/L	1
Dibromochloromethane	ND	U	0.134	1.00	ug/L	1
1,2-Dibromoethane	ND	U	0.120	1.00	ug/L	1
Chlorobenzene	ND	U	0.116	1.00	ug/L	1
Bromoform	ND	U	0.0974	1.00	ug/L	1
1,1,2,2-Tetrachloroethane	ND	U	0.156	1.00	ug/L	1

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Method Blank

Blank ID: MB for HBN 19159 [VXX/2625]
Blank Lab ID: 54502
QC for Samples:
31200102001, 31200102002, 31200102003, 31200102004

Matrix: Water

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
Ethyl Benzene	ND	U	0.0877	1.00	ug/L	1
m,p-Xylene	ND	U	0.182	2.00	ug/L	1
Styrene	ND	U	0.102	1.00	ug/L	1
o-Xylene	ND	U	0.0874	1.00	ug/L	1
Isopropylbenzene (Cumene)	ND	U	0.0869	1.00	ug/L	1
1,3,5-Trimethylbenzene	ND	U	0.113	1.00	ug/L	1
1,3-Dichlorobenzene	ND	U	0.103	1.00	ug/L	1
1,4-Dichlorobenzene	ND	U	0.130	1.00	ug/L	1
1,2-Dichlorobenzene	ND	U	0.137	1.00	ug/L	1
1,2-Dibromo-3-chloropropane	ND	U	0.748	5.00	ug/L	1
1,2,4-Trichlorobenzene	ND	U	0.0913	1.00	ug/L	1
1,2,3-Trichlorobenzene	ND	U	0.110	1.00	ug/L	1
Surrogates						
1,2-Dichloroethane-d4	109			64.0-140	%	1
Toluene d8	97.0			82.0-117	%	1
4-Bromofluorobenzene	97.0			85.0-115	%	1

Batch Information

Analytical Batch: VMS1830
Analytical Method: SW-846 8260B
Instrument: MSD4
Analyst: DVO
Analytical Date/Time: 1/17/2012 11:37:00AM

Prep Batch: VXX2625
Prep Method: SW-846 5030B
Prep Date/Time: 1/17/2012 8:17:18AM
Prep Initial Wt./Vol.: 40 mL
Prep Extract Vol: 40 mL

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Blank Spike Summary

Blank Spike ID: LCS for HBN 19159 [VXX/2625]
Blank Spike Lab ID: 54500
Date Analyzed: 01/17/2012 09:32

Spike Duplicate ID: LCSD for HBN 19159 [VXX/2625]
Spike Duplicate Lab ID: 54501
Date Analyzed: 01/17/2012 09:56
Matrix: Water

QC for Samples: 31200102001, 31200102002, 31200102003, 31200102004

Results by **SW-846 8260B**

	Blank Spike (ug/L)			Spike Duplicate (ug/L)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Dichlorodifluoromethane	5.00	5.38	108	5.00	5.06	101	33.0-170	6.1	30.00
Chloromethane	5.00	5.68	114	5.00	5.42	108	57.0-132	4.7	30.00
Vinyl chloride	5.00	5.51	110	5.00	5.28	106	59.0-138	4.3	30.00
Bromomethane	5.00	5.51	110	5.00	5.02	100	51.0-134	9.3	30.00
Chloroethane	5.00	6.17	123	5.00	6.16	123	64.0-145	0.16	30.00
Trichlorofluoromethane	5.00	5.87	117	5.00	5.68	114	64.0-133	3.3	30.00
1,1-Dichloroethene	5.00	4.60	92	5.00	4.87	97	71.0-128	5.7	30.00
Acetone	25.0	26.3	105	25.0	28.5	114	52.0-140	8.0	30.00
Methylene chloride	5.00	4.64	93	5.00	4.96	99	70.0-113	6.7	30.00
trans-1,2-Dichloroethene	5.00	4.57	91	5.00	4.89	98	57.0-138	6.8	30.00
tert-Butyl methyl ether (MTBE)	5.00	4.88	98	5.00	5.14	103	47.0-142	5.2	30.00
1,1-Dichloroethane	5.00	4.89	98	5.00	5.12	102	68.0-133	4.6	30.00
cis-1,2-Dichloroethene	5.00	4.66	93	5.00	5.06	101	73.0-128	8.2	30.00
2-Butanone	25.0	23.5	94	25.0	25.3	101	58.0-134	7.4	30.00
Bromochloromethane	5.00	4.65	93	5.00	5.08	102	73.0-128	8.8	30.00
Chloroform	5.00	4.81	96	5.00	5.05	101	74.0-124	4.9	30.00
1,1,1-Trichloroethane	5.00	4.60	92	5.00	4.89	98	76.0-119	6.1	30.00
Carbon tetrachloride	5.00	4.34	87	5.00	4.54	91	75.0-120	4.5	30.00
Benzene	5.00	4.53	91	5.00	4.89	98	76.0-124	7.6	30.00
1,2-Dichloroethane	5.00	5.15	103	5.00	5.40	108	76.0-119	4.7	30.00
Trichloroethene	5.00	4.43	89	5.00	4.73	95	74.0-121	6.6	30.00
1,2-Dichloropropane	5.00	4.53	91	5.00	4.73	95	74.0-124	4.3	30.00
Bromodichloromethane	5.00	4.81	96	5.00	5.04	101	72.0-120	4.7	30.00
cis-1,3-Dichloropropene	5.00	4.50	90	5.00	4.77	95	73.0-122	5.8	30.00
4-Methyl-2-pentanone	25.0	22.8	91	25.0	24.5	98	65.0-124	7.2	30.00
Toluene	5.00	4.60	92	5.00	4.90	98	75.0-123	6.3	30.00
trans-1,3-Dichloropropene	5.00	4.29	86	5.00	4.52	90	70.0-125	5.2	30.00
Carbon disulfide	5.00	5.39	108	5.00	5.59	112	65.0-132	3.6	30.00
1,1,2-Trichloroethane	5.00	4.57	91	5.00	5.07	101	76.0-121	10	30.00
Tetrachloroethene	5.00	4.41	88	5.00	4.72	94	59.0-112	6.8	30.00
2-Hexanone	25.0	22.4	90	25.0	24.4	97	56.0-133	8.5	30.00
Dibromochloromethane	5.00	4.24	85	5.00	4.69	94	67.0-122	10	30.00
1,2-Dibromoethane	5.00	4.44	89	5.00	4.78	96	74.0-119	7.4	30.00
Chlorobenzene	5.00	4.33	87	5.00	4.82	96	74.0-120	11	30.00

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Blank Spike Summary

Blank Spike ID: LCS for HBN 19159 [VXX/2625]
Blank Spike Lab ID: 54500
Date Analyzed: 01/17/2012 09:32

Spike Duplicate ID: LCSD for HBN 19159 [VXX/2625]
Spike Duplicate Lab ID: 54501
Date Analyzed: 01/17/2012 09:56
Matrix: Water

QC for Samples: 31200102001, 31200102002, 31200102003, 31200102004

Results by **SW-846 8260B**

	Blank Spike (ug/L)			Spike Duplicate (ug/L)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Bromoform	5.00	3.91	78	5.00	4.12	82	62.0-127	5.2	30.00
1,1,2,2-Tetrachloroethane	5.00	4.77	95	5.00	5.22	104	68.0-129	9.0	30.00
Ethyl Benzene	5.00	4.62	92	5.00	4.83	97	76.0-123	4.4	30.00
m,p-Xylene	10.0	9.22	92	10.0	9.76	98	76.0-124	5.7	30.00
Styrene	5.00	4.48	90	5.00	4.82	96	76.0-121	7.3	30.00
o-Xylene	5.00	4.44	89	5.00	4.79	96	75.0-124	7.6	30.00
Isopropylbenzene (Cumene)	5.00	4.66	93	5.00	5.01	100	77.0-120	7.2	30.00
1,3,5-Trimethylbenzene	5.00	4.81	96	5.00	5.03	101	76.0-122	4.5	30.00
1,3-Dichlorobenzene	5.00	4.55	91	5.00	4.96	99	75.0-120	8.6	30.00
1,4-Dichlorobenzene	5.00	4.50	90	5.00	4.84	97	70.0-125	7.3	30.00
1,2-Dichlorobenzene	5.00	4.66	93	5.00	4.85	97	76.0-118	4.0	30.00
1,2-Dibromo-3-chloropropane	30.0	27.6	92	30.0	30.5	102	62.0-130	10	30.00
1,2,4-Trichlorobenzene	5.00	4.44	89	5.00	4.72	94	72.0-119	6.1	30.00
1,2,3-Trichlorobenzene	5.00	4.53	91	5.00	4.76	95	68.0-123	5.0	30.00
Surrogates									
1,2-Dichloroethane-d4			107			108	64.0-140		
Toluene d8			98			99	82.0-117		
4-Bromofluorobenzene			98			100	85.0-115		

Batch Information

Analytical Batch: **VMS1830**
Analytical Method: **SW-846 8260B**
Instrument: **MSD4**
Analyst: **DVO**

Prep Batch: **VXX2625**
Prep Method: **SW-846 5030B**
Prep Date/Time: **01/17/2012 08:17**
Spike Init Wt./Vol.: **40 mL** Extract Vol: **40 mL**
Dupe Init Wt./Vol.: **40 mL** Extract Vol: **40 mL**

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Batch Summary

Analytical Method: SW-846 8260B

Prep Method: SW-846 5035 SM
Prep Batch: VXX2639
Prep Date: 01/17/2012 08:00

Client Sample ID	Lab Sample ID	Analysis Date	Analytical Batch	Instrument	Analyst
LCS-S for HBN 19210 [VXX/2639]	54697	01/17/2012 09:32	VMS1830	MSD4	DVO
LCSD-S for HBN 19210 [VXX/2639	54698	01/17/2012 09:56	VMS1830	MSD4	DVO
MB-S for HBN 19210 [VXX/2639]	54696	01/17/2012 12:02	VMS1830	MSD4	DVO
Trip Blanks (Not on COC)	31200102009	01/17/2012 13:41	VMS1830	MSD4	DVO
5th-4-1	31200102008	01/17/2012 17:26	VMS1830	MSD4	DVO

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Method Blank

Blank ID: MB-S for HBN 19210 [VXX/2639]
Blank Lab ID: 54696
QC for Samples:
31200102008, 31200102009

Matrix: Soil-Solid as dry weight

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
Dichlorodifluoromethane	ND	U	8.55	250	ug/Kg	50
Chloromethane	ND	U	22.4	50.0	ug/Kg	50
Vinyl chloride	ND	U	6.20	50.0	ug/Kg	50
Bromomethane	ND	U	11.9	50.0	ug/Kg	50
Chloroethane	ND	U	15.6	50.0	ug/Kg	50
Trichlorofluoromethane	ND	U	6.85	50.0	ug/Kg	50
1,1-Dichloroethene	ND	U	10.6	50.0	ug/Kg	50
Acetone	ND	U	43.2	1250	ug/Kg	50
Methylene chloride	ND	U	7.60	250	ug/Kg	50
trans-1,2-Dichloroethene	ND	U	11.2	50.0	ug/Kg	50
tert-Butyl methyl ether (MTBE)	ND	U	7.20	50.0	ug/Kg	50
1,1-Dichloroethane	ND	U	8.25	50.0	ug/Kg	50
cis-1,2-Dichloroethene	ND	U	6.80	50.0	ug/Kg	50
2-Butanone	ND	U	36.2	1250	ug/Kg	50
Bromochloromethane	ND	U	10.6	50.0	ug/Kg	50
Chloroform	ND	U	6.95	50.0	ug/Kg	50
1,1,1-Trichloroethane	ND	U	6.15	50.0	ug/Kg	50
Carbon tetrachloride	ND	U	5.05	50.0	ug/Kg	50
Benzene	ND	U	5.65	50.0	ug/Kg	50
1,2-Dichloroethane	ND	U	8.35	50.0	ug/Kg	50
Trichloroethene	ND	U	6.25	50.0	ug/Kg	50
1,2-Dichloropropane	ND	U	8.15	50.0	ug/Kg	50
Bromodichloromethane	ND	U	5.50	50.0	ug/Kg	50
1,4 Dioxane	ND	U	720	5000	ug/Kg	50
cis-1,3-Dichloropropene	ND	U	3.84	50.0	ug/Kg	50
4-Methyl-2-pentanone	ND	U	27.9	250	ug/Kg	50
Toluene	ND	U	6.65	50.0	ug/Kg	50
trans-1,3-Dichloropropene	ND	U	4.31	50.0	ug/Kg	50
Carbon disulfide	ND	U	5.30	50.0	ug/Kg	50
1,1,2-Trichloroethane	ND	U	6.30	50.0	ug/Kg	50
Tetrachloroethene	ND	U	7.75	50.0	ug/Kg	50
2-Hexanone	ND	U	36.4	250	ug/Kg	50
Dibromochloromethane	ND	U	6.70	50.0	ug/Kg	50
1,2-Dibromoethane	ND	U	6.00	50.0	ug/Kg	50
Chlorobenzene	ND	U	5.80	50.0	ug/Kg	50
Bromoform	ND	U	4.87	50.0	ug/Kg	50
1,1,2,2-Tetrachloroethane	ND	U	7.80	50.0	ug/Kg	50
Ethyl Benzene	ND	U	4.39	50.0	ug/Kg	50
m,p-Xylene	ND	U	9.10	100	ug/Kg	50
Styrene	ND	U	5.10	50.0	ug/Kg	50
o-Xylene	ND	U	4.37	50.0	ug/Kg	50

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Method Blank

Blank ID: MB-S for HBN 19210 [VXX/2639]
Blank Lab ID: 54696
QC for Samples:
31200102008, 31200102009

Matrix: Soil-Solid as dry weight

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
Isopropylbenzene (Cumene)	ND	U	4.35	50.0	ug/Kg	50
1,3-Dichlorobenzene	ND	U	5.15	50.0	ug/Kg	50
1,4-Dichlorobenzene	ND	U	6.50	50.0	ug/Kg	50
1,2-Dichlorobenzene	ND	U	6.85	50.0	ug/Kg	50
1,2-Dibromo-3-chloropropane	ND	U	37.4	250	ug/Kg	50
1,2,4-Trichlorobenzene	ND	U	4.57	50.0	ug/Kg	50
1,2,3-Trichlorobenzene	ND	U	5.50	50.0	ug/Kg	50
Cyclohexane	ND	U	8.15	50.0	ug/Kg	50
Methyl Acetate	ND	U	50.0	500	ug/Kg	50
Methylcyclohexane	ND	U	5.40	50.0	ug/Kg	50
Trichlorotrifluoroethane	ND	U	6.15	50.0	ug/Kg	50
Surrogates						
1,2-Dichloroethane-d4	107			55.0-173	%	50
Toluene d8	97.0			57.0-134	%	50
4-Bromofluorobenzene	96.0			23.0-141	%	50

Batch Information

Analytical Batch: VMS1830
Analytical Method: SW-846 8260B
Instrument: MSD4
Analyst: DVO
Analytical Date/Time: 1/17/2012 12:02:00PM

Prep Batch: VXX2639
Prep Method: SW-846 5035 SM
Prep Date/Time: 1/17/2012 8:00:00AM
Prep Initial Wt./Vol.: 5 g
Prep Extract Vol: 5 mL

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Blank Spike Summary

Blank Spike ID: LCS-S for HBN 19210 [VXX/2639]
Blank Spike Lab ID: 54697
Date Analyzed: 01/17/2012 09:32

Spike Duplicate ID: LCSD-S for HBN 19210 [VXX/2639
Spike Duplicate Lab ID: 54698
Matrix: Soil-Solid as dry weight

QC for Samples: 31200102008, 31200102009

Results by **SW-846 8260B**

	Blank Spike (ug/Kg)			Spike Duplicate (ug/Kg)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Dichlorodifluoromethane	250	269	108	250	253	101	70.0-130	6.1	30.00
Chloromethane	250	284	114	250	271	108	70.0-130	4.7	30.00
Vinyl chloride	250	276	110	250	264	106	70.0-130	4.4	30.00
Bromomethane	250	276	110	250	251	100	70.0-130	9.5	30.00
Chloroethane	250	309	123	250	308	123	70.0-130	0.32	30.00
Trichlorofluoromethane	250	294	117	250	284	114	70.0-130	3.5	30.00
1,1-Dichloroethene	250	230	92	250	244	97	70.0-130	5.9	30.00
Acetone	1250	1310	105	1250	1420	114	70.0-130	8.1	30.00
Methylene chloride	250	232	93	250	248	99	70.0-130	6.7	30.00
trans-1,2-Dichloroethene	250	229	91	250	245	98	70.0-130	6.8	30.00
tert-Butyl methyl ether (MTBE)	250	244	98	250	257	103	70.0-130	5.2	30.00
1,1-Dichloroethane	250	245	98	250	256	102	70.0-130	4.4	30.00
cis-1,2-Dichloroethene	250	233	93	250	253	101	70.0-130	8.2	30.00
2-Butanone	1250	1180	94	1250	1270	101	70.0-130	7.3	30.00
Bromochloromethane	250	233	93	250	254	102	70.0-130	8.6	30.00
Chloroform	250	241	96	250	253	101	70.0-130	4.9	30.00
1,1,1-Trichloroethane	250	230	92	250	245	98	70.0-130	6.3	30.00
Carbon tetrachloride	250	217	87	250	227	91	70.0-130	4.5	30.00
Benzene	250	227	91	250	245	98	70.0-130	7.6	30.00
1,2-Dichloroethane	250	258	103	250	270	108	70.0-130	4.5	30.00
Trichloroethene	250	222	89	250	237	95	70.0-130	6.5	30.00
1,2-Dichloropropane	250	227	91	250	237	95	70.0-130	4.3	30.00
Bromodichloromethane	250	241	96	250	252	101	70.0-130	4.5	30.00
cis-1,3-Dichloropropene	250	225	90	250	239	95	70.0-130	6.0	30.00
4-Methyl-2-pentanone	1250	1140	91	1250	1230	98	70.0-130	7.6	30.00
Toluene	250	230	92	250	245	98	70.0-130	6.3	30.00
trans-1,3-Dichloropropene	250	215	86	250	226	90	70.0-130	5.0	30.00
Carbon disulfide	250	270	108	250	280	112	70.0-130	3.6	30.00
1,1,2-Trichloroethane	250	229	91	250	254	101	70.0-130	10	30.00
Tetrachloroethene	250	221	88	250	236	94	70.0-130	6.6	30.00
2-Hexanone	1250	1120	90	1250	1220	97	70.0-130	8.5	30.00
Dibromochloromethane	250	212	85	250	235	94	70.0-130	10	30.00
1,2-Dibromoethane	250	222	89	250	239	96	70.0-130	7.4	30.00
Chlorobenzene	250	217	87	250	241	96	70.0-130	10	30.00

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Blank Spike Summary

Blank Spike ID: LCS-S for HBN 19210 [VXX/2639]
Blank Spike Lab ID: 54697
Date Analyzed: 01/17/2012 09:32

Spike Duplicate ID: LCSD-S for HBN 19210 [VXX/2639
Spike Duplicate Lab ID: 54698
Matrix: Soil-Solid as dry weight

QC for Samples: 31200102008, 31200102009

Results by **SW-846 8260B**

	Blank Spike (ug/Kg)			Spike Duplicate (ug/Kg)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Bromoform	250	196	78	250	206	82	70.0-130	5.0	30.00
1,1,2,2-Tetrachloroethane	250	239	95	250	261	104	70.0-130	8.8	30.00
Ethyl Benzene	250	231	92	250	242	97	70.0-130	4.7	30.00
m,p-Xylene	500	461	92	500	488	98	70.0-130	5.7	30.00
Styrene	250	224	90	250	241	96	70.0-130	7.3	30.00
o-Xylene	250	222	89	250	240	96	70.0-130	7.8	30.00
Isopropylbenzene (Cumene)	250	233	93	250	251	100	70.0-130	7.4	30.00
1,3-Dichlorobenzene	250	228	91	250	248	99	70.0-130	8.4	30.00
1,4-Dichlorobenzene	250	225	90	250	242	97	70.0-130	7.3	30.00
1,2-Dichlorobenzene	250	233	93	250	243	97	70.0-130	4.2	30.00
1,2-Dibromo-3-chloropropane	1500	1380	92	1500	1530	102	70.0-130	10	30.00
1,2,4-Trichlorobenzene	250	222	89	250	236	94	70.0-130	6.1	30.00
1,2,3-Trichlorobenzene	250	227	91	250	238	95	70.0-130	4.7	30.00
Surrogates									
1,2-Dichloroethane-d4			107			108	55.0-173		
Toluene d8			98			99	57.0-134		
4-Bromofluorobenzene			98			100	23.0-141		

Batch Information

Analytical Batch: **VMS1830**
Analytical Method: **SW-846 8260B**
Instrument: **MSD4**
Analyst: **DVO**

Prep Batch: **VXX2639**
Prep Method: **SW-846 5035 SM**
Prep Date/Time: **01/17/2012 08:00**
Spike Init Wt./Vol.: **5 g** Extract Vol: **5 mL**
Dupe Init Wt./Vol.: **5 g** Extract Vol: **5 mL**

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Batch Summary

Analytical Method: SW-846 8260B

Prep Method: SW-846 5035 SL
Prep Batch: VXX2646
Prep Date: 01/19/2012 08:37

Client Sample ID	Lab Sample ID	Analysis Date	Analytical Batch	Instrument	Analyst
LCS-S for HBN 19230 [VXX/2646]	54808	01/19/2012 13:19	VMS1844	MSD4	DVO
LCSD-S for HBN 19230 [VXX/2646	54809	01/19/2012 13:45	VMS1844	MSD4	DVO
MB-S for HBN 19230 [VXX/2646]	54810	01/19/2012 15:30	VMS1844	MSD4	DVO
5th-1-2	31200102005	01/19/2012 16:22	VMS1844	MSD4	DVO
5th-2-1	31200102006	01/19/2012 16:48	VMS1844	MSD4	DVO
5th-3-1	31200102007	01/19/2012 17:14	VMS1844	MSD4	DVO
5th-2-1(54320DUP)	54910	01/19/2012 19:51	VMS1844	MSD4	DVO
5th-1-2(54319MS)	54911	01/19/2012 20:17	VMS1844	MSD4	DVO

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Method Blank

Blank ID: MB-S for HBN 19230 [VXX/2646]
Blank Lab ID: 54810
QC for Samples:
31200102005, 31200102006, 31200102007

Matrix: Soil-Solid as dry weight

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
Dichlorodifluoromethane	ND	U	0.727	5.00	ug/Kg	1
Chloromethane	ND	U	0.725	5.00	ug/Kg	1
Vinyl chloride	ND	U	0.736	5.00	ug/Kg	1
Bromomethane	ND	U	1.76	5.00	ug/Kg	1
Chloroethane	ND	U	0.460	5.00	ug/Kg	1
Trichlorofluoromethane	ND	U	0.754	5.00	ug/Kg	1
1,1-Dichloroethene	ND	U	0.903	5.00	ug/Kg	1
Acetone	ND	U	1.24	50.0	ug/Kg	1
Methylene chloride	**1.60**	J	0.698	20.0	ug/Kg	1
trans-1,2-Dichloroethene	ND	U	0.861	5.00	ug/Kg	1
tert-Butyl methyl ether (MTBE)	ND	U	0.852	5.00	ug/Kg	1
1,1-Dichloroethane	ND	U	0.863	5.00	ug/Kg	1
cis-1,2-Dichloroethene	ND	U	0.775	5.00	ug/Kg	1
2-Butanone	ND	U	1.56	25.0	ug/Kg	1
Bromochloromethane	ND	U	0.873	5.00	ug/Kg	1
Chloroform	ND	U	0.812	5.00	ug/Kg	1
1,1,1-Trichloroethane	ND	U	0.778	5.00	ug/Kg	1
Carbon tetrachloride	ND	U	0.870	5.00	ug/Kg	1
Benzene	ND	U	0.893	5.00	ug/Kg	1
1,2-Dichloroethane	ND	U	0.886	5.00	ug/Kg	1
Trichloroethene	ND	U	0.837	5.00	ug/Kg	1
1,2-Dichloropropane	ND	U	0.805	5.00	ug/Kg	1
Bromodichloromethane	ND	U	0.813	5.00	ug/Kg	1
1,4 Dioxane	ND	U	68.1	500	ug/Kg	1
cis-1,3-Dichloropropene	ND	U	0.861	5.00	ug/Kg	1
4-Methyl-2-pentanone	ND	U	3.21	12.5	ug/Kg	1
Toluene	ND	U	0.810	5.00	ug/Kg	1
trans-1,3-Dichloropropene	ND	U	0.896	5.00	ug/Kg	1
Carbon disulfide	ND	U	0.864	5.00	ug/Kg	1
1,1,2-Trichloroethane	ND	U	1.04	5.00	ug/Kg	1
Tetrachloroethene	ND	U	0.752	5.00	ug/Kg	1
2-Hexanone	ND	U	1.95	12.5	ug/Kg	1
Dibromochloromethane	ND	U	0.847	5.00	ug/Kg	1
1,2-Dibromoethane	ND	U	0.758	5.00	ug/Kg	1
Chlorobenzene	ND	U	0.774	5.00	ug/Kg	1
Bromoform	ND	U	0.669	5.00	ug/Kg	1
1,1,2,2-Tetrachloroethane	ND	U	1.13	5.00	ug/Kg	1
Ethyl Benzene	ND	U	0.827	5.00	ug/Kg	1
m,p-Xylene	ND	U	1.77	10.0	ug/Kg	1
Styrene	ND	U	0.986	5.00	ug/Kg	1
o-Xylene	ND	U	1.01	5.00	ug/Kg	1

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Method Blank

Blank ID: MB-S for HBN 19230 [VXX/2646]
Blank Lab ID: 54810
QC for Samples:
31200102005, 31200102006, 31200102007

Matrix: Soil-Solid as dry weight

Results by **SW-846 8260B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
Isopropylbenzene (Cumene)	ND	U	0.963	5.00	ug/Kg	1
1,3-Dichlorobenzene	ND	U	1.16	5.00	ug/Kg	1
1,4-Dichlorobenzene	ND	U	1.10	5.00	ug/Kg	1
1,2-Dichlorobenzene	ND	U	1.29	5.00	ug/Kg	1
1,2-Dibromo-3-chloropropane	ND	U	5.81	30.0	ug/Kg	1
1,2,4-Trichlorobenzene	ND	U	1.19	5.00	ug/Kg	1
1,2,3-Trichlorobenzene	ND	U	1.39	5.00	ug/Kg	1
Cyclohexane	ND	U	0.930	5.00	ug/Kg	1
Methyl Acetate	ND	U	8.85	50.0	ug/Kg	1
Methylcyclohexane	ND	U	0.865	5.00	ug/Kg	1
Trichlorotrifluoroethane	ND	U	5.00	5.00	ug/Kg	1
Surrogates						
1,2-Dichloroethane-d4	107			55.0-173	%	1
Toluene d8	99.0			57.0-134	%	1
4-Bromofluorobenzene	99.0			23.0-141	%	1

Batch Information

Analytical Batch: VMS1844
Analytical Method: SW-846 8260B
Instrument: MSD4
Analyst: DVO
Analytical Date/Time: 1/19/2012 3:30:00PM

Prep Batch: VXX2646
Prep Method: SW-846 5035 SL
Prep Date/Time: 1/19/2012 8:37:52AM
Prep Initial Wt./Vol.: 5 g
Prep Extract Vol: 5 mL

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Blank Spike Summary

Blank Spike ID: LCS-S for HBN 19230 [VXX/2646]
Blank Spike Lab ID: 54808
Date Analyzed: 01/19/2012 13:19

Spike Duplicate ID: LCSD-S for HBN 19230 [VXX/2646
Spike Duplicate Lab ID: 54809
Matrix: Soil-Solid as dry weight

QC for Samples: 31200102005, 31200102006, 31200102007

Results by **SW-846 8260B**

	Blank Spike (ug/Kg)			Spike Duplicate (ug/Kg)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Dichlorodifluoromethane	30.0	30.6	102	30.0	30.4	101	52.0-133	0.66	30.00
Chloromethane	30.0	38.1	**127***	30.0	37.1	124	64.0-126	2.7	30.00
Vinyl chloride	30.0	32.5	108	30.0	32.4	108	69.0-120	0.31	30.00
Bromomethane	30.0	44.8	149	30.0	42.9	143	41.0-160	4.3	30.00
Chloroethane	30.0	31.7	106	30.0	30.9	103	69.0-126	2.6	30.00
Trichlorofluoromethane	30.0	30.0	100	30.0	28.8	96	72.0-123	4.1	30.00
1,1-Dichloroethene	30.0	29.0	97	30.0	27.5	92	78.0-113	5.3	30.00
Acetone	75.0	91.2	122	75.0	90.7	121	0.00-243	0.55	30.00
Methylene chloride	30.0	29.2	97	30.0	28.2	94	40.0-156	3.5	30.00
trans-1,2-Dichloroethene	30.0	28.8	96	30.0	27.5	92	78.0-111	4.6	30.00
tert-Butyl methyl ether (MTBE)	30.0	30.1	100	30.0	29.1	97	68.0-138	3.4	30.00
1,1-Dichloroethane	30.0	29.0	97	30.0	27.8	93	71.0-121	4.2	30.00
cis-1,2-Dichloroethene	30.0	29.0	97	30.0	27.8	93	80.0-114	4.2	30.00
2-Butanone	75.0	87.3	116	75.0	82.5	110	31.0-189	5.7	30.00
Bromochloromethane	30.0	29.3	98	30.0	28.8	96	81.0-115	1.7	30.00
Chloroform	30.0	28.0	93	30.0	26.6	89	76.0-114	5.1	30.00
1,1,1-Trichloroethane	30.0	27.9	93	30.0	27.1	90	79.0-117	2.9	30.00
Carbon tetrachloride	30.0	24.8	83	30.0	24.3	**81***	82.0-119	2.0	30.00
Benzene	30.0	29.2	97	30.0	28.6	95	82.0-113	2.1	30.00
1,2-Dichloroethane	30.0	29.8	99	30.0	28.3	94	72.0-126	5.2	30.00
Trichloroethene	30.0	28.3	94	30.0	28.1	94	82.0-108	0.71	30.00
1,2-Dichloropropane	30.0	28.8	96	30.0	28.6	95	78.0-116	0.70	30.00
Bromodichloromethane	30.0	26.0	87	30.0	25.6	85	79.0-122	1.6	30.00
cis-1,3-Dichloropropene	30.0	27.7	92	30.0	27.4	91	75.0-127	1.1	30.00
4-Methyl-2-pentanone	75.0	82.5	110	75.0	77.5	103	57.0-159	6.3	30.00
Toluene	30.0	30.0	100	30.0	29.7	99	83.0-111	1.0	30.00
trans-1,3-Dichloropropene	30.0	26.4	88	30.0	25.8	86	75.0-134	2.3	30.00
Carbon disulfide	30.0	27.3	91	30.0	26.8	89	72.0-116	1.8	30.00
1,1,2-Trichloroethane	30.0	31.3	104	30.0	30.1	100	73.0-121	3.9	30.00
Tetrachloroethene	30.0	31.4	105	30.0	30.7	102	60.0-118	2.3	30.00
2-Hexanone	75.0	88.7	118	75.0	82.9	110	41.0-171	6.8	30.00
Dibromochloromethane	30.0	25.6	85	30.0	25.2	84	77.0-126	1.6	30.00
1,2-Dibromoethane	30.0	31.7	106	30.0	29.9	100	76.0-125	5.8	30.00
Chlorobenzene	30.0	30.7	102	30.0	30.4	101	78.0-109	0.98	30.00

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Blank Spike Summary

Blank Spike ID: LCS-S for HBN 19230 [VXX/2646]
Blank Spike Lab ID: 54808
Date Analyzed: 01/19/2012 13:19

Spike Duplicate ID: LCSD-S for HBN 19230 [VXX/2646
Spike Duplicate Lab ID: 54809
Matrix: Soil-Solid as dry weight

QC for Samples: 31200102005, 31200102006, 31200102007

Results by **SW-846 8260B**

	Blank Spike (ug/Kg)			Spike Duplicate (ug/Kg)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Bromoform	30.0	23.5	78	30.0	22.6	75	72.0-134	3.9	30.00
1,1,2,2-Tetrachloroethane	30.0	32.6	109	30.0	31.2	104	76.0-129	4.4	30.00
Ethyl Benzene	30.0	30.6	102	30.0	29.9	100	72.0-115	2.3	30.00
m,p-Xylene	60.0	60.9	101	60.0	60.4	101	73.0-114	0.82	30.00
Styrene	30.0	30.7	102	30.0	30.2	101	74.0-114	1.6	30.00
o-Xylene	30.0	30.5	102	30.0	30.4	101	74.0-113	0.33	30.00
Isopropylbenzene (Cumene)	30.0	31.0	103	30.0	30.6	102	72.0-115	1.3	30.00
1,3-Dichlorobenzene	30.0	31.0	103	30.0	30.5	102	75.0-110	1.6	30.00
1,4-Dichlorobenzene	30.0	31.5	105	30.0	31.1	104	76.0-110	1.3	30.00
1,2-Dichlorobenzene	30.0	30.6	102	30.0	30.4	101	77.0-109	0.66	30.00
1,2-Dibromo-3-chloropropane	180	179	99	180	163	91	54.0-166	9.4	30.00
1,2,4-Trichlorobenzene	30.0	32.0	107	30.0	32.6	109	76.0-115	1.9	30.00
1,2,3-Trichlorobenzene	30.0	32.3	108	30.0	31.7	106	78.0-115	1.9	30.00
Surrogates									
1,2-Dichloroethane-d4			106			102	55.0-173		
Toluene d8			99			99	57.0-134		
4-Bromofluorobenzene			100			102	23.0-141		

Batch Information

Analytical Batch: **VMS1844**
Analytical Method: **SW-846 8260B**
Instrument: **MSD4**
Analyst: **DVO**

Prep Batch: **VXX2646**
Prep Method: **SW-846 5035 SL**
Prep Date/Time: **01/19/2012 08:37**
Spike Init Wt./Vol.: **5 g** Extract Vol: **5 mL**
Dupe Init Wt./Vol.: **5 g** Extract Vol: **5 mL**

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Matrix Spike Summary

Original Sample ID: 31200102005 (5th-1-2)
MS Sample ID: 54911
MSD Sample ID:

Analysis Date: 01/19/2012 16:22
Analysis Date: 01/19/2012 20:17
Analysis Date:
Matrix: Soil-Solid as dry weight

QC for Samples: 31200102005, 31200102006, 31200102007

Results by **SW-846 8260B**

		Matrix Spike (ug/Kg)			Spike Duplicate (ug/Kg)					
Parameter	Sample	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
1,1,1-Trichloroethane	ND	26.1	21.3	82				78.0-121		
1,1,2,2-Tetrachloroethane	ND	26.1	40.1	154 *				76.0-136		
1,1,2-Trichloroethane	ND	26.1	31.5	121				65.0-128		
1,1-Dichloroethane	ND	26.1	22.9	88				72.0-139		
1,1-Dichloroethene	ND	26.1	22.5	87				72.0-135		
1,2,3-Trichlorobenzene	ND	26.1	18.8	72				61.0-126		
1,2,4-Trichlorobenzene	ND	26.1	19.2	74				61.0-125		
1,2-Dibromo-3-chloropropane	ND	156	260	167				43.0-229		
1,2-Dibromoethane	ND	26.1	32.7	126				78.0-148		
1,2-Dichlorobenzene	ND	26.1	24.3	94				58.0-148		
1,2-Dichloroethane	ND	26.1	27.3	105				73.0-146		
1,2-Dichloropropane	ND	26.1	24.0	92				76.0-136		
1,3-Dichlorobenzene	ND	26.1	23.7	91				55.0-145		
1,4-Dichlorobenzene	ND	26.1	24.0	92				53.0-146		
2-Butanone	24.3	65.0	107	128				41.0-256		
2-Hexanone	ND	65.0	97.3	150 *				42.0-111		
4-Methyl-2-pentanone	ND	65.0	123	190 *				6.90-166		
Acetone	85.6	65.0	165	122				6.80-355		
Benzene	ND	26.1	23.2	89				75.0-133		
Bromochloromethane	ND	26.1	25.9	100				85.0-136		
Bromodichloromethane	ND	26.1	20.8	80				77.0-140		
Bromoform	ND	26.1	23.1	89				75.0-151		
Bromomethane	ND	26.1	30.5	117				30.0-127		
Carbon disulfide	0.812	26.1	19.6	76				64.0-145		
Carbon tetrachloride	ND	26.1	18.3	70				64.0-142		
Chlorobenzene	ND	26.1	24.3	94				66.0-135		
Chloroethane	ND	26.1	25.4	98				21.0-182		
Chloroform	ND	26.1	22.6	87				71.0-143		
Chloromethane	ND	26.1	30.5	117				69.0-138		
Dibromochloromethane	ND	26.1	22.2	85				78.0-141		
Dichlorodifluoromethane	ND	26.1	25.4	98				82.0-130		
cis-1,3-Dichloropropene	ND	26.1	21.5	83				72.0-146		
trans-1,3-Dichloropropene	ND	26.1	21.1	81				45.0-144		
Ethyl Benzene	ND	26.1	25.5	98				74.0-126		
Isopropylbenzene (Cumene)	ND	26.1	25.2	97				74.0-123		
Methylene chloride	1.79	26.1	25.5	98				49.0-155		
Styrene	ND	26.1	21.6	83				73.0-123		
Tetrachloroethene	ND	26.1	24.2	93				46.0-153		

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Matrix Spike Summary

Original Sample ID: 31200102005 (5th-1-2)
MS Sample ID: 54911
MSD Sample ID:

QC for Samples: 31200102005, 31200102006, 31200102007

Analysis Date: 01/19/2012 16:22
Analysis Date: 01/19/2012 20:17
Analysis Date:
Matrix: Soil-Solid as dry weight

Results by **SW-846 8260B**

		Matrix Spike (ug/Kg)			Spike Duplicate (ug/Kg)					
Parameter	Sample	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Toluene	ND	26.1	23.7	91				66.0-128		
Trichloroethene	ND	26.1	22.2	85				35.0-136		
Trichlorofluoromethane	ND	26.1	25.0	96				77.0-132		
Vinyl chloride	ND	26.1	26.4	102				68.0-137		
cis-1,2-Dichloroethene	ND	26.1	23.2	89				77.0-134		
m,p-Xylene	ND	52.0	50.1	96				80.0-118		
o-Xylene	ND	26.1	25.3	98				80.0-121		
tert-Butyl methyl ether (MTBE)	ND	26.1	29.9	115				67.0-135		
trans-1,2-Dichloroethene	ND	26.1	21.7	83				72.0-135		
Surrogates										
1,2-Dichloroethane-d4				118				55.0-173		
4-Bromofluorobenzene				102				23.0-141		
Toluene d8				98				57.0-134		

Batch Information

Analytical Batch: **VMS1844**
Analytical Method: **SW-846 8260B**
Instrument: **MSD4**
Analyst: **DVO**

Prep Batch: **VXX2646**
Prep Method: **SW-846 5035 SL**
Prep Date/Time: **01/13/2012 08:00**
MS Init Wt./Vol.: **6.96 g** Extract Vol.: **5 mL**
MSD Init Wt./Vol.: Extract Vol.:

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Duplicate Sample Summary

Original Sample ID: 31200102006-A
Duplicate Sample ID: 54910

Analysis Date: 01/19/2012 16:48
Analysis Date: 01/19/2012 19:51
Matrix: Soil-Solid as dry weight

QC for Samples: 31200102005, 31200102006, 31200102007

Results by **SW-846 8260B**

PARAMETER	Original (ug/Kg)	Duplicate (ug/Kg)	RPD (%)	RPD CL
1,1,1-Trichloroethane	ND	ND	0	30.00
1,1,2,2-Tetrachloroethane	ND	ND	0	30.00
1,1,2-Trichloroethane	ND	ND	0	30.00
1,1-Dichloroethane	ND	ND	0	30.00
1,1-Dichloroethene	ND	ND	0	30.00
1,2,3-Trichlorobenzene	ND	ND	0	30.00
1,2,4-Trichlorobenzene	ND	ND	0	30.00
1,2-Dibromo-3-chloropropane	ND	ND	0	30.00
1,2-Dibromoethane	ND	ND	0	30.00
1,2-Dichlorobenzene	ND	ND	0	30.00
1,2-Dichloroethane	ND	ND	0	30.00
1,2-Dichloropropane	ND	ND	0	30.00
1,3-Dichlorobenzene	ND	ND	0	30.00
1,4 Dioxane	ND	ND	0	30.00
1,4-Dichlorobenzene	ND	ND	0	30.00
2-Butanone	5.99	4.33	**32***	30.00
2-Hexanone	ND	ND	0	30.00
4-Methyl-2-pentanone	ND	ND	0	30.00
Acetone	45.5	52.4	14	30.00
Benzene	ND	ND	0	30.00
Bromochloromethane	ND	ND	0	30.00
Bromodichloromethane	ND	ND	0	30.00
Bromoform	ND	ND	0	30.00
Bromomethane	ND	ND	0	30.00
Carbon disulfide	ND	ND	0	30.00
Carbon tetrachloride	ND	ND	0	30.00
Chlorobenzene	ND	ND	0	30.00
Chloroethane	ND	ND	0	30.00
Chloroform	ND	ND	0	30.00
Chloromethane	ND	ND	0	30.00
cis-1,2-Dichloroethene	ND	ND	0	30.00
cis-1,3-Dichloropropene	ND	ND	0	30.00
Cyclohexane	ND	ND	0	30.00
Dibromochloromethane	ND	ND	0	30.00
Dichlorodifluoromethane	3.03	5.22	**53***	30.00
Ethyl Benzene	ND	ND	0	30.00
Isopropylbenzene (Cumene)	ND	ND	0	30.00
m,p-Xylene	ND	ND	0	30.00
Methyl Acetate	ND	ND	0	30.00
Methylcyclohexane	ND	ND	0	30.00

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Duplicate Sample Summary

Original Sample ID: 31200102006-A
Duplicate Sample ID: 54910

Analysis Date: 01/19/2012 16:48
Analysis Date: 01/19/2012 19:51
Matrix: Soil-Solid as dry weight

QC for Samples: 31200102005, 31200102006, 31200102007

Results by **SW-846 8260B**

PARAMETER	Original (ug/Kg)	Duplicate (ug/Kg)	RPD (%)	RPD CL
Methylene chloride	1.18	1.46	21	30.00
o-Xylene	ND	ND	0	30.00
Styrene	ND	ND	0	30.00
tert-Butyl methyl ether (MTBE)	ND	ND	0	30.00
Tetrachloroethene	ND	ND	0	30.00
Toluene	ND	ND	0	30.00
trans-1,2-Dichloroethene	ND	ND	0	30.00
trans-1,3-Dichloropropene	ND	ND	0	30.00
Trichloroethene	ND	ND	0	30.00
Trichlorofluoromethane	ND	ND	0	30.00
Trichlorotrifluoroethane	ND	ND	0	30.00
Vinyl chloride	ND	ND	0	30.00
Surrogates				
1,2-Dichloroethane-d4	118	118	11	
4-Bromofluorobenzene	94.0	86.0	3.1	
Toluene d8	97.0	95.0	9.3	

Batch Information

Analytical Batch: VMS1844
Analytical Method: SW-846 8260B
Instrument: MSD4
Analyst: DVO

Prep Batch: VXX2646
Prep Method: SW-846 5035 SL
Prep Date/Time: 01/13/2012 08:00

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Batch Summary

Analytical Method: SW-846 6010C

Prep Method: SW-846 3010A
Prep Batch: MXX1746
Prep Date: 01/16/2012 08:39

Client Sample ID	Lab Sample ID	Analysis Date	Analytical Batch	Instrument	Analyst
MB for HBN 19122 [MXX/1746]	54382	01/16/2012 18:06	MIP1395	ICP1	PSW
LCS for HBN 19122 [MXX/1746]	54383	01/16/2012 18:13	MIP1395	ICP1	PSW
LCSD for HBN 19122 [MXX/1746]	54384	01/16/2012 18:33	MIP1395	ICP1	PSW
Effluent(53848MS)	54385	01/16/2012 18:47	MIP1395	ICP1	PSW
Effluent(53848MSD)	54386	01/16/2012 18:54	MIP1395	ICP1	PSW
5th-1	31200102001	01/16/2012 19:07	MIP1395	ICP1	PSW
5th-2	31200102002	01/16/2012 19:14	MIP1395	ICP1	PSW
5th-3	31200102003	01/16/2012 19:21	MIP1395	ICP1	PSW
5th-4	31200102004	01/16/2012 19:28	MIP1395	ICP1	PSW
GAB(54263DUP)	54387	01/17/2012 10:24	MIP1396	ICP1	PSW
Effluent(53848MS)	54385	01/17/2012 14:19	MIP1397	ICP1	PSW
Effluent(53848MS)	54385	01/17/2012 14:23	MIP1397	ICP1	PSW
Effluent(53848MSD)	54386	01/17/2012 14:36	MIP1397	ICP1	PSW
Effluent(53848MSD)	54386	01/17/2012 14:40	MIP1397	ICP1	PSW
5th-1	31200102001	01/17/2012 14:44	MIP1397	ICP1	PSW
5th-2	31200102002	01/17/2012 14:52	MIP1397	ICP1	PSW
5th-2	31200102002	01/17/2012 14:56	MIP1397	ICP1	PSW
5th-3	31200102003	01/17/2012 15:00	MIP1397	ICP1	PSW
5th-3	31200102003	01/17/2012 15:04	MIP1397	ICP1	PSW
5th-4	31200102004	01/17/2012 15:08	MIP1397	ICP1	PSW
5th-4	31200102004	01/17/2012 15:12	MIP1397	ICP1	PSW

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Method Blank

Blank ID: MB for HBN 19122 [MXX/1746]
Blank Lab ID: 54382
QC for Samples:
31200102001, 31200102002, 31200102003, 31200102004

Matrix: Water

Results by **SW-846 6010C**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
Zinc	**0.00269**	J	0.00226	0.0200	mg/L	1
Barium	**0.00577**	J	0.000394	0.100	mg/L	1
Manganese	ND	U	0.00152	0.0100	mg/L	1
Iron	ND	U	0.0222	0.100	mg/L	1
Chromium	ND	U	0.00147	0.0100	mg/L	1
Magnesium	ND	U	0.0302	0.100	mg/L	1
Aluminum	ND	U	0.0315	0.100	mg/L	1
Calcium	ND	U	0.0236	0.100	mg/L	1
Sodium	ND	U	0.0132	0.200	mg/L	1
Potassium	**0.0134**	J	0.0126	0.200	mg/L	1

Batch Information

Analytical Batch: MIP1395
Analytical Method: SW-846 6010C
Instrument: ICP1
Analyst: PSW
Analytical Date/Time: 1/16/2012 6:06:39PM

Prep Batch: MXX1746
Prep Method: SW-846 3010A
Prep Date/Time: 1/16/2012 8:39:07AM
Prep Initial Wt./Vol.: 50 mL
Prep Extract Vol: 50 mL

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Blank Spike Summary

Blank Spike ID: LCS for HBN 19122 [MXX/1746]
Blank Spike Lab ID: 54383
Date Analyzed: 01/16/2012 18:13

Spike Duplicate ID: LCSD for HBN 19122 [MXX/1746]
Spike Duplicate Lab ID: 54384
Date Analyzed: 01/16/2012 18:33
Matrix: Water

QC for Samples: 31200102001, 31200102002, 31200102003, 31200102004

Results by **SW-846 6010C**

	Blank Spike (mg/L)			Spike Duplicate (mg/L)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Zinc	0.400	0.351	88	0.400	0.363	91	80.0-120	3.4	20.00
Barium	2.00	1.82	91	2.00	1.87	93	80.0-120	2.7	20.00
Manganese	0.400	0.374	94	0.400	0.381	95	80.0-120	1.9	20.00
Iron	2.00	1.88	94	2.00	1.98	99	80.0-120	5.2	20.00
Chromium	0.400	0.365	91	0.400	0.373	93	80.0-120	2.2	20.00
Magnesium	2.00	1.90	95	2.00	1.95	97	80.0-120	2.6	20.00
Aluminum	2.00	1.84	92	2.00	1.90	95	80.0-120	3.2	20.00
Calcium	2.00	1.85	92	2.00	1.89	95	80.0-120	2.1	20.00
Sodium	2.00	1.87	93	2.00	1.92	96	80.0-120	2.6	20.00
Potassium	2.00	1.86	93	2.00	1.91	95	80.0-120	2.7	20.00

Batch Information

Analytical Batch: **MIP1395**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Spike Init Wt./Vol.: **50 mL** Extract Vol: **50 mL**
Dupe Init Wt./Vol.: **50 mL** Extract Vol: **50 mL**

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Batch Summary

Analytical Method: SW-846 6010C

Prep Method: SW-846 3050B
Prep Batch: MXX1747
Prep Date: 01/16/2012 09:06

Client Sample ID	Lab Sample ID	Analysis Date	Analytical Batch	Instrument	Analyst
MB for HBN 19135 [MXX/1747]	54434	01/16/2012 15:50	MIP1395	ICP1	PSW
LCS for HBN 19135 [MXX/1747]	54435	01/16/2012 15:57	MIP1395	ICP1	PSW
LCSD for HBN 19135 [MXX/1747]	54436	01/16/2012 16:03	MIP1395	ICP1	PSW
Tank 7-SS1 @ 6 feet(54284MS)	54438	01/16/2012 16:17	MIP1395	ICP1	PSW
Tank 7-SS1 @ 6 feet(54284MSD)	54439	01/16/2012 16:24	MIP1395	ICP1	PSW
5th-1-2	31200102005	01/16/2012 16:44	MIP1395	ICP1	PSW
5th-2-1	31200102006	01/16/2012 16:51	MIP1395	ICP1	PSW
5th-3-1	31200102007	01/16/2012 17:12	MIP1395	ICP1	PSW
5th-4-1	31200102008	01/16/2012 17:18	MIP1395	ICP1	PSW
2nd-drum(54337DUP)	54437	01/16/2012 17:59	MIP1395	ICP1	PSW
Tank 7-SS1 @ 6 feet(54284MS)	54438	01/17/2012 12:13	MIP1397	ICP1	PSW
Tank 7-SS1 @ 6 feet(54284MS)	54438	01/17/2012 12:17	MIP1397	ICP1	PSW
Tank 7-SS1 @ 6 feet(54284MSD)	54439	01/17/2012 12:21	MIP1397	ICP1	PSW
Tank 7-SS1 @ 6 feet(54284MSD)	54439	01/17/2012 12:25	MIP1397	ICP1	PSW
5th-1-2	31200102005	01/17/2012 12:29	MIP1397	ICP1	PSW
5th-1-2	31200102005	01/17/2012 12:33	MIP1397	ICP1	PSW
5th-2-1	31200102006	01/17/2012 12:37	MIP1397	ICP1	PSW
5th-2-1	31200102006	01/17/2012 12:42	MIP1397	ICP1	PSW
5th-3-1	31200102007	01/17/2012 12:54	MIP1397	ICP1	PSW
5th-3-1	31200102007	01/17/2012 12:58	MIP1397	ICP1	PSW
5th-4-1	31200102008	01/17/2012 13:02	MIP1397	ICP1	PSW
5th-4-1	31200102008	01/17/2012 13:06	MIP1397	ICP1	PSW
2nd-drum(54337DUP)	54437	01/17/2012 14:03	MIP1397	ICP1	PSW
2nd-drum(54337DUP)	54437	01/17/2012 14:07	MIP1397	ICP1	PSW

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Method Blank

Blank ID: MB for HBN 19135 [MXX/1747]
Blank Lab ID: 54434
QC for Samples:
31200102005, 31200102006, 31200102007, 31200102008

Matrix: Soil-Solid as dry weight

Results by **SW-846 6010C**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
Zinc	ND	U	1.10	1.96	mg/kg	1
Barium	**0.469**	J	0.128	9.80	mg/kg	1
Manganese	ND	U	0.269	0.980	mg/kg	1
Iron	ND	U	9.22	9.80	mg/kg	1
Chromium	ND	U	0.141	0.980	mg/kg	1
Magnesium	ND	U	4.84	9.80	mg/kg	1
Aluminum	ND	U	2.07	9.80	mg/kg	1
Calcium	ND	U	6.91	9.80	mg/kg	1
Sodium	**4.08**	J	1.83	19.6	mg/kg	1
Potassium	ND	U	2.03	19.6	mg/kg	1

Batch Information

Analytical Batch: MIP1395
Analytical Method: SW-846 6010C
Instrument: ICP1
Analyst: PSW
Analytical Date/Time: 1/16/2012 3:50:17PM

Prep Batch: MXX1747
Prep Method: SW-846 3050B
Prep Date/Time: 1/16/2012 9:06:31AM
Prep Initial Wt./Vol.: .51 g
Prep Extract Vol: 50 mL

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Blank Spike Summary

Blank Spike ID: LCS for HBN 19135 [MXX/1747]
Blank Spike Lab ID: 54435
Date Analyzed: 01/16/2012 15:57

Spike Duplicate ID: LCSD for HBN 19135 [MXX/1747]
Spike Duplicate Lab ID: 54436
Date Analyzed: 01/16/2012 16:03
Matrix: Soil-Solid as dry weight

QC for Samples: 31200102005, 31200102006, 31200102007, 31200102008

Results by **SW-846 6010C**

	Blank Spike (mg/kg)			Spike Duplicate (mg/kg)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Zinc	34.5	30.2	87	37.0	33.1	89	80.0-120	9.2	
Barium	172	156	90	185	171	92	80.0-120	9.2	
Manganese	34.5	31.8	92	37.0	35.2	95	80.0-120	10	
Iron	172	163	95	185	181	98	80.0-120	10	
Chromium	34.5	31.2	91	37.0	34.1	92	80.0-120	8.9	
Magnesium	172	160	93	185	179	97	80.0-120	11	
Aluminum	172	161	93	185	172	93	80.0-120	6.6	
Calcium	172	162	94	185	176	95	80.0-120	8.3	
Sodium	172	161	93	185	177	95	80.0-120	9.5	
Potassium	172	156	90	185	173	94	80.0-120	10	

Batch Information

Analytical Batch: **MIP1395**
Analytical Method: **SW-846 6010C**
Instrument: **ICP1**
Analyst: **PSW**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Spike Init Wt./Vol.: **.58 g** Extract Vol: **50 mL**
Dupe Init Wt./Vol.: **.54 g** Extract Vol: **50 mL**

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Batch Summary

Analytical Method: SW-846 7470A

Prep Method: SW-846 7470A PREP
Prep Batch: MXX1752
Prep Date: 01/19/2012 10:36

Client Sample ID	Lab Sample ID	Analysis Date	Analytical Batch	Instrument	Analyst
LLC for HBN 19239 [MXX/1752]	54865	01/19/2012 14:07	MHG1189	HG2	NTM
MB for HBN 19239 [MXX/1752]	54866	01/19/2012 14:13	MHG1189	HG2	NTM
LCS for HBN 19239 [MXX/1752]	54867	01/19/2012 14:15	MHG1189	HG2	NTM
LCSD for HBN 19239 [MXX/1752]	54868	01/19/2012 14:17	MHG1189	HG2	NTM
E2658(54836MS)	54869	01/19/2012 14:22	MHG1189	HG2	NTM
E2658(54836MSD)	54870	01/19/2012 14:24	MHG1189	HG2	NTM
5th-1	31200102001	01/19/2012 14:29	MHG1189	HG2	NTM
5th-2	31200102002	01/19/2012 14:30	MHG1189	HG2	NTM
5th-3	31200102003	01/19/2012 14:32	MHG1189	HG2	NTM
5th-4	31200102004	01/19/2012 14:39	MHG1189	HG2	NTM

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Method Blank

Blank ID: MB for HBN 19239 [MXX/1752]
Blank Lab ID: 54866
QC for Samples:
31200102001, 31200102002, 31200102003, 31200102004

Matrix: Water

Results by **SW-846 7470A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
Mercury	**0.0000233**	J	0.0000190	0.000150	mg/L	1

Batch Information

Analytical Batch: MHG1189
Analytical Method: SW-846 7470A
Instrument: HG2
Analyst: NTM
Analytical Date/Time: 1/19/2012 2:13:54PM

Prep Batch: MXX1752
Prep Method: SW-846 7470A PREP
Prep Date/Time: 1/19/2012 10:36:27AM
Prep Initial Wt./Vol.: 40 mL
Prep Extract Vol: 57 mL

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Blank Spike Summary

Blank Spike ID: LCS for HBN 19239 [MXX/1752]
Blank Spike Lab ID: 54867
Date Analyzed: 01/19/2012 14:15

Spike Duplicate ID: LCSD for HBN 19239 [MXX/1752]
Spike Duplicate Lab ID: 54868
Date Analyzed: 01/19/2012 14:17
Matrix: Water

QC for Samples: 31200102001, 31200102002, 31200102003, 31200102004

Results by **SW-846 7470A**

	Blank Spike (mg/L)			Spike Duplicate (mg/L)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Mercury	0.00713	0.00785	110	0.00713	0.00784	110	80.0-120	0.13	20.00

Batch Information

Analytical Batch: **MHG1189**
Analytical Method: **SW-846 7470A**
Instrument: **HG2**
Analyst: **NTM**

Prep Batch: **MXX1752**
Prep Method: **SW-846 7470A PREP**
Prep Date/Time: **01/19/2012 10:36**
Spike Init Wt./Vol.: **40 mL** Extract Vol: **57 mL**
Dupe Init Wt./Vol.: **40 mL** Extract Vol: **57 mL**

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Batch Summary

Analytical Method: SW-846 7471B

Prep Method: SW-846 7471B PREP
Prep Batch: MXX1748
Prep Date: 01/18/2012 08:43

Client Sample ID	Lab Sample ID	Analysis Date	Analytical Batch	Instrument	Analyst
LLC for HBN 19197 [MXX/1748]	54621	01/18/2012 10:43	MHG1188	HG2	NTM
MB for HBN 19197 [MXX/1748]	54612	01/18/2012 10:50	MHG1188	HG2	NTM
LCS for HBN 19197 [MXX/1748]	54613	01/18/2012 10:52	MHG1188	HG2	NTM
LCSD for HBN 19197 [MXX/1748]	54614	01/18/2012 10:53	MHG1188	HG2	NTM
5th-1-2	31200102005	01/18/2012 10:56	MHG1188	HG2	NTM
5th-1-2(54319MS)	54615	01/18/2012 10:58	MHG1188	HG2	NTM
5th-1-2(54319MSD)	54616	01/18/2012 11:00	MHG1188	HG2	NTM
5th-2-1	31200102006	01/18/2012 11:02	MHG1188	HG2	NTM
5th-2-1(54320DUP)	54617	01/18/2012 11:04	MHG1188	HG2	NTM
5th-3-1	31200102007	01/18/2012 11:25	MHG1188	HG2	NTM
5th-4-1	31200102008	01/18/2012 11:27	MHG1188	HG2	NTM

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Method Blank

Blank ID: MB for HBN 19197 [MXX/1748]
Blank Lab ID: 54612
QC for Samples:
31200102005, 31200102006, 31200102007, 31200102008

Matrix: Soil-Solid as dry weight

Results by **SW-846 7471B**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
Mercury	ND	U	0.000804	0.0179	mg/kg	1

Batch Information

Analytical Batch: MHG1188
Analytical Method: SW-846 7471B
Instrument: HG2
Analyst: NTM
Analytical Date/Time: 1/18/2012 10:50:12AM

Prep Batch: MXX1748
Prep Method: SW-846 7471B PREP
Prep Date/Time: 1/18/2012 8:43:33AM
Prep Initial Wt./Vol.: .56 g
Prep Extract Vol: 50 mL

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Blank Spike Summary

Blank Spike ID: LCS for HBN 19197 [MXX/1748]
Blank Spike Lab ID: 54613
Date Analyzed: 01/18/2012 10:52

Spike Duplicate ID: LCSD for HBN 19197 [MXX/1748]
Spike Duplicate Lab ID: 54614
Date Analyzed: 01/18/2012 10:53
Matrix: Soil-Solid as dry weight

QC for Samples: 31200102005, 31200102006, 31200102007, 31200102008

Results by **SW-846 7471B**

	Blank Spike (mg/kg)			Spike Duplicate (mg/kg)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Mercury	0.490	0.507	103	0.439	0.450	103	80.0-120	12	20.00

Batch Information

Analytical Batch: **MHG1188**
Analytical Method: **SW-846 7471B**
Instrument: **HG2**
Analyst: **NTM**

Prep Batch: **MXX1748**
Prep Method: **SW-846 7471B PREP**
Prep Date/Time: **01/18/2012 08:43**
Spike Init Wt./Vol.: **.51 g** Extract Vol: **50 mL**
Dupe Init Wt./Vol.: **.57 g** Extract Vol: **50 mL**

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Matrix Spike Summary

Original Sample ID: 31200102005 (5th-1-2)
MS Sample ID: 54615
MSD Sample ID: 54616

Analysis Date: 01/18/2012 10:56
Analysis Date: 01/18/2012 10:58
Analysis Date: 01/18/2012 11:00
Matrix: Soil-Solid as dry weight

QC for Samples: 31200102005, 31200102006, 31200102007, 31200102008

Results by **SW-846 7471B**

		Matrix Spike (mg/kg)			Spike Duplicate (mg/kg)					
Parameter	Sample	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Mercury	0.0143	0.603	0.672	111	0.559	0.629	113	80.0-120	6.7	20.00

Batch Information

Analytical Batch: **MHG1188**
Analytical Method: **SW-846 7471B**
Instrument: **HG2**
Analyst: **NTM**

Prep Batch: **MXX1748**
Prep Method: **SW-846 7471B PREP**
Prep Date/Time: **01/18/2012 08:43**
MS Init Wt./Vol.: **.5 g** Extract Vol.: **50 mL**
MSD Init Wt./Vol.: **.54 g** Extract Vol.: **50 mL**

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Duplicate Sample Summary

Original Sample ID: 31200102006-E
Duplicate Sample ID: 54617

Analysis Date: 01/18/2012 11:02
Analysis Date: 01/18/2012 11:04
Matrix: Soil-Solid as dry weight

QC for Samples: 31200102005, 31200102006, 31200102007, 31200102008

Results by **SW-846 7471B**

PARAMETER	Original (mg/kg)	Duplicate (mg/kg)	RPD (%)	RPD CL
Mercury	0.0512	0.0829	**47***	20.00

Batch Information

Analytical Batch: MHG1188
Analytical Method: SW-846 7471B
Instrument: HG2
Analyst: NTM

Prep Batch: MXX1748
Prep Method: SW-846 7471B PREP
Prep Date/Time: 01/18/2012 08:43

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Batch Summary

Analytical Method: SW-846 6020A

Prep Method: SW-846 3010A
Prep Batch: MXX1746
Prep Date: 01/16/2012 08:39

Client Sample ID	Lab Sample ID	Analysis Date	Analytical Batch	Instrument	Analyst
MB for HBN 19122 [MXX/1746]	54382	01/18/2012 10:27	MMS1143	ICPMS2	PSW
MB for HBN 19122 [MXX/1746]	54382	01/18/2012 10:31	MMS1143	ICPMS2	PSW
LCS for HBN 19122 [MXX/1746]	54383	01/18/2012 10:34	MMS1143	ICPMS2	PSW
LCS for HBN 19122 [MXX/1746]	54383	01/18/2012 10:37	MMS1143	ICPMS2	PSW
LCSD for HBN 19122 [MXX/1746]	54384	01/18/2012 10:40	MMS1143	ICPMS2	PSW
LCSD for HBN 19122 [MXX/1746]	54384	01/18/2012 10:44	MMS1143	ICPMS2	PSW
Effluent(53848MS)	54385	01/18/2012 10:54	MMS1143	ICPMS2	PSW
5th-1	31200102001	01/18/2012 11:20	MMS1143	ICPMS2	PSW
5th-1	31200102001	01/18/2012 11:23	MMS1143	ICPMS2	PSW
5th-2	31200102002	01/18/2012 11:30	MMS1143	ICPMS2	PSW
5th-3	31200102003	01/18/2012 11:33	MMS1143	ICPMS2	PSW
5th-3	31200102003	01/18/2012 11:36	MMS1143	ICPMS2	PSW
5th-4	31200102004	01/18/2012 11:46	MMS1143	ICPMS2	PSW
5th-4	31200102004	01/18/2012 11:50	MMS1143	ICPMS2	PSW
MB for HBN 19122 [MXX/1746]	54382	01/18/2012 16:01	MMS1144	ICPMS2	PSW
5th-2	31200102002	01/18/2012 16:27	MMS1144	ICPMS2	PSW
5th-3	31200102003	01/18/2012 16:30	MMS1144	ICPMS2	PSW
5th-4	31200102004	01/18/2012 16:40	MMS1144	ICPMS2	PSW
5th-4	31200102004	01/18/2012 16:44	MMS1144	ICPMS2	PSW

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Method Blank

Blank ID: MB for HBN 19122 [MXX/1746]
Blank Lab ID: 54382
QC for Samples:
31200102001, 31200102002, 31200102003, 31200102004

Matrix: Water

Results by **SW-846 6020A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
Beryllium	ND	U	0.000297	0.00250	mg/L	5
Vanadium	ND	U	0.000661	0.00500	mg/L	10
Cobalt	ND	U	0.000358	0.00500	mg/L	10
Nickel	ND	U	0.00135	0.00500	mg/L	10
Copper	**0.00220**	J	0.000860	0.00500	mg/L	10
Arsenic	ND	U	0.000712	0.00500	mg/L	10
Selenium	ND	U	0.000824	0.00500	mg/L	10
Silver	ND	U	0.000374	0.00500	mg/L	10
Cadmium	ND	U	0.000278	0.00500	mg/L	10
Antimony	ND	U	0.000437	0.00500	mg/L	10
Thallium	ND	U	0.000297	0.00500	mg/L	10
Lead	ND	U	0.000640	0.00500	mg/L	10

Batch Information

Analytical Batch: MMS1143
Analytical Method: SW-846 6020A
Instrument: ICPMS2
Analyst: PSW
Analytical Date/Time: 1/18/2012 10:27:46AM

Prep Batch: MXX1746
Prep Method: SW-846 3010A
Prep Date/Time: 1/16/2012 8:39:07AM
Prep Initial Wt./Vol.: 50 mL
Prep Extract Vol: 50 mL

Analytical Batch: MMS1144
Analytical Method: SW-846 6020A
Instrument: ICPMS2
Analyst: PSW
Analytical Date/Time: 1/18/2012 4:01:18PM

Prep Batch: MXX1746
Prep Method: SW-846 3010A
Prep Date/Time: 1/16/2012 8:39:07AM
Prep Initial Wt./Vol.: 50 mL
Prep Extract Vol: 50 mL

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Blank Spike Summary

Blank Spike ID: LCS for HBN 19122 [MXX/1746]
Blank Spike Lab ID: 54383
Date Analyzed: 01/18/2012 10:37

Spike Duplicate ID: LCSD for HBN 19122 [MXX/1746]
Spike Duplicate Lab ID: 54384
Date Analyzed: 01/18/2012 10:44
Matrix: Water

QC for Samples: 31200102001, 31200102002, 31200102003, 31200102004

Results by **SW-846 6020A**

	Blank Spike (mg/L)			Spike Duplicate (mg/L)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Beryllium	0.400	0.432	108	0.400	0.444	111	80.0-120	2.7	20.00
Cobalt	0.400	0.413	103	0.400	0.410	103	80.0-120	0.73	20.00
Nickel	0.400	0.416	104	0.400	0.434	108	80.0-120	4.2	20.00
Copper	0.400	0.442	111	0.400	0.465	116	80.0-120	5.1	20.00
Arsenic	0.400	0.434	109	0.400	0.434	109	80.0-120	0.0	20.00
Selenium	0.400	0.430	108	0.400	0.439	110	80.0-120	2.1	20.00
Silver	0.400	0.419	105	0.400	0.447	112	80.0-120	6.5	20.00
Cadmium	0.400	0.426	107	0.400	0.452	113	80.0-120	5.9	20.00
Antimony	0.400	0.423	106	0.400	0.446	112	80.0-120	5.3	20.00
Thallium	0.400	0.416	104	0.400	0.435	109	80.0-120	4.5	20.00
Lead	0.400	0.422	106	0.400	0.438	110	80.0-120	3.7	20.00

Batch Information

Analytical Batch: **MMS1143**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**

Prep Batch: **MXX1746**
Prep Method: **SW-846 3010A**
Prep Date/Time: **01/16/2012 08:39**
Spike Init Wt./Vol.: **50 mL** Extract Vol: **50 mL**
Dupe Init Wt./Vol.: **50 mL** Extract Vol: **50 mL**

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Batch Summary

Analytical Method: SW-846 6020A

Prep Method: SW-846 3050B
Prep Batch: MXX1747
Prep Date: 01/16/2012 09:06

Client Sample ID	Lab Sample ID	Analysis Date	Analytical Batch	Instrument	Analyst
MB for HBN 19135 [MXX/1747]	54434	01/18/2012 12:29	MMS1143	ICPMS2	PSW
LCS for HBN 19135 [MXX/1747]	54435	01/18/2012 12:36	MMS1143	ICPMS2	PSW
LCSD for HBN 19135 [MXX/1747]	54436	01/18/2012 12:42	MMS1143	ICPMS2	PSW
Tank 7-SS1 @ 6 feet(54284MS)	54438	01/18/2012 12:55	MMS1143	ICPMS2	PSW
5th-1-2	31200102005	01/18/2012 13:12	MMS1143	ICPMS2	PSW
5th-1-2	31200102005	01/18/2012 13:15	MMS1143	ICPMS2	PSW
5th-2-1	31200102006	01/18/2012 13:18	MMS1143	ICPMS2	PSW
5th-2-1	31200102006	01/18/2012 13:22	MMS1143	ICPMS2	PSW
5th-3-1	31200102007	01/18/2012 13:25	MMS1143	ICPMS2	PSW
5th-3-1	31200102007	01/18/2012 13:28	MMS1143	ICPMS2	PSW
5th-4-1	31200102008	01/18/2012 13:31	MMS1143	ICPMS2	PSW
5th-4-1	31200102008	01/18/2012 13:35	MMS1143	ICPMS2	PSW
2nd-drum(54337DUP)	54437	01/18/2012 14:24	MMS1143	ICPMS2	PSW
2nd-drum(54337DUP)	54437	01/18/2012 14:28	MMS1143	ICPMS2	PSW
MB for HBN 19135 [MXX/1747]	54434	01/18/2012 17:10	MMS1144	ICPMS2	PSW
LCS for HBN 19135 [MXX/1747]	54435	01/18/2012 17:20	MMS1144	ICPMS2	PSW
LCSD for HBN 19135 [MXX/1747]	54436	01/18/2012 17:23	MMS1144	ICPMS2	PSW
Tank 7-SS1 @ 6 feet(54284MS)	54438	01/18/2012 17:33	MMS1144	ICPMS2	PSW
5th-1-2	31200102005	01/18/2012 17:39	MMS1144	ICPMS2	PSW
5th-1-2	31200102005	01/18/2012 17:43	MMS1144	ICPMS2	PSW
5th-2-1	31200102006	01/18/2012 17:46	MMS1144	ICPMS2	PSW
5th-2-1	31200102006	01/18/2012 17:49	MMS1144	ICPMS2	PSW
5th-2-1	31200102006	01/18/2012 17:59	MMS1144	ICPMS2	PSW
5th-3-1	31200102007	01/18/2012 18:02	MMS1144	ICPMS2	PSW
5th-3-1	31200102007	01/18/2012 18:06	MMS1144	ICPMS2	PSW
5th-3-1	31200102007	01/18/2012 18:09	MMS1144	ICPMS2	PSW
5th-4-1	31200102008	01/18/2012 18:12	MMS1144	ICPMS2	PSW
5th-4-1	31200102008	01/18/2012 18:15	MMS1144	ICPMS2	PSW
5th-4-1	31200102008	01/18/2012 18:19	MMS1144	ICPMS2	PSW
5th-3-1	31200102007	01/19/2012 10:44	MMS1145	ICPMS2	PSW
5th-4-1	31200102008	01/19/2012 10:47	MMS1145	ICPMS2	PSW
2nd-drum(54337DUP)	54437	01/19/2012 11:30	MMS1145	ICPMS2	PSW
2nd-drum(54337DUP)	54437	01/19/2012 11:33	MMS1145	ICPMS2	PSW
2nd-drum(54337DUP)	54437	01/19/2012 11:36	MMS1145	ICPMS2	PSW

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Method Blank

Blank ID: MB for HBN 19135 [MXX/1747]
Blank Lab ID: 54434
QC for Samples:
31200102005, 31200102006, 31200102007, 31200102008

Matrix: Soil-Solid as dry weight

Results by **SW-846 6020A**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
Antimony	ND	U	0.0529	0.0980	mg/kg	10
Arsenic	ND	U	0.0853	0.0980	mg/kg	10
Beryllium	ND	U	0.0175	0.0980	mg/kg	10
Cadmium	ND	U	0.0175	0.0980	mg/kg	10
Cobalt	**0.00980**	J	0.00245	0.0980	mg/kg	10
Copper	ND	U	0.101	0.980	mg/kg	10
Lead	ND	U	0.0128	0.0980	mg/kg	10
Nickel	**0.471**		0.0622	0.0980	mg/kg	10
Selenium	ND	U	0.133	0.196	mg/kg	10
Silver	**0.0294**	J	0.0191	0.0980	mg/kg	10
Thallium	ND	U	0.0240	0.0980	mg/kg	10
Vanadium	**0.0882**	J	0.0330	0.0980	mg/kg	10

Batch Information

Analytical Batch: MMS1143
Analytical Method: SW-846 6020A
Instrument: ICPMS2
Analyst: PSW
Analytical Date/Time: 1/18/2012 12:29:29PM

Prep Batch: MXX1747
Prep Method: SW-846 3050B
Prep Date/Time: 1/16/2012 9:06:31AM
Prep Initial Wt./Vol.: .51 g
Prep Extract Vol: 50 mL

Analytical Batch: MMS1144
Analytical Method: SW-846 6020A
Instrument: ICPMS2
Analyst: PSW
Analytical Date/Time: 1/18/2012 5:10:17PM

Prep Batch: MXX1747
Prep Method: SW-846 3050B
Prep Date/Time: 1/16/2012 9:06:31AM
Prep Initial Wt./Vol.: .51 g
Prep Extract Vol: 50 mL

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Blank Spike Summary

Blank Spike ID: LCS for HBN 19135 [MXX/1747]
Blank Spike Lab ID: 54435
Date Analyzed: 01/18/2012 17:20

Spike Duplicate ID: LCSD for HBN 19135 [MXX/1747]
Spike Duplicate Lab ID: 54436
Date Analyzed: 01/18/2012 17:23
Matrix: Soil-Solid as dry weight

QC for Samples: 31200102005, 31200102006, 31200102007, 31200102008

Results by **SW-846 6020A**

	Blank Spike (mg/kg)			Spike Duplicate (mg/kg)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Antimony	34.5	34.7	101	37.0	33.5	91	80.0-120	3.5	20.00
Arsenic	34.5	34.1	99	37.0	38.1	103	80.0-120	11	20.00
Beryllium	34.5	35.4	103	37.0	39.3	106	80.0-120	10	20.00
Cadmium	34.5	33.5	97	37.0	33.1	90	80.0-120	1.2	20.00
Cobalt	34.5	31.5	91	37.0	31.6	85	80.0-120	0.32	20.00
Copper	34.5	35.9	104	37.0	43.2	117	80.0-120	18	20.00
Lead	34.5	36.1	105	37.0	39.4	106	80.0-120	8.7	20.00
Nickel	34.5	34.3	100	37.0	31.9	86	80.0-120	7.3	20.00
Selenium	34.5	33.4	97	37.0	32.2	87	80.0-120	3.7	20.00
Silver	34.5	36.1	105	37.0	39.6	107	80.0-120	9.2	20.00
Thallium	34.5	35.3	103	37.0	38.4	104	80.0-120	8.4	20.00
Vanadium	34.5	32.3	94	37.0	32.0	87	80.0-120	0.93	20.00

Batch Information

Analytical Batch: **MMS1143**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Spike Init Wt./Vol.: **.58 g** Extract Vol: **50 mL**
Dupe Init Wt./Vol.: **.54 g** Extract Vol: **50 mL**

Analytical Batch: **MMS1144**
Analytical Method: **SW-846 6020A**
Instrument: **ICPMS2**
Analyst: **PSW**

Prep Batch: **MXX1747**
Prep Method: **SW-846 3050B**
Prep Date/Time: **01/16/2012 09:06**
Spike Init Wt./Vol.: **.58 g** Extract Vol: **50 mL**
Dupe Init Wt./Vol.: **.54 g** Extract Vol: **50 mL**

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SGS Environmental Services Inc.

Locations Nationwide

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Maryland New Jersey

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CLIENT: Independent Environmental Consultants, LLC

CONTACT: Dolph Lathrop PHONE NO: 804.379.7133

PROJECT: HPDTA SITE/PWSID#: 5th Street Trash Site

REPORTS TO: IEC

INVOICE TO: IEC QUOTE #: P.O. NUMBER:

SGS Reference #: 3120001

page 1 of 1

LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX	# CONTAINERS	Preserv used E C = COMP G = GRAB	TAL Metals	TCL VOCs by 8260	REMARKS
	5th-1	01/10/12	110	W S	5	G =	☒	☒	
	5th-2	01/10/12	150	W S	5	G =	☒	☒	
	5th-3	01/10/12	240	W S	5	G =	☒	☒	
	5th-4	01/10/12	340	W S	5	G =	☒	☒	
	5th-1-2	01/10/12	110	S W	4	G =	☒	☒	
	5th-2-1	01/10/12	150	S W	4	G =	☒	☒	
	5th-3-1	01/10/12	240	S W	4	G =	☒	☒	
	5th-4-1	01/10/12	340	S W	4	G =	☒	☒	

Collected/Relinquished By: (1)	Date	Time	Received By:
	1/12/12	2:00T	
Relinquished By: (2)	Date	Time	Received By:
Relinquished By: (3)	Date	Time	Received By:
Relinquished By: (4)	Date 1/13/12	Time 10:15	Received For Laboratory By:

Shipping Carrier:

Shipping Ticket No:

Samples Received Cold? YES

Temperature °C: 2.0

Special Deliverable Requirements:

Chain of Custody Seal: (Circl INTACT BROKEN ABSE

Requested Turnaround Time and/or Special Instructions:

10 Day

- 200 W. Potter Drive Anchorage, AK 99518 Tel: (907) 562-2343 Fax: (907) 561-5301
- 3180 Peger Road Fairbanks, AK 99701 Tel: (907) 474-8656 Fax: (907) 474-9685
- 5500 Business Drive Wilmington, NC 28405 Tel: (910) 350-1903 Fax: (910) 350-1557

documents\forms\approved\F016_SGS_COC_electronic.xls
rev.01 01/13/2006

SGS North America Inc.

Sample Receipt Checklist (SRC)

Client: IEC Work Order No.: 3120010~~3~~

1. x Shipped
   ___ Hand Delivered

2. x COC Present on Receipt
   ___ No COC
   ___ Additional Transmittal Forms

3. x Custody Tape on Container
   ___ No Custody Tape

4. x Samples Intact
   ___ Samples Broken / Leaking

5. x Chilled on Receipt Actual Temp.(s) in °C: 2
   ___ Ambient on Receipt
   ___ Walk-in on Ice; Coming down to temp.
   ___ Received Outside of Temperature Specifications

6. x Sufficient Sample Submitted
   ___ Insufficient Sample Submitted

7. ___ Chlorine absent
   x HNO3 < 2
   ___ HCL < 2
   ___ Additional Preservatives verified (see notes)

8. x Received Within Holding Time
   ___ Not Received Within Holding Time

9. ___ No Discrepancies Noted
   x Discrepancies Noted
   ___ NCDENR notified of Descrepancies*

10. x No Headspace present in VOC vials
    ___ Headspace present in VOC vials >6mm

Notes:

Matrices incorrect on COC (reversed).

Comments:

Inspected and Logged in by: TP

Date: Fri-1/13/12 00:00

*NCDENR must be notified when collection, holding time or preservation requirements are not met.

Appendix D
Accident Prevention Plan

Accident Prevention Plan
Remedial Investigation Work Plan
Towers Road Disposal Areas

Harvey Point Defense Testing Activity
Hertford, North Carolina

Task Order 20

April 2013

Prepared for

Department of the Navy
Naval Facilities Engineering Command
Atlantic

Under the

Navy Multimedia Contract
Contract N62470-10-D-3009

Prepared by

CH2MHILL

Virginia Beach, Virginia
NC Engineering License #F-0699

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1 Site Safety and Health Plan

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1 HPDTA Location Map
2 Site Location

Acronyms and Abbreviations

AHA	activity hazard analysis
APP	Accident Prevention Plan
AST	aboveground storage tank
bgs	below ground surface
CFR	Code of Federal Regulations
CO/COR	Contracting Officer/Representative
CPR	cardiopulmonary resuscitation
CSHO	Corporate Safety and Health Officer
DART	Days Away, Restricted, or Transferred
DoD	Department of Defense
DOT	Department of Transportation
EAP	Employee Assistance Program
EM	Engineering Manual
EMR	experience modification rate
ERC	Emergency Response Coordinator
FTL	Field Team Leader
ft	foot/feet
HAZWOPER	Hazardous Waste Operations and Emergency Response
HPDTA	Harvey Point Defense Testing Activity
HSM	Health and Safety Manager
IARC	International Agency for Research on Cancer
IDW	investigation-derived waste
IIPP	Injury and Illness Prevention Program
LWD	lost work day
MSDS	Material Safety Data Sheet
NAICS	North American Industry Classification System
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
PM	Project Manager
PPE	personal protective equipment
PTSP	Pre-Task Safety Planning
REC	Registered Environmental Consultant
RI	Remedial Investigation
SOH	safety and occupational health
SSC	Site Safety Coordinator
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
USACE	United States Army Corps of Engineers
VO	virtual office
VOC	volatile organic compound

SECTION 1

Signature Page

Accident Prevention Plan
Remedial Investigation Work Plan, Towers Road Disposal Areas, Harvey Point Defense Testing Activity
Hertford, North Carolina

Date: October 2012

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SECTION 2

Background Information

This Accident Prevention Plan (APP) has been developed to protect and guide the personnel conducting remedial investigation (RI) activities. The site covered in this investigation consists of the Towers Road Disposal Areas in Harvey Point Defense Testing Activity (HPDTA), consisting of 2nd Street and 5th Street Disposal Areas. This APP has been prepared to meet applicable requirements of the United States Army Corps of Engineers (USACE) Safety and Health Requirements Manual Engineering Manual (EM) 385-1-1 (USACE, 2008), the *Code of Federal Regulations*, 29 code of federal regulations (CFR) 1910.1200 Hazard Communication Standard, Hazardous Waste Operations or emergency response as required by 29 CFR 1910.120 and 29 CFR 1926.65 and the corporate safety and health policies of CH2M HILL, Inc. Various portions of this work shall also be conducted under Non-Hazardous Waste site protocols. The Site Safety and Health Plan (SSHP) for this project is included as **Attachment 1**.

2.1 Contractor

CH2M HILL, Inc.

2.2 Contract Number

N62470-10-D-3009

2.3 Project Name

Towers Road Disposal Areas, HPDTA

2.4 Project Description and Locations

This APP presents the hazards known or anticipated to be present at Towers Road Disposal Areas in HPDTA, Hertford, North Carolina.

2.4.1 Harvey Point Defense Testing Activity

HPDTA is an active Department of Defense (DoD) facility. As shown on **Figure 1**, HPDTA is bounded by surface water on three sides: the Perquimans River to the north, and the Albemarle Sound to the south and east. The facility's western boundary is mostly agricultural land with some residential properties. Further detail about HPDTA is available in Section 2 of the attached SSHP (**Attachment 1**).

2.4.2 Towers Road Disposal Areas

The Towers Road Disposal Areas consists of two sites, the 2nd Street Disposal Area and 5th Street Disposal Area (**Figures 1 and 2**). Details regarding the surface features in the vicinity of these disposal areas, historical use, and current conditions of the disposal areas are presented in Section 2 of the attached SSHP (**Attachment 1**).

2.4.3 Previous Investigations/Nature and Extent of Contamination

2.4.3.1. Previous Investigations

The following is a brief description of previous site investigations and removal actions:

- 1997 – A polychlorinated biphenyl (PCB) removal action was conducted to dispose of 2,544 tons of PCB contaminated soil within the 5th Street Disposal Area. Confirmation samples from the removal action indicated that PCBs remained in place after the completion of the removal action (OHM, 1997).
- 2011 – Conducted a geophysical survey of the 2nd Street Disposal Area (ATS, 2011a) and 5th Street Disposal Area (ATS, 2011b) to determine the extent of buried debris in the accessible areas.
- 2012 – Completed soil and groundwater sampling of eight total samples (four sample locations from the 2nd Street Disposal Area and four from the 5th Street Disposal Area) for volatile organic compounds (VOCs) and metals analysis. The sampling was conducted as a state of North Carolina required pre-requisite in

preparation for entry of the Towers Road Disposal Areas into the Responsible Environmental Consultant (REC) Program.

2.4.3.2. Nature and Extent of Contamination

This section describes the nature and extent of waste based on the 2011 geophysical surveys and contamination of soil and groundwater at the 2nd Street Disposal Area and 5th Street Disposal Area based on the January 2012 sampling event.

The geophysical survey for the 2nd Street Disposal Area covered approximately 1.7 acres. The resistivity data suggest that the depth of the buried materials is probably not more than 16 feet (ft), and the limited vertical extent of the low-resistivity zones suggests little or no migration of dissolved constituents. The geophysical surveyor for the 5th Street Disposal Area covered approximately 0.9 acres. The resistivity data suggest buried materials may exist beyond the limits of the existing data and the possible presence of dissolved constituents that may have migrated vertically downward from the buried materials due to extensive vertical extent of the low-resistivity zones.

The soil and groundwater samples were collected from Geoprobe borings at a depth of 8 to 12 ft bgs. Three of the four samples from the 2nd Street Disposal Area were collected north of Flat Run Road within 100 ft of each other and the fourth sample was collected south of Flat Run Road approximately 200 ft from the cluster of samples collected north of Flat Run Road. The four samples from 5th Street Disposal Area were collected in the northern portion of the disposal area within 130 ft of each other.

The 2nd Street Disposal Area soil samples had eleven metals (aluminum, antimony, arsenic, cadmium, chromium, cobalt, iron, manganese, silver, thallium, and vanadium) detected at concentrations that exceeded the screening criteria and no VOCs that exceeded the screening criteria. The 5th Street Disposal Area soil samples had 13 metals (aluminum, antimony, arsenic, cadmium, chromium, cobalt, iron, lead, manganese, mercury, thallium, vanadium, and zinc) detected at concentrations that exceeded the screening criteria and no VOCs that exceeded the screening criteria.

The 2nd Street Disposal Area groundwater samples had 14 metals (antimony, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, thallium, vanadium, and zinc) and one VOC (vinyl chloride) detected at concentrations that exceeded the screening criteria. The 5th Street Disposal Area groundwater samples had 12 metals (antimony, arsenic, barium, cadmium, chromium, cobalt, iron, lead, manganese, mercury, thallium, and vanadium) and two VOCs (dichlorodifluoromethane and vinyl chloride) detected at concentrations that exceeded the screening criteria.

2.4.4 General Task Order Scope of Work

Trash disposal reportedly occurred at two sites, the 2nd Street and 5th Street Disposal Areas, until the early 1980s. Combined, the sites are estimated to cover 2 acres. The trash may extend to a depth of up to 16 ft bgs. Disposal practices reportedly included digging pits and burying waste, pouring diesel on waste and burning it, and possible chemical dumping (e.g., from a nearby dry cleaning facility and photography chemicals). The specific contents of the waste disposal areas are not known but are reported to include paper, utensils, computer disks, broken dishes, glass, and guns (but no ammunition) at both sites; drums at the 2nd Street Disposal Area; and safes, metal cars, and PCBs at the 5th Street Disposal Area.

The nature and extent of contamination has not been completely characterized during the previous site investigations. Further investigation is necessary to complete the characterization of the nature and extent of contamination at the two disposal areas.

The scope of work to be completed for this investigation includes the following:

- Complete an underground utility location prior to conducting any intrusive work.
- Arrange for a North Carolina registered professional land surveyor to complete a civil survey of the existing conditions at the site.

- Vegetation clearance of forested land within the site.
- Complete a geophysical survey to determine the extent of buried debris in previously inaccessible forested land within the site.
- Conduct test pitting to evaluate the horizontal and vertical extents of buried debris.
- Install monitoring wells to determine the horizontal extent of groundwater contamination.
- Measure groundwater levels at the site to develop a potentiometric surface map.
- Conduct a groundwater and soil sampling event to evaluate the nature and extent of contamination.
- Decontaminate equipment and personnel.

Manage investigation-derived waste (IDW).

The RI will be conducted in two phases, Phase I will consist of geophysical surveying, test pitting, groundwater sampling and soil sampling. Based on the results of the Phase I RI activities and development of preliminary remediation goals, activities conducted during Phase II of the RI will consist of delineation and characterization through test pitting, groundwater sampling, and soil sampling.

This plan also outlines the health and safety procedures that will be used to conduct RI activities at this site. The work is expected to be performed from November 2012 to August 2013. This Project-Specific APP will be used by CH2M HILL and its subcontractors to identify and mitigate task-specific hazards and to select appropriate health and safety protective measures.

Onsite personnel must review the APP and sign an agreement to comply with its provisions prior to commencing onsite work. This APP and its attached SSHP (**Attachment 1**) are considered operational documents that are subject to revisions in response to various site-specific conditions that may be encountered. However, these documents may be modified or updated only with the approval of the Health and Safety Manager (HSM) and Project Manager (PM).

Specific work activities requiring activity hazard analyses (AHAs) are listed in Section 2.6.

2.5 Contractor Accident Experience

CH2M HILL's exceptional safety performance greatly exceeds the industry average. Our injury and illness rates and our Experience Modification Rate (EMR) have decreased over the past 5 years.

Following are examples of our achievements:

An EMR of less than 1.0 over the past 5 years, which is the average accident injury experience for the industry, with a 2011 EMR of 0.67 (or 67 percent) of the industry average (NAICS 54133).

Category	2007	2008	2009	2010	2011
Employee Hours	13,800,315	15,313,289	14,675,460	12,842,086	10,704,063
Experience Modification Rate (EMR)	0.74	0.66	0.70	0.70	0.67
Fatalities	0	0	0	0	0
Recordable Incidents	27	48	20	9	13
Recordable Incident Rate *	0.39	0.63	0.27	0.14	0.24
Recordable Incident Rate Average *	1.4	1.1	1.2	1.0	1.0
Lost Workday (LWD) Incidents (DART) **	7	11	3	1	3
LWD Incident Rate (DART)	0.10	0.14	0.04	0.02	0.06

2.6 Work Requiring Activity Hazard Analysis

The planned field tasks requiring AHAs are as follows.

- 01 Mobilization and Demobilization
- 02 Utility Locating
- 03 Geophysical and Site Surveying
- 04 Vegetation Clearance
- 05 Test Pitting
- 06 Monitoring Well Installation
- 07 Groundwater Sampling and Water Level Measurements
- 08 Soil Sampling

09 IDW Handling and Management

AHAs for each of the above field tasks are included in the SSHP (**Attachment 1**).

SECTION 3

Statement of Safety and Health Policy and Compliance Procedures

CH2M HILL is committed to providing a safe and healthful workplace for employees. These conditions will be ensured through an aggressive and comprehensive worker safety and health program that is integrated with other site worker protection activities. We regard employee protection as a priority and are committed to developing, implementing, and improving safety and health practices that will afford optimal protection to employees and enable continuous improvement of the quality of worker protection performance. The safety and health of employees will take precedence whenever conflicts with production or other objectives arise.

Managers and supervisors are held accountable for worker safety and health. Accountability is achieved by assigning worker protection responsibilities, evaluating personnel performance, and holding personnel accountable for worker protection performance.

In addition to complying with this APP and their corporate safety and health program, persons working under the SSHP (**Attachment 1**) are encouraged to be active participants in their workplace safety and health activities, and to actively take advantage of the worker rights in a responsible manner, without reprisal.

The following activities may result in disciplinary action, up to and including discharge of any employee from their corporation:

- Violation of the safety and health requirements of their corporation's policy or of this APP
- Unauthorized or illegal possession, use or sale of alcohol or controlled substances on work premises, during working hours, while engaged in corporate activities, or in corporate vehicles
- Use or sale of firearms or explosives on work premises

See Section 3 of the SSHP (**Attachment 1**) for further details.

3.1 Objective

The objective of the CH2M HILL Program is to provide a place of employment free of all recognized hazards that are causing or will likely result in death or serious physical harm to our employees. This objective can be facilitated by developing and administering an overall health and safety program, which establishes written policies and procedures to serve as vehicles through which the program requirements will be implemented.

3.2 Purpose

The purpose of this project APP, in conjunction with the project-specific or program health and safety documents, is to define the policies, procedures, and requirements that must be implemented for the CH2M HILL Program and to establish the requirements, responsibilities, and expectations for management, supervisors, employees, and subcontractors that may participate in the execution of the program projects. It is the intent of this APP to address applicable requirements set forth by 29 CFR 1910, 29 CFR 1926, EM 385 1-1, and CH2M HILL policies and procedures incorporated by reference, herein.

3.3 Goals

The health and safety goal for this project and the overall goal for the CH2M HILL Program are to eliminate workplace accidents, gain worker acceptance through cooperation and training, and provide our clients with a responsible, well-trained, safety-oriented work force.

CH2M HILL considers safety the highest priority during work at all project sites and in its business offices and has established a goal of zero incidents. CH2M HILL's Program will be conducted in a manner that minimizes the probability of near misses, injury, illness, and equipment or property damage.

SECTION 4

Health and Safety Expectations, Incentive Program, and Compliance

4.1 Safe Work Policy

It is policy to perform work in the safest manner possible. Safety must never be compromised. To fulfill the requirements of this policy, an organized and effective safety program must be carried out at each location where work is performed.

CH2M HILL believes that all injuries are preventable, and is dedicated to the goal of a safe work environment. To achieve this goal, every employee on the project must assume responsibility for safety.

Every employee is empowered to:

- Conduct their work in a safe manner
- Stop work immediately to correct any unsafe condition that is encountered
- Take corrective actions so that work may proceed in a safe manner

Safety, occupational health, and environmental protection will not be sacrificed for production. These elements are integrated into QC, cost reduction, and job performance, and are crucial to project success.

4.2 Health and Safety Commitment

CH2M HILL has embraced a philosophy for H&S excellence. The primary driving force behind this commitment to H&S is simple: employees are the company's most significant asset and management values their safety, health, and welfare. Also, top management believes that all injuries are preventable. The safety culture empowers employees at all levels to accept ownership for safety and take whatever actions are necessary to eliminate injury. Our company is committed to world-class performance in H&S and also understands that world-class performance in H&S is a critical element in overall business success.

CH2M HILL is committed to the prevention of personal injuries, occupational illnesses, and damage to equipment and property in all of its operations; to the protection of the general public whenever it comes in contact with the Company's work; and to the prevention of pollution and environmental degradation.

Company management, field supervisors, and employees plan safety into each work task in order to prevent occupational injuries and illnesses. CH2M HILL management extends its full commitment to H&S excellence.

4.3 Project-Specific Health, Safety, and Environment Goals

All management and employees are to strive to meet the project-specific HS&E goals outlined below. The team will be successful only if everyone makes a concerted effort to accomplish these goals. The goals allow the project to stay focused on optimizing the H&S of all project personnel and, therefore, making the project a great success.

The Project has established 11 specific goals and objectives:

- Create an injury-free environment.
- Have zero injuries or incidents.
- Provide management leadership for HS&E by communicating performance expectations, reviewing and tracking performance, and leading by example.
- Ensure effective implementation of the SSHP and APP through education, delegation, and team work.
- Ensure 100-percent participation in training programs, PPE use, and HS&E compliance.
- Continuously improve safety performance.

- Maintain free and open lines of communication.
- Make a personal commitment to safety as a value.
- Focus safety improvements on high-risk groups.
- Continue strong employee involvement initiatives.
- Achieve H&S excellence.

4.4 Standards of Conduct Violations

All individuals associated with this project must work injury-free and drug-free and must comply with the following Standards of Conduct, the SSHP and APP, and the site safety requirements. Commonly accepted standards of conduct help maintain good relationships between people. They promote responsibility and self-development. Misunderstandings, frictions, and disciplinary action can be avoided by refraining from thoughtless or wrongful acts. Violations of the standards of conduct would include, but not be limited to:

- Failure to perform work
- Inefficient performance, incompetence, or neglect of work
- Willful refusal to perform work as directed (insubordination)
- Negligence in observing safety regulations, poor housekeeping, or failure to report on-the-job injuries or unsafe conditions
- Unexcused or excessive absence or tardiness
- Unwillingness or inability to work in harmony with others
- Discourtesy, irritation, friction, or other conduct that creates disharmony
- Harassment or discrimination against another individual
- Failure to be prepared for work by wearing the appropriate construction clothing or PPE, or bringing the necessary tools
- Violation of any other commonly accepted reasonable rule of responsible personal conduct

4.5 Intolerable Offenses

Certain employee conduct may be so intolerable as to justify removal from the project. Intolerable offenses and actions will include, but not be limited to, the following:

- Any manager, supervisor, foreman, or other person in charge of the work being performed who requires requests, asks, threatens with their job, allows, or condones employees to work in or around unsafe acts or conditions.
- Any employee, supervisor, or manager who knowingly falsifies any investigative documents or testimony involving an investigation.
- Any employee, supervisor, or manager who openly exhibits disregard, defiance, or disrespect for the safety program.
- Any employee who violates established safety rules, regulations, or codes that endanger themselves or other employees.
- Any and all parties involved in workplace violence, including physical encounters (fighting) or threats of violence, theft, or destruction of property.

- Any employee, supervisor, or manager failing to comply with procedures contained in the subcontract, SSHP and APP, USACE EM 385-1-1 Manual, or local safety laws and regulations that create the potential for serious or costly consequences.
- Any employee who commits repeated minor offenses and shows a lack of responsible effort to correct these offenses.

4.6 Enforcement and Discipline

CH2M HILL's Enforcement and Discipline procedures, the Standards of Conduct, the Intolerable Offenses, and the Drug-Free Workplace policy will be thoroughly reviewed with each employee during the employee project orientation.

4.6.1 Intolerable Offenses

CH2M HILL practices zero tolerance for intolerable offenses. Those individuals found participating in such offenses will be:

- Suspended from work for 3 days without pay, or
- Immediately discharged and not allowed to return

4.6.2 Other Violations

Other violations will be handled accordingly:

- First offense—employee will receive a written warning
- Second offense—employee will receive a 2-day suspension without pay
- Third offense—employee will be discharged

4.7 Subcontractor Default

If the subcontractor fails to comply with any of the requirements of the subcontract, SSHP and APP, or local safety laws and regulations, the prime contractor may issue a stop work order to the subcontractor. Thereupon, the subcontractor will immediately cease all work or portion of work that may be specifically designated in the stop work order until the prime contractor has concluded in writing that the subcontractor has corrected its failure of performance. No adjustments will be made to the subcontractor price or schedule as a result of any stop work orders being issued by the prime contractor. A stop work order will be given to the noncompliant subcontractor on the date of deficiency. If the subcontractor fails to correct the deficiencies noted in the stop work order within 3 working days following the written notice from the prime contractor, the prime contractor may, without prejudice to any other rights or remedies under the subcontract or at law or equity, suspend all further payments to subcontractor and/or terminate subcontractor's right to continue performance of the work.

4.8 Incentive Program

The prime contractor will encourage the subcontractor to implement a safety incentive program for the project that rewards workers for exhibiting exemplary safety behaviors. Actions that qualify are those that go above and beyond what is expected, like wearing your own safety equipment, seatbelt, etc. Actions that will be rewarded include spotting and correcting a hazard, bringing a hazard to the attention of your foreman, telling your foreman about an incident, coming up with a safer way to get the work done, stopping a crew member from doing something unsafe, etc. The program will operate throughout the project, covering all craft workers. The incentive program will be communicated to all employees during the project employee orientation and project safety meetings.

4.9 Posting of Health and Safety Information

There will be a posting area, accessible by all workers onsite, and in clear view for the posting of site-specific H&S information. The posted information will be protected from the environment and kept updated as project information changes.

SECTION 5

Responsibilities and Lines of Authorities

This section identifies the personnel who have specific safety responsibilities on the project.

5.1 Personnel with Safety Responsibilities

Participating personnel are responsible for complying with safety procedures and for proactively making safety awareness part of their day-to-day conduct.

The following positions have specific corporate and project safety responsibilities:

- HSM
- Corporate Safety and Health Officer (CSHO)
- PM
- Site Safety Coordinator (SSC)/Site Safety and Health Officer (SSHO)
- Field Team Leader (FTL)
- Other project field staff

The SSHP (**Attachment 1**) lists the specific personnel that will fill the stated positions for this project. See Section 4 of the SSHP (**Attachment 1**) for details.

All work is conducted under a Behavior Based and Loss Prevention System program. AHAs are a vital part of this work, as well as using Pre-Task Safety Planning (PTSP). All staff are accountable for their own health and safety, and have the authority to request a work stoppage when they feel unsafe behaviors, actions, or situations are occurring.

All work requiring a competent person per Occupational Safety and Health Administration (OSHA) definition (29 CFR 1926.32(f)), will not be started until that competent person is designated and on site. *Competent person* means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

SECTION 6

Subcontractors and Suppliers

Subcontractors and suppliers providing services onsite will be subject to the safety provisions of this APP and those included in the SSHP (**Attachment 1**). See Section 5 of the SSHP for details. At this time, there are eight subcontractors planned for use to fulfill this task order.

This APP has been constructed to directly track with the EM 385-1-1 2011 Appendix A, *Minimum Basic Outline for Accident Prevention Plan.*

CH2M HILL and any identified subcontractors shall conduct site work in accordance with this APP and associated documents. CH2M HILL shall address compliance with specific safety and health requirements through safety meetings at the start of each shift. The specific safety and health requirements and site conditions will be reviewed with field personnel during these meetings. All parties shall also comply with the requirements of their respective Injury and Illness Prevention Programs (IIPPs).

SECTION 7

Training

Site workers, supervisors, and managers will have training appropriate to their assigned duties and as specified in the SSHP (**Attachment 1**) and its attached AHAs that are applicable to the work being performed. As specified in Section 6 of the SSHP, the SSC (who will also conduct the project safety and health inspections), will meet the training and indoctrination requirements prescribed in this APP and the SSHP, as well as the Hazardous Waste Operations and Emergency Response (HAZWOPER) supervisory training. All employees engaging in hazardous waste operations or emergency response shall receive appropriate training as required by 29 CFR 1910.120 and 29 CFR 1926.65. At a minimum, the training shall have consisted of instruction in the topics outlined in 29 CFR 1910.120 and 29 CFR 1926.65. As there are tasks planned that require a competent person, competent person level training is required. Personnel who have not met these training requirements shall not be allowed to engage in hazardous waste operations or emergency response activities.

Details of required training are specified in Section 6 of the SSHP (**Attachment 1**)

7.1 New Hire Safety and Occupational Health Orientation Training

New Hire Safety and Occupational Health (SOH) orientation will be performed by an employee's line supervisor, human resource representative, intranet training, or by employee review of information provided by the employer. In general, New Hire SOH orientation training would include the following components, depending on the employee's hire category:

1. Introduction to company/corporate history
2. Organizational Structure
3. Briefing on job functions and employee performance expectations
4. Time keeping and/or expense reporting
5. Provision, review, and acknowledgement of Corporate Policies and Procedures Manual (also known as the Employee Manual) or equivalent
6. Provision, review, and acknowledgement of Corporate Health and Safety Program Plan or equivalent
7. General Hazard Communication, Manuel Lifting Safety, and Ergonomics Training
8. Verification and update (as necessary) of prerequisite training and medical surveillance testing, where applicable for field work (HAZWOPER/Construction)
9. Management and Supervisor training, as applicable

All designated CH2M HILL personnel, regardless of assignment responsibilities, who are engaged in site operations must review or be provided with a detailed briefing on the contents of SSHP, APPs, task specific AHAs, and daily safety briefings and must acknowledge such documents by signature.

7.2 Requirements for Mandatory Training and Certificates

CH2M HILL engages in construction, environmental remediation, and other consulting services and endeavors to comply with the health and safety training requirements mandated by governmental agencies, internal policies, and client requirements.

Personnel will be provided sufficient training to execute their jobs in a safe and healthy manner. It is the responsibility of each employer to ensure that their employees maintain the appropriate training requirements to complete their assigned duties.

Direct supervisors, with support from the Senior Management and Health and Safety professionals, are responsible for determining the training requirements for a specific project or task and ensuring that personnel assigned to CH2M HILL operations have the necessary training to complete the project or task safely. Senior management and the Project HSM will assist with the delivery of identified required training.

Designated employer personnel and electronic databases facilitate the maintenance of training records and applicable experience documentation. When an employee's training is identified as being insufficient to perform an assigned task, every effort will be made to provide the necessary training or to provide a trained and experienced alternate until the employee has achieved the required criteria.

Employee training records are available at corporate offices, by electronic means, and are generally maintained on the project site. Depending on the size of the project crew and because of work crew dynamics and scheduling, the provision of hard-copy employee training records (and medical surveillance records where applicable) for all anticipated personnel who may be assigned to this project within the content of this APP is impractical. CH2M HILL endeavors to maintain these documents onsite for review and will provide them to government officials for verification, upon request.

All CH2M HILL personnel performing HAZWOPER-regulated Tasks are enrolled in a comprehensive health and safety program, which, at a minimum, meets the requirements of 29 CFR 1910.120/29 CFR 1926.65 or 29 CFR 1910.134.

7.3 Procedures for Periodic Safety and Health Training of Supervisors and Employees

Supervisor and employee routine training is provided by the employer as a method of adhering to OSHA, the Department of Transportation (DOT), or other state or local regulations, as is required to be provided by an employer to an employee. The types and frequency of routine training provided to CH2M HILL program participants is identified in Appendix A of this APP.

7.4 Requirements for Emergency Response Training

There are no specific requirements for emergency response training for this project other than the following:

- 29 CFR 1910.120(e)(3)/29 CFR 1926.65(e)(3) standard
- On the job experience associated with operations regulated by 29 CFR 1910.120(e)(3)/29 CFR 1926.65(e)(3) standard
- First Aid and cardiopulmonary resuscitation (CPR) training and Bloodborne Pathogen training

SECTION 8

Safety and Health Inspections

8.1 Inspection Details

The project SSC (specifically identified in the SSHP [**Attachment 1**]) will provide onsite safety and health inspections for this project. The SSC will meet the training and indoctrination requirements as prescribed in this APP and the SSHP, including HAZWOPER supervisory training, CPR, first aid, and bloodborne pathogen awareness training. The SSC will also have hands-on experience overseeing these types of tasks.

See Section 7 of the SSHP (**Attachment 1**) for further inspection details.

8.2 Recordkeeping

Project safety and health documentation will be maintained by the CSHOs for the respective companies. Records to be maintained (both in project files of each of the respective companies, and in the onsite field trailer) will include:

- HAZWOPER training certificates
- First aid and CPR training certificates
- Documentation of medical surveillance
- Daily safety and health briefing acknowledgment forms
- Deficiency identification, correction, and follow-up documentation
- Accident reports and investigation records
- Respirator usage and fit training, as applicable
- Material Safety Data Sheet (MSDS) for sample preservatives

8.3 External Inspection/Certifications

External inspections or certifications will not be required for this work.

SECTION 9

Accident Reporting

The SSC and HSM are responsible for all incidents and accidents reporting. Specific details are found in Section 9 of the SSHP for accidents and Section 16 of the SSHP for incidents (**Attachment 1**).

Also, all significant accidents shall be reported as soon as possible, but not more than 24 hours afterwards to the Contracting Officer/Representative (CO/COR). The contractor shall thoroughly investigate the incident and submit the findings of the investigation along with appropriate corrective actions to the CO/COR in the prescribed format as soon as possible, but no later than 5 working days following the incident. Implement corrective actions as soon as reasonably possible.

The following occurrences require immediate accident notification:

- A fatal injury
- A permanent total disability
- A permanent partial disability
- The hospitalization of three or more people resulting from a single occurrence
- Property damage of $200,000 or more

SECTION 10

Plans Required By the EM 385-1-1 Safety Manual

Plans required by the EM 385-1-1 Safety Manual are presented below. Plans and procedures that are not applicable to this project are indicated as such with the non-applicability rationale.

10.1 Layout Plan

See **Figures 1 and 2**.

10.2 Hospital Addresses and Route

Information on the nearest medical facility with emergency care is discussed in the front portion of the SSHP (**Attachment 1**).

10.3 Emergency Response Plan

10.3.1 Pre-Emergency Planning

The Emergency Response Coordinator (ERC), for this project, the FTL/SSC, performs the applicable pre-emergency planning tasks before starting field activities and coordinates emergency response with CH2M HILL onsite parties, the facility, and local emergency-service providers as appropriate. Pre-Emergency Planning activities performed by the FTL/SSC include:

- Review the facility emergency and contingency plans where applicable.
- Determine what onsite communication equipment is available (two-way radio, air horn).
- Determine what offsite communication equipment is needed (nearest telephone, cell phone).
- Confirm and post the “Emergency Contacts” page and route to the hospital located in the front portion of the SSHP (**Attachment 1**) and keep a copy in field vehicles along with evacuation routes and assembly areas. Communicate the information to onsite personnel and keep it updated.
- Review changed site conditions, onsite operations, and personnel availability in relation to emergency response procedures.
- Where appropriate and acceptable to the client, inform emergency room and ambulance and emergency response teams of anticipated types of site emergencies.
- Inventory and check site emergency equipment, supplies, and potable water.
- Communicate emergency procedures for personnel injury, exposures, fires, explosions, and releases.
- Rehearse the emergency response plan before site activities begin. This may include a “tabletop” exercise or an actual drill depending on the nature and complexity of the project. Drills should take place periodically but no less than once a year.
- Brief new workers on the emergency response plan.
- The FTL/SSC will evaluate emergency response actions and initiate appropriate follow-up actions.

10.3.2 Emergency Equipment and Supplies

The FTL/SSC shall ensure the following emergency equipment is on the site. Verify and update the locations of this equipment as needed. The equipment will be inspected in accordance with manufacturer’s recommendations. The inspection shall be documented in a field logbook or similar means to be kept in the project files.

Emergency Equipment and Supplies	Location
Small class A,B,C fire extinguisher	Field vehicle
First aid kit of suitable size and quality to meet requirements for on-site firsts aid or CPR response	Field vehicle
Eye Wash Station	Field vehicle
Potable water	Field vehicle
Bloodborne-pathogen kit	Field vehicle
Additional equipment (specify): Cell Phone	Field vehicle
Spill Control/Clean-up Materials/Proper Spill Response PPE	Field vehicle and/or Construction Support Area

10.3.3 Incident Response

In fires, explosions, or chemical releases, actions to be taken include the following:

- Notify appropriate response personnel
- Shut down CH2M HILL operations and evacuate the immediate work area
- Account for personnel at the designated assembly area(s)
- Assess the need for site evacuation, and evacuate the site as warranted
- Implement HSE-111, Incident Notification, Reporting and Investigation
- Notify and submit reports to clients as required in contract

Small fires or spills posing minimal safety or health hazards may be controlled with onsite spill kits or fire extinguishers without evacuating the site. When in doubt evacuate. Follow the incident reporting procedures.

Outdoor field work on this project will be suspended in the event of severe weather that could impact field activities. Such work suspension will be communicated immediately to the PM and the procedures noted in Section 16 of the SSHP (**Attachment 1**) will be followed.

An effective means of communication and to summon transportation of injured workers to medical treatment facilities must be evaluated and established prior to the start of field activities. Communication devices shall be tested in the area of use to assure functionality.

When a medical facility or physician is not accessible within 5 minutes of an injury to a group of two or more employees for the treatment of injuries, at least two employees on each shift shall be qualified to administer first-aid and CPR.

The procedures listed below may also be applied to non-emergency incidents. If there is doubt about whether medical treatment is necessary, or if the injured person is reluctant to accept medical treatment, contact the designated medical consultant, as applicable. (During non-emergencies, follow these procedures as appropriate).

- Notify appropriate emergency response authorities (e.g., 911 or the non-emergency phone number for the local authorities if appropriate).
- The FTL/SSC will assume charge during a medical emergency until the ambulance arrives or until the injured person is admitted to the emergency room.
- Prevent further injury—for life-threatening emergencies summon medical attention immediately.
- Initiate first aid and CPR where feasible and where worker “Universal Precautions” to Bloodborne Pathogens can be completed.
- Perform decontamination where feasible; lifesaving and first aid or medical treatment take priority.
- Make certain that the injured person is accompanied to the emergency room.

- When contacting the medical consultant, give your name and telephone number, the name of the injured person, the extent of the injury or exposure, and the name and location of the medical facility where the injured person was taken.
- Report incident as outlined in Section 16.

10.3.4 Emergency Medical Treatment

Emergency medical treatment is needed when there is a life-threatening injury (such as severe bleeding, loss of consciousness, breathing or heart has stopped). When in doubt if an injury is life-threatening or not, treat it as needing emergency medical treatment.

- Notify 911 or other appropriate emergency response authorities as listed in the "Emergency Contacts" page located in the front portion of the SSHP (**Attachment 1**).
- The FTL/SSC will assume charge during a medical emergency until the ambulance arrives or until the injured person is admitted to the emergency room.
- Prevent further injury, perform decontamination (if applicable) where feasible; lifesaving and first aid or medical treatment takes priority.
- Initiate first aid and CPR where feasible.
- Notify supervisor and if the injured person is a CH2M HILL employee, the supervisor will call the occupational nurse at 1-866-893-2514 and make other notifications as required by HSE SOP-111, *Incident Notification, Reporting and Investigation*.
- Make certain that the injured person is accompanied to the emergency room.
- Follow the Serious Incident Reporting process in HSE SOP-111, *Incident Notification, Reporting and Investigation,* and complete incident report using the HITS system on the Virtual Office (VO) or if not feasible, use the hard copy forms provided in Attachment 11 of the SSHP (**Attachment 1**).
- Notify and submit reports to client as required in contract.

10.3.5 Evacuation

General "evacuations" will be performed in accordance with the situation. If evacuation is due to fire, personnel will move away from and upwind of burning areas. If evacuation is due to inclement weather, personnel will assemble at the rental vehicle or will proceed to the lowest lying land area in the case of a tornado warning. These areas will NOT be specified on each site map.

- Evacuation route(s) and assembly area(s) will be designated by the FTL/SSC or designee before work begins at each project site.
- The emergency signal will be several three successive blasts on the site vehicle horn and/or cell phones will be used if personnel are separated to communicate the impending hazard.
- The FTL/SSC and a "buddy" will remain on the site after the site has been evacuated (if safe) to assist local responders and advise them of the nature and location of the incident.
- The FTL/SSC will account for all personnel in the onsite assembly area.
- A designated person will account for personnel at alternate assembly area(s).
- The FTL/SSC will follow the incident reporting procedures in Section 16 of the SSHP **(Attachment 1)**.

10.3.6 Evacuation Signals

Signal	Meaning
Grasping throat with hand	Emergency-help me.
Thumbs up	OK; understood.
Grasping buddy's wrist	Leave area now.
Continuous sounding of horn	Emergency; leave site now.
Severe Weather Warnings (radio, TV, internet)	Leave the region in accordance with the facility evacuation orders or directives from program/project management team

10.3.7 Procedures and Tests

It is the intention of the project team to verify that emergency response processes are in place and capable of being executed, prior to the start of field assignments. However, because response to medical or fire emergencies will be by government facility installation personnel or even by outside public responders, it may be impractical and disruptive to the primary mission of these responders to perform procedural response testing. In this case, the designated responsible party (SSHO) shall verify that emergency services are available for response, that contact information is appropriate, and that responders know how to access anticipated work areas.

10.3.8 Spill Plan/Containment Procedures

The initial response to any spill or discharge will be to protect human health and safety, and then the environment. Identification, containment, treatment, and disposal assessment will be the secondary response. During the initial installation of the sediment curtain, oil absorbent booms (typically white in color) will be deployed around the work area.

Spills On Land

If a chemical spill on land is not contained within a dike or sump area, an area of isolation will be established around the spill. The size of the area will generally depend on the size of the spill and the materials involved. If the spill is large (greater than 55 gallons) and involves a tank or a pipeline rupture, an initial isolation of at least 100 ft in all directions will be used. Small spills (less than or equal to 55 gallons) or leaks from a tank or pipe will require evacuation of at least 50 ft in all directions to allow cleanup and repair and to prevent exposure.

If the spill results in the formation of a toxic vapor cloud (by reaction with surrounding materials or by outbreak of fire) and its release (due to high vapor pressures under ambient conditions), further evacuation must be engaged. In general, an area at least 500 ft wide and 1,000 ft long will be evacuated downwind if volatile materials are spilled. (Consult the Department of Transportation Emergency Response Guide for isolation distances for listed hazardous materials.)

If an incident may threaten the health or safety of the surrounding community, the public will be informed (via proper local and state emergency management planning agencies) and possibly evacuated from the area. The onsite emergency coordinator will inform the proper agencies in the event this is necessary.

In a spill or release response/containment, personnel shall take the following measures:

- Immediately warn any nearby workers and alert SSHO.
- Assess the spill area to ensure that it is safe to respond.
- Evacuate area if spill presents an emergency.
- Put on protective clothing and equipment.
- If a flammable material is involved, remove all ignition sources, and use only spark- and explosion-proof equipment for recovery of material. Remove all surrounding materials that could be reactive.

- Stop the source of the spill.
- If wastes threatens to reach an outfall (e.g., storm sewer), dam the outfall with sand, earth, or sandbags. Pump this material out into a temporary holding tank or drums as soon as possible.
- Establish site control for spill area.

  Provide notification to the Project Manager. The PM will coordinate notification to the HPDTA Environmental Manager (252-426-4360). HPDTA will coordinate the reporting of spills or releases of oil or hazardous materials to appropriate agencies and stakeholders. Any changes in field conditions should be promptly reported to HPDTA.
- Provide notification to the Environmental Manager.
- Provide notification to the HSM.
- Place spill cleanup wastes in appropriate, labeled containers and coordinate with the HPDTA Environmental Manager for proper management and disposal.

Anticipated Hazardous Materials

The following is a list of hazardous materials or chemicals that may be brought onsite and incorporated as part of the final completion of the work, generated during the execution of the work for offsite disposal or recycling or otherwise used to facilitate site work. These hazardous materials or chemicals may require spill prevention and countermeasure control processes to ensure sensitive environmental receptors are not adversely impacted in the event of a spill or release of these materials.

- Gasoline (small metal safety containers for fueling small engine equipment).
- Diesel fuel in heavy equipment and potentially in a 550 gallon aboveground storage tank (AST).
- Minor quantities of sample preservatives (e.g., nitric acid, hydrochloric acid, sulfuric acid, sodium hydroxide/zinc acetate, phosphoric acid).
- Marking paint
- Minor quantities of grease, motor oil and hydraulic fluid
- Insect repellent(s)

Notification

In the event a spill occurs that requires notification, the SSC shall follow the procedures outlined above.

In addition, the PM shall make notification to the HPDTA Environmental Manager, such that additional appropriate community and/or federal/state agencies may be engaged and notified, as applicable. The PM shall coordinate with the EM for support with regard to adhering to local, state, or federal regulations for spill notification clean-up and closure requirements.

10.4 Man Overboard/Abandon Ship (Section 19.A.04)

NOT APPLICABLE. No work will be performed over water.

10.5 Onsite Medical Support

Location and direction to medical support facilities shall be posted in a conspicuous location where temporary construction facilities or support are established at the project site. Where temporary construction facilities or a designated administrative/support office are not allowed or provided, the list shall be available for quick reference by the SSC personnel executing site operations and its location shall also be made known to other site personnel.

In addition, the project shall be outfitted with first aid kits of suitable size and quality (contents) to meet health and safety requirements for on-site first aid and CPR response. Personal protective devices shall be provided such that universal precautions against blood borne pathogens can be exercised while administering CPR or first aid. Eye wash stations, either portable or stationary, will be available.

An effective means of communication and to summon transportation of injured workers to medical treatment facilities must be evaluated and established prior to the start of field activities. Communication devices shall be tested in the area of use to assure functionality. When a medical facility or physician is not accessible within 5 minutes of an injury to a group of two or more employees for the treatment of injuries, at least two employees on each shift shall be qualified/certified to administer basic first-aid and CPR, along with Bloodborne Pathogens annual training. Unless injured, the SSHO/SSC will be the lead person to initiate any required first aid until offsite medical support can be engaged.

It must be understood that for life threatening emergencies, get or summon medical attention immediately.

- During non-life threatening emergencies, follow these procedures as appropriate.
- Notify appropriate emergency response authorities (e.g., 911).
- The site supervisor or SSC will assume charge during a medical emergency until the ambulance arrives or until the injured person is admitted to the emergency room.
- Prevent further injury.
- Initiate first aid and CPR where feasible and where worker “Universal Precautions” to Blood borne Pathogens can be completed.
- Perform decontamination where feasible; lifesaving and first aid or medical treatment take priority.
- Make certain that the injured person is accompanied to the emergency room.
- When contacting the medical consultant, give your name and telephone number, the name of the injured person, the extent of the injury or exposure, and the name and location of the medical facility where the injured person was taken.

10.6 Offsite Medical Support

In the event of a medical emergency or if follow up to basic first aid is required, request emergency medical transport as opposed to transporting the injured person in a private or company vehicle where practical. The contact and location information for the nearest offsite medical support is presented below. A map indicating the travel route to the nearest medical facility with emergency care is presented in the SSHP (**Attachment 1**).

Chowan Hospital **211 Virginia Road** **Edenton, NC 27932** **252-482-8451**	
Emergency #:	In case of an emergency the site escort will summon HPDTA base medical, fire, or security personnel by radio.

Further specific details are provided in the SSHP (**Attachment 1**).

10.7 Alcohol and Drug Abuse Prevention

In order to maintain a drug and alcohol free workplace, the respective parties have established a drug and alcohol free awareness program to educate employees on 1) the danger of drug abuse and alcohol in the workplace; 2) the corporate drug and alcohol free workplace policy; 3) the availability of any drug and alcohol counseling, rehabilitation, and employee assistance programs; and 4) the penalties that may be imposed upon employees for drug abuse and alcohol violations and violations of the corporation’s drug and alcohol free workplace. Such

education includes the distribution of the drug- and alcohol-free workplace policy at the employment interview; a discussion of the drug- and alcohol-free workplace policy at the new employee orientation session; and inclusion of the company's drug- and alcohol-free workplace policy in the employee handbook and any other personnel policy publications.

10.7.1 CH2M HILL

The corporation has vital interests in ensuring a safe, healthy, and efficient working environment for our employees, their coworkers and clients we serve. The unlawful or improper use of controlled substances or alcohol in the workplace presents a danger to everyone. In addition, as a federal contractor we have a duty to comply with the requirement of the Drug-Free Workplace Act of 1988. For these reasons, we have established as a condition of employment and continued employment with the corporation the following drug- and alcohol-free workplace policy.

Employees are prohibited from reporting to work or working while using illegal or unauthorized substances. Employees are prohibited from reporting to work or working when the employee uses any drugs, except when the use is pursuant to a doctor's orders and the doctor has advised the employee that the substance does not adversely affect the employee's ability to safely perform his or her job duties. This does not include the authorized use of alcohol at corporate-sponsored functions or activities.

In addition, employees are prohibited from engaging in the unlawful or unauthorized manufacture, distribution, sale, or possession of illegal or unauthorized substances and alcohol in the workplace including on client paid time, on client premises, in client vehicles, or while engaged in client activities.

In accordance with the Drug-Free Workplace Act of 1988, employees must notify their supervisor of any criminal drug statute conviction for a violation occurring within the workplace within 5 days of such conviction.

Employment with the corporation is conditioned upon an employee's full compliance with the foregoing drug and alcohol free workplace policy. Any violation of this policy may result in disciplinary action, up to and including discharge. Furthermore, any employee who violates this policy who is subject to termination may be permitted in lieu of termination, at the corporation's sole discretion, to participate in and successfully complete an appropriate treatment, counseling, or rehabilitation program as recommended by a substance abuse professional as a condition of continued employment and in accordance with applicable federal, state, and local laws.

Consistent with its fair employment policy, the corporation maintains a policy of nondiscrimination and reasonable accommodation with respect to recovering addicts and alcoholics, and those having a medical history reflecting treatment for substance abuse conditions. We encourage employees to seek assistance before their drug and alcohol use renders them unable to perform their essential job functions or jeopardizes the health and safety of themselves or others. The corporation will attempt to assist its employees through referrals to rehabilitation, appropriate leaves of absence, and other measures consistent with the corporation's policies and applicable federal, state, or local laws.

The corporation further reserves the right to take any and all appropriate and lawful actions necessary to enforce this drug and alcohol free workplace policy including, but not limited to, the inspection of corporation-issued lockers, desks, or other suspected areas of concealment. Employees are required to submit for "post accident" and "for cause" drug and alcohol screening following any incident. Random drug and/or alcohol screening is not a requirement of CH2M HILL unless required by a client.

10.7.2 Employee Assistance Program

Employees may participate in CH2M HILL's Employee Assistance Program (EAP) immediately upon hire. The EAP helps eligible employees and their immediate families with a wide range of problems, including marriage and family problems; emotional problems; alcoholism and alcohol abuse; drug abuse and dependency; financial problems; compulsive gambling; and eating disorders. Employee conversations and records under the EAP are strictly confidential. The administrative cost of this program is fully paid by the company.

10.8 Site Sanitation Plan (Section 02)

The following constitutes the Site Sanitation Plan for this project.

10.8.1 Drinking Water

A cooler containing an adequate supply of drinking water and/or bottled water will be available at the site for the site workers and replenished each day. The cooler and/or bottled water will be stored outside the exclusion zone on or near the field vehicles.

10.8.2 Toilets

Access to toilets is available on the facility.

However, toilet facilities on construction sites shall be provided as follows:

Minimum Toilet Facilities at Construction Sites	
Number of Personnel	Number of Toilets
20 or fewer	One
20 or greater	One toilet seat and One urinal per 40 workers
Greater than 200	One toilet seat and One urinal per 50 workers.

Note:

The above requirements do not apply to mobile crews or to normally unattended work locations if employees working at these locations have transportation immediately available to nearby toilet facilities. Separate toilet rooms for each sex need not be provided if toilet rooms can only be occupied by one person at a time can be locked from the inside, and contain at least one toilet seat.

Toilet facilities shall be constructed so that the occupants are protected against weather and falling objects; all cracks shall be sealed, and the door shall be tight-fitting, self-closing, and capable of being latched. Adequate ventilation shall be provided and all windows and vents shall be screened. Toilet facilities shall be constructed so that the interior is lighted.

Provisions for routinely servicing and cleaning all toilets and disposing of the sewage shall be established before placing toilet facilities into operation. The method of sewage disposal and the placement location selected shall be in accordance with Federal, state, and local health regulations.

10.8.3 Washing Facilities

Access to washing facilities is available at the same location as the toilets.

Washing facilities shall be provided at toilet facilities and as needed to maintain healthful and sanitary conditions. Each washing facility shall be maintained in a sanitary condition and provided with water (either hot and cold running water or tepid running water), soap, and individual means of drying. If it is not practical to provide running water, hand sanitizers may be used as a substitute. Washing facilities shall be in close proximity to the worksite.

10.8.4 Food Service

No food service will be provided onsite. Site workers will either bring their food to the site to be consumed outside of the exclusion zone and only after proper decontamination, or will go offsite for food.

10.8.5 Waste Disposal

Any IDW will be stored, profiled, and disposed of in accordance with the project Work Plan.

Nonhazardous waste materials and rubbish will be contained in a garbage bag and disposed of with regular site sanitary service disposal or at an offsite disposal facility.

10.8.6 Vermin Control

Trash and garbage generated by the normal site operations must be properly stowed, containerized, and secured such that vermin will not be attracted and disposed of off-site on a regular basis to provide vermin control.

10.9 Access and Haul Road Plan (Section 04.B)

The site access and haul road is anticipated to the same as the Emergency Evacuation Route and will be coordinated with and approved by the HPDTA Environmental Manager prior to site mobilization.

10.10 Respiratory Protection Plan (Section 05.G)

Exposure to respiratory hazards above the permissible exposure limit is not anticipated for the scope of work being performed under this APP. However, air monitoring of worker breathing zones during certain activities (e.g. soil and groundwater sampling) may be conducted to confirm these conditions.

If air monitoring determines vapor concentrations exceed permissible exposure limits, workers, under the direct supervision of the SSC, will implement engineered controls to mitigate exposure. If engineered controls are not sufficient, work will be suspended, and the SSHP (**Attachment 1**) will be amended to include a specific Respiratory Protection Plan.

Only field personnel who have been medically cleared, fit-tested, and trained in the use and maintenance of the appropriate respiratory protection will be allowed to proceed with work under conditions requiring respiratory protection.

10.11 Health Hazard Control Plan (Section 06.A)

Safety and health hazards for performing work covered under this APP are identified through the preparation of AHAs (provided in the SSHP [**Attachment 1**]). Each AHA also indicates recommended controls for each identified potential safety/health hazard.

Appropriate personal protective equipment shall be supplied and used at all times for this project. Personal protective equipment (PPE) selection is based on the selected hazard control measures specified in the AHAs.

10.12 Hazard Communication Program

Chemical products may occasionally be stored and used on the project site, and/or stored on field vehicles. Examples of chemicals include hydrogen peroxide, gases used to calibrate sensing equipment, and lubricants. Other chemicals may be used as well. These chemicals may pose hazards including flammability, corrosiveness, reactivity and incompatibility, and toxicity. Because of these potential hazards, special precautions must be taken including:

- Tracking and controlling hazardous chemical products received and stored.
- A hazard evaluation of each chemical product, using such sources as MSDSs.
- Informing workers of the potential hazards through training, MSDSs, and appropriate labeling of containers.
- Air monitoring in the case of potential respiratory hazards.
- Design and implementation of engineering controls such as ventilation and source control.
- Developing storage, handling, housekeeping, and decontamination procedures.
- Assigning appropriate personal protective equipment such as eye and face protection, gloves, body protection, and respirators. Respirator usage by CH2M HILL or subcontractor employees will be in accordance with the employees' IIPP.
- Training personnel handling chemicals on safe handling procedures, personal protective equipment, and emergency and spill cleanup procedures.

Hazardous substances that may be encountered in soil on the project site are not covered by this program. The SSHP (**Attachment 1**) addresses chemical and other hazard assessment and mitigation associated with site contaminants including investigation and remediation of waste materials.

10.12.1 Chemicals Covered by this Project Program

For the purposes of this program, chemicals considered to be hazardous are those:

- Listed in the OSHA Permissible Exposure Limits.
- Included in the American Conference of Governmental Industrial Hygienists Threshold Limit Values for Chemical Substances (2007).
- Found to be suspected or confirmed carcinogens by the National Toxicology Program in the latest edition of the Annual Report on Carcinogens, or by the International Agency for Research on Cancer (IARC) in the latest edition of the IARC monographs.

Chemicals that are expected to be used during field activities as part of this scope of work include sampling preservatives and fuel for boats

Exceptions to this policy, by OSHA definition, include consumer products that are used in a consumer fashion and pose no more of an exposure hazard than a consumer would face.

10.12.2 Training

Employees who work with or are potentially exposed to hazardous chemicals will receive initial training on the elements of this Hazard Communication Program, including the following:

- Content and requirements of this Program and the OSHA Hazard Communication Standard
- The potential physical and toxic hazards of the chemicals used in their work location, and especially the hazards of non-routine tasks
- Chemical inventory and tracking procedures
- Location of this Hazard Communication Program, the chemical inventory, and the MSDSs
- How to read Material Safety Data Sheets
- Methods to detect the release of or exposure to chemicals in their area
- Content and interpretation of labels
- Safe use and handling of chemicals
- Required personal protective equipment
- Basic emergency procedures

Additional training will be provided on an annual basis, whenever a new chemical is added to the workplace, and when non routine tasks are planned.

10.12.3 Labeling

The SSC will ensure that hazardous chemicals brought onto the site are properly labeled with at least the following information, in English, as a minimum, and the language of non-English-speaking employees who may use the product, as appropriate. This labeling includes the following:

- The identity of the product and chemical components
- Appropriate hazard warnings
- Name and address of the manufacturer, importer or other responsible party

Hazard warnings will also be transmitted in the form of the National Fire Prevention Agency or Hazardous Materials Information System color-coded warnings, which are ranked on a 0 to 4 scale. When chemicals are

transferred to a portable container, labels containing chemical identification and hazard warnings must be affixed to the portable container.

10.12.4 Current Onsite Inventory

There is currently no inventory of hazardous materials stored on site for this project.

10.13 Process Safety Management Plan (Section 06.B.04)

NOT APPLICABLE. This work does not include chemical management.

10.14 Lead Abatement Plan

NOT APPLICABLE. Lead is not known to be an exposure concern for this project.

10.15 Asbestos Hazard Control Plan

NOT APPLICABLE. Asbestos is not known to be an exposure concern for this project.

10.16 Radiation Safety Program (Section 06.E.03.a)

NOT APPLICABLE. Radiation hazards not anticipated for this work.

10.17 Abrasive Blasting (Section 06.H.01)

NOT APPLICABLE. This work does not involve abrasive blasting.

10.18 Heat/Cold Stress Monitoring Plan (Section 06.I.02)

See the SSHP (**Attachment 1**) Section 13.2 for more details.

10.19 Crystalline Silica Monitoring Plan (Section 06.M)

NOT APPLICABLE. Crystalline silica is not known to be an exposure concern for this project.

10.20 Night Operations Lighting Plan

NOT APPLICABLE. Work will not be conducted at night.

10.21 Fire Prevention Plan

See Section 12.10 of the SSHP (**Attachment 1**) for more details.

10.22 Wildland Fire Management Plan

NOT APPLICABLE. Wildland fires are not anticipated as a risk for this work.

10.23 Hazardous Energy Control Plan

NOT APPLICABLE. Servicing or maintenance on a system where the unexpected energizing, startup, or release of kinetic or stored energy that could cause injury or damage to occur is not part of this project.

10.24 Critical Lift Procedures

NOT APPLICABLE. This work will not involve performing any critical lifts.

10.25 Contingency Plan for Severe Weather

See Section 12.8 of the SSHP (**Attachment 1**).

10.26 Float Plan (Section 19.F.04)

NOT APPLICABLE. This work does not involve working over water.

10.27 Fall Protection Plan

NOT APPLICABLE. This work does not involve falls greater than 6 feet.

10.28 Demolition Plan (Engineering and Asbestos Surveys)

NOT APPLICABLE. This work does not involve demolition.

10.29 Excavation/Trenching Plan (Section 25.A.01)

Excavation activities shall be executed on this site in order to complete the proposed project objectives. Excavation activities shall include test pitting. At this time, site excavations, needed to complete this investigation are anticipated to extend from 0-16 ft bgs, or to the water table (estimated at 5 ft bgs), whichever is encountered first. As such, the requirements of 29 CFR 1926 Subpart P "Excavations" and EM 385 1-1, Section 25, "Excavations" will be applicable. The following must be evaluated and executed as part of the proposed excavation activities associated with this task order.

At a minimum, the following must be evaluated and executed as part of the proposed excavation activities shall be implemented.

- Review and implement all applicable components of CH2MHILL SOP # HSE&Q-307, Excavation & Trenching Safety and evaluate the applicability of 29 CFR 1926 Subpart P "Excavations" and EM 385 1-1, Section 25, "Excavations".
- Prior to opening an excavation, underground installations (i.e., utility easements) shall be located and protected from damage or displacement. Utility companies (utility owners) and other responsible authorities shall be contacted to locate and mark the locations and, if they so desire, direct or assist with protecting the underground installations. When required, CH2M HILL or designated subcontractor shall obtain a "Dig Permit" or "Excavation Permit" from the Client designated point of contact having jurisdiction prior to initiation of and excavation work, where required. Also see Section 13.1.18 in the SSHP (**Attachment A**) for additional information.
- When personnel will be in or around and excavation, a competent person shall inspect the excavation, adjacent areas, and protective systems at least daily, or as needed throughout the work shifts and after every rainstorm or other hazard-increasing event. Documentation of this inspection must be available on site at all times. If evidence of a situation that could result in possible cave-ins, slides, failure of protective systems, hazardous atmospheres, or other hazardous condition is identified, exposed workers shall be removed from the hazard and all work in the excavation stopped until necessary safety precautions have been implemented. The competent person is also required to monitor and inspect equipment use in water removal operations (i.e. pump systems). Documentation of excavation inspections must be available on site at all times.
- A competent person is defined as:
  - An individual who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees and who has authority to take prompt corrective measures to eliminate them.

    The competent person should be an individual designated by the employee's respective employer.
- Excavated material shall be placed at least 2 feet. (0.6 meter) from the edge of excavation or greater distance as necessary to prevent excessive loading (and potential collapse) of the excavation face(s). Increased separation shall be made to account for increased volumes of excavated material, soil type, protective system types and weather conditions.
- Sloping and benching configurations less than 20' in depth shall be in accordance with 29 CFR 1926.652(b) or EM 385 1-1, section 25.C, whichever is more stringent.

- Where the use of support systems, shields or other protective systems is determined to be necessary, the design of said systems shall be in accordance with 29CFR1926.652(c) or shall be in EM 385 1-1, section 25.C, whichever is more stringent.
- Special Excavation Requirements defined by 29CFR1926.651 shall also be evaluated prior to the start of site excavation activities (i.e. accumulating water, water diversion).
- CH2M HILL personnel must notify and be granted authorization from the excavation-competent person prior to entering any excavation. CH2M HILL personnel must follow all excavation requirements established by the competent person.
- Prior to excavating at a location, buried utilities in the area must be identified. Refer to Section 13.1.18 in the SSHP (**Attachment A**).

CH2M HILL personnel must not enter any excavation where protective systems are deficient at any time, for any reason. The competent person must be notified of such conditions.

10.30 Emergency Rescue (Tunneling)

NOT APPLICABLE. Tunneling and other underground construction is not necessary for this work.

10.31 Compressed Air Plan

NOT APPLICABLE. Compressed air usage is not necessary for this work, except for calibration gases of very small amounts.

10.32 Formwork and Shoring Erection and Removal Plans

NOT APPLICABLE. This work does not involve forming or shoring.

10.33 Jacking Plan (Lift) Slab Plans

NOT APPLICABLE. These plans are associated with concrete masonry work, which is not part of this project.

10.34 Steel Erection Plan

NOT APPLICABLE. This work does not involve steel erection.

10.35 Safety and Health Plan

An SSHP is attached to this APP as **Attachment 1**. The SSHP meets the requirements for work on hazardous waste sites in accordance with 29 CFR 1910.120 and 29 CFR 1926.65.

Detailed site-specific hazards and controls are provided in the SSHP (**Attachment 1**) and its attached AHAs.

10.36 Blasting Plan

NOT APPLICABLE. This work does not involve blasting.

10.37 Diving Plan

NOT APPLICABLE. This work does not involve diving.

10.38 Workplace Fire

10.38.1 Potential Ignition Sources

The potential ignition sources consists of dry vegetation or other combustible material contacting hot engine or exhaust parts of the support vehicles or heavy equipment.

10.38.2 Fire Suppression Equipment

The field vehicles and heavy equipment will be supplied with a Class ABC fire extinguisher.

10.38.3 Responsibility Assignments

Equipment maintenance (truck, fire extinguisher, excavator, and sampling equipment) falls under the responsibility of the field staff and will be overseen by the SSC including an inspection of vehicles, heavy equipment, and fire extinguishers to ensure they are in proper condition.

The SSC will ensure that vehicles or heavy equipment are not brought into immediate proximity to dried vegetation that could come in contact with vehicle or heavy equipment ignition sources (that is, the undercarriage). The SSC will also ensure proper site housekeeping including collection and disposal of any rubbish.

10.39 Confined Space

NOT APPLICABLE. Entry or proximity to confined space is not required for this project.

SECTION 11

Risk Management Processes

The specific processes are addressed in multiple sections of the SSHP (**Attachment 1**), depending on whether classified as physical, chemical, or other type, as well as the task-specific AHAs included in the SSHP.

Figures

12-112-002

Legend

- HPDTA Boundary
- Investigation Area

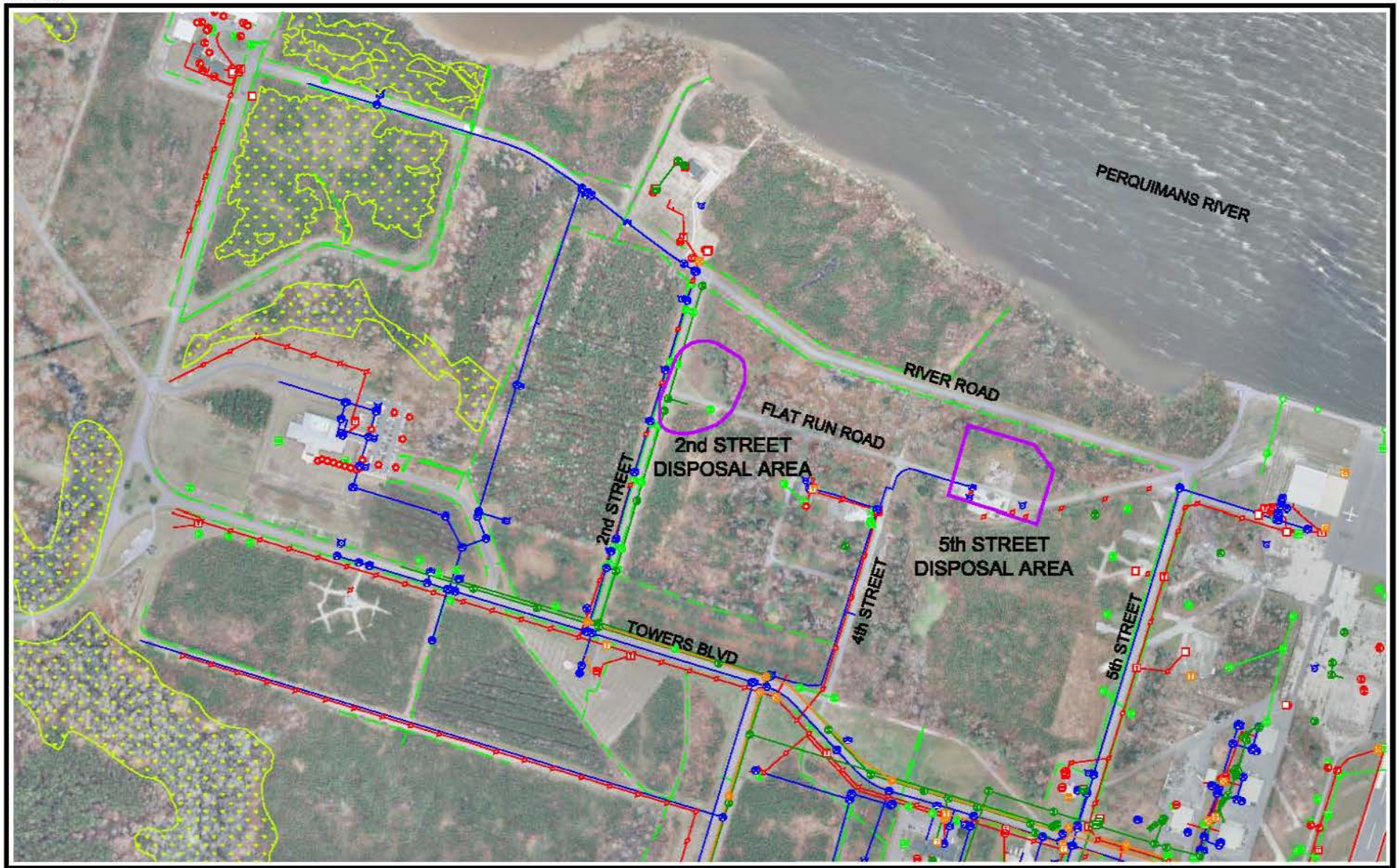
N
W E
S

0 6000 12000 Feet

Figure 1
HPDTA Location
Towers Road Disposal Areas Remedial Investigation
Harvey Point Defense Testing Activity
Hertford, North Carolina

CUES MappingServices

12-112-001



Legend

- Investigation Area
- Wetland
- Storm Sewer Utility
- Open Drainage
- Electrical Utility
- Water Utility
- Wastewater Utility
- Communication Utility

N
W E
S

0 300 600 Feet

Figure 2
Site Location
Towers Road Disposal Areas Remedial Investigation
Harvey Point Defense Testing Activity
Hertford, North Carolina

CUES MappingServices

Attachment 1
Site Safety and Health Plan

Site Safety and Health Plan
Remedial Investigation Work Plan
Towers Road Disposal Areas

Harvey Point Defense Testing Activity
Hertford, North Carolina

Task Order 20

October 2012

Prepared for

Department of the Navy
Naval Facilities Engineering Command
Atlantic

Under the

Navy Multimedia Contract
Contract N62470-10-D-3009

Prepared by

CH2MHILL

Virginia Beach, Virginia

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Acronyms and Abbreviations

AHA	activity hazard analysis
ANSI	American National Standards Institute
APP	accident prevention plan
APR	air purifying respirator
BBLPS	behavior based loss prevention system
BG	business group
bgs	below ground surface
bpm	beats per minute
CIH	Certified Industrial Hygienist
CFR	Code of Federal Regulations
cm	centimeter(s)
CO	Contracting Officer
COC	contaminant of concern
COR	Contracting Officers Representative
CPR	cardiopulmonary resuscitation
CSE	confined space entry
CSHO	Compliance Safety and Health Officer
CSIR	Contractor Safety Incident Report
CSP	Certified Safety Professional
DART	days away, restricted, or transferred
dBA	decibel(s) (A-weighted scale)
DEET	N,N-diethylmetatoluamide
DFARS	Defense Federal Acquisition Regulation Supplement
DoD	Department of Defense
DOT	Department of Transportation
DPT	direct-push technology
ECC	Environmental Compliance Coordinator
EMR	Experience Modification Rate
ERC	Emergency Response Coordinator
ERP	Emergency Response Plan
°F	degrees Fahrenheit
FA	first aid
FAR	Federal Acquisition Regulations
FID	flame ionization detector
FSI	Field Safety Instructions
ft	foot(feet)
FTL	field team leader
FWSO	firm-wide security operations
GFCI	ground fault circuit interrupter
GW	groundwater
H&S	health and safety
HAZCOM	hazard communication
HAZWOPER	hazardous waste operations and emergency response
HCC	hazard communication coordinator
HITS	hours and incident tracking system

HPDTA	Harvey Point Defense Testing Activity
HR	human resources
HS&E	health, safety, and environment
HSE&Q	health, safety, environment, and quality
HSM	Health and Safety Manager
IDW	investigation-derived waste
IDLH	Immediately dangerous to life or health
IESNA	Illuminating Engineering Society of North America
IRF	Incident Report Form
KA	Contracts administrator
kV	kilovolt(s)
LEL	Lower Explosive Limit
LNLI	loss and near loss investigation
LWD	lost work day
MEC	munitions and explosives of concern
mg/kg	milligram(s) per kilogram
Mg/m^3	milligram (s) per cubic meter
mm	millimeter(s)
MR	munitions response
MSA	Mine Safety Association
MSDS	Material Safety Data Sheet
MSHA	Mine Safety and Health Administration
NAICS	North American Industry Classification System
NIOSH	National Institute for Occupational Safety and Health
NFPA	National Fire Protection Association
NRR	noise reduction rating
NSC	National Safety Council
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyls
PEL	Permissible Exposure Limit established by OSHA
PID	photo ionization detector
PM	Project Manager
PPE	personal protective equipment
ppm	part(s) per million
PTSP	Pre-Task Safety Planning
QC	Quality Control
RCA	Root Cause Analysis
REM	Responsible Environmental Manager
RF	radio frequency
RHSM	Responsible Health and Safety Manager
RI	Remedial Investigation
RMSF	Rocky Mountain spotted fever
RPM	Remedial Project Manager
SB	soil boring
SCBA	self-contained breathing apparatus
SOP	standard operating procedure
SOW	Scope of Work

SPA	Safety Program Assistant
SPF	sun protection factor
SSC	Site Safety Coordinator
SSHO	Site Safety & Health Officer
SSHP	Site Safety and Health Plan
STS	standard threshold shift
SWO	safe work observation
TBD	to be determined
TLV	Threshold Limit Value
TSD	treatment, storage, and disposal
USACE	U.S. Army Corps of Engineers
ug/L	microgram(s) per liter
UV	ultraviolet
UXO	unexploded ordnance
WBGT	Wet Bulb Globe Temperature

Health and Safety Plan Statement

Site Safety and Health Plan

Introduction

This Site Safety and Health Plan (SSHP) presents the hazards known or anticipated to be present during the contracted tasks (see Section 2.4). The scoped activities are planned for completion by August 2013. This SSHP will be used by CH2M HILL to identify and mitigate task-specific hazards and select appropriate health and safety protective measures.

The SSHP contains information pertinent to the general conditions at the building sites, such as general site information, hazard evaluation and control, personnel responsibilities and requirements, a general description of personal protective equipment, customary decontamination procedures, and emergency response procedures. Onsite personnel must review the SSHP and sign an agreement to comply with its provisions prior to commencing onsite work. The SSHP is considered an operational document that is subject to revisions in response to various site-specific conditions that may be encountered. However, these documents may be modified or updated only with the approval of the Health and Safety Manager (HSM) and Project Manager (PM).

Policy

This document was written based on the anticipated hazards and expected work conditions, and applies to field activities to be performed under the Work Plan. Applicability of this SSHP extends to all CH2M HILL employees, subcontractors and visitors entering the site.

This project-specific SSHP will, at a minimum, meet the requirements under Occupational Safety and Health Administration (OSHA) Standard *29 Code of Federal Regulations* (CFR) 1910 & 1926, and the U.S. Army Corps of Engineers (USACE) EM 385-1-1 (USACE, 2008), Safety - Safety and Health Requirements.

Pre-entry Requirements

During site mobilization, the Site Safety Coordinator (SSC) will perform a reconnaissance of each site as identified in the site-specific Work Plan to evaluate and determine the chemical, physical, and environmental hazards; establish or confirm emergency points of contact and procedures; and review any other issues deemed necessary to address site health and safety. The SSC will then conduct a health and safety briefing with the site personnel to discuss data obtained from the previous site reconnaissance, provisions outlined in this SSHP, and appropriate health and safety procedures and protocols.

CH2MHILL

Project HS&E Change Management Form

*This evaluation form should be reviewed on a **continuous** basis to determine whether the current site health and safety plan adequately addresses ongoing project work, and should be completed whenever new tasks are contemplated or changed conditions are encountered.*

Project Task:	Towers Road Disposal Areas		
Project Number:	439611.01.RI	Project/Task Manager:	Janna Staszak

Evaluation Checklist	Yes	No
1. Has the CH2MHILL staff listed in the original SSHP/FSI changed?		
2. Has a new subcontractor been added to the project?		
3. Is any chemical or product to be used not listed in Attachment 2 of the plan?		
4. Have additional tasks been added to the projects that were not originally addressed in Section 2.6 of the plan?		
5. Have new contaminants or higher than anticipated levels of original contaminants been encountered?		
6. Has other safety, equipment, activity, or environmental hazard been encountered that are not addressed in Section 2.7 of the plan?		

If the answer is "YES" to Questions 1-3, an SSHP revision is NOT needed. Please take the following actions:

- Confirm that staff's medical and training status is current—check training records at http://www.int.ch2m.com/hands (or contact your regional Safety Program Assistant [SPA]), and confirm subcontractor qualifications.
- Confirm with the project contract administrator that subcontractor safety performance has been reviewed and is acceptable
- Confirm with the CH2M HILL Health, Safety, and Environment (HS&E) Manager that subcontractor safety procedures have been reviewed and are acceptable.

If the answer is "YES" to Questions 4-6, an SSHP revision MAY BE NEEDED. To determine if revision is needed please contact HS&E directly.

Route to Hospital Map

In case of an emergency **the site escort will contact base medical, fire, or security personnel by radio**. If medical care is needed, but it is not an emergency, the name, address, phone number, and map to the nearest hospital is provided below.

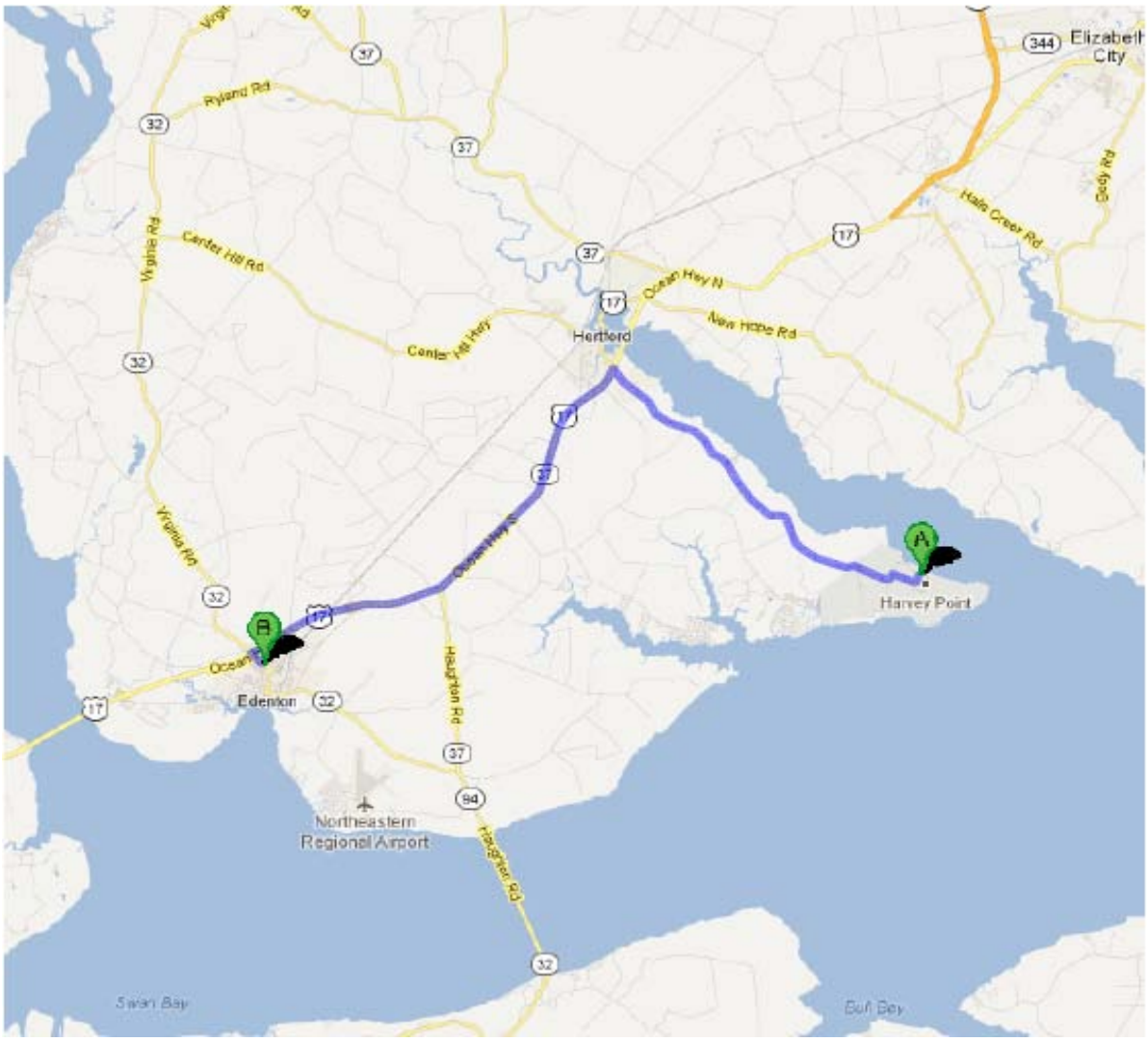
Chowan Hospital
211 Virginia Road
Edenton, NC 27932
252-482-8451

The route from the Towers Roads Disposal Area is as follows:

1) Head south towards Harvey Point Rd (0.2 mi)
2) Turn right onto Harvey Point Rd (0.6 mi)
3) Sharp left to stay on **Harvey Point Rd (9.1 mi)**
4) Turn left onto **US-17 S/Ocean Hwy S (11.6 mi)**
5) Take exit **227** for **N Carolina 32** toward **Edenton (0.3 mi)**
6) Turn left onto **N Carolina 32 S/Virginia Rd (0.4 mi)**

SEE REVERSE FOR THE HOSPITAL ROUTE MAP.

FIGURE 1
Route to Hospital Map



Project Contacts List

This form shall be completed and updated as necessary by the Site Safety Coordinator. A copy of the completed form shall be posted in a prominent location onsite.

Client: Harvey Point Defense Testing Activity

Project/Site Name: Towers Road Disposal Areas

Project Number: 439611.01.RI

Project Contacts	Name	Phone Number	Cell Number
CH2M HILL PM	Janna Staszak	757-671-6256	757-268-6136
CH2M HILL SSC	Nathaniel Price	757-671-6280	336-457-3094
CH2M HILL Activity Manager	Kimberly Henderson	757-671-6231	757-513-6632
CH2M HILL HSM	Mark Orman	414-847-0597	414-712-4138
CH2M HILL Environmental Compliance Coordinator (ECC)	Hope Wilson	678-530-4226	678-656-5411

CH2M HILL Subcontractors Contact List

Subcontractor	Primary Task	Site Manager	Phone	Safety Rep.	Phone
TBD	Underground Utility Location	TBD	TBD	TBD	TBD
TBD	Vegetation Clearance	TBD	TBD	TBD	TBD
TBD	Geophysical Surveying	TBD	TBD	TBD	TBD
TBD	Test Pitting	TBD	TBD	TBD	TBD
TBD	Drilling/Well Installation	TBD	TBD	TBD	TBD
TBD	Site Surveying	TBD	TBD	TBD	TBD
TBD	IDW Management & Disposal	TBD	TBD	TBD	TBD

Client Contractors Contact List

Contractor Name	Primary Task	Contact	Phone
None			

SECTION 1

Signature Sheet

This Site Safety and Health Plan has been written for use by CH2M HILL only. CH2M HILL claims no responsibility for its use by others unless that use has been specified and defined in project or contract documents. The plan is written for the specific site conditions, purposes, dates, and personnel specified, and must be amended if those conditions change.

1.1 Original Plan

Written By: Nathaniel Price Date: September 27, 2012

Approved By: Carl Woods (Project HSM) Date: October 3, 2012

1.2 Concurrences

Mark Orman, CSP
CH2M HILL
Program HSM

Date: October 5, 2012

Janna Staszak
CH2M HILL
PM

Date: October 22, 2012

SECTION 2

Background Information

2.1 Project Information and Description

Project Number: 439611.01.RI

Contract Number: N62470-10-D-3009

Client: NAVFAC Atlantic

Project Name and Address: Towers Road Disposal Areas – 2nd Street and 5th Street Disposal Areas Remedial Investigation (RI); Harvey Point Defense Testing Activity (HPDTA), 2835 Harvey Point Road, Hertford, Perquimans County, North Carolina

Project Manager: Janna Staszak

CH2M HILL Office: Virginia Beach, VA

Date (SSHP) Prepared: October 2012

Dates of Site Work: January 2013 – August 2013

2.2 Site Description and History

The Towers Road Disposal Areas are located at 2835 Harvey Point Road, Hertford, Perquimans County, North Carolina (36°06'13.02" N and 76°19'59.03"W) (**Figure 2**). The Towers Road Disposal Areas consists of the 2nd Street Disposal Area and 5th Street Disposal Area (**Figure 3**).The property is owned by HPDTA. HPDTA is an active Department of Defense (DoD) facility. HPDTA is bounded by surface water on three sides: the Perquimans River to the north, and the Albemarle Sound to the south and east. The facility's western boundary is mostly agricultural land with some residential properties. From 1943 to the end of World War II, the installation was used for Navy seaplane pilot training. Today, HPDTA is a DoD-operated activity serving the military services plus the special needs of other U.S. Government departments.

Trash disposal reportedly occurred at two sites, the 2nd Street and 5th Street Disposal Areas, until the early 1980s. Combined, the sites are estimated to cover 2 acres. The trash may extend to a depth of up to 16 ft below ground surface (bgs). Disposal practices reportedly included digging pits and burying waste, pouring diesel on waste and burning it, and possible chemical dumping (e.g., from a nearby dry cleaning facility and photography chemicals). The specific contents of the waste disposal areas are not known but are reported to include paper, utensils, computer disks, broken dishes, glass, and guns (but no ammunition) at both sites; drums at the 2nd Street Disposal Area; and safes, metal cars, and polychlorinated biphenyls (PCBs) at the 5th Street Disposal Area. See Site Map for work area.

2.3 Contractor Accident Experience (EMR)

CH2M HILL's exceptional safety performance greatly exceeds the industry average. Our injury and illness rates and our Experience Modification Rate (EMR) have decreased dramatically over the past 5 years.

Following are examples of our achievements:

An EMR of less than 1.0 over the past 5 years, which is the average accident injury experience for the industry, with a 2011 EMR of 0.67 (or 67 percent) of the industry average (NAICS 54133).

Category	2007	2008	2009	2010	2011
Employee Hours	13,800,315	15,313,289	14,675,460	12,842,086	10,704,063
Experience Modification Rate (EMR)	0.74	0.66	0.70	0.70	0.67
Fatalities	0	0	0	0	0

Category	2007	2008	2009	2010	2011
Recordable Incidents	27	48	20	9	13
Recordable Incident Rate *	0.39	0.63	0.27	0.14	0.24
Recordable Incident Rate Average *	1.4	1.1	1.2	1.0	1.0
Lost Workday (LWD) Incidents (DART) **	7	11	3	1	3
LWD Incident Rate (DART)	0.10	0.14	0.04	0.02	0.06

Notes:

* SIC code 871 (Engineering and Management Services) used for rate averages prior to 2003. Thereafter, NAICS code 54133 (Engineering Services) used for rate averages.

** LWD incidents include cases involving days away from work (DAW) or restricted duty (RD). These are also known as DART (Days Away, Restricted, or Transferred cases).

2.4 Description of Work

2.4.1 General Overview

Trash disposal reportedly occurred at two sites, the 2nd Street and 5th Street Disposal Areas, until the early 1980s. This RI is being conducted to identify releases of hazardous substances, characterize the chemical nature of releases, establish remediation goals, and determine the extents of soil, groundwater, and buried debris contamination. The following tasks will be completed during the RI.

- Underground utility locate
- Site civil survey
- Vegetation clearance
- Geophysical survey
- Test pitting
- Monitoring well installation
- Groundwater sampling and water level measurement
- Subsurface soil sampling via direct-push technology (DPT) and surface soil sampling via hand auger

2.5 Tasks Requiring Activity Hazard Analysis

Activity hazard analyses (AHAs) are required for all definable work tasks. As the project gets closer to initiation of field operations, additional information such as identification of subcontractor, specific equipment and/or tools is obtained; the AHAs will be updated accordingly. The planned field tasks requiring AHAs are as follows:

- 01 Mobilization and Demobilization
- 02 Utility Locating
- 03 Geophysical and Site Surveying
- 04 Vegetation Clearance
- 05 Test Pitting
- 06 Monitoring Well Installation
- 07 Groundwater Sampling and Water Level Measurements
- 08 Soil Sampling
- 09 IDW Handling and Management

Refer to Section 17.1 for information regarding AHA preparation, training, and use for visual inspection and all other tasks associated with this project. The project AHAs for the hazardous work operations listed above are included in Attachment 8.

2.6 Tasks to be Performed under This Plan

2.6.1 Description of Tasks

Underground Utility Location

Prior to conducting any intrusive work, a subsurface utility location will be completed to locate and mark out any underground utilities within the boundary of the 2nd and 5th Street Disposal Area sites.

Site Survey

A site survey will be completed to capture the existing site conditions.

Vegetation Clearance

Vegetation clearance via mechanical means will be conducted across forested land.

Geophysical Survey

Ground-based geophysical surveying will be conducted across the 2nd and 5th Street Disposal Areas. The geophysical survey will include recording terrain conductivity (i.e. quadrature) and in-phase response data.

Test Pitting

Prior to beginning the test pitting activities, a material handling area will be constructed to stage test-pitted material for offsite disposal. Test pitting will be performed at the 2nd Street Disposal Area and 5th Street Disposal Area for waste characterization and delineation.

Monitoring Well Installation

2-inch Schedule 40 PVC above grade stickup, monitoring wells will be installed to include two monitoring wells within the 2nd Street Disposal Area, two monitoring wells within the 5th Street Disposal Area, and two background monitoring wells at each disposal area.

Groundwater Sampling

Groundwater elevation in the eight newly installed monitoring wells will be measured. Low-flow groundwater sampling will be conducted at each monitoring well.

Soil Sampling

Surface soil samples will be collected from 0 to 12 inches bgs using a hand auger. Subsurface soil samples will be collected from three intervals ranging from 0 to 16 ft bgs via DPT.

IDW Handling and Management

Investigation-derived waste (IDW) consisting of stockpiled soil from the test pitting, soil cuttings from the monitoring well installation, purged/excess groundwater, personal protective equipment (PPE), and decontamination fluids will be managed for proper offsite disposal.

2.7 Task Hazard Analysis

The following table identifies the specific task to be performed on this project and the potential significant hazards associated with each task. Additional "general" hazards are identified in Section 13.

TABLE 2-1
Specific Tasks to be Performed

Potential Hazard	Project Activity									
	Water Level Measurements	IDW Handling & Mgmt	Groundwater Sampling	Soil Sampling	Test Pitting	Well Install	Surveying (Civil & Geophysical)	Utility Location	Site Walks	Vegetation Clearance
Arsenic	X	X	X	X	X	X				
Biological Hazards	X	X	X	X	X	X	X	X	X	X
Chromium	X	X	X	X	X	X				
Compressed Gas Cylinders	X		X	X	X					
Decontamination	X	X	X	X	X					
Drilling				X		X				
Drum Handling		X	X	X						
Drum Sampling		X								
Excavations				X	X			X		
Electrical Safety	X		X			X				X
Field Vehicles	X	X	X	X	X	X	X	X	X	X
Fire Prevention	X	X	X	X	X	X	X	X	X	X
Forklifts		X				X				
Hand & Power Tools		X		X						
Haul Truck Operations		X			X					
Heavy Equipment		X			X					X
Knife Use			X			X				
Land Clearing Operations										X
Lead	X	X	X	X	X	X				
Lockout /Tagout	X		X	X		X				X
Manual Lifting	X	X	X	X		X				

TABLE 2-1
Specific Tasks to be Performed

Potential Hazard	Project Activity									
	Water Level Measurements	IDW Handling & Mgmt	Groundwater Sampling	Soil Sampling	Test Pitting	Well Install	Surveying (Civil & Geophysical)	Utility Location	Site Walks	Vegetation Clearance
Mercury	X	X	X	X	X	X				
Noise				X		X				X
Portable Generators						X				X
Pressurized Lines/Equipment				X		X				X
Temperature Extremes	X	X	X	X	X	X	X	X	X	X
Traffic Control							X	X	X	
Ultraviolet Light exposure (sunburn)	X	X	X	X	X	X	X	X	X	X
Utilities (underground/overhead)				X	X	X				X
Vinyl Chloride	X	X	X	X	X	X				

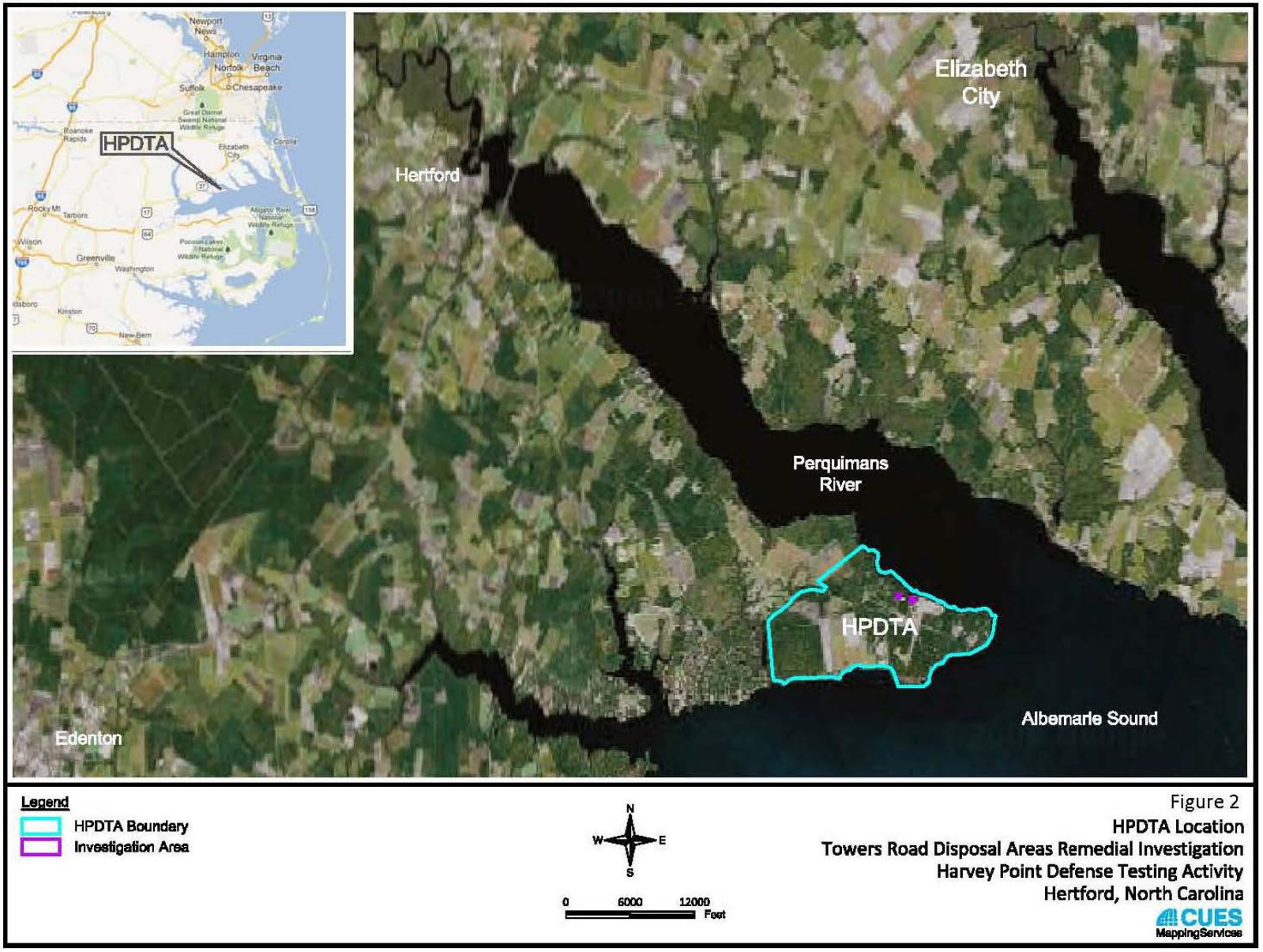


Figure 2
HPDTA Location
Towers Road Disposal Areas Remedial Investigation
Harvey Point Defense Testing Activity
Hertford, North Carolina

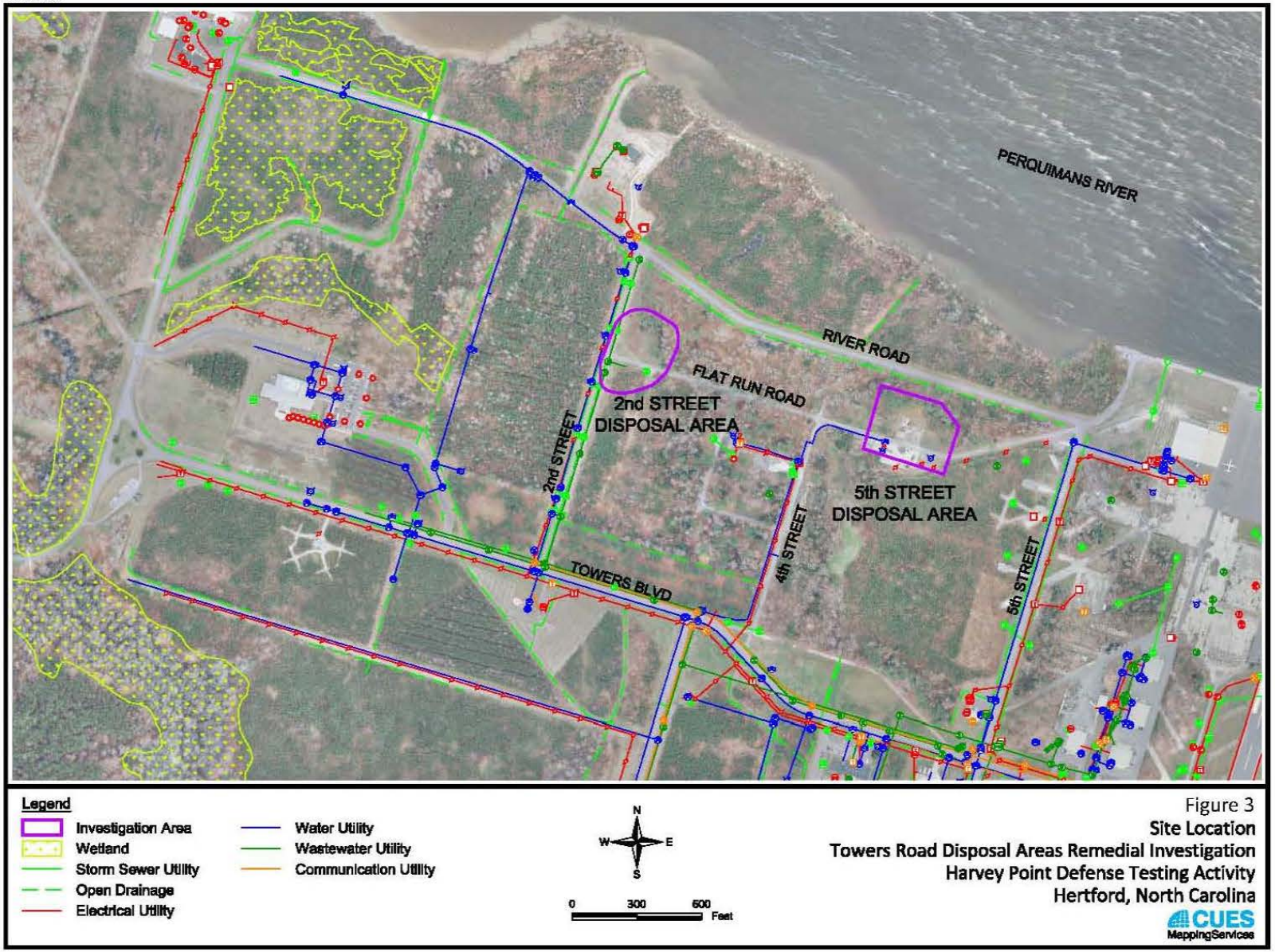


Figure 3
Site Location
Towers Road Disposal Areas Remedial Investigation
Harvey Point Defense Testing Activity
Hertford, North Carolina

SECTION 3

Statement of Safety & Health Policy

HSE TargetZero

Protecting People and the Environment

Health, Safety, and Environment Policy Commitment

Protection of people and the environment is a CH2M HILL core value. It is our vision to create a culture that empowers employees to drive this value into all global operations and achieve excellence in health, safety, and environment (HSE) performance. CH2M HILL deploys an integrated, enterprise-wide behavior based HSE management system to fulfill our mission and the expectations of our clients, staff, and communities based on the following principles:

- We require all management and supervisory personnel to provide the leadership and resources to inspire and empower our employees to take responsibility for their actions and for their fellow employees to prevent injuries, illnesses, and adverse environmental impacts, and create a safe, healthy, and environmentally-responsible workplace.
- We provide value to clients by tailoring HSE processes to customer needs and requiring CH2M HILL employees and subcontractors to deliver projects that identify HSE requirements and commit to compliance with applicable HSE laws and regulations, company standards, and external requirements.
- We are committed to pollution prevention in conjunction with our Sustainability Policy and by offering our clients sustainable solutions.
- We aspire to continually improve our performance and influence others to redefine world-class HSE excellence.
- We evaluate our design engineering and physical work environment to verify safe work conditions and practices are established, followed, and corrected as needed.
- We assess and continually improve our HSE program to achieve and maintain world-class performance by setting and reviewing objectives and targets, reporting performance metrics, and routinely evaluating our program.
- We expect all employees to embrace our Target Zero culture, share our core value for the protection of people and the environment, understand their obligations, actively participate, take responsibility, and "walk the talk" on and off the job.

The undersigned pledge our leadership, commitment, and accountability for making this Policy a reality at CH2M HILL.

Dated the 5th day of April, 2012

Lee McIntire
Chief Executive Officer

John Madia
Chief Human Resources Officer

Mike Lucki
Chief Financial Officer

Margaret McLean
Chief Legal Officer

Mike McKelvy
President, Government, Environment, and Infrastructure Division

Bob Card
President, Energy, Water and Facilities Division

Jacqueline Rast
President, International Division

Fred Brune
Chief Administrative Officer

Gene Lupia
President, Delivery Excellence

Brad Barber
Director, Health, Safety, and Environment

SECTION 4

Responsibilities and Lines of Authority

4.1 Client

Client Name:	NAVFAC Atlantic
Contact Name:	Dawn Hayes
Phone Number:	757-322-4792
Facility:	Harvey Point Defense Testing Activity
Contact Name:	Brian Murphy
Job Title:	HPDTA Environmental and Safety Program Manager
Phone Number:	252-426-4360

4.2 Project Management Staff

4.2.1 Program Manager

Name:	Phil Smith
Office:	Virginia Beach (VBO)
Phone Number:	757-671-6255

The Program Manager is the primary operational safety official of CH2M HILL and has overall responsibility for ensuring that CH2M HILL program participants adhere to the H&S policies and procedures adopted by CH2M HILL.

4.2.2 Project Manager

PM Name:	Janna Staszak
Office:	Virginia Beach (VBO)
Phone Number:	757-671-6256

The project manager is responsible for providing adequate resources (budget and staff) for project-specific implementation of the HS&E management process. The PM has overall management responsibility for the tasks listed below. The PM may explicitly delegate specific tasks to other staff, as described in sections that follow, but retains ultimate responsibility for completion of the following in accordance with this document:

- Incorporate standard terms and conditions, and contract-specific HS&E roles and responsibilities in contract and subcontract agreements (including flow-down requirements to lower-tier subcontractors)
- Select safe and competent subcontractors
- Obtain, review, and accept or reject subcontractor prequalification questionnaires
- Ensure that acceptable certificates of insurance are secured as a condition of subcontract award
- Incorporate HS&E information in subcontract agreements, and ensure that appropriate site-specific safety procedures, training, and medical monitoring records are reviewed and accepted prior to the start of subcontractor's field operations
- Maintain copies of subcontracts and subcontractor certificates of insurance, bond, contractor's license, training and medical monitoring records, and site-specific safety procedures are in the project file accessible to site personnel
- Provide full-time oversight of subcontractor HS&E practices per the site-specific safety plan
- Manage the site and interface with third parties in a manner consistent with our contract and subcontract agreements and the applicable standard of reasonable care

- Ensure that the overall, job-specific HS&E goals are fully and continuously implemented
- Issue Site Safety Rules consistent with this plan

4.2.3 Project Certified Safety Professional and Health and Safety Manager

Name:	Mark Orman, Certified Safety Professional
Office:	Milwaukee (MKE)
Phone Number:	414-847-0597

The HSM will have 3 years of experience managing safety and occupational health at hazardous waste site cleanup operations. Additionally, the HSM must have completed the OSHA 30-hr course or equivalent course area, as specified by EM 385-1-1. The project HSM responsibilities include the following:

Enlist the support of safety and occupation health professionals with appropriate education and experience.

- Develop, maintain, and oversee implementation of the SSHSP. Develop modifications to the SSHSP as necessary. Approve SSHSP by signature.
- The HSM will enlist the support of safety and occupational health professionals with appropriate education and experience when working on sites with multiple hazards.
- Review and accept or reject subcontractor pre-qualification questionnaires that fall outside the performance range delegated to the Contracts Administrator (KA).
- Review and accept or reject subcontractor training records and site-specific safety procedures prior to start of subcontractor's field operations.
- Support the Site Safety and Health Officer's (SSHO's) oversight of subcontractor (and lower-tier subcontractors) HS&E practices and interfaces with third parties, per this site-specific SSHSP/Accident Prevention Plan (APP).
- Evaluate occupational exposure monitoring/air sampling data and adjusting the SSHSP as needed.
- Support and assist program staff in executing the HS&E policies and procedures adopted by the program for implementation, including the program Behavior Based Loss Prevention System (BBLPS). Provide consultation and direction to project staff with regard to HS&E project and program requirements and industrial hygiene practices.
- Visit the project as needed to audit the effectiveness of the SSHSP.
- Remain available for project emergencies.
- Investigate accidents that occur under their supervision at the project site, in accordance with the accident investigation procedures identified by the program.
- Serve as Quality Control (QC) staff member.
- Provide project oversight to assess site conditions and review HS&E program implementation

4.2.4 Project Site Safety Coordinator Responsibilities (Site Safety & Health Officer)

Name:	Nathaniel Price
Office:	Virginia Beach (VBO)
Phone Number:	757-671-6280 (office)/ 336-457-3094 (cell)

The SSC/SSHO is responsible for facilitating the administration of established H&S procedures and protocols on project site(s). The SSC/SSHO is the primary safety official at the working level. The responsibility for safety is delegated and shared by PMs, alternate site safety officers, and subcontractors' supervisors. The SSC/SSHO will have a minimum of 1 year experience implementing safety and occupation health procedures at cleanup

operations. Additionally, the SSC/SSHO will have training and experience to conduct exposure monitoring/air sampling and select/adjust protective equipment use. At a minimum, the SSC/SSHO must perform, or otherwise supervise the performance of, the following:

- Verify this APP/SSHSP remains current and amended when project activities or conditions change. Coordinate changes to the SSHSP with the HSM and Contracting Officer (CO).
- Verify CH2M HILL's site personnel and subcontractor personnel read or have been briefed on the contents of this APP/SSHSP, and sign Attachment 1 "APP/SSHSP Employee Acknowledgement Form" prior to commencing field activities.
- Verify CH2M HILL's site personnel and subcontractor personnel have completed any required specialty training (e.g., Crane, Excavation, and medical surveillance).
- Verify adherence with the requirements of this APP/SSHSP and applicable subcontractor's H&S plan(s).
- Act as the project "Hazard Communication Coordinator" (HCC).
- Act as the project "Emergency Coordinator "and perform the responsibilities outlined in this APP/SSHSP or as maybe required to properly coordinate the onsite response of emergencies, as they arise.
- Verify that safety meetings are conducted at least daily or more frequently as project tasks or hazards change and documented for the project record in accordance with the requirements of the BBLPS and verify that other components of the BBLPS are being implemented as intended.
- Verify that project H&S forms and permits, found in Attachment 5 or in CH2M HILL's standard operating procedures (SOPs), are being used as intended.
- Verify that project posting are completed as required and subcontractor certificates/ documents (training and medical monitoring records) and site-specific safety procedures are available or have been executed prior to start of subcontractor's field operations.
- Manage interface with third parties in a manner consistent with our contract/ subcontract agreements and the applicable standard of reasonable care.
- Coordinate with the PM, HSM(s), as necessary regarding subcontractor operational performance or third-party interfaces.
- Ensure that the overall, project-specific, and program H&S goals are fully and continuously implemented.
- The SSC/SSHO is responsible for coordinating with the CH2M HILL individual responsible for site operations (i.e. the Field Team Leader [FTL]) and PM. In general, the PM will contact the client in the event accidents, injuries or property damage occurs on the project site. The HSM should be contacted by the SSC/SSHO as appropriate to the situation.
- The SSC/SSHO must be present any time operations are being performed to implement the SSHSP.
- Inspect site activities to identify safety and occupational health deficiencies and correct them.

4.2.5 Subcontractor Site Safety Coordinator Responsibilities

Subcontractors must comply with the following activities, and are responsible to:

- Provide appropriately trained personnel to serve as SSCs.
- Comply with this APP, USACE EM 385-1-1 Manual, Recognized Safety Rules, or other local safety standards.
- Comply with project and owner safety requirements.
- Actively participate in the project safety program and attend all required safety meetings.
- Maintain a first aid kit onsite.

- Maintain and replace safety protection systems damaged or removed by the subcontractor's operations.
- Notify the HSM of any accident, injury, and/or incident immediately and submit reports to the prime contractor within 24 hours.
- Install contractually required general conditions for safety (for example, handrail, fencing, fall protection systems, floor opening covers, etc.).
- Conduct and document weekly safety inspections of project-specific tasks and associated work areas.
- Conduct daily employee safety toolbox meetings and provide copies to the HSM.
- Conduct site-specific orientations for all subcontractor and client employees as requested.
- The subcontractor will provide an SSC who will have completed at least an OSHA, or equivalent, 10-hour construction safety course. Each SSC is responsible for the following as a minimum:
- Make safety integral to each operation by promoting worker involvement in the work planning and hazard identification process.
- Maintain active and visible involvement using open communication with employees regarding safety items on the project site.
- Coordinate with the HSM regarding subcontractor operational performance, and third party interfaces.
- Verify appropriate PPE use, availability, and training.
- Verify that project H&S forms and permits are being used as outlined in the SSHSP and APP.

4.2.6 Subcontractor Site Safety Coordinator

The subcontractor will provide an SSC who will have completed at least an OSHA, or equivalent, 10-hour construction safety course. Each SSC is responsible for the following as a minimum:

- Make safety integral to each operation by promoting worker involvement in the work planning and hazard identification process.
- Maintain active and visible involvement using open communication with employees regarding safety items on the project site.
- Coordinate with the HSM regarding subcontractor operational performance, and third party interfaces.
- Verify appropriate PPE use, availability, and training.
- Conduct and document weekly safety inspections of project-specific tasks and associated work areas.
- Conduct daily employee safety toolbox meetings and provide copies to the HSM.
- Verify that project health and safety forms and permits are being used as outlined in the SSHP and APP.
- Attend daily health and safety meetings to discuss new issues, health and safety compliance, lessons learned, and any open deficiencies noted on the project.

4.2.7 Employee Responsibilities

All personnel are assigned responsibility for safe and healthy operations. This concept is the foundation for involving all employees in identifying hazards and providing solutions. For any operation, individuals have full authority to stop work and initiate immediate corrective action or control. In addition, each worker has a right and responsibility to report unsafe conditions or practices. This right represents a significant facet of worker empowerment and program ownership. Through shared values and a belief that all accidents are preventable, our employees accept personal responsibility for working safely.

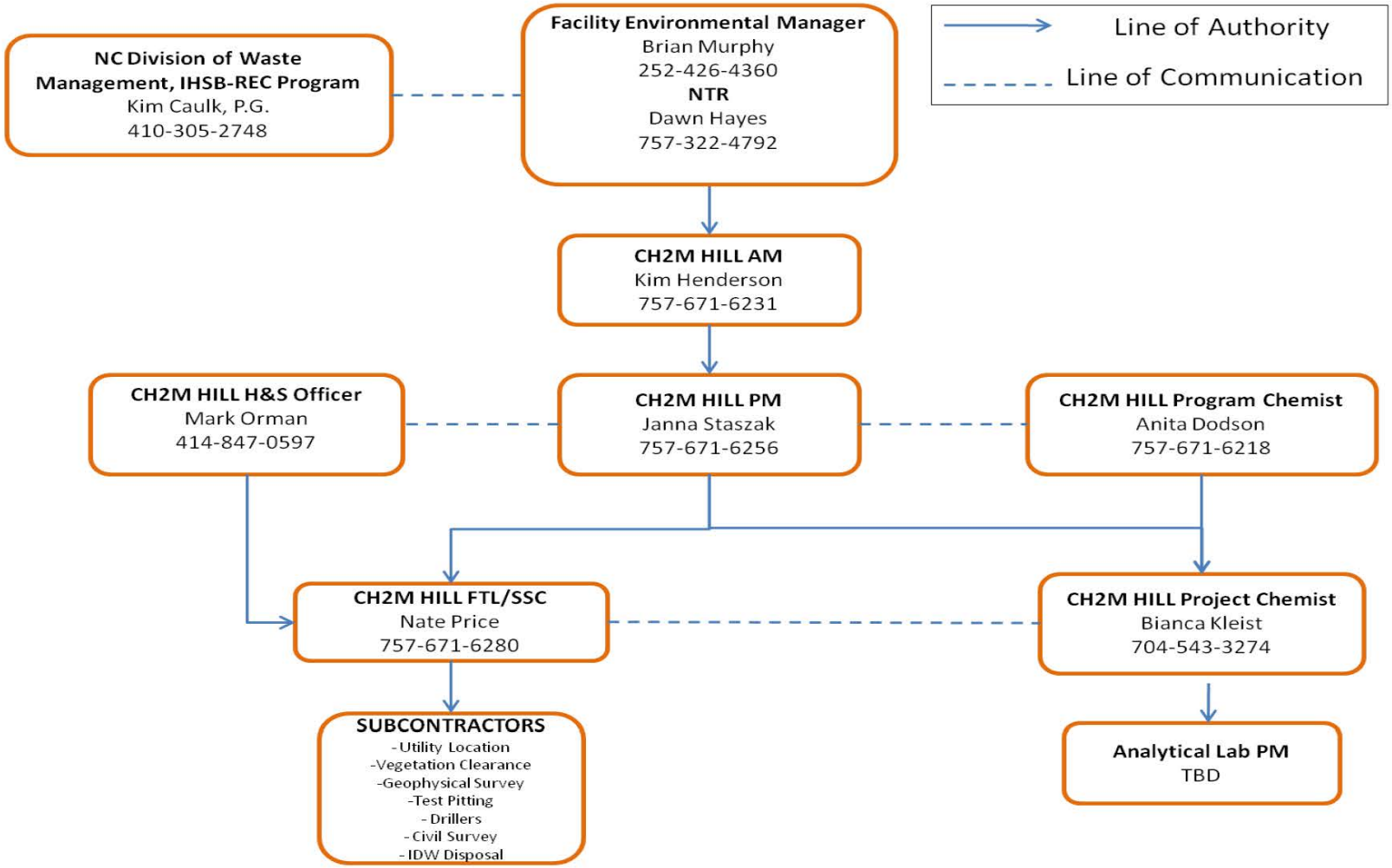
Every CH2M HILL employee, regardless of job title, shares the responsibility for safety and must report any "unsafe" or "deficient" work conditions or acts without fear of reprisal. It is imperative that employees observe the following minimum requirements in order to achieve a safe and healthy workplace:

- Each employee must familiarize themselves with the contents this APP/SSHSP and the general safety rules herein.
- Each employee must complete an HS&E orientation prior to being authorized to enter the project work areas.
- Each employee will practice procedures and follow all safety rules and regulations for the successful completion of any job task.
- All employees will wear the necessary PPE required for the job or task as specified by this APP/SSHSP or other applicable program requirements.
- The employee will perform work in a safe manner and produce quality results;
- The employee will perform work in accordance with company policies, and report injuries, illnesses, and unsafe conditions;
- The employee will complete work without injury, illness, or property damage;
- The employee will notify their immediate supervisor of any potential workplace hazard or work practice that is not consistent with the CH2M HILL's H&S policies and procedures and could result in an accident, injury, illness, or destruction of property.
- The employee will report all accidents to an immediate supervisor regardless of whether injury or property damage resulted and will file proper forms with a Human Resources (HR) representative. This includes all near misses (accidents without injury or damage). This requirement serves to bring unsafe conditions to the attention of management.
- Each employee will be subject to contraband search for safety purposes and for the safety of fellow employees.
- Violations of published safety policies and procedures may be cause for disciplinary actions up to and including dismissal.
- Each employee that is taking any prescription or over the counter medications that could alter the manner in which they could be treated in an emergency or effect their job performance/safety of the employee or other employees in the work environments (i.e. via heavy equipment operations) will notify their supervisor prior to beginning work.

4.2.8 Employee Authority

Each employee on the project has the obligation and authority to shut down any perceived unsafe work and, during employee orientation, each employee will be informed of their authority to do so.

4.3 Lines of Authority



SECTION 5

Subcontractors and Suppliers

(Reference CH2M HILL SOP HSE-215, *Contracts, Subcontracts and HSE&Q Management Practices*)

5.1 Subcontractors

Subcontractor:	TBD
Contact Name:	TBD
Telephone:	TBD

5.2 Subcontractor/Supplier Coordination and Control

CH2M HILL subcontractor safety performance and adherence to established industry standards and project policies and procedures will be reviewed prior to being issued a contract for site work. CH2M HILL subcontractors are required to comply with the most stringent requirement defined by the subcontractor's own policies and procedures, requirements outlined in CH2M HILL's site APP/SSHSP, or other policies and procedures/requirements applicable to a project (i.e. contract flow-down requirements).

All subcontractors who may be required to execute this contract may not be identified at the time that H&S documents are prepared for submission or implementation. Because of the potentially dynamic and evolving nature of contract requirements and resultant project scheduling at many points during the project evolution, only partial identification of potential subcontractors who may be selected for our projects is likely. To this end, continuously updating and amending this APP/SSHSP with potentially selected, newly selected, or approved subcontractors would not be practical or cost effective for all parties concerned. At this time, CH2M HILL's primary subcontractor for this project is being procured.

The CH2M HILL procurement/contracting team maintains an extensive and detailed process for subcontractor procurement with the Federal Acquisition Regulations (FAR) as the primary driver. Subcontractor selection is based on Scope of Work (SOW) pricing, qualifications, safety performance, and best value evaluations.

5.3 Subcontractor Responsibilities

All subcontractor employees are subject to the same training and medical surveillance requirements as CH2M HILL personnel, depending on job activity. Project activities involving the potential for exposure to hazardous waste materials will require medical and training certification as mandated by 29 CFR 1910.120/29CFR19126.65, but will be determined based on the subcontractor's assigned work.

All subcontractor personnel will be required to sign in daily at CH2M HILL controlled project sites and either attend a CH2M HILL sponsored daily safety meeting discussing operations, site-specific hazard awareness, or other pertinent issues associated with the scheduled work or complete their own meeting of similar intent. Subcontractors involved in construction/remedial activities will document the details of the daily meeting prior to the start of work at the site. In addition, subcontractors must develop and provide AHAs for their work activities to CH2M HILL for review prior to the start of work, which depending upon contract conditions, may also be required to be forward to NAVFAC for review as well.

Typically, the subcontractor reports directly to the CH2M HILL PM. The CH2M HILL PM may designate subcontractor reporting requirements to the FTL or other appropriate designee. All incidents involving subcontractor employees will be reported to the FTL and a copy of the subcontractor's incident or injury/illness report will be submitted to the CH2M HILL PM as soon as possible, but no later than 24 hours.

CH2M HILL subcontractors are required to acknowledge and adhere to the requirements of this APP/SSHSP. Subcontractors covered by this APP/SSHSP must be provided a copy of it to read and accept prior to initiating work on this site or be provided a briefing of its contents. However, this APP/SSHSP plan may not address specific hazards associated with specialty tasks and equipment that the subcontractor has expertise in (e.g., electrical,

scaffold erection, demolition). Where specifically applicable to the subcontractor's specialized work or where subcontractor's work is not addressed by this APP/SSHSP, a subcontractor is required to submit AHAs that comply with EM 385-1-1 Risk Assessment Code format.

Subcontractors are responsible for the H&S procedures specific to their work, and are required to submit these procedures to CH2M HILL for review before the start of field work. It is critical that subcontractor work be performed in a manner that is consistent with applicable OSHA standards (29 CFR 1910, 29 CFR 1926), EM 385 1-1 or other applicable H&S plan(s)/protocols. The SSHO should verify that applicable subcontractor employee training and medical clearance documents, as applicable, are valid. Identified subcontractor H&S performance or site conditions that are not consistent with established procedures be notified must be corrected.

Suppliers delivering materials to the project site or providing equipment and equipment maintenance must adhere to established rules and regulations specified by the site owner. Supplier personnel will not be permitted into contaminated areas unless training and medical surveillance is in accordance with 29 CFR 1910.120(f)/29 CFR 1926.65(f), as applicable.

Subcontractor personnel will not be allowed to ride on tractors, forklifts, or similar vehicles unless specific seats are provided. They must follow Facility hot work rules if hot work is required for vehicle or equipment maintenance. Subcontractor haul trucks must be loaded and unloaded in a safe and effective manner and materials must be stored safely in designated locations only. Associated packaging will be properly disposed and litter will not be permitted to be scattered or blown from truck beds. Operators of mobile onsite equipment must observe all traffic rules such as speed limits and pedestrian rights-of-way.

CH2M HILL continuously endeavors to observe subcontractors' safety performance. This goal should be reasonable, and include observing for hazards or practices and procedures that are not consistent with established H&S requirements that are both readily observable and occur in common work areas. CH2M HILL oversight does not relieve subcontractors of their responsibility for effective implementation and compliance with the established plan(s), protocols, or established safety regulations or contract conditions.

In addition to this level of observation, the FTL or SSHO should confirm subcontractor performance against both the subcontractor's safety plan and standard industry procedures or contractual requirements.

5.4 Health and Safety Interaction with Subcontractor

Team members should continuously endeavor to observe subcontractors' safety performance. This endeavor should be reasonable, and include observation of hazards or unsafe practices that are both readily observable and occur in common work areas. The prime contractor is not responsible for exhaustive observation for hazards and unsafe practices. In addition to this level of observation, the SSC is responsible for confirming subcontractor performance against both the subcontractor's task-specific safety procedures (that is, AHAs) and applicable self-assessment checklists. Self-assessment checklists, provided in this document in Attachment 5, are to be used by the HSM and designated SSCs to review performance.

H&S-related communications with the subcontractor should be conducted as follows:

- Brief subcontractor and employees on the provisions of this plan, and require them to sign the Employee Signoff Form, included in Attachment 1.
- Request the subcontractor to brief project team on the hazards and precautions related to their work.
- When apparent non-compliant or unsafe conditions or practices are observed, notify the subcontractor safety representative and require corrective action—the subcontractor is responsible for determining and implementing necessary controls and corrective actions.
- When repeat noncompliant or unsafe conditions are observed, notify the subcontractor safety representative and stop affected work until adequate corrective measures are implemented.

- When an apparent imminent danger exists, immediately remove all affected personnel, notify the subcontractor safety representative, stop affected work until adequate corrective measures are implemented, and notify the PM and HSM as appropriate.
- Document all verbal H&S-related communications in project field logbook, daily reports, or other records.

SECTION 6

Training

6.1 Employee Training

The intent of employee training program is to ensure that employees receive the appropriate level of training to conduct their work in a safe manner and to comply with applicable regulations. All employees are required to maintain the training qualification necessary to perform their assigned duties and job functions. Guidance on required courses can be obtained from the HSM and CH2M HILL SOP HSE-110, *Health, Safety, and Environment Training*.

6.1.1 Training Requirements

6.1.2 Hazardous Waste Operations Training

All employees engaging in hazardous waste operations or emergency response shall receive appropriate training as required by 29 CFR 1910.120 and 29 CFR 1926.65. At a minimum, the training shall have consisted of instruction in the topics outlined in 29 CFR 1910.120 and 29 CFR 1926.65. Personnel who have not met these training requirements shall not be allowed to engage in hazardous waste operations or emergency response activities.

Initial Training

General site workers engaged in hazardous waste operations shall, at the time of job assignment, have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations, unless otherwise noted in the above-referenced standards.

Employees who may be exposed to health hazards or hazardous substances at treatment, storage, and disposal (TSD) operations shall receive a minimum of 24 hours of initial training to enable the employee to perform their assigned duties and functions in a safe and healthful manner.

Employees engaged in emergency response operations shall be trained to the level of required competence in accordance with 29 CFR 1910.120.

Three-Day Actual Field Experience

General site workers for hazardous waste operations shall have received three days of actual experience (on-the-job training) under the direct supervision of a trained, qualified supervisor and shall be documented. If the field experience has not already been received and documented at a similar site, this supervised experience shall be accomplished and documented at the beginning of the assignment of the project.

Refresher Training

General site workers and TSD workers shall receive 8-hours of refresher training annually (within the previous 12-month period) to maintain qualifications for fieldwork. Employees engaged in emergency response operations shall receive annual refresher training of sufficient content and duration to maintain their competencies or shall demonstrate competency in those areas at least annually.

Eight-Hour Supervisory Training

On site management or supervisors who will be directly responsible for, or supervise employees engaged in hazardous waste site operations, will have received at least 8 hours of additional specialized training on managing such operations. Employees designated as Safety Coordinator – Hazardous Waste are considered 8-hour HAZWOPER Site Safety Supervisor trained.

6.1.3 First Aid/Cardiopulmonary Resuscitation

First aid and CPR training consistent with the requirements of a nationally recognized organization such as the American Red Cross Association or National Safety Council shall be administered by a certified trainer. A minimum of two personnel per active field operation will have first aid and CPR training. Bloodborne pathogen training located on CH2M HILL's Virtual Office is also required for those designated as first aid/CPR trained.

6.1.4 Safety Coordinator Training

SCs are trained to implement the HSE program on CH2M HILL field projects. A qualified SC is required to be identified in the site-specific HSP for CH2M HILL field projects. SCs must also meet the requirements of the worker category appropriate to the type of field project (construction or hazardous waste). In addition, the SCs shall have completed additional safety training required by the specific work activity on the project that qualifies them to implement the HSE program (for example, fall protection, excavation).

6.1.5 Site-Specific Training

Prior to commencement of field activities, all field personnel assigned to the project will have completed site-specific training that will address the contents of applicable HSPs, including the activities, procedures, monitoring, and equipment used in the site operations. Site-specific training will also include site and facility layout, potential hazards, risks associated with identified emergency response actions, and available emergency services. This training allows field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and work operations for their particular activity.

6.1.6 Project-Specific Training Requirements

Project-specific training for this project includes:

- HSPs/AHAs

Pregnant employees are to be informed of and are to follow the procedures in CH2M HILL's SOP, *Reproduction Protection*, including obtaining a physician's statement of the employee's ability to perform the assigned activities before being assigned fieldwork.

Employee Name	Office	Responsibility	Qualifications
Nathaniel Price	VBO	SSC	Level C, SSC/First Aid-CPR
Carl Woods	CIN	Project HSM	Level C, SSC/First Aid-CPR

6.2 Subcontractor Personnel Qualifications

All subcontractors will provide the HSM with a list certifying the training and qualifications of competent persons and qualified operators for the following activities/equipment.

6.2.1 Competent Persons/Qualified Operators

- Test Pitting Heavy Equipment Operators – TBD
- Vegetation Clearing Equipment Operators – TBD
- Drill Rig and DPT Drill Rig Operators – TBD

6.2.2 Activity/Equipment List

- Drill Rig and Heavy Equipment

6.3 Project Employee Orientation

Employees expecting to access the site are required to have the project employee orientation. The training will be provided by the SSC. The training provided to the employees in the employee orientation shall include the following:

- Review the SSHP and APP
- Present an overall site safety briefing (general site safety)
- Review employee responsibilities
- Review AHA policies and procedures
- Review emergency procedures and evacuation plan
- Review injury and incident reporting procedures
- Review reporting procedures for hazardous conditions and/or hazardous activities

6.4 Personal Protective Equipment Training

OSHA requires each PPE user to receive training on the proper care, maintenance, limitations, and instructions on how to wear and adjust PPE. The proper use of PPE will also be included in project safety briefings and toolbox meetings.

6.5 Safety Meetings and Toolbox Meetings

Safety meetings provide a method for maintaining safety awareness and providing safety-related information and training to employees. Safety meetings for project supervisory personnel and project employees shall be held at least daily, and include relevant information for on- and off-the-job safety.

6.6 Activity Hazard Analysis Training

Each supervisor will review task-specific AHAs with all workers assigned to perform that task prior to the beginning of that task anywhere on the job site. All workers will sign the AHA document signifying they have been trained and understand the task steps, hazards, and hazard controls to be used.

6.7 Safety Pre-Task Planning and Training

Each day, the onsite supervisors shall hold informational safety training with each member of their crew. Information discussed and training performed shall pertain to current project activities and scope of work. The subcontractor is encouraged to use this time for employee input and task-specific training.

6.8 Vendor Training

Vendors that supply equipment to the project will be required to perform a training session to review and explain the safe operation procedures to the parties that will be using or operating the equipment.

6.9 Emergency Response Plan Training

Emergency Response Plan (ERP) training will occur during the employee orientation and retraining will occur periodically in safety meetings. The ERP training will include evacuation alarms, site evacuation, designated evacuation assembly areas, and route to emergency medical facility. Emergency drills will be performed initially, but at least twice per year. See Section 12 for the Emergency Preparedness procedures.

6.10 Conduct of Training

6.10.1 Instructor/Trainer Requirements

All personnel who will conduct training will have documented expertise in the areas of which they will be conducting the training, and knowledge of the regulatory and other requirements. They will also be listed as a competent person in that area by the employer or contractor.

6.10.2 Initial Training

All employees will have documentation of initial training required to perform their assigned duties with their assigned tools and equipment. If previous documentation or subcontractor certification is not available, then initial training will take place onsite prior to the employee commencing work.

6.10.3 Re-Training

Retraining will be required under the following conditions:

- There is a change in operations or equipment capabilities.
- An employee is seen performing an unsafe act, or operating equipment or machinery in an unauthorized manner.
- There is an incident or accident on the job site.
- Anytime the regulatory requirements require refresher training due to time periods, such as Hazardous Waste Operations and Emergency Response (HAZWOPER), etc.

6.10.4 Demonstrated Competency

For all training conducted for equipment, machinery, or hazardous activities, the trainer will document in writing that the individual has “demonstrated competency” in the areas required to perform their assigned tasks safely and in compliance with the regulatory and other guidance.

6.11 Documentation

All training shall be documented. Documentation and certificates verifying completion will be maintained onsite by the employer and copies of the training documentation will be submitted to the HSM. Training documentation will be made available for review at all times.

6.12 Mandatory Training and Certifications

All site personnel entering a regulated work area, EZ, or performing designated Hazardous Waste and/or Emergency Response Operations, or other tasks that may require specific training will be trained to meet the requirements that may be applicable to the individual’s assigned tasks. This training will include, but may not be limited to the following:

SSC:

- OSHA construction 30-hr safety training in accordance with 29 CFR 1926
- 40- or 24-hour training course in accordance with 29 CFR 1910.120(e)(3)/29 CFR 1926.65(e)(3) (as applicable to assigned duties)
- Annual 8-hour refresher training course in accordance with 29 CFR 1910.120(e)(8)/ 29 CFR 1926.65(e)(8).
- Management and Supervisor training course in accordance with 29 CFR 1910.120(e)(4)/29 CFR 1910.65(e)(4)
- First Aid and CPR (minimum of 2 trained personnel per project site)
- Relevant Competent Person Courses (such as excavations), as applicable to the SSC’s assigned duties.
- Project Specific training as may be required by project specific tasks (i.e. BBLPS, Drum Handling, Field Awareness Safety, Fire Extinguisher Training, Hazard Communication [HAZCOM] Training, Manual Lifting Training, PPE Training, SC Construction, SC Hazardous Waste, Awareness Training: Construction Site Storm Water Runoff Management)

Site Workers:

- 40- or 24-hour hazardous waste training course in accordance with 29 CFR 1910.120(e)(3)/29 CFR 1926.65(e)(3) (as applicable as applicable to assigned duties)

- Annual 8-hour refresher training course in accordance with 29 CFR 1910.120(e)(8)/ 29 CFR 1926.65(e)(8).
- Project-specific training as dictated by project requirements or as determined by the SSC or HSM

Visitor Training:

All visitors to the site will check in with the SSC and receive a visitor's safety briefing that will include the following:

- Location and description of potential hazards and risks
- Emergency response and evacuation procedures
- Access restrictions
- Other topics as deemed appropriate

Site visitors wishing to enter the work area during site operations will be subject to the same documentation and training as specified for site workers. The SSC will identify all visitors, describe the nature of the visit, and document visitor training in a field logbook or on a separate visitor's log.

SECTION 7

Health and Safety Inspections

7.1 General Requirements

The FTL/SSHO is required to perform safety inspections using the checklists/forms included herein Attachment 5 of this APP/SSHP.

Safety inspection/evaluations will be made by the FTL/SSHO or other designated CH2M HILL representative. Discrepancies or deficiencies identified during inspection and evaluation process will be corrected as soon as practicable and documented on a Safe Work Observation (SWO) Form (Attachment 10 of this APP/SSHP). Serious inconsistencies will be corrected immediately. Inspections that identify Immediately Dangerous to Life or Health (IDLH) situations will require that work be immediately stopped and personnel removed from the work area until the situation is abated, corrected, or controlled to a non-hazardous condition.

The FTL/SSHO is responsible for conducting and preparing reports of daily inspections of work processes, site conditions, and equipment conditions, and maintaining these documents for the project record, as necessary. Corrective actions resulting from discrepancies identified during inspections will be reviewed with the PM and implemented, as necessary. Copies of these reports are maintained on file at the project locations.

The HSM or their designated representative may periodically conduct site visits and perform additional assessments of project H&S performance, at their own discretion or at the request of a corporate official employee, supervisor, or manager. Any discrepancies identified as part of these inspection processes will be addressed with the PM or may be corrected in the field if minor in nature.

Conduct of Inspections

7.1.1 Personnel Authorized to conduct inspections

All onsite supervisors are authorized to perform informal inspections of any project activity and make corrections as required. If anyone witnesses an unsafe act or what they believe to be an unsafe act they are obligated to intercede and prevent the act from occurring. Once they have accomplished that, they will immediately notify the SSC or HSM, who will conduct a formal review of the actions.

The following individuals are authorized to conduct formal Health and Safety inspections onsite for CH2M HILL:

- CH2M HILL SSC
- CH2M HILL HSM

7.1.2 Observed Hazard Form/Safe Work Observation Form

The SSC will perform daily site safety inspections to verify that the project is conducted in a safe manner. The SSC will keep a daily log to track the health and safety observations. In addition to the SSC's daily log, hazards that are discovered by the SSC will be documented on the Safe Work Observation Form (Attachment 10).

7.1.3 Self Assessment Checklists

The SSC will be responsible for conducting formal inspections of the work site(s) periodically throughout the work week. These inspections will focus on activities covered by self-assessment checklists, but can be expanded to cover all aspects of health and safety on the work site(s).

The self-assessment checklists (attached) will be used as a guide to determine compliance with recognized health and safety standards. There are four entries that can be entered on the checklists:

- **YES**—In compliance
- **NO**—Not in compliance
- **N/A**—Not Applicable to current operation

- **N/O**—Not observed during this period

7.2 Deficiency Tracking System

7.2.1 Safe Behavior Observation Forms

All observed hazard forms will be completed onsite at the time of the observed hazard, or activity inspection. Both good behaviors and questionable or unsafe behaviors will be annotated on the form and discussed with the observed worker(s). Any unsafe behavior or acts observed will be documented in writing to the subcontractor's project manager for action. All observed hazard forms will become a permanent part of the project files.

7.2.2 Self-Assessment Checklists

Any item that is annotated with a "NO" must be explained on the last sheet of the checklist, and followed up for corrective action. The last page of each checklist has a column for recording the date the deficiency was corrected. These self-assessment checklists—once completed and signed by the inspector, reviewed with the applicable supervisor and/or employee, and signed by the project manager—will become a permanent record of inspection and part of the project files.

7.2.3 Open Deficiencies

All self-assessment checklists with open deficiencies or stop work orders will be the top priority for the SSC each work day to ensure they are corrected, any training accomplished, or the situation corrected to close out the deficiency. If the deficiency is not handled in a timely manner, the SSC will report the problem in writing to the Prime Contractor Project Manager.

A copy of the Safety and Occupational Health deficiency tracking log shall be mounted on or be adjacent to the bulletin board or a notice on the bulletin board shall state the location where it may be accessed by all workers upon request. See attachment 12 for the form.

SECTION 8

Health and Safety Expectations, Incentive Program, and Compliance

Details about the safe work policy, H&S commitments, project-specific HS&E goals, standards of conduct violations, intolerable offenses, enforcement and discipline, subcontractor default, incentive program, and posting of H&S information is available in the APP (see Section 4.0)

SECTION 9

Accident Reporting

9.1 General Information

This section applies to the following:

- All injuries involving employees, third parties, or members of the public
- Damage to property or equipment
- Interruptions to work or public service
- Incidents that attract negative media coverage
- Near misses
- Spills, leaks, or regulatory violations
- Motor vehicle accidents

Documentation, including incident reports, investigation, analysis, and corrective measure taken, shall be kept by the SSC and maintained onsite for the duration of the project.

9.2 Section Definitions

Incident: an undesired event that results or could have resulted in loss through injury, damage to assets, or environmental harm. This includes “near misses,” “accidents,” and “dangerous occurrences.”

Accident: An incident involving actual loss through injury, damage to assets, or environmental harm.

Near Miss: An unsafe act or incident that, in other circumstances, could have resulted in loss through injury, damage to assets, or environmental harm.

Dangerous Occurrence: A dangerous occurrence complies in most respects with the definition of an accident, with the important difference being that, in a dangerous occurrence, there are no injuries suffered by personnel.

Major Incidents

- All fatalities, including contractors, subcontractors, third parties, or members of the public
- Serious injuries (see definition below) requiring hospitalization in excess of 24 hours, unless detained solely for observation
- Major stoppage of work for more than 24 hours
- Property damage in excess of $2,000
- Accidents that result or are likely to result in negative media or authorities’ attention
- Near misses with a high potential to result in any of the above losses

Serious Injury

- Fracture of a bone, including the skull, spine, or pelvis
- The loss of sight or an eye
- Any other injury, excluding occupational disease, that results in the person being hospitalized for more than 24 hours, unless detained solely for observation

Minor Injury: An injury that does not cause the injured person to lose any normal job time beyond the day or shift upon which the injury occurs.

Lost Time Injury: Any injury that causes the injured person to lose normal job time beyond the day or shift upon which the injury occurred.

9.3 Reporting Requirements

All employees and subcontractors' employees shall immediately report any incident (this includes "near misses," "accidents," and "dangerous occurrences" as defined in Section 9.2 above) in which they are involved or witness to their supervisor.

The supervisor, upon receiving an incident report, shall inform his immediate superior and the SSC.

The SSC shall immediately report the following information to the Program CSP/HSM and PM by phone, in person, and/or e-mail:

- Project name/site manager
- Date and time of incident
- Description of incident
- Extent of injuries/damage
- Level of medical attention
- Preliminary root cause/corrective actions

The SSC shall complete and forward the initial hard copy Incident & Near Loss Investigation Report Form ("Incident Report Form") and Root Cause Analysis Form to the Program CSP/HSM within 24 hours and finalize those forms within 3 calendar days. Examples of these forms are included in Attachment 11, Loss/Near-Loss Investigations.

Major accidents include any occupational hazard exposure or physical injury that requires more than basic first aid (physical injury/exposure) or fire, explosion, or property damage exceeding $200,000. Major accidents require immediate notification of appropriate personnel as discussed below and must be done within 24 hours to the Contracting Officer/ Representative.

In the event of an injury that constitutes an OSHA-recordable incident, the SSC will notify the Navy Remedial Project Manager (RPM), HPDTA Environmental Manager, Project Manager, Compliance Safety and Health Officer (CSHO), and HSM as soon as practical after the incident. The reporting form shall be Contractor Safety Incident Report (CSIR), found in Attachment 11.

9.3.1 EM 385-1-1 Reporting Requirements

Report all accidents as soon as possible but not more than 24 hours afterwards to the CO/COR. The contractor will thoroughly investigate the accident and submit the findings of the investigation along with appropriate corrective actions to the CO/COR in the prescribed format as soon as possible but no later than five (5) working days following the accident. Implement corrective actions as soon as reasonably possible.

The following require immediate accident notification:

- A fatal injury
- A permanent total disability
- A permanent partial disability
- The hospitalization of three or more people resulting from a single occurrence
- Property damage of $200,000 or more

9.4 Investigation Requirements

The supervisor or SSC shall proceed to the scene of the incident, take charge of the situation to prevent further injury or damage, and arrange first aid or medical treatment for the injured.

The supervisor shall ensure that no equipment, material, or other evidence of the incident is removed unless essential to prevent further injury or damage. The supervisor will also carry out an initial investigation of the incident.

The causes of loss and near loss incidents are similar, so by identifying and correcting the causes of near loss incidents, future loss incidents may be prevented. The following is the Loss/Near Loss Investigation Process:

- Gather all relevant facts, focusing on fact-finding, not fault-finding.
- Answer the “who, what, when, where, why, and how” questions.
- Put facts together into a probable scenario.
- Determine incident root cause(s), which are basic causes on why an unsafe act/ condition existed.
- Develop and implement solutions, matching all identified root causes with solutions.
- Communicate incident as a lesson learned to all project personnel.
- Follow up on implemented corrective active action to confirm solution is appropriate.

The supervisor and/or SSC shall perform an incident investigation, as soon as practical after the incident, for all Loss and Near Loss Incidents that occur on the project. Loss incident investigations shall be performed in accordance with the SOP HSE-111, *Incident Notification, Reporting and Investigation.* The following forms must be completed:

- Incident Report Form (Attachment 11)
- Root Cause Analysis Form (Attachment 11)

Provide a description of the event and the sequence of events and actions that took place prior to the incident. Start with the incident event and work backwards in time through all of the preceding events that directly contributed to the accident.

A preliminary Incident Report Form and Root Cause Analysis Form shall be submitted to the PM and Program CSP/HSM within 24 hours of incident occurrence. The final Incident Report From and Root Cause Analysis shall be submitted after completing a comprehensive investigation of the incident.

The Project Manager and SSC shall evaluate the supervisor’s investigation report and ensure that the report adequately addresses the facts and circumstances of the incident, the causes, and recommended corrective actions. If the initial investigation is considered inadequate, the Project Manager shall appoint the SSC to carry out further investigation.

For a major incident, the senior management shall convene a committee of inquiry to conduct a thorough investigation into the incident. The team shall be provided with proper terms of reference to guide the scope of their investigation. The team shall include the Project Manager, responsible Supervisor, SSC, and subcontractor if applicable. The Program CSP/HSM reserves the right to participate in the investigation.

9.5 Analysis

The accident analysis is essential if all causes of the incident are to be identified for the correct remedial actions to be taken to prevent the same and similar type of incident from recurring. The investigation team will consist of the SSC, the responsible supervisor, and Project Manager.

The Root Cause Analysis Form (Attachment 11) must be completed for all Loss Incidents and Near Loss Incidents. This form must be submitted to the investigation team for review.

For minor losses or near losses, the information may be gathered by the supervisor or other personnel immediately following the loss. Based on the complexity of the situation, this information may be all that is necessary to enable the investigation team to analyze the loss, determine the root cause, and develop recommendations. More complex situations may require the investigation team to revisit the loss site or re-interview key witnesses to obtain answers to questions that may arise during the investigation process.

Photographs or videotapes of the scene and damaged equipment should be taken from all sides and from various distances. This point is especially important when the investigation team will not be able to review the loss scene.

The investigation team must use the Root Cause Analysis Flow Chart (Attachment 11) to assist in identifying the root cause(s) of a loss. Any loss may have one or more root causes and contributing factors. The root cause is the primary or immediate cause of the incident, while a contributing factor is a condition or event that contributes to

the incident happening, but is not the primary cause of the incident. Root causes and contributing factors that relate to the person involved in the loss, his or her peers, or the supervisor should be referred to as “personal factors.” Causes that pertain to the system within which the loss or injury occurred should be referred to as “job factors.”

Personal Factors

- Lack of skill or knowledge
- Correct way takes more time and/or requires more effort
- Short-cutting standard procedures is positively reinforced or tolerated
- Person thinks there is no personal benefit to always doing the job according to standards

Job Factors

- Lack of or inadequate operational procedures or work standards
- Inadequate communication of expectations regarding procedures or standards
- Inadequate tools or equipment

The root cause(s) could be any one or a combination of these seven possibilities, or some other uncontrollable factor. In the vast majority of losses, the root cause is very much related to one or more of these seven factors. Uncontrollable factors should be used rarely and only after a thorough review eliminates all seven other factors.

9.6 Corrective Actions

In the investigation report, include all corrective actions taken or those that should be taken to prevent recurrence of the incident. In addition, include the specific actions to be taken, the employer and personnel responsible for implementing the actions, and a time frame for completion. Be sure the corrective actions address the causes.

Once the investigation report has been completed, the PM shall hold a review meeting to discuss the incident and provide recommendations. The responsible supervisors shall be assigned to carry out the recommendations, and shall inform the SSC upon successful implementation of all recommended actions.

9.7 Monthly Reports

The SSC will compile the information and prepare a report in accordance with Paragraph 01.D.05 (c), of the EM 385-1-1, which accurately reflects the employee-hours worked each month for all site workers, both prime and subcontractor. This report will be prepared on the form provided by the Contracting Officers Representative (COR) and attached to the monthly billing request submitted to the COR.

SECTION 10

Medical Support and Training

10.1 Personnel Qualified in First Aid and CPR

The following CH2M HILL individuals hold current certifications from the American Red Cross, American Heart Association, or other organization whose training is deemed equivalent.

- Nathaniel Price—SSC
- TBD- Site Worker
- TBD—Subcontractor

There will be a minimum of two staff on site at all times trained in FA/CPR and annual Blood-borne Pathogens training.

10.2 First Aid Kits

There will be at least one Type III first aid kit available that meets the requirements of EM 385-1-1paragraph 03.B.01 and EM 385-1-1 Table 3-1, on each individual work site during hours of operation.

10.3 Emergency Medical Treatment

The procedures listed below may also be applied to nonemergency incidents. Injuries and illnesses (including overexposure to contaminants) must be reported to HSM/Human Resources. If there is doubt about whether medical treatment is necessary, or if the injured person is reluctant to accept medical treatment, contact the CSP/HSM. During non-emergencies, follow these procedures as appropriate:

- Get medical attention immediately by notifying the supervisor, SSC, or HSM.
- Prevent further injury.
- Initiate first aid and CPR (if needed) where feasible.
- The SSC will assume charge during a medical emergency until the ambulance or EMT arrives or until the injured person is transported to the offsite medical facility.
- If the injured is a CH2M HILL employee, the SSC or PM must accompany the injured employee to the emergency room and to any follow-up appointments until the injured is released to full duty. Make certain that the injured person is accompanied to the emergency room.
- Report incident as outlined in Section 16, Incident Notification and Reporting.

10.4 Emergency Medical Support

Location and direction to medical support facilities will be posted in a conspicuous location where temporary construction facilities are established at the project site. In addition, the location and directions will be included in each project vehicle.

In addition, the project will be outfitted with FA kits of suitable size and quality (contents) to meet H&S requirements for onsite FA or CPR response. Personal protective devices will be provided such that universal precautions against BBPs can be exercised while administering CPR or FA. Portable eye wash kits will be available.

An effective means of communication to summon transportation of injured workers to medical treatment facilities must be evaluated and established prior to the start of field activities. Communication devices will be tested in the area of use to assure functionality.

When a medical facility or physician is not accessible within five minutes of an injury to a group of two or more employees for the treatment of injuries, at least two employees on each shift will be qualified to administer first-aid and CPR.

CH2M HILL employee injuries and illnesses must also be reported to the HR contact in Attachment 4, once the notification requirements identified in Section 9.3 of this SSHSP have been fulfilled. If there is doubt about whether medical treatment is necessary, or if the injured person is reluctant to accept medical treatment, contact the designated medical consultant, as applicable. During emergencies, follow these procedures as appropriate:

- Notify 911 or other appropriate emergency response authorities as listed in the “Emergency Contacts” page located in Attachment 4.
- Notify appropriate emergency response authorities (e.g., 911).
- The SSC will assume charge during a medical emergency until the ambulance arrives or until the injured person is admitted to the emergency room.
- Prevent further injury.
- Initiate FA and CPR where feasible and where worker “Universal Precautions” to bloodborne pathogens can be completed. If FA, CPR, or “Universal Precautions” cannot be completed, wait for emergency response authorities.
- For life threatening emergencies, get or summon medical attention immediately.
- Perform decontamination where feasible; lifesaving and FA or medical treatment take priority.
- Notify supervisor and if the injured person is a CH2M HILL employee, the supervisor will call the occupational nurse at 1-866-893-2514 and make other notifications as required by HS&E SOP-111, *Incident Notification, Reporting and Investigation*.
- Make certain that the injured person is accompanied to the emergency room.
- When contacting the medical consultant, give your name and telephone number, the name of the injured person, the extent of the injury or exposure, and the name and location of the medical facility where the injured person was taken.
- Report incident as outlined in Section 9.0 of this SSHSP.
- Complete incident report using the Hours and Incident Tracking System (HITS) system on the VO or if not feasible, use the hard copy forms provided in Attachment 11.
- Notify and submit reports to client as required in contract.

In the event of an injury or illness requiring emergency medical attention the site escort will contact HPDTA police, fire, and medical emergency dispatch for assistance in stabilizing the situation and personnel.

All site workers participating in hazardous waste operations or emergency response will maintain an adequate medical surveillance program in accordance with 29 CFR 1910.120 or 29 CFR 1926.65 and other applicable OSHA standards. Documentation of employee medical qualification (for example, physician’s written opinion) will be maintained in the project files and made available for inspection.

10.5 Hazardous Waste Operations and Emergency Response

CH2M HILL personnel expected to participate in onsite HAZWOPER are required to have a current medical qualification for performing this work. Medical qualification shall consist of a qualified physician’s written opinion regarding fitness for duty at a hazardous waste site, including any recommended limitations on the employee’s assigned work. The physician’s written opinion shall state whether the employee has any detected medical conditions that would place the employee at increased risk of material impairment of the employee’s health from work in hazardous waste operations or emergency response, or from respirator use.

For the purposes of this SOW, CH2M HILL employees are not expected to be involved in emergency response.

SECTION 11

Personal Protective Equipment

(References: EM 385-1-1 Section 5, *Personal Protective and Safety Equipment*; CH2M HILL SOPs HSE-117, *Personal Protective Equipment*, and HSE-121, *Respiratory Protection*)

11.1 General Information

When actual or potential hazards exist and engineering controls or safe work practices cannot eliminate the hazard, employees shall use PPE. The employer shall provide field personnel with the required disposable and project-specific PPE and training.

Employees are responsible to:

- Acquire the necessary PPE from the employer.
- Complete the appropriate training to learn the proper use and care.
- Use PPE as required in the project-specific written safety plan.
- Inspect PPE prior to use and maintain it in a clean and safe condition.
- Refrain from modifying, tampering with, or repairing PPE beyond routine maintenance.
- Inform the employer of equipment that is damaged.
- Inform the employer of equipment that they believe does not adequately protect them from actual or potential hazards.

11.2 Hazard Assessment for Determining PPE Levels

The employer shall identify actual or potential hazards and the need for PPE. Two conditions typically dictate the necessity for PPE: general hazards present in the work area, and hazards created by the tasks being performed. Some work areas have actual or potential hazards that can be present at any time, thereby potentially exposing any personnel working or walking through the area. Such areas should be posted as PPE-required areas, or personnel should be informed of the requirements in an equivalent manner. In addition, the actual task being performed may create a hazard and require personnel who perform this task to wear appropriate PPE. The areas where these tasks are taking place may become PPE-required areas as long as that specific task is taking place. The completed PPE Requirements per task assessment is reflected in Table 11-1. Specific hazardous assessments are conducted through the AHA process, and thus AHAs become the daily tool for proper hazard assessment and mitigation. The following table should be used as a general minimum guideline, with the specific task AHA having the final required protocol for PPE. AHAs are a living document, and should reflect changing site conditions.

See also the table in Section 2.7 for a more detailed hazard assessment for each task. Basic minimum safety guidelines are further defined in Sections 12 and 13.

11.3 PPE Requirements

Personnel must comply with the PPE requirements as specified in Table 11-1.

TABLE 11-1
PPE Specifications/Requirements

Task	Level	Body	Head	Respirator [b]
General site uniform: -Site walkover -Utility Locate/Surveys -Vegetation Clearance *No Chemical exposure anticipated	D[a]	**Coveralls:** Work clothes-long pants, shirt with at least a 3-inch sleeve. High visibility reflective vest while working around Heavy Equipment. **Boots:** ANSI Z41 approved steel-toe, leather work boots or equivalent. No steel-toe boots for geophysical surveyors. **Gloves:** Work glove while material handling.	ANSI Z89 approved hardhat[c] ANSI Z87 approved safety glasses with side shields. Hearing protection if necessary [d]	None required.
-Groundwater & Soil Sampling -IDW Sampling and Mgmt. -Drilling/Well Installation -Excavations/Test Pitting	Modified D[a]	**Coveralls:** High visibility reflective vest while working around Heavy Equipment. Work Clothes or Coveralls. SC to determine body protection based on potential contact with site contaminants. If outer layer of personal clothing cannot be kept clean, then outer cotton coveralls or uncoated Tyvek coveralls shall be worn. (Polycoated Tyvek when there is potential to contact contaminated groundwater or free liquids from drums.) **Boots:** ANSI Z41 approved steel-toe, leather work boots. **Gloves:** Nitrile glove while handling sampling materials. See AHA for this task for specific guidelines	ANSI Z89 approved hardhat [c] ANSI Z87 approved safety glasses with side shields. Hearing protection when within 50 feet of excavator, with NRR of 27 dB [d]	None required. Voluntary use of a dust mask is optional.
Work near vehicular traffic ways or earth moving equipment.	ALL	Appropriate level of ANSI/ISEA 107-2010 high-visibility safety vests.	Work near vehicular traffic ways or earth moving equipment.	NA
-Decontamination -Tasks requiring upgrade: none anticipated	C	**Coveralls:** Polycoated Tyvek® **Boots:** Steel-toe, chemical-resistant boots OR steel-toe, leather work boots with outer rubber boot covers **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [c] Splash shield [c] Ear protection [d] Spectacle inserts	APR, full face, MSA Ultratwin or equivalent; with GME-H cartridges or equivalent[e].

[a] Modifications are as indicated. CH2M HILL will provide PPE only to CH2M HILL employees.
[b] No facial hair that would interfere with respirator fit is permitted.
[c] Hardhat and splash-shield areas are to be determined by the SSC.
[d] Ear protection should be worn when conversations cannot be held at distances of 3 feet or less without shouting.
ANSI = American National Standards Institute

TABLE 11-2
Reasons for Upgrading or Downgrading Level of Protection

Upgrade [a]	Downgrade
• Request from individual performing tasks. • Change in work tasks that will increase contact or potential contact with hazardous materials. • Occurrence or likely occurrence of gas or vapor emission. • Known or suspected presence of dermal hazards. • Instrument action levels (see Section 15) exceeded.	• New information indicating that situation is less hazardous than originally thought. • Change in site conditions that decrease the hazard. • Change in work task that will reduce contact with hazardous materials.

[a] Performing a task that requires an upgrade to a higher level of protection (for example, Level D to Level C) is permitted only when the PPE requirements have been approved by the HSM, and an SSC qualified at that level is present.

11.4 Training

CH2M HILL requires each PPE user to receive training on the proper care, maintenance, limitations, and instructions on how to wear and adjust PPE. The proper use of PPE should also be included in project safety briefings and toolbox meetings.

PPE Certification

I certify that the PPE requirements listed in the table above for the associated tasks are based upon the project-specific hazard assessment I performed.

Carl Woods	10/03/12	10/03/12
Name	Date of Certification	Date(s) of Project Hazard Assessment

SECTION 12

Plans Required by the Safety Manual

12.1 Emergency Response Plans

12.1.1 Emergency Preparedness Training

The Emergency Response Coordinator (ERC), for this project, the FTL/SSC, performs the applicable pre-emergency planning tasks before starting field activities and coordinates emergency response with CH2M HILL onsite parties, the facility, and local emergency-service providers as appropriate. Pre-Emergency Planning activities performed by the FTL/SSC include:

- Review the facility emergency and contingency plans where applicable;
- Determine what onsite communication equipment is available (two-way radio, air horn);
- Determine what offsite communication equipment is needed (nearest telephone, cell phone);
- Confirm and post the “Emergency Contacts” page and route to the hospital located in Attachment 4 of the SSHSP and keep a copy in field vehicles along with evacuation routes and assembly areas. Communicate the information to onsite personnel and keep it updated;
- Review changed site conditions, onsite operations, and personnel availability in relation to emergency response procedures.
- Where appropriate and acceptable to the client, inform emergency room and ambulance and emergency response teams of anticipated types of site emergencies.
- Inventory and check site emergency equipment, supplies, and potable water.
- Communicate emergency procedures for personnel injury, exposures, fires, explosions, and releases.
- Rehearse the ERP before site activities begin. This may include a “tabletop” exercise or an actual drill depending on the nature and complexity of the project. Drills should take place periodically but no less than once a year.
- Brief new workers on the ERP.
- The FTL/SSC will evaluate emergency response actions and initiate appropriate follow-up actions.

Emergency Equipment and Supplies

The FTL/SSC will ensure the following emergency equipment is on the site. Verify and update the locations of this equipment as needed. The equipment will be inspected in accordance with manufacturer’s recommendations. The inspection will be documented in a field logbook or similar means to be kept in the project files.

TABLE 12-1
Emergency Equipment and Supplies

Emergency Equipment and Supplies	Location
2 fire extinguishers (A, B, and C classes)	Field vehicle
First aid kit	Field vehicle
Eye wash	Field vehicle
Potable water	Field vehicle
Bloodborne pathogen kit	Field vehicle
Additional equipment (specify): Cell phone	SSC

Incident Response

In fires, explosions, or chemical releases, actions to be taken include the following:

- Shut down operations and evacuate the immediate area
- Notify the SSC and PM by the fastest means available.
- Account for personnel at the designated assembly area(s)
- Assess the need for site evacuation, and evacuate the site as warranted
- Instead of implementing a work-area evacuation, note that small fires or spills posing minimal safety or health hazards may be controlled

Small fires or spills posing minimal safety or health hazards may be controlled with onsite spill kits or fire extinguishers without evacuating the site. When in doubt evacuate. Follow the incident reporting procedures in Section 9.3.

Outdoor field work on this project will be suspended in the event of severe weather that could impact field activities. Such work suspension will be communicated immediately to the PM and the procedures noted in Section 9.3 will be followed.

An effective means of communication and to summon transportation of injured workers to medical treatment facilities must be evaluated and established prior to the start of field activities. Communication devices will be tested in the area of use to assure functionality.

When a medical facility or physician is not accessible within five minutes of an injury to a group of two or more employees for the treatment of injuries, at least two employees on each shift will be qualified to administer first-aid and CPR.

The procedures listed below may also be applied to non-emergency incidents. If there is doubt about whether medical treatment is necessary, or if the injured person is reluctant to accept medical treatment, contact the designated medical consultant, as applicable. (During non-emergencies, follow these procedures as appropriate).

- Notify appropriate emergency response authorities (e.g., 911 or the non-emergency phone # for the local authorities if appropriate).
- The SSHO will assume charge during a medical emergency until the ambulance arrives or until the injured person is admitted to the emergency room.
- Prevent further injury—for life-threatening emergencies summon medical attention immediately.
- Initiate FA and CPR when needed/required and where worker “Universal Precautions” to Bloodborne Pathogens can be completed.
- Perform decontamination when/where needed/required; lifesaving and FA or medical treatment take priority.
- Make certain that the injured person is accompanied to the emergency room.
- When contacting the medical consultant, give your name and telephone number, the name of the injured person, the extent of the injury or exposure, and the name and location of the medical facility where the injured person was taken.
- Report incident as outlined in Section 9.3.

Emergency Medical Treatment

The procedures listed below may also be applied to nonemergency incidents. Injuries and illnesses (including overexposure to contaminants) must be reported to CH2M HILL HSM/Human Resources. If there is doubt about whether medical treatment is necessary, or if the injured person is reluctant to accept medical treatment, contact

the CH2M HILL medical consultant (see Emergency Contacts List in Attachment 4). During non-emergencies, follow these procedures as appropriate.

- Have the site escort notify the appropriate emergency response authorities.
- The SSC will assume charge during a medical emergency until the ambulance arrives or until the injured person is admitted to the emergency room.
- Prevent further injury.
- Initiate first aid and CPR (if needed) where feasible.
- Get medical attention immediately.
- Perform decontamination where feasible; lifesaving and first aid or medical treatment take priority.
- Make certain that the injured person is accompanied to the emergency room.
- When contacting the medical consultant, state that the situation is a CH2M HILL matter, and give your name and telephone number, the name of the injured person, the extent of the injury or exposure, and the name and location of the medical facility where the injured person was taken.

12.1.1.1. Evacuation Procedures

- Evacuation routes and assembly areas will be designated by the SSC before work begins.
- Personnel will assemble at the assembly area(s) upon hearing the emergency signal for evacuation.
- The SSC and a “buddy” will remain on the site after the site has been evacuated (if safe) to inform local responders of the nature and location of the incident.
- Each supervisor will account for their personnel at the assembly area, and report to the PM or CSP/HSM that either all personnel are accounted for, or the number of personnel unaccounted for.
- The SSC will write up the incident as soon as possible after it occurs and submit a report to the PM and/or CSP/HSM.

Signal	Meaning
Grasping throat with hand	Emergency-help me.
Thumbs up	OK; understood.
Grasping buddy’s wrist	Leave area now.
Continuous sounding of horn	Emergency; leave site now.

12.2 Spill Plans

In the event that any hazardous materials are spilled, the onsite employees will take immediate action to prevent further release as appropriate by turning off the source, up righting the container, or other immediate actions that can be safely performed.

Employees will only perform defensive actions to prevent further spread or release. Defensive actions are actions that can be performed without actual contact with the released materials and without the use of additional levels of PPE protection. These actions include, but are not limited to the following:

- Turning off a nozzle or valve
- Up righting a knocked over container
- Applying loose sorbent materials to a spill
- Placing sorbent booms or pads around the spilled materials to prevent further spread

Employees will immediately notify the SSC, who will notify the HSM, as to the location of the spill and any defensive measures taken to reduce its impact of further release.

Employees who have come into contact with any spilled hazardous materials will immediately seek emergency decontamination. Emergency decontamination includes the following actions:

- Remove any contaminated clothing.
- Immediately drench affected body areas with water.
- Seek medical attention as required.
- Maintain sorbent material in the support zone. Incidental spills will be contained with sorbent and disposed of properly.
- Plastic sheeting shall be considered IDW for disposal purposes.

All spills will be reported to the client, PM and HSM as required.

Spills of hazardous materials will be cleaned up, containerized, and disposed of in compliance with the local city/state/municipality directives and information provided by HPDTA.

12.3 Site Control Plan/Site Control Procedures

(Reference CH2M HILL SOP HSE-510, *Site Control)*

- The SSC will conduct a site safety briefing (see below) before starting field activities or as tasks and site conditions change.
- Topics for briefing onsite safety: general discussion of the SSHP, site-specific hazards, locations of work zones, PPE requirements, equipment, special procedures pertaining to emergencies.
- The SSC records attendance at safety briefings in a logbook and documents the topics discussed.
- Post the OSHA jobsite poster in a central and conspicuous location in accordance with CH2M HILL, OSHA Postings.
- Establish onsite communication consisting of the following:
  - Line-of-sight and hand signals
  - Air horn
  - Two-way radio or cellular telephone if available
- Establish offsite communication.
- Establish and maintain the “buddy system.”
- Initial air monitoring is conducted by the SSC in appropriate level of protection.
- The SSC is to conduct periodic inspections of work practices to determine the effectiveness of these procedures. Deficiencies are to be noted, reported to the HSM, and corrected.

An exclusion zone (size TBD pending site configuration) will be maintained around work areas where sampling activities are occurring or with any activity where chemical materials may be encountered. Protective clothing and equipment are to be worn by any personnel working within the exclusion zone. At a minimum, Level D PPE is required. The purpose of the exclusion zone is to limit outside personnel from entering the work area and potentially injuring themselves or exposing themselves to hazardous work conditions or chemicals. The exclusion zone will include a limited access ingress and egress for personnel and equipment. The zone is to be demarcated with caution/hazard tape and barricades (or similar restricting material). The exclusion zone is to be clearly labeled as such. All personnel are required to log in/out of exclusion zones daily.

12.3.1 Decontamination

(Reference CH2M HILL SOP HSE-506, *Decontamination*)

(Reference CH2M HILL SOP HSE-218, *Hazardous Waste Operations*)

The SSC must establish and monitor the decontamination procedures and their effectiveness. Decontamination procedures found to be ineffective will be modified by the SSC. The SSC must ensure that procedures are established for disposing of materials generated on the site. All rinse waters and materials shall be contained, and shall be disposed of according to client and/or site protocols.

Personnel	Sample Equipment	Heavy Equipment
Boot wash/rinse Glove wash/rinse Outer-glove removal Body-suit removal Inner-glove removal Respirator removal Hand wash/rinse Face wash/rinse Shower ASAP Dispose of PPE in municipal trash, or contain for disposal Dispose of personnel rinse water to facility or sanitary sewer, or contain for offsite disposal	Wash/rinse equipment Solvent-rinse equipment Contain solvent waste for offsite disposal	Power wash Steam clean Dispose of equipment rinse water to facility or sanitary sewer, or contain for offsite disposal

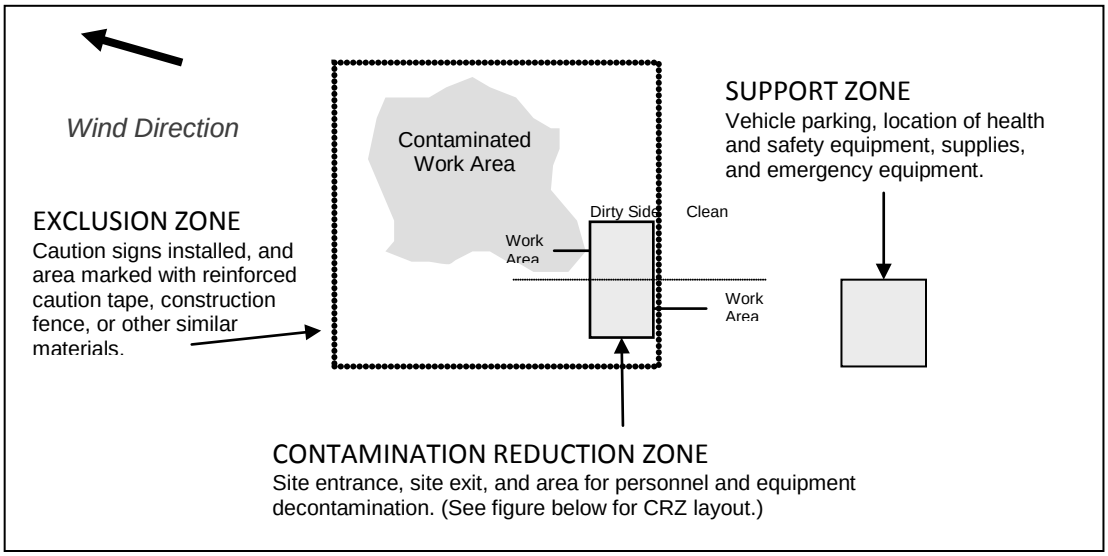
Diagram of Personnel-Decontamination Line

No eating, drinking, or smoking is permitted in contaminated areas and in exclusion or decontamination zones. The SSC should establish areas for eating, drinking, and smoking. Contact lenses are not permitted in exclusion or decontamination zones.

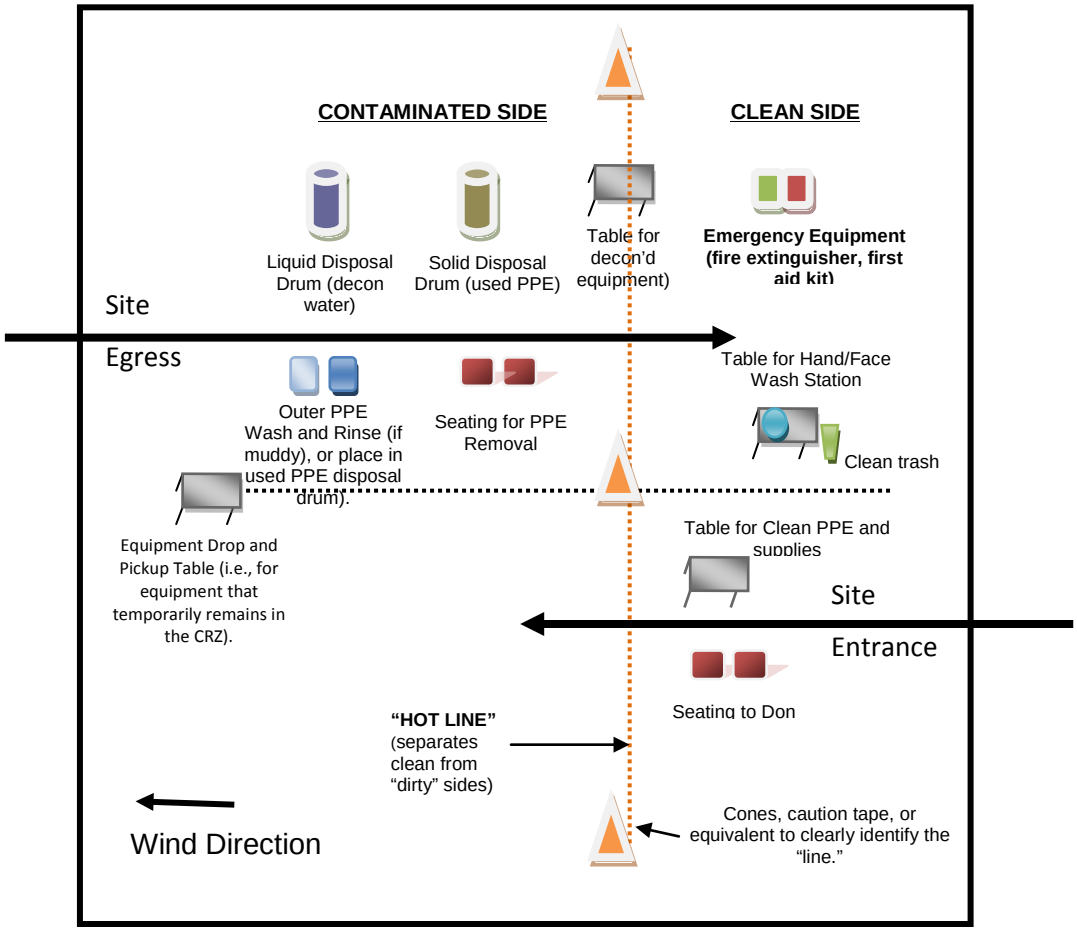
The following figure illustrates a conceptual establishment of work zones, including the decontamination line. Work zones are to be modified by the SSC to accommodate task-specific requirements.

No smoking is permitted in the work area. The SSC should establish areas for eating, drinking, and smoking.

Work Area - Set up appropriately based on wind direction



Typical Contamination Reduction Zone



12.3.2 Firefighting Plan

(References: Section 01.E.01 & 06.A.02, EM 385-1-1 and CH2M HILL SOP HSE-208, *Fire Prevention*)

The decision on whether or not to try to extinguish a fire using available site personnel and equipment will be made by the SSC, and is based on whether the fire is small or large, and involves explosives or flammable liquids/gases.

12.3.2.1. Location of Fire Extinguishers

Fire extinguishers will be located around the project sites as required. These will be located in the following places at a minimum:

- In each vehicle
- Near areas where flammable materials are stored or in use

All fire extinguishers will be kept clearly visible, marked, and placed where they are easily accessible.

12.4 Hazard Communication Program

(References: Section 01.B.06, EM 385-1-1 and CH2M HILL SOP HSE-107, *Hazard Communication*)

- Effective information and training on hazardous chemicals shall be given to project employees by their employer at the time of initial assignment and/or whenever a new physical or health hazard the employees have not been previously trained about is introduced into their work area.
- All onsite hazardous chemicals shall have an accompanying Material Safety Data Sheet (MSDS) available to employees for reference.
- The subcontractor shall submit a copy of the MSDS sheet to the SSC for all onsite hazardous chemicals and when a new hazardous chemical is introduced to the project.
- The SSC will complete the Chemical Specific Training Form, included in Attachment 3, to verify that training is provided on the hazards associated with these chemicals and the control measures to be used to prevent exposure to personnel are implemented.
- The subcontractor shall provide documentation (see the Chemical-Specific Training Form in Attachment 3 for an example) to the SSC to verify that they have provided adequate employee training for the onsite hazardous chemicals.
- All chemical containers shall be labeled with the identity of the chemical and with hazard warnings.

All hazardous materials will be properly stored. The SSC will give consideration to compatibility, quantity limits, secondary containment, fire prevention, and environmental conditions.

12.4.1 HAZWOPER Compliance Plan

(Reference CH2M HILL, SOP HSE-220, *Written Plans)*

This SSHP complies with a HAZWOPER program and requires staff to comply with hazardous waste operations or emergency response as required by 29 CFR 1910.120 and 29 CFR 1926.65.

12.5 Respiratory Protection Program

(References: Section 05.E.03, EM 385-1-1 and CH2M HILL SOP HSE-121, R*espiratory Protection*)

12.5.1 General

Respiratory protection is not anticipated to be required at this project site based on the current scope of work. If these parameters change, or unforeseen circumstances dictate the use of respiratory protection, the following guidelines will be adhered to.

12.5.2 Voluntary Usage

CH2M HILL has a regulatory compliant Voluntary Usage Program for employees and workers who feel that they may want to wear a respirator, even when the situation and conditions do not require their use for protection. Any employee or worker can approach their supervisor or SSC to have a respirator provided if so desired. Additional training and medical screening will be required to be performed in the event the user does want to wear a respirator.

12.5.3 Air Purifying Respirators

CH2M HILL employees and subcontractors will be required to utilize air purifying respirators (APRs) under the following conditions and operations:

- Operations where the concentration of substance or vapor is known
- There is a filter available that is National Institute of Occupational Safety and Health (NIOSH)/Mine Safety and Health Administration (MSHA) rated for the substance or material that poses the hazard

12.5.4 Filter Selection and Change Schedule

If, during the course of the project, the situation arises that would require the use of APRs, the SSC will contact CH2M HILL corporate Health & Safety to acquire the appropriate atmospheric monitoring equipment to determine the type of respirator cartridges needed. Once determined, a cartridge change schedule will be established based upon the analytical data collected.

12.5.5 Fit Testing

All personnel required to wear either a self-contained breathing apparatus (SCBA) or APR during the project will be fit tested and perform fit testing in accordance with the CH2M HILL SOP. An operator seal check will be performed each time the respirator is placed on the operator's face for use.

12.6 Health Hazard Control Program

(Reference: EM 385-1-1 Section 01.B.06)

The Health Hazard Control Program will be conducted by the use of the Activity Hazard Analysis process. This section outlines the process that will be utilized by the SSC onsite to determine the presence of hazardous environments or whether hazardous or toxic agents could be released into the work environment.

12.6.1 General Information

AHAs shall be developed during the preparation stage for each definable work task. An AHA is a procedure that integrates accepted health and safety principles and practices into a particular operation. In an AHA, each basic step of the overall task is examined to identify potential hazards and to determine the safest way to do the job.

Four basic stages in conducting an AHA are:

- Selecting the task to be analyzed
- Breaking the task down into a sequence of steps
- Identifying potential hazards
- Determining preventive measures to overcome these hazards

AHAs are intended to be a starting point and must be reviewed (and modified as appropriate) by the entire work team prior to initially conducting the task.

The AHA process will identify previously undetected hazards and increase the job knowledge of those participating. Safety and health awareness is raised, communication between workers and supervisors is improved, and acceptance of safe work procedures is promoted. The completed AHA will be the basis for regular contact between supervisors and workers on health and safety. It will serve as a teaching aid for initial job training. The AHA will also be used as a standard for health and safety observations and assist in completing comprehensive accident investigations.

All AHAs will be documented, reviewed, and signed by the SSC, Site Supervisor, and all workers involved in the task. All AHAs will be maintained onsite by the SSC.

12.6.2 Tasks Requiring Activity Hazard Analyses

Activity Hazard Analyses are required for all definable work tasks. The following hazardous work operations are examples of those requiring AHAs, but not inclusive:

- Mobilization/Demobilization
- Groundwater sampling and water level measurements
- Soil sampling
- Test pitting
- Monitoring well installation
- Site survey and geophysical survey
- Underground utility location
- Vegetation clearance

- IDW handling and management

12.6.3 Detailed Activity Hazard Analysis Procedures

To complete a detailed AHA form, the responsible supervisor obtains an AHA form (an example is given in Attachment 8) and identifies individuals who will be performing the task. With the assistance of those employees performing the task, the responsible supervisor should:

- Define the task and describe the work activity, including the tools, equipment, materials, and personnel to perform the activity.
- Identify the sequence of work or principal steps that are required to perform the activity.
- Identify and analyze the chemical, physical, safety, and biological/environmental hazards posed by each step in the activity.
- Identify the main hazard control measures for each hazard identified—hazard control measures shall follow the hierarchy of 1) implementing engineering control, 2) instituting safe work practices, and 3) providing PPE.
- List equipment, tools, and materials that will be used to perform the activity, along with the equipment/tool inspection and training requirements for workers and supervisors.
- Ensure employees have training qualifications necessary to perform their assigned duties and job functions.
- Identify and summarize relevant SOPs, as part of the hazard control measure identified for each work task.
- Review the AHA form in a safety briefing with all project personnel who will be performing the task prior to task performance (ensure that their signature is on the AHA form).
- Brief any new members to the crew prior to performing the task.
- Verify that the control measures recommended are implemented during execution of the work by assigning responsibilities to the appropriate team members.

The responsible supervisor must review all AHAs with all project personnel who will be performing the task in a safety briefing, prior to task performance. Any new crew members shall be briefed on the AHA prior to performing the activity. In addition, the responsible supervisor shall oversee subcontractor implementation of this AHA process for their work.

12.6.4 Activity Hazard Analysis Planning Tools

The following are planning tools that shall be utilized when preparing detailed AHAs.

12.6.4.1. Activity/Task Hazard Analysis Table

The Task Hazard Analysis Table, Section 2.7, details potential health and safety hazards for each project phase or task. Relevant safety procedures must be reviewed to identify the applicable hazard control procedures in the AHA.

12.6.4.2. Subcontractor Activity-Specific Safety Procedures

Subcontractor Activity-Specific Safety Procedures are not intended to be all-inclusive, but are provided as a tool to facilitate development and review of safe work procedures. Subcontractors are expected to address each outlined criterion as part of their AHA planning.

12.6.4.3. Project Activity Self-Assessment Checklists

Project Activity Self-Assessment Checklists, Attachment 5, have been provided as a method of verifying compliance with established safe work practices, regulations, and industry standards pertaining to various activities. Project activity self-assessments shall be performed at the start of specific hazardous work activity, then at least weekly and at intervals appropriate for the nature of work site activities. Checklists provided in Attachment 5 are for CH2M HILL employee use only. Each subcontractor shall provide their own checklists to be

used to assess the adequacy of site-specific safety requirements and determine whether control measures identified in the AHA are adequate for each work task.

12.6.5 Pre-Task Safety Planning

Pre-Task Safety Planning (PTSP) ensures that daily tasks are performed with safety integrated into the daily work routine. PTSP requires that the team identify that day's tasks to be performed; required equipment, tools, and materials to perform these tasks; the potential hazards posed; and required HS&E procedures.

A PTSP Form, Attachment 9, shall be completed for each work crew performing field activities. The PTSP shall be completed before work begins each morning throughout the course of the project. The supervisor/foreman and their crew complete the PTSP. The supervisor/foreman reviews the PTSP with each crew member during that day's safety briefing, using the following process:

- List all task personnel and the tasks that will be performed by the work crew for the workday.
- Review the overall task planning outlined in the AHA for this activity.
- List the tools and equipment required for that day's tasks.
- Identify and check the potential health and safety hazards posed by that day's tasks on the PTSP.
- Identify and check the hazard control procedures that will be employed to control the identified health and safety hazards posed by that day's tasks on the PTSP.
- Provide appropriate site-specific training to ensure employees can perform their job in a safe manner.
- Keep the PTSP in the work area, revise it, and brief the work crew when additional tasks are to be performed or when unanticipated hazards are encountered that were not listed on that day's PTSP.
- Monitor work crew compliance with the hazard control measures listed in the PTSP.
- Each work crew's daily PTSP shall be signed by the crew members and the supervisor/foreman. The supervisor/foreman shall submit the PTSP to the HSM at the end of the workday for review

The SSC shall review each work crew's daily PTSP, confirm that the potential health and safety hazards and control measures are identified for the listed tasks in that day's PTSP, and maintain them as part of the onsite project files to document compliance with this process.

12.7 Hazardous Energy Control Program

*(*References: EM 385-1-1 Section 12.A.07, and CH2M HILL SOP HSE-310, *Lock Out / Tag Out)*

<u>Although not anticipated for currently scoped tasks, we are keeping this in for potential future tasks.</u>

Prior to working on any energized equipment or circuits, the designated "competent person" for lockout/tagout will complete the Electrical Work Permit. If a lockout/tagout procedure is not available for the work to be accomplished or the equipment to be worked on, the competent person will complete the lockout/tagout worksheet. The following is a brief description of the lockout/tagout program that will be enforced on the project. Specific procedures will be developed and enforced by the competent person for each individual work site and electrical permit issued.

- Do not work on equipment when the unexpected operation could result in injury, unless lockout/tagout procedures are implemented.
- Employees working under a lockout/tagout procedure must complete sufficient training to acquire the understanding, knowledge, and skills necessary for the safe performance of their assigned duties within the plan.
- When available from the facility or equipment owner, equipment-specific lockout/tagout procedures shall be followed. When equipment-specific lockout/tagout procedures are not available, or when the existing

procedures are determined to be insufficient (such as not addressing all energy sources), then the authorized employee shall be required to develop a procedure specific to the equipment being serviced.

- Standard lockout/tagout procedures include the following steps:
  - Notify all personnel in the affected area of the lockout/tagout.
  - Shut down the equipment using normal operating controls.
  - Isolate all energy sources.
  - Apply an individual lock and tag to each energy-isolating device.
  - Relieve or restrain all potentially hazardous stored or residual energy.
  - Verify that isolation and de-energization of the equipment has been accomplished.
  - Once verified that the equipment is at the zero energy state, work may begin.
- All safeguards must be put back in place, all affected personnel notified that lockout/ tagout has been removed, and controls positioned in the safe mode prior to lockout/ tagout removal.
- Do not remove another person's lock or tag.

12.8 Contingency Plan for Severe Weather

12.8.1 Inclement Weather

- Work may proceed in light rain—wear rain gear.
- Exposure to slips, trips, and falls is increased during rainy conditions.
- Take cover in a sheltered location during adverse weather conditions (high winds, heavy rain).
  - Work shall cease and cover shall be taken in the event of lightning or tornado warnings.
  - Identify "Take Shelter" areas before starting the project.
- Notify the Project Manager and Client Representative after shelter has been sought.

Adverse weather conditions requiring immediate suspension of field work activities are defined as the following:

- Thunder or lightning. Thunderstorm watches or warning, as the situation warrants, will be used as an alert to potential electrical activity. Typically, a 30-minute stand-down occurs to allow the storm cell to pass the area. If lightning or thunder is observed within the stand down period, the 30-minute time frame is extended until electrical activity ceases.
- Sustained wind gusts of 25 mph for boating activities.
- Sustained wind speeds of 25 mph or wind gusts of 35 mph for high profile work where wind chill is not a factor, that is, greater than 60°F.
- Sustained wind speeds of 40 mph or wind gusts of 45 mph for non-high profile work.
- Moderate rain and/or snow fall of 0.11 to 0.3 inch per hour during hoisting activities. Freezing rain is also cause for suspending hoist use.
- An equivalent wind chill factor of -24°F on the wind chill factor chart (see Section 13.2.9) will trigger systematic shut down of all non-emergency work activities.
- A tornado or hurricane warning for the general area or county will suffice in requiring a general work stoppage.
- If you are inadvertently caught outside in a thunder/lightning storm, take the following precautions:
  - Move away from all metal structures.

12.9 Prevention of Alcohol and Drug Abuse

(References: DFARS, Subpart 252.223-7004 and CH2M HILL SOP HSE-105, *Drug Free Workplace Program)*

12.9.1 Drug-Free Workplace

CH2M HILL does not tolerate illegal drugs, or any use of drugs, controlled substances, or alcohol that impairs an employee's work performance or behavior. CH2M HILL has established a policy that its employees and subcontractors shall not be involved in any manner with the unlawful manufacture, distribution, dispensation, possession, sale, or use of illegal drugs in the workplace. The use or possession of alcohol in the workplace is also prohibited. Any violation of these prohibitions may result in discipline or immediate discharge. Please reference CH2M HILL SOP HSE-105, *Drug-Free Workplace Standard of Practice*, for more information. The following sections describe mandatory program requirements.

12.9.2 Policy Statement

A policy statement is included in the corporate Drug-Free Workplace Program. This policy statement details prohibited conduct and ramifications, and:

- Prohibits drug, alcohol, and/or controlled substances use or abuse.
- Prohibits involvement in the manufacture, distribution, dispensation, possession, sale, or use of illegal drugs in the workplace.
- Describes disciplinary actions that may be taken.

12.9.3 Subcontractor Management

The subcontractor must comply with the provisions of this program. As a minimum the subcontractor must provide a written statement that their drug-free workplace program meets the minimum requirements outlined in CH2M HILL's program.

The prime contractor Project Manager and SSC can request to be provided copies of any subcontractors employees last negative screening results. These results cannot be over 12 months old.

It is the responsibility of subcontractors to transfer this plan to the lower-tiered subcontractors.

12.9.4 Prescription and Nonprescription Drugs

Employees using prescription or nonprescription drugs that could impair their functions on the project are required to notify the employer in advance of such drug use.

Failure to report prescription and nonprescription drugs as required above, illegally obtaining the substance, or use that is inconsistent with the prescription or label may be subject to disciplinary action.

The subcontractor is required to document that all of their employees have also been provided with a drug-free workplace and alcohol education program.

12.10Fire Prevention Plan

(References: EM 385-1-1 Section 09.A.01, and CH2M HILL SOP HSE-208, *Fire Prevention*)

- A fire extinguisher, rated not less than 2A, shall be provided for each 280 square meters of a combustible building area, or major fraction thereof. Travel distance from any point of the protection area to the nearest fire extinguisher shall not exceed a horizontal distance of 50 feet or 15 meters.
- When 10 liters or more of a flammable or combustible liquid is being used, an extinguisher must be within 15 meters.
- Extinguishers must:
  - Be maintained in a fully charged and operable condition.
  - Be visually inspected each month.
  - Undergo a maintenance check and certification each year.

- The area in front of fire extinguishers must be kept clear.
- Solvent waste and oily rags must be kept in a fire resistant, covered container until removed from the site.
- Flammable/combustible liquids must be kept in approved containers, and must be stored in an approved storage cabinet.

Fire extinguishers can represent an important segment of any overall fire protection program. However, their successful functioning depends upon the following conditions having been met:

- The extinguisher is properly located and in working order.
- The extinguisher is of proper type and for a fire which may occur.
- The fire is discovered while still small enough for the extinguisher to be effective.
- The fire is discovered by a person ready, willing, and able to use the extinguisher.
- Class C fires (see below for fire classifications) can be readily extinguished by quenching-cooling with water or a water-mixture agent. Class B fires are more effectively extinguished by an agent that blankets-smothers the fire through exclusion of oxygen surrounding the fire area. Those extinguishers containing bromochlorodifluoromethane, monobromotrifluoromethane, carbon dioxide, or dry chemical are generally best suited for extinguishing Class B fires. For Class C fires, the primary consideration in extinguishing this type of fire is the selection of nonconductive extinguishing agent to prevent dangerous electrical shock and possible death to user.
- Due to its corrosive nature, dry chemical is not recommended for use on computerized, electronic, or other equipment with extensive circuitry.
- The following chart defines/explains classes of fires:

A	Common Combustibles	Wood, paper, cloth etc.
B	Flammable liquids and gases	Gasoline, propane and solvents
C	Live electrical equipment	Computers, fax machines (see note!)
D	Combustible metals	Magnesium, lithium, titanium
K	Cooking media	Cooking oils and fats

Fires are classified into five groups:

- Class A: Class A fires involve common combustibles such as wood, paper, cloth, rubber, trash and plastics. They are common in typical commercial and home settings, but can occur anywhere these types of materials are found.
- Class B: Class B fires involve flammable liquids, gases, solvents, oil, gasoline, paint, lacquers, tars and other synthetic or oil-based products. Class B fires often spread rapidly and, unless properly secured, can reflash after the flames are extinguished.
- Class C: Class C fires involve energized electrical equipment, such as wiring, controls, motors, data processing panels or appliances. They can be caused by a spark, power surge or short circuit and typically occur in locations that are difficult to reach and see.
- Class D: Class D fires involve combustible metals such as magnesium and sodium. Combustible metal fires are unique industrial hazards which require special dry powder agents.

(NOTE: Although ABC and BC dry chemical extinguishers can control a fire involving electronic equipment, the National Fire Code specifically advises against dry-chemical extinguishers for fires involving computers or other delicate electronic equipment due to the potential damage from residues).

Fire fighting shall only be conducted by those trained and certified in this practice. The commonly accepted practice is the PASS method. This means, pull the pin, aim, squeeze the handle and sweep the base of the fire area. The SSC shall verify that at least two staff are on site that have the required training for use of Fire Extinguishers.

12.11 Site Sanitation Plan

Housekeeping: all work areas will be maintained free and clear of clutter, tools and debris that may pose a trip, slip, or fall hazard to staff. Each work area will be evaluated prior to work starting in that location. Further details about the site sanitation plan are available in the Accident Prevent Plan.

SECTION 13

Contractor Information/Hazard Controls

This section provides safe work practices and control measures used to reduce or eliminate potential hazards. These practices and controls are to be implemented by the party in control of either the site or the particular hazard. CH2M HILL employees and subcontractors must remain aware of the hazards affecting them regardless of who is responsible for controlling the hazards. CH2M HILL employees and subcontractors who do not understand any of these provisions should contact the SSC for clarification.

In addition to the controls specified in this section, Project-Activity Self-Assessment Checklists are contained in Attachment 5. These checklists are to be used to assess the adequacy of CH2M HILL and subcontractor site-specific safety requirements. The objective of the self-assessment process is to identify gaps in project safety performance, and prompt for corrective actions in addressing these gaps. Self-assessment checklists should be completed early in the project, when tasks or conditions change, or when otherwise specified by the HSM. The self-assessment checklists, including documented corrective actions, should be made part of the permanent project records, and be promptly submitted to the HSM.

13.1 Project-Specific Physical (Safety) Hazards

Chainsaws

(Reference CH2M HILL SOP HSE-210, *Hand and Power Tools*)

Below are the hazard controls and safe work practices to follow when working around or operating chainsaws. Ensure the requirements in the referenced SOP are followed.

Equipment

Only chainsaws equipped with a spark arrestor and fully functioning chain brake or “safety chain” shall be used. The following safety equipment shall be readily available while operating a chainsaw:

- Chainsaw operator’s manual;
- Fully stocked first aid kit;
- Multipurpose fire extinguisher;
- Grounded extension cord approved for outdoor use and ground fault circuit interrupter (GFCI) for electrical-powered chainsaws;
- Approved safety gasoline container and funnel or flexible nozzle for refueling gasoline-powered chainsaws; and
- Sledge hammer and non-metallic wedges when necessary to prevent pinching of the chain.

PPE Requirements

The following personal protective equipment shall be worn while operating chainsaws:

- Safety glasses with side shields and face shield to prevent injury from wood chips, sawdust, or other flying objects;
- Hard hat with properly fitted suspension to prevent head injury from falling debris;
- Steel-toed safety shoes or boots to prevent foot injury from falling objects and accidental contact with the moving chain;
- Hearing protection to prevent permanent damage to hearing. Ear muffs or plugs will have a decibel noise reduction rating (NRR) assigned to them. The higher the rating, the greater the protection offered;

- Non-leather, fabric work gloves to prevent hand injury from abrasions, splinters and cuts;
- Clothing that is well-fitted and free of loose edges that could become entangled in the saw; and
- Protective chaps or leggings that cover the area from the groin to about 2 inches (5.08 cm) above the ankles should be used. These chaps are made from synthetic fabrics that are designed to prevent the running saw chain from coming in contact with your legs.

Safe Operation

The following safe operation guidelines shall be followed regardless of the purpose for using a chainsaw:

- Inspect the chainsaw prior to use;
- Chainsaws shall be held firmly with both hands, with thumbs and fingers encircling both chain saw handles;
- Stand slightly to the left side of the saw, out of the plane of the cutting chain and guide bar to reduce the risk of injury in the event of a kickback;
- Position saw so that it is between the waist and mid-chest level. Overreaching or cutting above the mid-chest height shall be avoided;
- Maintain a full throttle setting while cutting. Chainsaws are designed to be run at full speed;
- Always be aware of what is in the saw's downward path after the cut;
- Do not attempt to cut material that is larger than the guide bar of the saw;
- Avoid cuts that will cause the chainsaw to jam. Always cut into the compression wood first until the cut starts to close; then cut from the other side toward the compression cut;
- Use a non-metallic wedge to prevent the compression cut jamming on the blade;
- Chainsaws are designed to feed themselves into the wood and require only light pressure to cut efficiently. If extra force is required to keep cutting, the chain requires sharpening. Additional signs of a dull chain include a saw that is cutting crooked, results in fine sawdust instead of chips, or the smell of burnt wood. Do not use a dull chain;
- Bystanders and helpers shall be kept at a safe distance from operation;
- Do not operate a chainsaw when fatigued; take frequent breaks;
- Work slowly; don't rush; and
- A fire extinguisher shall be present at all times when operating the chainsaw in forest or brushy areas.

Refueling the Engine

The fuel for gasoline-powered chainsaws shall be mixed in accordance with the manufacturer's recommendations as outlined in the chainsaw operator's manual. Fuel shall be stored and transported in an approved safety container. The following precautions should also be followed:

- The engine shall be shut off and allowed to cool before refueling; never refuel a hot engine;
- A fire extinguisher shall be present during fueling and refueling;
- Smoking around fueling or refueling operations shall be prohibited; and
- A funnel or a flexible nozzle shall be used to avoid spilling fuel on the engine.

13.1.1 Compressed Gas Cylinders

(Reference CH2M HILL SOP HSE-403, *Hazardous Materials Handling*)

Below are the hazard controls and safe work practices to follow when working around or using compressed gas cylinders. Ensure the requirements in the referenced SOP are followed.

- Cylinders and pressure-controlling apparatus will be inspected for defects and leakage prior to use. Damaged or defective items will not be used. If a cylinder is found to be defective, the gas distributor will be notified and subsequent instructions followed. If a leak should develop at a fuse plug or other safety device, the cylinder will be removed from the work area.
- Cylinders will be labeled with the identity of the contents. Cylinders not labeled will be sent back to the cylinder distributor. The color of the cylinder will not be used exclusively to identify cylinder contents.
- Valve caps must be in place when cylinders are transported, moved, or stored.
- Cylinders must be secured in an upright position at all times.
- Cylinder valves must be closed when cylinders are not being used and when cylinders are being moved.
- Cylinders must be secured on a cradle, basket, or pallet when hoisted; they may not be hoisted by choker slings.
- Eye protection (safety glasses or goggles) will be worn when using cylinders.
- Cylinders must be shielded from welding and cutting operations and positioned to avoid being struck or knocked over; contacting electrical circuits; or exposed to extreme heat sources.
- Cylinders inside buildings will be stored in dry, well-ventilated locations at least 20 feet (6.1 meters) from highly combustible materials. Cylinders should be stored in definitely assigned places away from elevators, stairs, or gangways. Assigned storage areas will be located where cylinders will not be knocked over or damaged.
- Oxygen cylinders in storage will be separated from fuel gas cylinders or combustible materials by a minimum of 20 feet (6.1 meters) or by a noncombustible barrier at least 5 feet (1.5 meters) high, having a fire resistance rating of at least 0.5 hour.
- Signs indicating no smoking will be provided for storage areas containing flammable gas cylinders.
- Complete the self-assessment checklist for compressed gas cylinders are being used.

13.1.2 Arsenic

(Reference CH2M HILL SOP HSE-501, *Arsenic*)

- Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met.
- Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas.
- Avoid skin and eye contact with liquid and particulate arsenic or arsenic trichloride.
- Arsenic is considered a “Confirmed Human Carcinogen.”
- Arsenic particulates (inorganic metal dust) are odorless. Vapor and gaseous odor varies depending upon specific organic arsenic compound.
- Respiratory protection and other exposure controls selection will be based on the most recent exposure monitoring results obtained from the competent person.
- **Refer to Arsenic Fact Sheet found in Attachment 13.**

13.1.3 Drilling Safety

(Reference CH2M HILL SOP HSE-204, *Drilling*)

Below are the hazard controls and safe work practices to follow when working around or performing drilling. Ensure the requirements in the referenced SOP are followed.

- The drill rig is not to be operated in inclement weather.
- The driller is to verify that the rig is properly leveled and stabilized before raising the mast.
- Personnel should be cleared from the sides and rear of the rig before the mast is raised.
- The driller is not to drive the rig with the mast in the raised position.
- The driller must check for overhead power lines before raising the mast. Maintain a minimum distance of 10 feet (3 meters) between mast and overhead lines (<50 kV) and an additional 0.4 inches for every 1 kV over 50kV. Verify the voltage of nearby overhead power lines to determine the minimum distance.
- If the project site is suspected of munitions or explosives of concern (MEC) contamination, requirements of the *Explosives Usage and Munitions Response (MR)* SOP HSE-610 shall be followed. MECs include unexploded ordnance (UXO), discarded military munitions, materials that present a potential explosive hazard, chemical warfare materials, munitions constituents, and contaminated soil or groundwater. "Down-hole" avoidance support may be required to prevent accidental contact with UXO. Safety requirements will be based on the risk assessment identified within the MR (safety) Opportunity Risk Evaluation.
- Personnel should stand clear before rig startup.
- The driller is to verify that the rig is in neutral when the operator is not at the controls.
- Become familiar with the hazards associated with the drilling method used (cable tool, air rotary, hollow-stem auger, etc.).
- Do not wear loose-fitting clothing, watches, etc., that could get caught in moving parts.
- Do not smoke or permit other spark-producing equipment around the drill rig.
- The drill rig must be equipped with a kill wire or switch, and personnel are to be informed of its location.
- Be aware and stand clear of heavy objects that are hoisted overhead.
- The driller is to verify that the rig is properly maintained in accordance with the drilling company's maintenance program.
- The driller is to verify that all machine guards are in place while the rig is in operation.
- The driller is responsible for housekeeping (maintaining a clean work area).
- The drill rig should be equipped with at least one fire extinguisher.
- If the drill rig comes into contact with electrical wires and becomes electrically energized, do not touch any part of the rig or any person in contact with the rig, and stay as far away as possible. Notify emergency personnel immediately.
- Use the drilling self-assessment checklist attached to this HSP to evaluate drilling operations.

13.1.4 Drum and Portable Tank Handling

Below are the hazard controls and safe work practices to follow when overseeing the movement of drums or when handling drums:

- Ensure that personnel are trained in proper lifting and moving techniques to prevent back injuries;
- Ensure drum or tank bungs and lids are secured and are labeled prior to moving;

- Ensure that drums and tanks remain covered except when removing or adding material or waste. Covers and/or lids will be properly secured at the end of each workday;
- Provide equipment to keep the operator removed from the drums to lessen the likelihood of injury. Such equipment might include: a drum grappler attached to a hydraulic excavator; a small front-end loader, which can be either loaded manually or equipped with a bucket sling; a rough terrain forklift; Roller conveyor equipped with solid rollers; drum carts designed specifically for drum handling;
- Make sure the vehicle selected has sufficient rated load capacity to handle the anticipated loads, and make sure the vehicle can operate smoothly on the available road surface;
- Ensure there are appropriately designed Plexiglas cab shields on loaders, backhoes, etc., when handling drums containing potentially explosive materials;
- Equipment cabs should be supplied with fire extinguishers, and should be air-conditioned to increase operator efficiency;
- Supply operators with appropriate respiratory protective equipment when needed;
- Ensure that drums are secure and are not in the operator's view of the roadway;
- Prior to handling, all personnel should be warned about hazards of handling;
- Before moving anything, determine the most appropriate sequence in which the various drums, portable tanks, and other containers should be moved (e.g., small containers may have to be removed first to permit heavy equipment to enter and move the drums;
- Overpack drums and an adequate volume of absorbent should be kept near areas where minor spills may occur;
- Use containers or overpacks that are compatible with the waste or materials;
- Drums containing liquids or hazardous waste will be provided with secondary containment and may not be located near a storm water inlet or conveyance;
- Allow enough aisle space between drum pallets and between drums and other equipment that the drums can be easily accessed (at least 2 to 3 feet) by fire control equipment and similar equipment.; and
- Make sure that a spill kit is available in drum or tank storage areas (or where liquids are transferred from one vessel to another).

13.1.5 Drum Sampling Safety

Personnel are permitted to handle and/or sample drums containing certain types of waste (drilling waste, IDW, waste from known sources) only. Handling or sampling drums with unknown contents requires a plan revision or amendment approved by the Responsible Health and Safety Manager (RHSM). The following control measures will be taken when sampling drums:

- Minimize transportation of drums;
- Sample only labeled drums or drums from a known waste stream;
- Do not sample bulging or swollen drums. Contact the RHSM;
- If drums contain, or potentially contain, flammable materials, use non-sparking tools to open;
- Use the proper tools to open and seal drums;
- Reseal bung holes or plugs whenever possible;
- Avoid mixing incompatible drum contents;
- Sample drums without leaning over the drum opening;

- Transfer/sample the content of drums using a method that minimizes contact with material;
- Use the PPE and perform air monitoring as specified in the PPE and Site Monitoring sections of this SSHSP;
- Take precautions to prevent contaminated media from contacting the floor or ground, such as having plastic under the sampling area, having a spill kit accessible during sampling activities; and
- If transferring/sampling drums containing flammable or combustible liquids, drums and liquid transfer equipment should be grounded and bonded to reduce the potential of a static discharge.

13.1.6 Field Vehicles

- Ensure a rental car meets the following requirements.
  - Dual air bags.
  - Antilock brakes.
  - Midsize or larger.
- Familiarize yourself with rental vehicle features.
  - Mirror adjustments.
  - Seat adjustments.
  - Cruise control features, if offered.
  - Preprogram radio stations.
- Always wear the seatbelt while operating the vehicle.
- Adjust the headrest to proper position.
- Tie down loose items if utilizing a van.
- Pull off the road, put the car in park, and turn on flashers before talking on a mobile phone.
- Maintain both a FA kit and fire extinguisher in the field vehicle at all times.
- Close car doors slowly and carefully. Fingers can get pinched in doors or the trunk.
- Take shelter in the field vehicle in the event of heavy rain.
  - Listen to car radio for predictions of tornado or lightning.
- Park vehicle in a location where it can be accessed easily in the event of an emergency.

13.1.7 Cell Phones

Cell phones, earpieces, and/or headphones will not be used while operating company vehicles, rental vehicles, or personal vehicles for company business, including traveling to/from the project site.

Cell phones can be used in designated safe zones, away from operating equipment. Cell phones will also be used for emergency support operations.

Key personnel cell numbers are listed in Attachment 4 under Emergency contacts.

13.1.8 Hand and Power Tools

(Reference CH2M HILL SOP HSE-210, *Hand and Power Tools*)

- The employee is responsible for complying with all applicable HS&E training requirements relating to hand and power tool safety and for providing any additional training necessary to complete their tasks safely.
- Operate all tools according to the manufacturer's instructions and within design limitations.
- All hand and power tools shall be maintained in a safe condition.
- Tools are to be inspected and tested before use—if a tool is found to be defective it is to be tagged "Do Not Use" and removed from service until repaired.
- Personal protective equipment, such as gloves, safety glasses, earplugs, and face shields, are to be used when exposed to a hazard from the tool (see Section 11, Personal Protective Equipment).

- Power tools are not to be carried or lowered by the cord or hose.
- Disconnect tools from energy sources when not in use, before servicing and cleaning, and when changing accessories such as blades, bits, and cutters.
- Safety guards on tools are to remain installed while the tool is in use and promptly replaced after repair or maintenance has been performed.
- Tools are to be stored properly, where they will not be damaged or come in contact with hazardous materials.
- If a cordless tool is connected to its recharge unit, both pieces of equipment must conform strictly with electrical standards and manufacturer's specifications.
- Tools used in an explosive environment must be rated (that is, intrinsically safe, spark proof, etc.) for work in that environment.
- When using a knife or blade tool, stroke or cut away from the body with a smooth motion taking care not use excessive force that could damage tool, material being cut, or unprotected hands.
- As alternatives to manual and pistol-grip hand tools that involve work with highly repetitive movement, extended elevation, constrained postures, or positioning of body members (for example, hand, wrist, arm, shoulder, neck, etc.):
  - Consider alternative tool design
  - Improve posture
  - Select appropriate materials
  - Organize work—sequencing to prevent muscular skeletal, repetitive motion, and cumulative trauma stressors
- Only employees who have been trained in the operation of the particular tool in use shall be allowed to operate a powder-actuated tool—training and certification must be provided to the SSC before using the tool.
- GFCI protection shall be used on all electrical tools within the vicinity of water.
- Oxygen cylinders in storage shall be separated from fuel gas cylinders or combustible materials by a minimum of 20 feet (6.1 meters) or by a noncombustible barrier at least 5 feet (1.5 meters) high, having a fire resistance rating of at least 0.5 hour.
- Signs indicating no smoking shall be provided for storage areas containing flammable gas cylinders.
- Complete the self-assessment checklist for compressed gas cylinders are being used.
- Take precautions to prevent contaminated media from contacting the floor or ground, such as having plastic under the sampling area, having a spill kit accessible during sampling activities; and
- If transferring/sampling drums containing flammable or combustible liquids, drums and liquid transfer equipment should be grounded and bonded to reduce the potential of a static discharge.

13.1.9 Excavation Activities

Excavation activities shall be executed on this site in order to complete the proposed project objectives. Excavation activities shall include test pitting. At this time, site excavations, needed to complete this investigation are anticipated to extend from 0-16 ft below ground surface, or to the water table, whichever is encountered first. As such, the requirements of 29 CFR 1926 Subpart P "Excavations" and EM 385 1-1, Section 25, "Excavations" will be applicable. The following must be evaluated and executed as part of the proposed excavation activities associated with this task order.

Prior to excavation activities, underground utilities will be located in accordance with Section 13.1.18. The contractor or designated subcontractor will contact the Client designated POC having jurisdiction at the facility (such as base public works) prior to initiation of and excavation work.

Contractors and subcontractors are responsible for providing an excavation competent person. OSHA regulations describe a competent person as one who is capable of identifying existing and predictable hazards in the work surroundings and has the authorization to take prompt corrective measures to eliminate them.

Excavation Activities

(Reference CH2M HILL SOP HSE-307, *Excavation and Trenching Safety*)

The requirements in this section shall be followed whenever excavation is being performed. Refer to the Earthmoving Equipment section and SOP for additional requirements applicable to operating/oversight of earthmoving equipment. Below are the hazard controls and safe work practices to follow when working around or performing excavation. Ensure the requirements in the referenced SOP are followed.

If the project site is suspected of MEC contamination, requirements of the *Explosives Usage and MR* SOP HSE-610 shall be followed. MECs include UXO, discarded military munitions, materials that present a potential explosive hazard, chemical warfare materials, munitions constituents, and contaminated soil or groundwater. "Down-hole" avoidance support may be required to prevent accidental contact with UXO. Safety requirements will be based on the risk assessment identified within the MR (safety) Opportunity Risk Evaluation.

Do not enter the excavations unless completely necessary, and only after the excavation competent person has completed their daily inspection and has authorized entry. An inspection shall be conducted by the competent person prior to the start of work, as needed throughout the shift, after every rainstorm, and after any hazard increasing occurrence. Documentation of the inspection must be maintained onsite at all times.

Follow all excavation entry requirements established by the excavation competent person and any excavation permit being used.

Sloping, benching, shoring, shielding, or other protective systems are required to protect personnel from cave-ins except when the excavation is made entirely in stable rock or is less than 5 feet deep (1.5 meters) and there is no indication of possible cave-in, as determined by the excavation competent person. Protective systems for excavations deeper than 20 feet (6.1 meters) must be designed or approved by a registered professional engineer.

Trenches greater than 4 feet (1.2 meters) deep shall be provided with a ladder, stairway, or ramp positioned so that the maximum lateral travel distance is no more than 25 feet (7.6 meters).

The atmosphere of excavations greater than 4 feet (1.2 meters) deep shall be tested prior to entry when a hazardous atmosphere exists or could reasonably be expected to exist, such as excavating landfills, hazardous waste dumps; or areas containing sewer or gas utility systems, petroleum distillates, or areas where hazardous substances are stored nearby.

Spoil piles, material, and equipment must be kept at least 2 feet (61 centimeters) from the edge of the excavation, or a retaining device must be used to prevent the material from falling into the excavation.

Excavations shall not be entered when:

- Protective systems are damaged or unstable;
- Objects or structures above the work location may become unstable and fall into the excavation;
- The potential for a hazardous atmosphere exists, unless the air has been tested and found to be at safe levels; or
- Accumulated water exists in the excavation, unless precautions have been taken to prevent excavation cave-in.

The excavation self-assessment checklist shall be used to evaluate excavations prior to entry.

13.1.10 Forklift Operations

(Reference CH2M HILL, SOP HSE-309, *Forklifts*)

Below are the hazard controls and safe work practices to follow when working around or operating forklifts. Ensure the requirements in the referenced SOP are followed.

- A rated lifting capacity must be posted in a location readily visible to the operator.
- A forklift truck must not be used to elevate employees unless a platform with guardrails, a back guard, and a kill switch is provided on the vehicle. When guardrails are not possible, fall arrest protection is required.
- The subcontractor operating the forklift must post and enforce a set of operating rules for forklift trucks.
- Only certified forklift operators shall operate forklifts.
- Stunt driving and horseplay are prohibited.
- Employees must not ride on the forks.
- Employees must never be permitted under the forks (unless forks are blocked).
- The driver must inspect the forklift once a shift and document this inspection.
- The operator must look in the direction of travel and must not move the vehicle until all persons are clear of the vehicle.
- Forks must be carried as low as possible.
- The operator must lower the forks, shut off the engine, and set the brakes (or block the wheels) before leaving the forklift operator's position unless maintenance or safety inspections require the forklift to be running.
- Trucks must be blocked and have brakes set when forklifts are driven onto their beds.
- Extreme care must be taken when tilting elevated loads.
- Every forklift must have operable brakes capable of safely stopping it when fully loaded.
- Forklifts must have parking brakes and an operable horn.
- When the operator is exposed to possible falling objects, industrial trucks must be equipped with overhead protection (canopy).
- If using certified CH2M HILL forklift operators—forklifts must be inspected and documented daily using the forklift inspection form.

13.1.11 Groundwater Sampling/Water Level Measurements

Below are the hazard controls and safe work practices to follow when personnel or subcontractors are performing groundwater sampling and/or water level measurements.

- Full coolers are heavy. Plan in advance to have two people available at the end of the sampling effort to load full coolers into vehicles. If two people won't be available use several smaller coolers instead of fewer large ones.
- Wear the appropriate PPE when sampling, including safety glasses, nitrile gloves, and steel toe boots (see PPE section of this SSHP).
- Monitor headspace of wells prior to sampling to minimize any vapor inhalation (refer to the "Site Monitoring" section of this SSHP).
- Use caution when opening well lids. Wells may contain poisonous spiders and hornet or wasp nests.

- Use the appropriate lifting procedures (see CH2M HILL SOP HSE-112) when unloading equipment and sampling at each well.
- Avoid sharp edges on well casings.
- If dermal contact occurs with groundwater or the acid used in sample preservation, immediately wash all affected skin thoroughly with soap and water.
- Avoid eating and drinking on site and during sampling.
- Use ear plugs during sampling if sampling involves a generator.
- Containerize all purge water and transport to the appropriate storage area.
- Use two people to transport full coolers/containers whenever possible. If two people are not available use a dolly to move coolers. If the coolers weigh more than 40 pounds Attachment 1 of the HSE-112, *Manual Lifting,* shall be completed by the SSC. If the coolers weigh more than 50 pounds they should never be lifted by one person.

13.1.12 Haul Trucks

Below are the hazard controls and safe work practices to follow when working around or operating haul trucks:

- Haul truck operators should be familiar with their equipment and inspect all equipment before use;
- Haul truck operators should ensure all persons are clear before operating truck or equipment. Before moving operators should sound horn or alarm, all equipment should be equipped with a working back up alarm;
- Haulage trucks or equipment with restricted visibility should be equipped with devices that eliminate blind spots;
- Employees should stay off haul roads. When approaching a haul area, employees should make eye contact and communicate their intentions directly with the equipment operator;
- If possible minimize steep grades on haul roads;
- Where grades are steep provide signage indicating the actual grade as well as measures for a runaway truck;
- Trucks are to be operated within the manufacturer's recommendations (for example- retarder charts indicate the combination of loads, grades and speeds that should not be exceeded if the truck's retarder is to work properly – to ensure the truck does not descend grade at speeds greater than listed);
- Haul roads should be well lit, sufficiently wide (at least 50% of the width of the equipment on both sides of road) and equipped with reflectors to indicate access points;
- Haul roads should have adequate right-of-way signs indicating haul directions;
- Haul trucks will follow designated haul roads; and
- Haul trucks will comply with posted speed limits.

13.1.13 Heavy Equipment

(Reference SOP # HSE&Q 306, Earth Moving Equipment)

It is anticipated that heavy equipment may be used for the site maintenance activities. When heavy equipment is used on the project, the following work procedures shall be exercised by CH2M HILL personnel and subcontractors who may be designated to operate or supervise the operation of site heavy equipment.

- CH2M HILL authorizes only those employees qualified by training or previous experience to operate heavy equipment.
- The subcontractor will be required to provide documentation to CH2M Hill showing that the employee is qualified to operate heavy equipment.

- Equipment must be checked at the beginning of each shift to ensure the equipment is in safe operating condition and free of apparent damage. The check should include service brakes, parking brakes, emergency brakes, tires, horn, back-up alarm, steering mechanism, coupling devices, seat belts, and operating controls. All defects will be corrected before the equipment is placed in service.
  - Documentation of this inspection must be maintained onsite at all times.
  - Refer to the Earthmoving Equipment Inspection Form found in **Attachment 5** of this document.
- Equipment must be on a stable foundation such as solid ground or cribbing; outriggers are to be fully extended.
- Seat belts shall be used by all personnel operating equipment.
- Equipment must not be used to lift personnel; loads must not be lifted over the heads of personnel.
- Equipment, or parts thereof, which are suspended must be substantially blocked or cribbed to prevent shifting before personnel are permitted to work under or between them. All controls will be in a neutral position, with the motors stopped and brakes set.
- Equipment that is operating in reverse must have a reverse signal alarm distinguishable from the surrounding noise or a signal person when the operator's view is obstructed.
- When equipment is used near energized power lines, the closest part of the equipment must be at least 10 ft from power lines < 50 kV. Provide an additional 4 ft for every 10 kV over 50 kV. A person must be designated to observe clearances and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means. All overhead power lines must be considered energized until the electrical utility authorities indicate that it is not an energized line and it has been visibly grounded.
- Underground utility lines must be located before excavation begins. See Section 13.1.18 for additional information.
- Operators loading/unloading from vehicles are responsible for seeing that vehicle drivers are in the vehicle cab or in a safe area.
- The parking brake will be set whenever equipment is parked; wheels must be chocked when parked on inclines.
- When heavy equipment is not in operation, the blade/bucket must be blocked or grounded; the master clutch must be disengaged when the operator leaves the cab. When equipment is unattended, power must be shut off, brakes set, blades/buckets landed, and shift lever in neutral.

13.1.14 Working Around Material Handling Equipment

Where material handling equipment (earthmoving equipment, haul trucks, and electromagnet) may be operating on or adjacent to the project work sites, it is important to observe the following measures when working in the same areas as material handling equipment.

- Never approach operating equipment/vehicles from the rear. Always make positive contact with the operator, and confirm that the operator has stopped the motion of the equipment.
- Never approach the side of operating equipment; remain outside of the swing and turning radius.
- Maintain distance from pinch points of operating equipment/vehicles.
- Never turn your back on any operating equipment/vehicles.
- Never climb onto operating equipment or operate subcontractor/client equipment/vehicles.
- Never ride CH2M HILL, subcontractor, or client equipment/vehicles unless authorized to do so and unless it is designed to accommodate passengers (equipped with firmly attached passenger seat).

- Never work or walk under a suspended load.
- Never use equipment as a personnel lifts; do not ride excavator buckets, crane hook, or material handling equipment forks.
- Always stay alert and maintain a safe distance from operating equipment, especially equipment/vehicles on cross slopes and unstable terrain.
- CH2M HILL personnel will pull to the side of the road when encountering a forklift/ heavy equipment, even if the equipment is not loaded with cargo, and stop until the equipment has passed.

13.1.15 Land Clearing Operations - General

Land clearance via mechanical means will be conducted across forested land at the 2nd and 5th Street Disposal Areas. The land clearance shall consist of selected removal of vegetation and trees to within 6-inches of the ground surface. Land clearance will be minimized to only what is necessary to conduct the geophysical survey, collect soil samples, and install groundwater monitoring wells; other trees should be left in place as they serve as a sound and visual barrier for the facility. All trees over 6 inches in diameter and all stumps that are removed shall be disposed of offsite. All branches, trees less than 6 inches in diameter, and bushes that are removed shall be mulched and left in place. AHAs shall be implemented for all site land clearing and grubbing operations. The minimum PPE to be used by ground personnel performing Site clearing operations shall be as follows:

- Appropriate work clothes (long pants, shirts, sturdy hard toe work boots with sufficient ankle support)
- ANSI Z87 approved eyewear with a face shield (ground personnel not protected by closed equipment cabs or using chainsaws/brushcutters)
- A hardhat with the visor facing forward
- Leather work gloves
- Long-sleeved shirt
- Ear muffs (or equivalent hearing protection)
- Chainsaw chaps, properly sized for the employee

Note: For ground personnel engaged in land clearing operations, the substitution of high visibility clothing (reflective/high visibility vests) may be considered where there is potential for worker entanglement in heavy brush growth or working in proximity to rotating heavy equipment.

The following sections identify general work practices that shall be implemented on-site in connection with the execution of land clearing and grubbing operations.

13.1.16 Land Clearing Via Hydraulic Equipment

Where hydraulic mowers/brush cutting equipment is used, to facilitated limited site clearing objectives, the following shall be applicable.

- Only qualified personnel, by training or previous experience, shall operate hydraulic land clearing heavy equipment.
- Only essential person shall be involved these operations. Sufficient distance must be maintained by ground support personnel or personnel observing the operations.
- Ensure that equipment kill switches are properly operating and accessible by equipment operators.
- Operators should not operate equipment on steep, slippery, or uneven slopes that could cause the equipment to flip over or otherwise become unstable to the point were operators or ground personnel could become exposed to the engaged equipment.
- Ensure all mechanic guards or protective devices over mower discharge chutes are in place.

- Operators shall review or be knowledgeable of equipment manufacturer manuals to ensure that the mower is operated in accordance with manufacturer's parameters.

13.1.17 Brush/Sapling Clearing – Chainsaws/Brush cutters

The following safe work operations apply to personnel using chainsaws or hand held brush cutters (where applicable) during clearing operations.

- Only authorized personnel are allowed to operate chainsaws.
- In addition to the PPE listed above, personnel using chainsaws or brush cutters shall also wear chainsaw chaps, appropriately sized for each applicable worker.
- Do not ever start a chainsaw until all coworkers are clear from the operating envelope and potential "kickback" zone of the chainsaw.
- Do not allow personnel to use chainsaws/brush cutters who do not have appropriate experience or training for the assigned tasks.
- Verify that the owner's manual is available to personnel using the equipment.
- Chainsaw operators who perform daily or more frequent inspections and maintenance of equipment have inspected equipment. Inspections and maintenance are based on chainsaw use as follows:
  - no leaks
  - chainsaw chain sharp and maintained
  - chainsaw oiling mechanism operating properly and not clogged with debris
  - inspection of chain integrity/tension
  - chain brake mechanism
  - throttle control operation
  - hand guard and chain catcher
  - carburetor idle
  - chain slack adjustment mechanism
  - stop control
- Do not distract or disturb someone who is operating a chainsaw or brush cutter. Non essential ground personnel or other team members engaged in land clearing operations who must interface with personnel actively engaged in chainsaw use must first establish eye contact with the operator and signal (via hand) that they would like to approach the drop zone. Both the chainsaw operator and ground personnel must assess that it is safe to enter the drop zone.
- Prohibit smoking while fueling or operating the saw. Refuel the saw only after it has cooled, and require funnel use. Make sure the fuel cap is secured and any fuel spillage is cleaned up. Move sufficient distance away from refueling area before restarting saw. Keep a fire extinguisher nearby. Transport and store fuel only in approved containers.
- Implement proper work break regimens, heat stress monitoring, and fluid intake for personnel operating chainsaws. If they become tired or overheated, ensure they are examined for heat stress— refer to information regarding heat stress monitoring and treatment.
- Ensure personnel operating chainsaws properly maintain and stow chainsaws after work is completed.
- Ensure that when chainsaws must be un-jammed, cleaned, or maintained, that the saw is shut off.
- Working from heights (ladder, aerial lift, back of trucks) requires additional planning and must be approved by the PROGRAM Certified Industrial Hygienist (CIH) or CIH.
- Review Biological Hazard information contained in this APP. Use appropriate insect repellents, as applicable.

13.1.18 Land Clearing - Tree Felling via Chainsaws

The following work practices apply to personnel performing tree felling operations.

- Evaluate the tree(s) & the surrounding area for anything that may cause property damage or worker injury when the tree falls.
- Evaluate the shape of tree(s), lean of the tree and decayed or weak spots.
- Evaluate wind force and direction. Evaluate the location of people and other perceived hazards.
- Evaluate potential electrical hazards. (Note: no electrical hazards exist in area where tree felling operations are to occur.)
- Work area shall be routinely cleared to permit safe working conditions. An escape route shall be evaluated by each worker performing tree felling operation.
- Each worker shall be involved in tree felling operations shall be advised on their roles. All workers not directly involved in the operation shall be kept clear of the work area. Create sufficient buffer zone between non-essential ground support personnel and tree felling crew.
- Perform proper maintenance and inspection of all equipment to be utilized in the operation.
- All equipment to be operated and maintained by experienced and qualified operators/personnel.
- De-limb trees from base to top prior to “topping” trees.
- Use directional notching for tree felling (top cut ~60° angle to 20-25% tree diameter and bottom horizontal cut to meet termination point of top cut) before through-cutting of trunks/limbs.
- Tree “topping” operations are to be performed qualified and experienced personnel only.

13.1.19 Site Clearing -Chippers

The following work practices apply to personnel operating wood chippers.

- Mechanical chippers must be maintained in accordance with the manufacturer's specifications.
- The motor ignition shall be locked out and the key removed from the ignition before any maintenance or service is performed, or when the chipper is left unattended.
- The chipper drum shall be blocked, and only authorized persons allowed to perform any service or maintenance.
- On the drum or blades, retightening of chipper blade bolts shall be done according to manufacturer's specifications.
- The chipper shall be equipped with a workable "kill" switch of approved design located at the in feed location.
- The chipper shall have a curtain in place at all times (workable in all weather conditions, in order to prevent fly-back of material.
- Before the wood chipper is started, the apron and feed platform should be checked and cleared of any foreign objects.
- The front of the feed apron table shall be a minimum of 1500 mm (60 inches) from the chipper blades.
- Hands or feet shall not be placed beyond the curtain guard while the blade is in operation.
- A “push stick” shall be used to force shorter or thorny brush into the chipper.
- Care shall be exercised when chipping dead or frozen wood in order to avoid kickback.
- Maximum diameter of material to be fed into the chipper shall be 150 mm (6 inches), unless manufacturer's specifications allow larger material size.

- Material from 75 mm to 150 mm (3 to 6 inches) diameter shall not exceed 2.5 meters (8 feet) in length, unless manufacturer's specifications allow longer material length.
- The person feeding the chipper shall stand to the side of the apron at the rear of material being fed into the machine.
- No person shall be allowed to stand or sit on any part of the discharge chute while the brush chipper is in operation.
- No person shall stand or sit on any part of the brush chipper while it is in operation or while it is being transported from one job site to another.
- The chipper apron is to be secured in the "up" position when being transported from one job site to another.

13.1.20 Utilities (Overhead)

Proximity to Power Lines

No work is to be conducted within 50 feet (15.2 meters) of overhead power lines without first contacting the utility company to determine the voltage of the system. No aspect of any piece of equipment is to be operated within 50 feet (15.2 meters) of overhead power lines without first making this determination.

Operations adjacent to overhead power lines are PROHIBITED unless one of the following conditions is satisfied:

Power has been shut off, positive means (such as lockout) have been taken to prevent the lines from being energized, lines have been tested to confirm the outage, and the utility company has provided a signed certification of the outage.

The minimum clearance from energized overhead lines is as shown in the table below, or the equipment will be repositioned and blocked to ensure that no part, including cables, can come within the minimum clearances shown in the following table.

Minimum Distances from Powerlines

Powerlines Nominal System kV	Minimum Required Distance, feet (meters)
0-50	10 (3.0)
51-100	12 (3.7)
101-200	15 (4.6)
201-300	20 (6.1)
301-500	25 (7.6)
501-750	35 (10.7)
751-1000	45 (13.7)

Note:
These distances have been determined to eliminate the potential for arcing based on the line voltage.

The power line(s) has been isolated through the use of insulating blankets which have been properly placed by the utility. If insulating blankets are used, the utility will determine the minimum safe operating distance; get this determination in writing with the utility representative's signature.

All inquiries regarding electric utilities must be made in writing and a written confirmation of the outage/isolation must be received by the PM prior to the start of work.

13.1.21 Utilities (underground)

An assessment for underground utilities must be conducted where there is a potential to contact underground utilities or similar subsurface obstructions during intrusive activities. Intrusive activities include excavation, trenching, drilling, hand augering, soil sampling, or similar activities.

The assessment must be conducted before any intrusive subsurface activity and must include at least the following elements:

1. A background and records assessment of known utilities or other subsurface obstructions.
2. Contacting and using the designated local utility locating service.
3. Conducting an independent field survey to identify, locate, and mark potential underground utilities or subsurface obstructions. *Note: This is independent of, and in addition to, any utility survey conducted by the designated local utility locating service above.*
4. A visual survey of the area to validate the chosen location.

When any of these steps identifies an underground utility within 5 feet (1.5 meters) of intrusive work, then non-aggressive means must be used to physically locate the utility before a drill rig, backhoe, excavator or other aggressive method is used.

Aggressive methods are never allowed within 2 feet of an identified high risk utility (see paragraph below).

Any deviation from these requirements must be approved by the RHSM and the PM.

Background and Records Assessment of Known Utilities

Identify any client- or location-specific permit and/or procedural requirements (e.g., dig permit or intrusive work permit) for subsurface activities. For military installations, contact the Base Civil Engineer and obtain the appropriate form to begin the clearance process.

Obtain available utility diagrams and/or as-built drawings for the facility.

Review locations of possible subsurface utilities including sanitary and storm sewers, electrical lines, water supply lines, natural gas lines, fuel tanks and lines, communication lines, lighting protection systems, etc. Note: Use caution in relying on as-built drawings as they are rarely 100 percent accurate.

Request that a facility contact with knowledge of utility locations review and approve proposed locations of intrusive work.

Designated Local Utility Locating Service

Contact your designated local utility locating service (e.g., Dig-Safe, Blue Stake, One Call) to identify and mark the location of utilities. Call 811 in the US or go to www.call811.com to identify the appropriate local service group. Contacting the local utility locating service is a legal requirement in most jurisdictions.

Independent Field Survey (Utility Locate)

The organization conducting the intrusive work (CH2M HILL or subcontractor) shall arrange for an independent field survey to identify, locate, and mark any potential subsurface utilities in the work area. This survey is in addition to any utility survey conducted by the designated local utility locating service.

The independent field survey provider shall determine the most appropriate instrumentation/technique or combinations of instrumentation/techniques to identify subsurface utilities based on their experience and expertise, types of utilities anticipated to be present, and specific site conditions.

A CH2M HILL or subcontractor representative must be present during the independent field survey to observe the utility locate and verify that the work area and utilities have been properly identified and marked. If there is any question that the survey was not performed adequately or the individual was not qualified, then arrangements

must be made to obtain a qualified utility locate service to re-survey the area. Obtain documentation of the survey and clearances in writing and signed by the party conducting the clearance. Maintain all documentation in the project file.

If the site owner (military installation or client) can provide the independent field survey, CH2M HILL or the subcontractor shall ensure that the survey includes:

- Physically walking the area to verify the work location and identify, locate, and mark underground utility locations:
- Having qualified staff available and instrumentation to conduct the locate;
- Agreeing to document the survey and clearances in writing.
- Should any of the above criteria not be met, CH2M HILL or subcontractor must arrange for an alternate independent utility locate service to perform the survey.
- The markings from utility surveys must be protected and preserved until the markings are no longer required. If the utility location markings are destroyed or removed before intrusive work commences or is completed, the PM, SSC, or designee must notify the independent utility locate service or the designated local utility locating service to resurvey and remark the area.

Visual Assessment before and during Intrusive Activities

Perform a “360 degree” assessment. Walk the area and inspect for utility-related items such as valve caps, previous linear cuts, patchwork in pavement, hydrants, manholes, utility vaults, drains, and vent risers in and around the dig area.

The visual survey shall include all surface landmarks, including manholes, previous liner cuts, patchwork in pavement, pad-mounted transformers, utility poles with risers, storm sewer drains, utility vaults, and fire hydrants.

If any unanticipated items are found, conduct further research before initiating intrusive activities and implement any actions needed to avoid striking the utility or obstruction.

Subsurface Activities within 5 feet of an Underground Utility or if there is Uncertainty

When aggressive intrusive activities will be conducted within 5 feet (1.5 meters) of an underground utility or when there is uncertainty about utility locations, locations must be physically verified by non-aggressive means such as air or water knifing, hand digging, or human powered hand augering. Non-conductive tools must be used if electrical hazards may be present. If intrusive activities are within 5 feet (1.5 meters) and parallel to a marked existing utility, the utility location must be exposed and verified by non-aggressive methods every 100 feet (30.5 meters). Check to see if the utility can be isolated during intrusive work.

Intrusive Activities within 2 feet of an Underground Utility

Use non-aggressive methods (hand digging, vacuum excavation, etc.) to perform intrusive activities within 2 feet of a high risk utility (i.e., a utility that cannot be de-energized or would cause significant impacts to repair/replace). Hazardous utilities shall be de-energized whenever possible.

Spotter

A spotter shall be used to monitor for signs of utilities during advancement of intrusive work (e.g., sudden change in advancement of auger or split spoon, presence of pea gravel or sand in soils, presence of concrete or other debris in soils, refusal of auger or excavating equipment). If any suspicious conditions are encountered stop work immediately and contact the PM or HSM to evaluate the situation. The spotter must have a method to alert an operator to stop the intrusive activity (e.g., air horn, hand signals).

13.1.22 Manual Lifting

(Reference CH2M HILL SOP HSE-112, *Manual Lifting*)

Back injuries are the leading cause of disabling work injuries, and most back injuries are the result of improper lifting techniques or overexertion. Use the following to mitigate the hazards associated with lifting:

- When possible, the task should be modified to minimize manual lifting hazards.
- Lifting of loads weighing more than 40 pounds (18 kilograms) shall be evaluated by the SSC using the Lifting Evaluation Form contained in SOP HSE-112.
- Using mechanical lifting devices is the preferred means of lifting heavy objects such as forklifts; cranes, hoists, and rigging; hand trucks; and trolleys.
- Personnel shall seek assistance when performing manual lifting tasks that appear beyond their physical capabilities.
- In general, the following steps must be practiced when planning and performing manual lifts: Assess the situation before you lift; ensure good lifting and body positioning practices; ensure good carrying and setting down practices.
- All CH2M HILL workers must have training in proper manual lifting training either through the New Employee Orientation or through Manual Lifting module located on the VO.

13.1.23 Noise

(Reference CH2M HILL SOP HSE-108, *Hearing Conservation*)

CH2M HILL is required to control employee exposure to occupational noise levels of 85 decibels (dBA) and above by implementing a hearing conservation program that meets the requirements of the OSHA Occupational Noise Exposure standard, 29 CFR 1910.95. A noise assessment may be conducted by the RHSM or designee based on potential to emit noise above 85 dBA and also considering the frequency and duration of the task.

Areas or equipment emitting noise at or above 90 dBA shall be evaluated to determine feasible engineering controls. When engineering controls are not feasible, administrative controls can be developed and appropriate hearing protection will be provided.

Areas or equipment emitting noise levels at or above 85 dBA, hearing protection must be worn.

Employees exposed to 84 dBA or a noise dose of 50 percent must participate in the Hearing Conservation program including initial and annual (as required) audiograms.

The RHSM will evaluate appropriate controls measures and work practices for employees who have experienced a standard threshold shift (STS) in their hearing.

Employees who are exposed at or above the action level of 85 dBA are required to complete the online Noise Training Module located on CH2M HILL's virtual office.

Hearing protection will be maintained in a clean and reliable condition, inspected prior to use and after any occurrence to identify any deterioration or damage, and damaged or deteriorated hearing protection repaired or discarded.

In work areas where actual or potential high noise levels are present at any time, hearing protection must be worn by employees working or walking through the area.

Areas where tasks requiring hearing protection are taking place may become hearing protection required areas as long as that specific task is taking place.

High noise areas requiring hearing protection should be posted or employees must be informed of the requirements in an equivalent manner.

13.1.24 Electrical Safety

(Reference CH2M HILL SOP HSE-206, *Electrical Safety*)

Below are the hazard controls and safe work practices to follow when using electrical tools, extension cords, and/or other electrical-powered equipment or when exposed to electrical hazards. Ensure the requirements of the referenced SOP are followed.

13.1.25 General Electrical Safety

Only qualified personnel are permitted to work on unprotected energized electrical systems.

Only authorized personnel are permitted to enter high-voltage areas.

CH2M HILL employees who might from time to time work in an environment influenced by the presence of electrical energy must complete Awareness Level Electrical Safety Training located on the CH2M HILL Virtual Office.

Do not tamper with electrical wiring and equipment unless qualified to do so. All electrical wiring and equipment must be considered energized until lockout/tagout procedures are implemented.

Inspect electrical equipment, power tools, and extension cords for damage prior to use. Do not use defective electrical equipment, remove from service.

CH2M HILL has selected GFCIs as the standard method for protecting employees from the hazards associated with electric shock.

- GFCIs shall be used on all 120-volt, single phase 15 and 20-amphere receptacle outlets which are not part of the permanent wiring of the building or structure.

An assured equipment grounding conductor program may be required under the following scenarios:

- GFCIs can not be utilized;
- Client requires such a program to be implemented; or
- Business group decides to implement program in addition to GFCI protection.

Extension cords must be equipped with third-wire grounding. Cords passing through work areas must be covered, elevated or protected from damage. Cords should not be routed through doorways unless protected from pinching. Cords should not be fastened with staples, hung from nails, or suspended with wire.

Electrical power tools and equipment must be effectively grounded or double-insulated and Underwriters Laboratory approved.

Operate and maintain electric power tools and equipment according to manufacturers' instructions.

Maintain safe clearance distances between overhead power lines and any electrical conducting material unless the power lines have been de-energized and grounded, or where insulating barriers have been installed to prevent physical contact. Maintain at least 10 feet (3 meters) from overhead power lines for voltages of 50 kV or less, and 10 feet (3 meters) plus ½ inch (1.27 cm) (for every 1 kV over 50 kV.

Temporary lights shall not be suspended by their electric cord unless designed for suspension. Lights shall be protected from accidental contact or breakage.

Protect all electrical equipment, tools, switches, and outlets from environmental elements.

13.1.26 Portable Generator Hazards

Portable generators are useful when temporary or remote electric power is needed, but they also can be hazardous. The primary hazards to avoid when using a generator are carbon monoxide poisoning from the toxic engine exhaust, electric shock or electrocution, and fire.

NEVER use a generator indoors or in similar enclosed or partially-enclosed spaces. Generators can produce high levels of carbon monoxide very quickly. When you use a portable generator, remember that you cannot smell or see carbon monoxide. Even if you can't smell exhaust fumes, you may still be exposed to carbon monoxide.

If you start to feel sick, dizzy, or weak while using a generator, get to fresh air RIGHT AWAY. DO NOT DELAY. The carbon monoxide from generators can rapidly lead to full incapacitation and death.

If you experience serious symptoms, get medical attention immediately. Inform project staff that carbon monoxide poisoning is suspected. If you experienced symptoms while indoors have someone call the fire department to determine when it is safe to re-enter the building.

Follow the instructions that come with your generator. Locate the unit outdoors and away from doors, windows, and vents that could allow carbon monoxide to come indoors.

Keep the generator dry and do not use in rain or wet conditions. To protect from moisture, operate it on a dry surface under an open, canopy-like structure. Dry your hands if wet before touching the generator.

Plug appliances directly into the generator. Or, use a heavy duty, outdoor-rated extension cord that is rated (in watts or amps) at least equal to the sum of the connected appliance loads. Check that the entire cord is free of cuts or tears and that the plug has all three prongs, especially a grounding pin.

Most generators come with GFCI. Test the GFCIs daily to determine whether they are working

If the generator is not equipped with GFCI protected circuits plug a portable GFCI into the generator and plug appliances, tools and lights into the portable GFCI.

Never store fuel near the generator or near any sources of ignition.

Before refueling the generator, turn it off and let it cool down. Gasoline spilled on hot engine parts could ignite.

13.1.27 Working Alone

(Reference CH2M HILL Core Standard, *Working Alone*)

Personnel can only be tasked to work alone by the PM who will assess potential hazards and appropriate control measures, with assistance from the HSM.

"Lone workers" with an accountability system in place is permitted, depending on the hazards presented during the execution of the task. Reference the "Lone Worker Protocol" included as an attachment to this APP/SSHP.

The employee will at all times be equipped with a working voice communication device such as a cellular phone or two-way radio to check-in to their project contact (s) at pre-determined times.

Call in contact name:	TBD during the planning stage of the task
Phone numbers (office and cell):	TBD during the planning stage of the task

Check-in or contact times must be based on the risk associated with the task, or the timeframe expected to complete the task, but at a minimum of at least two times during an 8-hour work shift.

Call in contact Form will be completed by lone worker and given to call in contact prior to going into the field. Refer to the "Lone Worker Protocol" attached to this SSHP.

Work tasks will cease if communication is lost during work day. Work may resume when communication is re-established.

13.2 General Hazards

13.2.1 General Practices and Housekeeping

(Reference CH2M HILL SOP HSE-209, *General Practices*)

- Site work should be performed during daylight hours whenever possible. Work conducted during hours of darkness requires enough illumination intensity to read a newspaper without difficulty.
- Good housekeeping must be maintained at all times in all project work areas.
- Common paths of travel should be established and kept free from the accumulation of materials.
- Keep access to aisles, exits, ladders, stairways, scaffolding, and emergency equipment free from obstructions.
- Provide slip-resistant surfaces, ropes, and/or other devices to be used.
- Specific areas should be designated for the proper storage of materials.
- Tools, equipment, materials, and supplies shall be stored in an orderly manner.
- As work progresses, scrap and unessential materials must be neatly stored or removed from the work area.
- Containers should be provided for collecting trash and other debris and shall be removed at regular intervals.
- All spills shall be quickly cleaned up. Oil and grease shall be cleaned from walking and working surfaces.

13.2.2 Hazard Communication

(Reference CH2M HILL SOP HSE-107, *Hazard Communication)*

The SSC is to perform the following:

- Complete an inventory of chemicals brought onsite by CH2M HILL using Attachment 2.
- Confirm that an inventory of chemicals brought onsite by CH2M HILL subcontractors is available.
- Request or confirm locations of MSDSs from the client, contractors, and subcontractors for chemicals to which CH2M HILL employees potentially are exposed.
- Before or as the chemicals arrive onsite, obtain an MSDS for each hazardous chemical.
- Label chemical containers with the identity of the chemical and with hazard warnings, and store properly.
- Give employees the required chemical-specific HAZCOM training using Attachment 3.
- Store all materials properly, giving consideration to compatibility, quantity limits, secondary containment, fire prevention, and environmental conditions.

13.2.3 Slips, Trips, and Falls

- Institute and maintain good housekeeping practices.
- Pick up tools and debris in the work area.
- Walk or climb only on equipment surfaces designed for personnel access.
- Be aware of poor footing and potential slipping and tripping hazards in the work area.

13.2.4 Knife Use

Open-bladed knives (for example, box cutters, utility knives, pocket knives, machetes, and multi-purpose tools with fixed blades such as a Leatherman™) are prohibited at worksites except where the following three conditions are met:

- The open-bladed knife is determined to be the best tool for the job;

- An approved AHA or written procedure is in place that covers the necessary safety precautions (work practices, PPE, and training); and
- Knife users have been trained and follow the AHA.

13.2.5 Visible Lighting

Site work should be performed during daylight hours whenever possible. Work conducted during hours of darkness (including dusk and dawn) requires the set-up of supplemental lighting equipment. (Note: A general "rule of thumb" is that the illumination intensity must be sufficient to read a newspaper without difficulty).

13.2.6 Illumination Requirements

Illumination (Foot Candles [FCs])	Illumination (luminous flux per unit area [lux])	Area of Operation
5	~ 55	General construction area lighting
3	~ 33	General construction areas, concrete placement, excavation and waste areas, access ways, active storage areas, loading platforms, refueling, and field maintenance areas

Notes:

An **FC** is a unit of illumination on a surface that is everywhere 1 ft from a point source of one candle.

A **lux** is a unit of measurement of the intensity of light. It is equal to the illumination of a surface 1 m away from a single candle.

CONVERSIONS

FC = Lux x .0929

Lux = FC x 10.76 - (i.e.: 50 FC = 538 LUX)

Marine lighting will be in accordance with ANSI/ Illuminating Engineering Society of North America (IESNA) RP-12, as specified in EM 385-1-1. The following safe work practices will be considered with regard to lighting in the workplace.

- Do not enter poorly lit areas without first providing portable illumination.
- Do not use non-explosion proof lighting in areas of flammable or combustible gases or liquids.

The following practices will be followed in accordance with EM 385-1-1:

- If the lighting provided is questionable as to intensity, light monitoring will be performed to insure proper light intensities are provided.
- Means of egress will be illuminated with emergency and non-emergency lighting, to provide a minimum of 1 FC (1 lumen per square foot [lm/ft^2] , [11 lux , measured at the floor], per National Fire Protection Association [NFPA] 101). The illumination will be arranged so that the failure of any single lighting unit, including the burning out of an electric bulb, will not leave any area in total darkness, impeding the means of egress.
- Lamps and fixtures will be guarded and secured to preclude injury to personnel. Open fluorescent fixtures will be provided with wire guards, lenses, tube guards and locks, or safety sockets that require force in the horizontal axis to remove the lamp.
- Lamps for general illumination will be protected from accidental contact or breakage. Protection will be provided by elevation of at least 7 ft (2.1 m) from normal working surface, suitable fixture or lamp holder with a guard.
- Bulbs attached to temporary lighting strings and extension cords will be protected by guards unless the bulbs are deeply recessed in a reflector.
- Unless designed for suspension, temporary lights will not be suspended by their electric wire.

- Exposed empty light sockets and broken bulbs will be replaced immediately.

Portable electric lighting used in wet and/or other conductive locations (e.g., drums, tanks, and vessels) will be operated at 12 volts or less.

13.2.7 Personal Hygiene

Good hygiene is essential for personal health and to reduce the potential of cross-contamination when working on a hazardous waste site. Implement the following:

- Keep hands away from nose, mouth, and eyes during work;
- Keep areas of broken skin (chapped, burned, etc.) covered; and
- Wash hands with soap and water prior to eating, smoking, or applying cosmetics.

13.2.8 Shipping and Transportation of Chemical Products

(Reference CH2M HILL SOP HSE-403, *Hazardous Materials Handling)*

Chemicals brought to the site might be defined as hazardous materials by the U.S. Department of Transportation (DOT). All staff who ship the materials or transport them by road must receive CH2M HILL training in shipping dangerous goods. All hazardous materials that are shipped (for example, via Federal Express) or are transported by road must be properly identified, labeled, packed, and documented by trained staff. Contact the HSM or the Equipment Coordinator for additional information.

13.2.9 Temperature Extremes

Heat Stress Monitoring and Prevention

Because of the high average ambient air temperature of the southeastern parts of the United States, workers should be aware of necessary procedures to prevent heat related disorders, be cognizant of the signs and systems that indicate heat related disorders are occurring and know when FA or medical treatment may be required to treat heat related disorders. The following information is provided as procedural information to monitor and prevent heat related injuries to site workers, while performing assigned tasks.

- It is recommended that personnel drink 16 ounces of water before beginning work. Disposable cups or containers and water maintained at 50°F to 60°F will be available. Under severe conditions, drink 1 to 2 cups every 20 minutes, for a total of 1 to 2 gallons per day. Do not use alcohol in place of water or other nonalcoholic fluids. Decrease your intake of coffee and caffeinated soft drinks during working hours.
- Acclimate yourself by slowly increasing workloads (e.g., do not begin with extremely demanding activities).
- Use cooling devices, such as cooling vests, to aid natural body ventilation. These devices add weight, so their use should be balanced against efficiency.
- Use mobile showers or hose-down facilities to reduce body temperature and cool protective clothing.
- Conduct field activities in the early morning or evening and rotate shifts of workers, if possible.
- Whenever possible, avoid direct sun, which can decrease physical efficiency and increase the probability of heat stress. Take regular breaks in a cool, shaded area. Use a wide-brim hat or an umbrella when working under direct sun for extended periods.
- Provide adequate shelter/shade to protect personnel against radiant heat (sun, flames, hot metal).
- Maintain good hygiene standards by frequently changing clothing and showering.
- Observe one another for signs of heat stress. Persons who experience signs of heat syncope, heat rash, or heat cramps should consult the SSHO to avoid progression of heat-related illness.

To counteract the onset of heat stress symptoms, a work-break regimen must be established during the executed work. Workers with elevated core temperatures will be allowed to rest and lower core body temperature to normal status when any one condition is exceeded:

- Visual signs and symptoms of heat stress are present in a worker.
- It is determined that a worker's core body temperature exceeds 100.4°F.
- Personnel reactions, physical conditions or extreme atmospheric conditions warrant.

Note: In the event site personnel are required to perform work in Modified Level D or Level C PPE in ambient temperatures in excess of 70°F (without regard to humidity evaluation) occurs for more than 45 minutes then this condition will also constitute a requirement for initiating a proper work/rest regiment and Wet Bulb Globe Temperature (WBGT) Index or physiological will be performed.

The signs and symptoms and treatment requirements of heat related disorders are as follows:

TABLE 13-1
Symptoms and Treatment of Heat Stress

	Heat Syncope	Heat Rash	Heat Cramps	Heat Exhaustion	Heat Stroke
Signs and Symptoms	Sluggishness or fainting while standing erect or immobile in heat.	Profuse tiny raised red blister-like vesicles on affected areas, along with prickling sensations during heat exposure.	Painful spasms in muscles used during work (arms, legs, or abdomen); onset during or after work hours.	Fatigue, nausea, headache, giddiness; skin clammy and moist; complexion pale, muddy, or flushed; may faint on standing; rapid thready pulse and low blood pressure; oral temperature normal or low	Red, hot, dry skin; dizziness; confusion; rapid breathing and pulse; high oral temperature (104F or above).
Treatment	Remove to cooler area. Remove outer impermeable protective clothing. Rest victim lying down in supine position (on back, facing up) with head shoulders slightly elevated. Increase fluid intake. Recovery usually is prompt and complete. Where effected person is conscious, have them loosen their clothing to promote cooling surface between clothing/body.	Remove to cooler area. Remove outer impermeable protective clothing. Remove to cooler area. Remove outer impermeable protective clothing. Rest victim lying down in supine position (on back, facing up) with head shoulders slightly elevated.. Use mild drying lotions and powders, and keep skin clean for drying skin and preventing infection. Where effected person is conscious, have them loosen their clothing to promote cooling surface between clothing/body.	Remove to cooler area. Remove outer impermeable protective Rest victim lying down in supine position (on back, facing up) with head shoulders slightly elevated. Increase fluid intake. Where effected person is conscious, have them loosen their clothing to promote cooling surface between clothing/body.	Remove to cooler area. Remove outer impermeable protective clothing and all PPE. Rest victim lying down in supine position (on back, facing up) with head shoulders slightly elevated. Administer fluids by mouth. Victim will be given sips of cool potable water or electrolyte replenishing fluids. Seek medical attention immediately. Where effected person is conscious, have them loosen their clothing to promote cooling surface between clothing/body.	Remove to cooler area to avoid further exposure to the heat/sun. Rest victim lying down in supine position (on back, facing up) with head shoulders slightly elevated. Where effected person is conscious, have them loosen their clothing to promote cooling surface between clothing/body. Call ambulance, and <u>get medical attention immediately!</u> Provide <u>sips</u> of cool water to if fully conscious and not nauseous or vomiting. Fan or have bags of ice (if available) placed behind the neck, in the axilia and groin areas. Cool rapidly by soaking clothing in cool–but not cold–water. This procedure will only be performed where directed by someone with medical training/ licensure (i.e. EMT, physician) and only as a life saving precaution. Evaluate employee's condition by an occupational physician prior to resuming normal assigned duties.

Monitoring Heat Stress

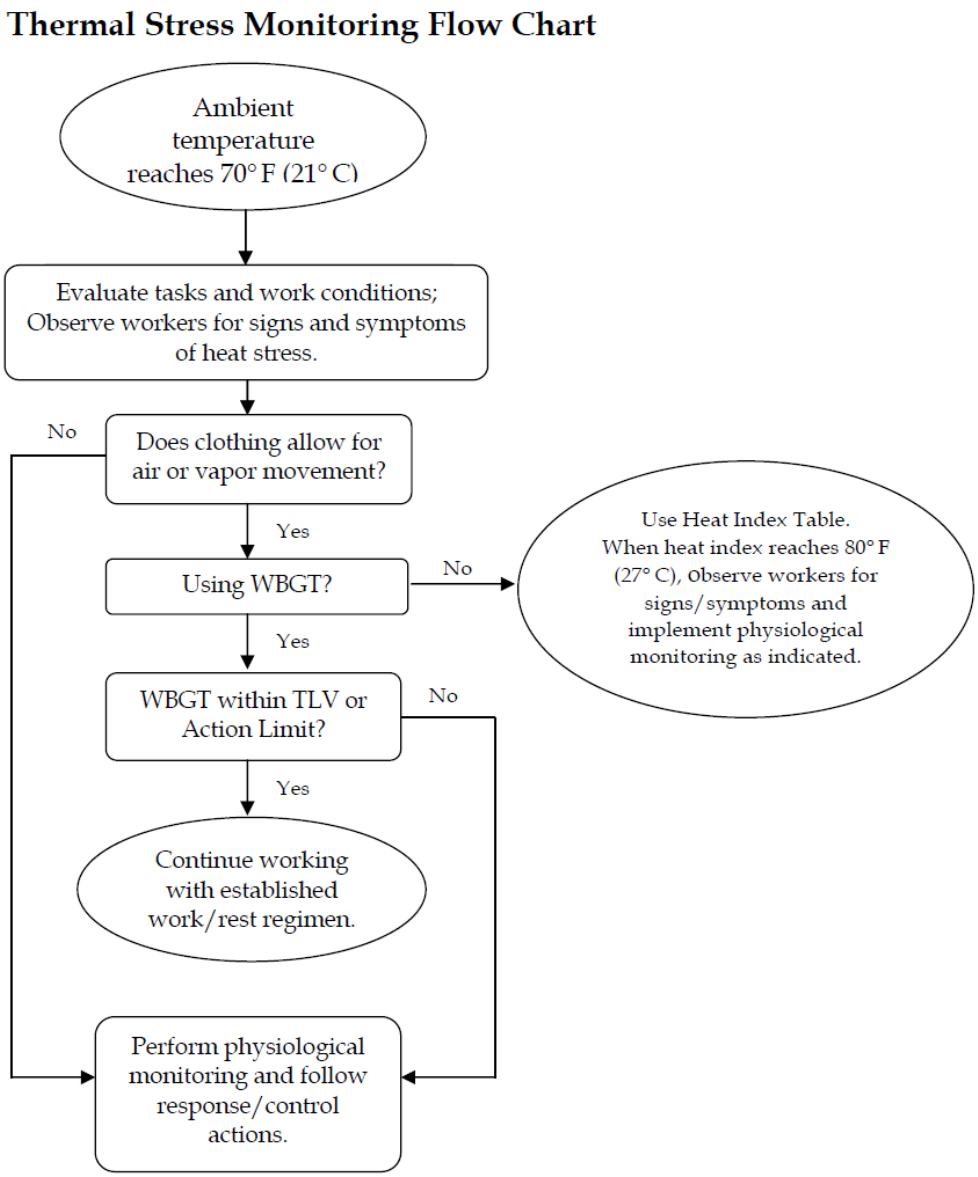
Heat Stress monitoring procedures must be implemented when the ambient air temperature exceeds 70°F, the relative humidity is high (>50 percent), or when workers exhibit symptoms of heat stress, or when workers are required to wear impermeable protective clothing (Saranex, Tyvek or Rain Gear) to perform their assigned duties.

In these conditions, physiological monitoring will be facilitated by the use of automatic blood pressure monitors and by taking body temperature measurements monitored with aural or oral thermometers. All temperature

measurement devices will be affixed with disposable covers or protectors to ensure exposure to blood borne pathogens does not occur.

The heart rate should be measured by the radial pulse for 30 seconds, as early as possible in the resting period. The heart rate at the beginning of the rest period should not exceed 100 beats/minute, or 20 beats/minute above resting pulse. If the heart rate is higher, the next work period should be shortened by 33 percent, while the length of the rest period stays the same. If the pulse rate still exceeds 100 beats/minute at the beginning of the next rest period, the work cycle should be further shortened by 33 percent. The procedure is continued until the rate is maintained below 100 beats/minute, or 20 beats/minute above resting pulse.

Thermal Stress Monitoring



Thermal Stress Monitoring – Permeable or Impermeable Clothing

When permeable work clothes are worn (street clothes or clothing ensembles over street clothes), regularly observe workers for signs and symptoms of heat stress and implement physiological monitoring as indicated below. This should start when the heat index reaches 80° F (27° C) [see Heat Index Table below], or sooner if workers exhibit symptoms of heat stress indicated in the table above. These heat index values were devised for shady, light wind conditions; exposure to full sunshine can increase the values by up to 15°F (8 degrees Celsius [°C]). Also, strong winds, particularly with very hot, dry air, can be extremely hazardous.

When wearing **impermeable clothing** (e.g., clothing doesn't allow for air or water vapor movement such as Tyvek), physiological monitoring as described below will be conducted when the ambient temperature reaches 70° F (21°C) or at a lower temperature when workers begin to exhibit signs and symptoms of heat stress.

Heat Index	Possible Heat Disorders	Minimum Frequency of Physiological Monitoring
80°F - 90°F (27°C - 32°C)	Fatigue possible with prolonged exposure and/or physical activity	Observe Workers for signs of heat stress and implement physiological monitoring if warranted.
90°F - 105°F (32°C - 41°C)	Sunstroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity	Every 2 hours, or sooner, if signs of heat stress are observed.
105°F - 130°F (41°C - 54°C)	Sunstroke, heat cramps, or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity.	Every 60 minutes or sooner if signs of heat stress are observed.
130°F or Higher (54°C or Higher)	Heat/Sunstroke highly likely with continued exposure.	Every 30 minutes or sooner if signs of heat stress are observed.

Source: National Weather Service

Physiological Monitoring and Associated Actions

The following physiological monitoring protocol below, using either radial pulse or aural temperature, will occur when the heat index is 80 °F or greater (or when personnel exhibit signs of heat stress), the following will be performed:

- The sustained heart rate during the work cycle should remain below 180 beats per minute (bpm) minus the individual's age (e.g. 180 – 35 year old person = 145 bpm). The sustained heart rate can be estimated by measuring the heart rate at the radial pulse for 30 seconds as quickly as possible prior to starting the rest period.
- The heart rate after one minute rest period should not exceed 120 bpm.
- If the heart rate is higher than 120 bpm, the next work period should be shortened by 33 percent, while the length of the rest period stays the same.
- If the pulse rate still exceeds 120 bpm at the beginning of the next rest period, the following work cycle should be further shortened by 33 percent.
- Continue this procedure until the rate is maintained below 120 bpm.
- Alternately, the body temperature can be measured, either oral or aural (ear), before the workers have something to drink.
- If the oral or aural temperature exceeds 99.6° F (37.6 ° F) at the beginning of the rest period, the following work cycle should be shortened by 33 percent.
- Continue this procedure until the oral or aural (ear) temperature is maintained below 99.6 ° F (37.6° C). While an accurate indication of heat stress, oral temperature is difficult to measure in the field, however, a digital aural thermometer is easy to obtain and inexpensive to purchase.

- Use the form attached to this SSHSP to track workers' measurements and actions taken.

Procedures for when Heat Illness Symptoms are Experienced

- **Always** contact the RHSM when any heat illness related symptom is experienced so that controls can be evaluated and modified, if needed.
- In the case of cramps, reduce activity, increase fluid intake, move to shade until recovered.
- In the case of all other heat-related symptoms (fainting, heat rash, heat exhaustion), and if the worker is a CH2M HILL worker, contact the occupational physician at 1-866-893-2514 and immediate supervisor.
- In the case of heat stroke symptoms, call 911, have a designee give location and directions to ambulance service if needed, follow precautions under the emergency medical treatment of this SSHSP.
- Follow the Incident Notification, Reporting, and Investigation section of this SSHSP.
- l temperature exceeds 99.6° F (37.6 ° F) at the beginning of the rest period, the following work cycle should be shortened by 33 percent.
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- In the case of heat stroke symptoms, call 911, have a designee give location and directions to ambulance service if needed, follow precautions under the emergency medical treatment of this SSHSP.
- Follow the Incident Notification, Reporting, and Investigation section of this SSHSP.

13.2.10 Cold

General

Low ambient temperatures increase the heat lost from the body to the environment by radiation and convection. In cases where the worker is standing on frozen ground, the heat loss is also due to conduction.

Wet skin and clothing, whether because of water or perspiration, may conduct heat away from the body through evaporative heat loss and conduction. Thus, the body cools suddenly when chemical protective clothing is removed if the clothing underneath is perspiration soaked.

Movement of air across the skin reduces the insulating layer of still air just at the skin's surface. Reducing this insulating layer of air increases heat loss by convection.

Non-insulating materials in contact or near-contact with the skin, such as boots constructed with a metal toe or shank, conduct heat rapidly away from the body.

Certain common drugs, such as alcohol, caffeine, or nicotine, may exacerbate the effects of cold, especially on the extremities. These chemicals reduce the blood flow to peripheral parts of the body, which are already high-risk areas because of their large surface area to volume ratios. These substances may also aggravate an already hypothermic condition.

Precautions

- Be aware of the symptoms of cold-related disorders, and wear proper, layered clothing for the anticipated fieldwork. Appropriate rain gear is a must in wet weather.
- Consider monitoring the work conditions and adjusting the work schedule using guidelines developed by the United States Army (wind-chill index) and the NSC.
- Wind-Chill Index (below) is used to estimate the combined effect of wind and low air temperatures on exposed skin. The wind-chill index does not take into account the body part that is exposed, the level of activity, or the amount or type of clothing worn. For those reasons, it should only be used as a guideline to warn workers when they are in a situation that can cause cold-related illnesses.
- Persons who experience initial signs of immersion foot, frostbite, and/or hypothermia should report it immediately to their supervisor/PM to avoid progression of cold-related illness.
- Observe one another for initial signs of cold-related disorders.
- Obtain and review weather forecast – be aware of predicted weather systems along with sudden drops in temperature, increase in winds, and precipitation.

TABLE 13-2
Symptoms and Treatment of Cold Stress

	Immersion (Trench) Foot	Frostbite	Hypothermia
Signs and Symptoms	Feet discolored and painful; infection and swelling present.	Blanched, white, waxy skin, but tissue resilient; tissue cold and pale.	Shivering, apathy, sleepiness; rapid drop in body temperature; glassy stare; slow pulse; slow respiration.
Treatment	Seek medical treatment immediately.	Remove victim to a warm place. Re-warm area quickly in warm—but **not** hot—water. Have victim drink warm fluids, but **not** coffee or alcohol. Do not break blisters. Elevate the injured area, and get medical attention.	Remove victim to a warm place. Have victim drink warm fluids, but **not** coffee or alcohol. Get medical attention.

Wind Chill Chart

Wind (mph) \ Temperature (°F)	Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5		36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10		34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15		32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20		30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25		29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30		28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35		28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40		27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45		26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50		26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55		25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60		25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes, 10 minutes, 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

13.2.11 Ultraviolet Radiation (sun exposure)

Health effects regarding ultraviolet (UV) radiation are confined to the skin and eyes. Overexposure can result in many skin conditions, including erythema (redness or sunburn), photoallergy (skin rash), phototoxicity (extreme sunburn acquired during short exposures to UV radiation while on certain medications), premature skin aging, and numerous types of skin cancer. Implement the following controls to avoid sunburn.

Limit Exposure Time

- Rotate staff so the same personnel are not exposed all of the time.
- Limit exposure time when UV radiation is at peak levels (approximately 2 hours before and after the sun is at its highest point in the sky).
- Avoid exposure to the sun, or take extra precautions when the UV index rating is high.

Provide Shade

- Take lunch and breaks in shaded areas.
- Create shade or shelter through the use of umbrellas, tents, and canopies.
- Fabrics such as canvas, sailcloth, awning material and synthetic shade cloth create good UV radiation protection.
- Check the UV protection of the materials before buying them. Seek protection levels of 95 percent or greater, and check the protection levels for different colors.

Clothing

- Reduce UV radiation damage by wearing proper clothing; for example, long sleeved shirts with collars, and long pants. The fabric should be closely woven and should not let light through.
- Head protection should be worn to protect the face, ears, and neck. Wide-brimmed hats with a neck flap or “Foreign Legion” style caps offer added protection.
- Wear UV-protective sunglasses or safety glasses. These should fit closely to the face. Wrap-around style glasses provide the best protection.

Sunscreen

- Apply sunscreen generously to all exposed skin surfaces at least 20 minutes before exposure, allowing time for it to adhere to the skin.
- Re-apply sunscreen at least every 2 hours, and more frequently when sweating or performing activities where sunscreen may be wiped off.
- Choose a sunscreen with a high sun protection factor (SPF). Most dermatologists advocate SPF 30 or higher for significant sun exposure.
- Waterproof sunscreens should be selected for use in or near water, and by those who perspire sufficiently to wash off non-waterproof products.
- Check for expiration dates, because most sunscreens are only good for about 3 years. Store in a cool place out of the sun.
- No sunscreen provides 100 percent protection against UV radiation. Other precautions must be taken to avoid overexposure.

13.3 Biological Hazards and Controls

(Reference CH2M HILL SOP HSE-202, *Biological Hazards*)

13.3.1 Bees and Other Stinging Insects

Bee and other stinging insects may be encountered almost anywhere and may present a serious hazard, particularly to people who are allergic. Watch for and avoid nests. Keep exposed skin to a minimum. Carry a kit if you have had allergic reactions in the past, and inform the SSC and/or buddy. If a stinger is present, remove it carefully with tweezers. Wash and disinfect the wound, cover it, and apply ice. Watch for allergic reaction; seek medical attention if a reaction develops.

13.3.2 Bird Droppings

Large amounts of bird droppings may present a disease risk. The best way to prevent exposure to fungus spores in bird droppings is to avoid disturbing it. A brief inhalation exposure to highly contaminated dust may be all that is needed to cause infection and subsequent development of fungal disease.

If disturbing the droppings or if removal is necessary to perform work, follow these controls:

- Use dust control measures (wetting with water or HEPA vacuuming) for all activities that may generate dust from the accumulated droppings.
- Wear Tyvek with hoods, disposable gloves and booties, and air-purifying respirators with a minimum N95 rating.
- Put droppings into plastic/poly bags and preferably into a 55-gallon drum to prevent bag from ripping.

13.3.3 Fire Ants

There are several types of fire ants in the United States that can cause painful bites and allergic reactions. Fire ants aggressively defend their nests by stinging several times after climbing on their victims. Large ant mounds are easily visible, but there can be smaller mounds or nests with little “worked” soil that can be stepped on inadvertently. They can also be under rocks, wood or other debris. Implement the following when fire ants are observed:

- Be aware of fire ants and take care not to stand on ant nests;
- Use insect repellents on clothing and footwear to temporarily discourage ants from climbing; and
- Tuck pants into socks.
- If stung, get away from the area you are standing on, briskly brush off ants—wash affected area with soap. Call the occupational nurse.

13.3.4 Poison Ivy, Poison Oak, and Poison Sumac

Poison ivy, poison oak, and poison sumac typically are found in brush or wooded areas. They are more commonly found in moist areas or along the edges of wooded areas. Shrubs are usually 12 to 30 inches high, or can also be a tree-climbing vine, with triple leaflets and short, smooth hair underneath. Plants are red and dark green in spring and summer, with yellowing leaves anytime especially in dry areas. Leaves may achieve bright reds in fall, but plants lose its (yellowed, then brown) leaves in winter, leaving toxic stems. All parts of the plant remain toxic throughout the seasons. These plants contain urushiol a colorless or pale yellow oil that oozes from any cut or crushed part of the plant, including the roots, stems and leaves and causes allergic skin reactions when contacted. The oil is active year round.

Become familiar with the identity of these plants (see below). Wear protective clothing that covers exposed skin and clothes. Avoid contact with plants and the outside of protective clothing. If skin contacts a plant, wash the area with soap and water immediately. If the reaction is severe or worsens, seek medical attention.

Poison Ivy

Poison Sumac

Poison Oak

Contamination with poison ivy, sumac or oak can happen through several pathways, including:

- Direct skin contact with any part of the plant (even roots once above ground foliage has been removed).
- Contact with clothing that has been contaminated with the oil.
- Contact from removing shoes that have been contaminated (shoes are coated with urishol oil).
- Sitting in a vehicle that has become contaminated.
- Contact with any objects or tools that have become contaminated.
- Inhalation of particles generated by weed whacking, chipping, vegetation clearing.

If you must work on a site with poison ivy, sumac or oak the following precautions are necessary:

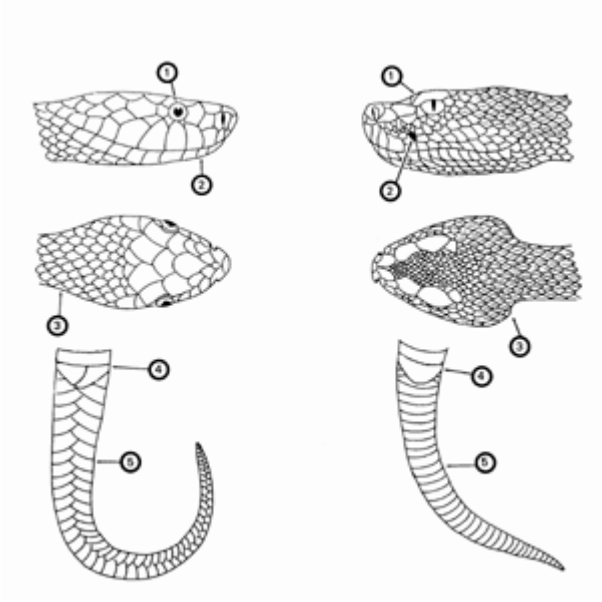
- Do not drive vehicles onto the site where it will come into contact with poison ivy, sumac or oak. Vehicles which need to work in the area, such as drill rigs or heavy equipment must be washed as soon as possible after leaving the site.
- All tools used in the poison ivy, sumac or oak area, including those used to cut back poison oak, surveying instruments used in the area, air monitoring equipment or other test apparatus must be decontaminated before they are placed back into the site vehicle. If on-site decontamination is not possible, use plastic to wrap any tools or equipment until they can be decontaminated.
- Personal protective equipment, including Tyvek coveralls, gloves, and boot covers must be worn. PPE must be placed into plastic bags and sealed if they are not disposed immediately into a trash receptacle.
- As soon as possible following the work, shower to remove any potential contamination. Any body part with suspected or actual exposure should be washed with Zanfel, Tecnu or other product designed for removing urishiol. If you do not have Zanfel or Tecnu wash with cold water. Do not take a bath, as the oils can form and invisible film on top of the water and contaminate your entire body upon exiting the bath.
- Tecnu may also be used to decontaminate equipment.
- Use IvyBlock or similar products to prevent poison oak, ivy and sumac contamination. Check with the closest CH2M HILL warehouse to see if these products are available. Follow all directions for application.
- If you do come into contact with one of these poisonous plants and a reaction develops, contact your supervisor and the occupational nurse 1-866-893-2514.

13.3.5 Snakes

Snakes typically are found in underbrush and tall grassy areas. If you encounter a snake, stay calm and look around; there may be other snakes. Turn around and walk away on the same path you used to approach the area. If bitten by a snake, wash and immobilize the injured area, keeping it lower than the heart if possible. Call the occupational nurse at 1-866-893-2514 immediately. Do not apply ice, cut the wound, or apply a tourniquet. Try to identify the type of snake: note color, size, patterns, and markings. Below is a guide to identifying poisonous snakes from non-poisonous snakes.

Identification of Poisonous Snakes

Major Identification Features Non-venomous Snake	Major Identification Features Venomous Snake
1. Round pupils 2. No sensing pit 3. Head slightly wider than neck 4. Divided anal plate 5. Double row of scales on the underside of the tail	1. Elliptical pupils 2. Sensing pit between eye and nostril 3. Head much wider than neck 4. Single anal plate 5. Single scales on the underside of the tail



13.3.6 Spiders - Brown Recluse and Widow

The Brown Recluse spider can be found most anywhere in the United States. It varies in size in shape, but the distinguishing mark is the violin shape on its body. They are typically non-aggressive. Keep an eye out for irregular, pattern-less webs that sometimes appear almost tubular built in a protected area such as in a crevice or between two rocks. The spider will retreat to this area of the web when threatened.

The Black Widow, Red Widow and the Brown Widow are all poisonous. Most have globose, shiny abdomens that are predominantly black with red markings (although some may be pale or have lateral stripes), with moderately long, slender legs. These spiders are nocturnal and build a three-dimensional tangled web, often with a conical tent of dense silk in a corner where the spider hides during the day.

Hazard Controls

- Inspect or shake out any clothing, shoes, towels, or equipment before use.
- Wear protective clothing such as a long-sleeved shirt and long pants, hat, gloves, and boots when handling stacked or undisturbed piles of materials.
- Minimize the empty spaces between stacked materials.
- Remove and reduce debris and rubble from around the outdoor work areas.
- Trim or eliminate tall grasses from around outdoor work areas.
- Store apparel and outdoor equipment in tightly closed plastic bags.
- Keep your tetanus boosters up-to-date (every 10 years). Spider bites can become infected with tetanus spores.

If you think you have been bit by a poisonous spider, immediately call the occupational nurse at 1-866-893-2514 and follow the guidance below:

- Remain calm. Too much excitement or movement will increase the flow of venom into the blood;
- Apply a cool, wet cloth to the bite or cover the bite with a cloth and apply an ice bag to the bite;
- Elevate the bitten area, if possible;
- Do not apply a tourniquet, do not try to remove venom; and
- Try to positively identify the spider to confirm its type. If the spider has been killed, collect it in a plastic bag or jar for identification purposes. Do not try to capture a live spider—especially if you think it is a poisonous spider.

Black Widow

Red Widow

Brown Widow

Brown Reclus

If you are stung by a scorpion, call the occupational nurse 1-866-893-2514 and try to note the description of the scorpion. Cleanse the sting area and apply ice.

13.3.7 Ticks

Every year employees are exposed to tick bites at work and at home putting them at risk of illness. Ticks typically are in wooded areas, bushes, tall grass, and brush. Ticks are black, black and red, or brown and can be up to one-quarter inch (6.4 mm) in size.

In some geographic areas exposure is not easily avoided. Wear tightly woven light-colored clothing with long sleeves and pant legs tucked into boots; spray only outside of clothing with permethrin or permanone and spray skin with only DEET; and check yourself frequently for ticks.

Where site conditions (vegetation above knee height, tick endemic area) or when tasks (having to sit or kneel in vegetation) diminish the effectiveness of the other controls mentioned above, bug-out suits (check with your local or regional warehouse) or Tyvek shall be used. Bug-out suits are more breathable than Tyvek.

Take precautions to avoid exposure by including pre-planning measures for biological hazards prior to starting field work. Avoid habitats where possible, reduce the abundance through habitat disruption or application of acracide. If these controls aren't feasible, contact your local or regional warehouse for preventative equipment such as repellants, protective clothing and tick removal kits. Use the buddy system and perform tick inspections prior to entering the field vehicle. If ticks were not planned to be encountered and are observed, do not continue field work until these controls can be implemented.

See Tick Fact Sheet attached to this SSHP for further precautions and controls to implement when ticks are present. If bitten by a tick, follow the removal procedures found in the tick fact sheet, and call the occupational nurse at 1-866-893-2514.

Be aware of the symptoms of Lyme disease or Rocky Mountain spotted fever (RMSF). Lyme disease is a rash that might appear that looks like a bull's eye with a small welt in the center. RMSF is a rash of red spots under the skin 3 to 10 days after the tick bite. In both RMSF and Lyme disease, chills, fever, headache, fatigue, stiff neck, and bone pain may develop. If symptoms appear, again contact the occupational nurse at 1-866-893-2514.

Be sure to complete an Incident Report (either use the HITS system on the VO) if you do come in contact with a tick.

13.3.8 Blood-borne Pathogens

(Reference CH2M HILL, SOP HSE-202, *Blood-borne Pathogens*)

Exposure to blood-borne pathogens may occur when rendering first aid or CPR, or when coming into contact with landfill waste or waste streams containing potentially infectious material. Exposure controls and personal protective equipment are required as specified in CH2M HILL SOP HSE-202, *Blood-borne Pathogens*. Hepatitis B vaccination must be offered before the person participates in a task where exposure is a possibility.

13.3.9 Mosquito Bites

Due to the recent detection of the West Nile Virus in the southwestern United States it is recommended that **preventative measures** be taken to reduce the probability of being bitten by mosquitoes whenever possible. Mosquito's are believed to be the primary source for exposure to the West Nile Virus as well as several other types of encephalitis. The following guidelines should be followed to reduce the risk of these concerns for working in areas where mosquitoes are prevalent.

- Stay indoors at dawn, dusk, and in the early evening.
- Wear long-sleeved shirts and long pants whenever you are outdoors.
- Repellents may irritate the eyes and mouth, so avoid applying repellent to the hands. Spray clothing with repellents containing permethrin or DEET since mosquitoes may bite through thin clothing.
- Apply insect repellent sparingly to exposed skin. An effective repellent will contain 35% DEET. DEET in high concentrations (greater than 35%) provides no additional protection.
- Whenever you use an insecticide or insect repellent, be sure to read and follow the manufacturer's DIRECTIONS FOR USE, as printed on the product.

Note: Vitamin B and "ultrasonic" devices are NOT effective in preventing mosquito bites.

13.3.10 Symptoms of Exposure to the West Nile Virus

Most infections are mild, and symptoms include fever, headache, and body aches, occasionally with skin rash and swollen lymph glands. More severe infection may be marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, paralysis, and, rarely, death.

The West Nile Virus incubation period is from 3 to 15 days.

If you have any questions or to report any suspicious symptoms, contact the project Health and Safety Manager.

SECTION 14

Contaminants of Concern

Table 14-1 summarizes the potential contaminants of concern (COCs) and their occupational exposure limit and signs and symptoms of exposure. This table serves as general information regarding the specific compounds. These concentrations were used to determine engineering and administrative controls as well as PPE and site monitoring requirements. As a precaution, air monitoring will be conducted to prevent exposure from any potential inhalation pathway during the course of this investigation. See section 15.0 for specific details. Also, strict industrial hygiene practices will be enforced to prevent any other type of exposure pathway from occurring.

TABLE 14-1
Contaminants of Concern
(Refer to Project Files for additional contaminant information)

Contaminant	Location and Maximum[a] Concentration	Exposure Limit[b]	IDLH[c]	Symptoms and Effects of Exposure	PIP[d] (eV)
VOCs					
1,4-Dichlorobenzene	SB: 1.18 mg/kg	10 ppm	150 Ca	Headache, eye irritation, nausea, vomiting, swelling periorbital, profus rhinitis, jaundice, cirrhosis	8.98
Methylene Chloride	SB: 0.0262 mg/kg	25 ppm	2300 Ca	Irritation eyes, skin; lassitude (weakness, exhaustion), drowsiness, dizziness; numbness, tingle limbs; nausea; [potential occupational carcinogen]	11.32
Vinyl Chloride	GW: 13.6 ug/L	1 ppm	NL Ca	Weakness, abdominal pain, gastrointestinal bleeding, enlarged liver, pallor or cyanosis of extremities	9.99
Metals					
Chromium	SB: 58.3 mg/kg GW: 495 ug/L	0.5 mg/m^3	25 mg/m^3	Irritated eyes, sensitization dermatitis, histologic fibrosis of lungs	NA
Iron	SB: 18,900 mg/kg GW: 237,000 ug/L	0.1 ppm	NL	irritation eyes, mucous membrane, respiratory system; headache, dizziness, nausea, vomiting; fever, cyanosis, cough, dyspnea (breathing difficulty); liver, kidney, lung injury; degenerative changes in central nervous system	NA
Antimony	SB: 4.5 mg/kg	0.5 mg/m^3	50 mg/m^3	irritation eyes, skin, nose, throat, mouth; cough; dizziness; headache; nausea, vomiting, diarrhea; stomach cramps; insomnia; anorexia; unable to smell properly	NA
Arsenic	SB: 29.6 mg/kg GW: 71.7 ug/L	0.01 mg/m^3	5 mg/ m^3 as As Ca	Ulceration of nasal septum, respiratory irritation, dermatitis, gastrointestinal disturbances, peripheral neuropathy, hyperpigmentation	NA
Cadmium	SB: 3.15 mg/kg	0.005 mg/m^3	9 mg/ m^3 as Cd Ca	Pulmonary edema, coughing, chest tightness/pain, headache, chills, muscle aches, nausea, vomiting, diarrhea, difficulty breathing, loss of sense of smell, emphysema, mild anemia	NA

TABLE 14-1
Contaminants of Concern
(Refer to Project Files for additional contaminant information)

Contaminant	Location and Maximum[a] Concentration	Exposure Limit[b]	IDLH[c]	Symptoms and Effects of Exposure	PIP[d] (eV)
Cobalt	SB: 5.68 mg/kg	0.05 mg/m^3	20 mg/m^3	Coughing, difficulty breathing, wheezing, decreased pulmonary function, diffuse nodule fibrosous, dermatitis, respiratory hypersensitivity, asthma	NA
Lead	SB: 692 mg/kg GW: 233 mg/kg	0.05 mg/m^3	100 mg/m^3 as Pb	Weakness lassitude, facial pallor, pal eye, weight loss, malnutrition, abdominal pain, constipation, anemia, gingival lead line, tremors, paralysis of wrist and ankles, encephalopathy, kidney disease, irritated eyes, hypertension	NA
Manganese	GW: 3,500 ug/L	TWA 1 mg/m^3 ST 3 mg/m^3	500 mg/m^3	Manganism; asthenia, insomnia, mental confusion; metal fume fever: dry throat, cough, chest tightness, dyspnea (breathing difficulty), rales, flu-like fever; low-back pain; vomiting; malaise (vague feeling of discomfort); lassitude (weakness, exhaustion); kidney damage	NA
Mercury	SB: 2.31 mg/kg GW: 1.75 ug/L	0.025 mg/m^3	10 mg/m^3	Skin and eye irritation, cough, chest pain, difficult breathing, bronchitis, pneumontitis, tremors, insomnia, irritability, indecision, headache, fatigue, weakness, GI disturbance	NA
Nickel	GW: 338 ug/L	Ca 0.015 mg/m^3	Ca 10 mg/m^3	sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen]	NA
Vanadium	SB: 34.5 mg/kg	0.5 mg/m^3	35 mg/m^3	irritation eyes, skin, throat; green tongue, metallic taste, eczema; cough; fine rales, wheezing, bronchitis, dyspnea (breathing difficulty)	NA

Footnotes:
[a] Specify sample-designation and media: SB (Soil Boring), A (Air), D (Drums), GW (Groundwater), L (Lagoon), TK (Tank), S (Surface Soil), SL (Sludge), SW (Surface Water).
[b] Appropriate value of PEL, REL, or TLV listed.
[c] IDLH = immediately dangerous to life and health (units are the same as specified "Exposure Limit" units for that contaminant); NL = No limit found in reference materials; CA = Potential occupational carcinogen.
[d] PIP = photoionization potential; NA = Not applicable; UK = Unknown.

Potential Routes of Exposure		
Dermal: Contact with contaminated media. This route of exposure is minimized through proper use of PPE, as specified in Section 11	**Inhalation:** Vapors and contaminated particulates. This route of exposure is minimized through proper respiratory protection and monitoring, as specified in Sections 12.5 and 15, respectively.	**Other:** Inadvertent ingestion of contaminated media. This route should not present a concern if good hygiene practices are followed (e.g., wash hands and face before drinking or smoking).

SECTION 15

Air Monitoring/Sampling

15.1 Site Monitoring

(Reference CH2M HILL SOP HSE-207, *Exposure Monitoring for Airborne Chemical Hazards*)

When performing site monitoring, record all the information, such as in a field logbook. Note date and time, describe monitoring location (for example, in breathing zone, at source, etc. and site location), and what the reading is. If any action levels are reached, note it in the field logbook and note the action taken.

Exposure records (air sampling) must be preserved for the duration of employment plus thirty years. Ensure that copies of the field log book are maintained in the project file.

Copies of all project exposure records (for example, copies of field logbook pages where air monitoring readings are recorded and associated calibration) shall be sent to the regional SPA for retention and maintained in the project files.

As the background information on COCs shows low to moderate levels, and the tasks involved in this SSHP do pose an exposure potential, the action limits are set for work to proceed in Level D only. If any action limit is exceeded, the work will be halted and the HSM shall be notified to assess and determine what further action is necessary.

15.2 Direct Reading Monitoring Specifications

Instrument	Tasks	Action Levels [a]	Action to be Taken when Action Level Reached	Frequency [b]	Calibration
Toxic Gas Monitor: MultiRAE Plus with 11.4 eV lamp (VOCs, O_2, Lower Explosive Limit [LEL], CO, H_2S) Flame ionization detector (FID) and/or photoionization detector (PID) may be substituted for MultiRae, contact HSM for guidance if needed.	All Intrusive Task and Sampling Activities	< 1 ppm 1 - 5 ppm 5> ppm	Level D Level C Level B not authorized Contact RHSM	Initially and periodically during task Collect Vinyl Chloride tube when MultiRae >1 ppm and is sustained for 5 minutes	Daily
	All Intrusive Task and Sampling Activities	0-10% : >10% LEL:	No explosion hazard Explosion hazard; evacuate or vent	Continuous	Daily
	All Intrusive Task and Sampling Activities	>25%[c] O_2: 20.9%[c] O_2: <19.5%[c] O_2:	Explosion hazard; evacuate or vent Normal O_2 O_2 deficient; vent or use SCBA	Continuous	Daily
Dust Monitor: Visual	All Sampling Activities	No Dust → Visible Dust→	Level D Level D. Practice dust suppression techniques/engineering controls	Continuous during task	NA
Noise-Level Monitor [d] *Must shout to be heard at 3 feet	All Equipment operations	<85 dB(A) 85-120 dB(A) 120 dB(A)	No action required Hearing protection required Stop; re-evaluate	Initially and periodically during task	Daily

Instrument	Tasks	Action Levels [a]	Action to be Taken when Action Level Reached	Frequency [b]	Calibration
Colormetric Tube: Drager vinyl chloride specific (0.5 to 30 ppm range) with pre-tube, or equivalent	When PID is ≥1 ppm at sites listed above	<0.5 ppm ≥0.5 ppm	Continue work Suspend Work and contact RHSM; Level B will be required	Initially and periodically when PID >1 ppm	None (check expiration date)

[a] Action levels apply to sustained breathing-zone measurements above background.

[b] The exact frequency of monitoring depends on field conditions and is to be determined by the SSC; generally, every 5 to 15 minutes if acceptable; more frequently may be appropriate.

[c] If the measured percent of O_2 is less than 10, an accurate LEL reading will not be obtained. Percent LEL and percent O_2 action levels apply only to ambient working atmospheres, and not to confined-space entry. More-stringent percent LEL and O_2 action levels are required for confined-space entry.

[d] Noise monitoring with either Type I or II meter set for A scale, slow response and audiometric testing also required.

15.3 Calibration Specifications

(Refer to the respective manufacturer's instructions for proper instrument-maintenance procedures)

Instrument	Gas	Span	Reading	Method
PID: MultiRae Plus 11.4 eV bulb	100 ppm isobutylene	RF = 1.0	100 ppm	1.5 lpm reg T-tubing
Dust Monitor: DataRAM	Dust-free air	Not applicable	0.00 mg/m^3 in "Measure" mode	Dust-free area OR Z-bag with HEPA filter
Sound Level Meter	Refer to Instrument Manual on site			

Calibrate air monitoring equipment daily (or prior to use) in accordance with the instrument's instructions. Document the calibration in the field logbook (or equivalent) and include the following information:

- Instrument name
- Serial number
- Owner of instrument (for example, CH2M HILL, HAZCO)
- Calibration gas (including type and lot number)
- Type of regulator (for example, 1.5 lpm)
- Type of tubing (for example, direct or T-tubing)
- Ambient weather condition (for example, temperature and wind direction)
- Calibration/instrument readings
- Operator's name and signature
- Date and time

SECTION 16

Incident Notification and Reporting

(Reference CH2M HILL SOP HSE-111, Incident Reporting and Investigation)

16.1 General Information

This section applies to the following:

- All injuries involving employees, third parties, or members of the public
- Damage to property or equipment
- Interruptions to work or public service (e.g., hitting a utility)
- Incidents which attract negative media coverage
- Near misses
- Spills, leaks, or regulatory violations
- Motor vehicle accidents
- Documentation, including incident reports, investigation, analysis and corrective measure taken, shall be kept by the SSC and maintained onsite for the duration of the project.

16.2 Section Definitions

Incident: an undesired event which results or could have resulted in loss through injury, damage to assets or environmental harm. This includes all of the definitions below.

Accident: an incident involving actual loss through injury, damage to assets, or environmental harm.

Near Miss: an unsafe act or incident which, in other circumstances, could have resulted in loss through injury, damage to assets, or environmental harm.

Serious Incident:

- All fatalities including contractors, subcontractors, third parties, or members of the public
- Kidnap/Missing Person
- Event that involves a fire, explosion, or property damage that requires a site evacuation or is estimated to result in greater than $ 500,000 in damage.
- Acts or threats of terrorism
- Spill or release of hazardous materials or substances that involves a significant threat of imminent harm to site workers, neighboring facilities, the community or the environment.

16.3 Reporting Requirements

All employees and subcontractors' employees shall immediately report any incident (including "near misses," as defined in the section above) in which they are involved or witness to their supervisor.

The CH2M HILL or Subcontractor supervisor, upon receiving an incident report, shall inform his immediate superior and the CH2M HILL SSC.

The SSC shall immediately report the following information to the HSM and PM by phone and e-mail:

- Project Name/Site Manager

- Date and time of incident
- Description of incident
- Extent of know injuries/damage
- Level of medical attention
- Preliminary root cause/corrective actions

The SC shall complete an entry into the HITS database system located on CH2M HILL's Virtual Office (or if VO not available, use the hard copy Incident Report Form and Root Cause Analysis Form and forward it to the HSM) within 24 hours and finalize those forms within 3 calendar days.

The CH2M HILL team shall comply with all applicable statutory incident reporting requirements such as those to OSHA and the police.

16.4 HITS System and Incident Report Form

It is the policy of CH2M HILL to maintain a HITS entry and/or Incident Report Form (IRF) for all work-related injuries and illnesses sustained by its employees in accordance with recordkeeping and insurance requirements. A HITS entry and/or IRF will also be maintained for other incidents (property damage, fire or explosion, spill, release, potential violation, and near misses) as part of our loss prevention and risk reduction initiative.

16.5 Injury Management/Return-to-Work (for CH2M HILL Staff Only)

(Reference CH2M HILL, SOP HSSE-124, Injury Management/Return-to-Work)

16.5.1 Background

The Injury Management Program has been established to provide orderly, effective and timely medical treatment and return-to-work transition for an employee who sustains a work-related injury or illness. It also provides guidance and assistance with obtaining appropriate treatment to aid recovery, keep supervisors informed of employee status, and to quickly report and investigate work-related injury/illnesses to prevent recurrence.

To implement the Injury Management/Return-to-Work Program successfully, supervisors and/or SC should:

- Ensure employees are informed of the Injury Management/Return-to-Work Program.
- Become familiar with the Notification Process (detailed below).
- Post the Injury Management/Return-to-Work Notification Poster.

16.5.2 The Injury Management/Return-to-Work Notification Process:

- Employee informs their Supervisor.
- Employee calls the Injury Management Program toll free number 1-866-893-2514 immediately and speaks with the Occupational Injury Nurse. This number is operable 24 hours per day, 7 days a week.
- Supervisor ensures employee immediately calls the Injury Management Program number. Supervisor makes the call with the injured worker or for the injured worker if needed.
- Nurse assists employee with obtaining appropriate medical treatment, as necessary schedules clinic visit for employee (calls ahead, and assists with any necessary follow up treatment) with the supervisor or SSC accompany the employee if a clinic visit is necessary to ensure that employees receive appropriate and timely care.
- Supervisor/SSC completes the HITS entry or Incident Report Form immediately (within 24 hours) and forwards it to the Project Manager and RHSM.
- Nurse notifies appropriate CH2M HILL staff by e-mail (supervisor, Health & Safety, Human Resources, Workers' Compensation).

- Nurse communicates and coordinates with and for employee on treatment through recovery.
- Supervisor ensures suitable duties are identified and available for injured/ill workers who are determined to be medically fit to return to work on transitional duty (temporary and progressive).
- Supervisor ensures medical limitations prescribed (if any) by physician are followed until the worker is released to full duty.

16.6 Serious Incident Reporting Requirements

(Reference CH2M HILL SOP HSE-111, Incident Reporting, Notification and Investigation)

The Serious Incident Reporting Requirements ensures timely notification and allows for positive control over flow of information so that the incident is handled effectively, efficiently, and in conjunction with appropriate corporate entities. This standard notification process integrates HS&E and Firm Wide Security Operations (FWSO) requirements for the consistent reporting of and managing of serious events throughout our operations.

16.6.1 Serious Incident Determination

The following are general criteria for determining whether an incident on CH2M HILL owned or managed facilities or program sites is considered serious and must be immediately reported up to Group President level through the reporting/notification process:

- Work related death, or life threatening injury or illness of a CH2M HILL employee, subcontractor, or member of the public
- Kidnap/missing person
- Acts or threats of terrorism
- Event that involves a fire, explosion, or property damage that requires a site evacuation or is estimated to result in greater than $ 500,000 in damage.
- Spill or release of hazardous materials or substances that involves a significant threat of imminent harm to site workers, neighboring facilities, the community or the environment.

16.6.2 Serious Incident Reporting

If an incident meets the "Serious Incident" criteria, the Project Manager is to immediately contact the Crisis Manager at 720-286-4911, then follow the standard incident reporting procedure.

For all serious incidents this standard reporting process is implemented immediately so as to ultimately achieve notification to the Business Group President within 2 hours of incident onset or discovery, and notification to appropriate corporate Crisis Management Support Team.

16.7 Incident Root Cause Analysis

The accident analysis is essential if all causes of the incident are to be identified for the correct remedial actions to be taken to prevent the same and similar type of incident from recurring. The investigation team will consist of the SSC (with support from the HSM), appropriate subcontractor personnel as necessary, the PM, and the responsible supervisor. More participants may be involved as needed to complete the investigation.

The Root Cause Analysis Form must be completed for all Loss Incidents and Near Loss Incidents. This form must be submitted to the investigation team for review.

For minor losses or near losses, the information may be gathered by the supervisor or other personnel immediately following the loss. Based on the complexity of the situation, this information may be all that is necessary to enable the investigation team to analyze the loss, determine the root cause, and develop recommendations. More complex situations may require the investigation team to revisit the loss site or re-interview key witnesses to obtain answers to questions that may arise during the investigation process.

Photographs or videotapes of the scene and damaged equipment should be taken from all sides and from various distances. This point is especially important when the investigation team will not be able to review the loss scene.

The investigation team must use the Root Cause Analysis Flow Chart to assist in identifying the root cause(s) of a loss. Any loss may have one or more root causes and contributing factors. The root cause is the primary or immediate cause of the incident, while a contributing factor is a condition or event that contributes to the incident happening, but is not the primary cause of the incident. Root causes and contributing factors that relate to the person involved in the loss, his or her peers, or the supervisor should be referred to as "personal factors." Causes that pertain to the system within which the loss or injury occurred should be referred to as "job factors."

16.7.1 Personal Factors

- Lack of skill or knowledge
- Correct way takes more time and/or requires more effort
- Short-cutting standard procedures is positively reinforced or tolerated
- Person thinks there is no personal benefit to always doing the job according to standards

16.7.2 Job Factors

- Lack of or inadequate operational procedures or work standards
- Inadequate communication of expectations regarding procedures or standards
- Inadequate tools or equipment

The root cause(s) could be any one or a combination of these seven possibilities or some other uncontrollable factor. In the vast majority of losses, the root cause is very much related to one or more of these seven factors. Uncontrollable factors should be used rarely and only after a thorough review eliminates all seven other factors.

16.7.3 Corrective Actions

Include all corrective actions taken or those that should be taken to prevent recurrence of the incident. Include the specific actions to be taken, the employer and personnel responsible for implementing the actions, and a timeframe for completion. Be sure the corrective actions address the causes.

Once the investigation report has been completed, the PM shall hold a review meeting to discuss the incident and provide recommendations. The responsible supervisors shall be assigned to carry out the recommendations, and shall inform the SC upon successful implementation of all recommended actions.

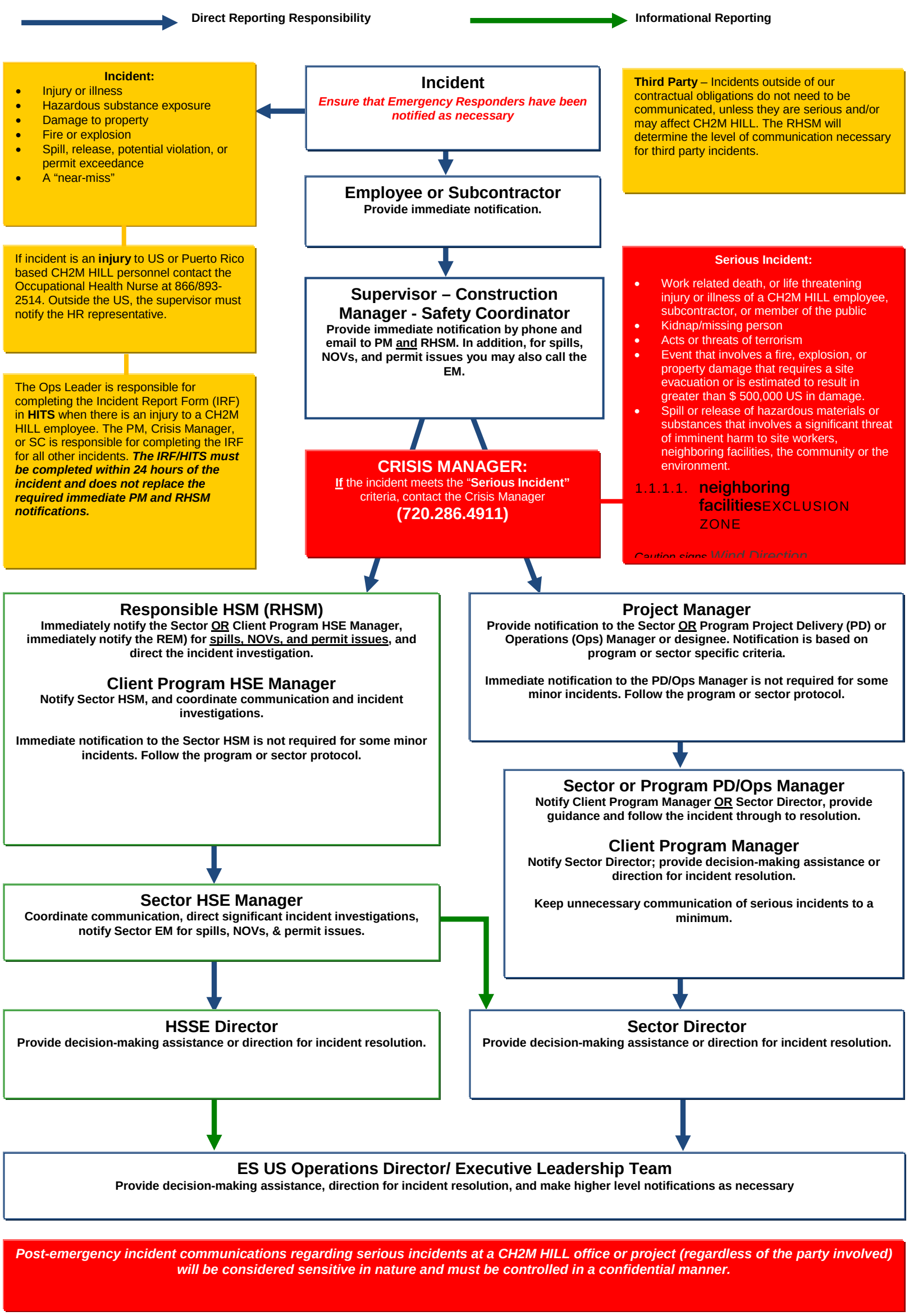
The RHSM will inform the Responsible Environmental Manager (REM) of any environmental incidents.

Evaluation and follow-up of the IRF will be completed by the type of incident by the RHSM, REM, or FWSO. The Business Group (BG) HSE Lead will review all BG incidents and modify as required.

Incident Investigations must be initiated and completed as soon as possible but no later than 72 hours after the incident.

Note: See the following Incident Notification flowcharts

ESBG US Operations
Incident Reporting Flow Diagram



Post-emergency incident communications regarding serious incidents at a CH2M HILL office or project (regardless of the party involved) will be considered sensitive in nature and must be controlled in a confidential manner.

SECTION 17

Behavioral Based Loss Prevention

Research shows that 90% of incidents are related to unsafe acts and 10 percent are related to unsafe conditions. This means 90 percent of incidents are self inflicted.

A Behavior Based Loss Prevention System (BBLPS) is a system to prevent or reduce losses using behavior-based tools and proven management techniques to focus on behaviors or acts that could lead to losses.

The four basic Loss Prevention tools that will be used during this project to implement the BBLPS include:

- AHA
- PTSP
- SWO
- Loss and Near Loss Investigations (LNLI)

The Site Supervisor serves as the SSC and is responsible for implementing the BBLPS on this site. When a separate individual is assigned as the SSC, the SSC is delegated authority from the Site Supervisor to implement the BBLPS on the project site, but the Site Supervisor remains accountable for its implementation. The Site Supervisor/SSC shall only oversee the subcontractor's implementation of their AHAs and PTSPs processes on the project.

17.1 Activity Hazard Analysis

An AHA defines the activity being performed, the hazards posed and control measures required to perform the work safely. Workers are briefed on the AHA before doing the work and their input is solicited prior, during and after the performance of work to further identify the hazards posed and control measures required.

The Project AHAs are provided in Attachment 8. The AHAs identify the work tasks required to perform each activity, along with potential H&S hazards and recommended control measures for each work task. In addition, a listing of the equipment to be used to perform the activity, inspection requirements and training requirements for the safe operation of the equipment listed must be identified.

AHAs are prepared for all field activities performed by CH2M HILL and subcontractors during the course of the project by the Site Supervisor/SSC. The Project-Specific and General Hazards of the SSHP, the Task Hazard Analysis Table, and applicable CH2M HILL SOPs are used as a basis for preparing CH2M HILL's AHAs.

CH2M HILL subcontractors are required to provide AHAs specific to their scope of work on the project for acceptance by CH2M HILL. Each subcontractor shall submit AHAs for their field activities, as defined in their work plan/scope of work, along with their project-specific SSHP. Additions or changes in CH2M HILL or subcontractor field activities, equipment, tools or material to perform work or additional/different hazard encountered that require additional/different hazard control measures requires either a new AHA to be prepared or an existing AHA to be revised.

17.2 Pre-Task Safety Plans

Daily safety meetings shall be held with all project personnel in attendance to review the hazards posed and required H&S procedures/AHAs that apply for each day's project activities. The PTSPs serve the same purpose as these general assembly safety meetings, but the PTSPs are held between the crew supervisor and their work crews to focus on those hazards posed to individual work crews. At the start of each day's activities, the crew supervisor completes the PTSP, provided in Attachment 9, with input from the work crew, during their daily safety meeting. The day's tasks, personnel, tools and equipment that will be used to perform these tasks are listed, along with the hazards posed and required H&S procedures, as identified in the AHA. The use of PTSPs better promotes worker participation in the hazard recognition and control process, while reinforcing the task-specific hazard and required H&S procedures with the crew each day. The use of PTSPs is a common safety practice in the construction industry.

17.3 Safe Work Observations

SWOs shall be conducted by Site Supervisor/SSC for specific work tasks or operations comparing the actual work process against established safe work procedures identified in this SSHP and AHAs. SWOs are a tool to be used by supervisors to provide positive reinforcement for work practices performed correctly, while also identifying and eliminating deviations from safe work procedures that could result in a loss. Site Supervisor/SSC shall perform at least one SWO each week for tasks/operations addressed in this SSHP and AHAs. The Site Supervisor/SSC shall complete the SWO form in Attachment 10 for the task/operation being observed.

17.4 Loss/Near Loss Investigations

LNLIs shall be performed for the all CH2M HILL and subcontractor incidents involving:

- Person injuries/illnesses and near miss injuries
- Equipment/property damage
- Spills, leaks, regulatory violations
- Motor vehicle accidents

The causes of loss and near loss incidents are similar, so by identifying and correcting the causes of near loss causes, future loss incidents may be prevented. The following is the LNLI Process:

- Gather all relevant facts, focusing on fact-finding, not fault-finding, while answering the who, what, when, where, and how questions.
- Draw conclusions, pitting facts together into a probable scenario.
- Determine incident root cause(s), which are basic causes on why an unsafe act/condition existed.
- Develop and implement solutions, matching all identified root causes with solutions.
- Communicate incident as a Lesson Learned to all project personnel.
- File follow-up on implemented corrective active action to confirm solution is appropriate.

Site Supervisors/SSC shall perform an incident investigation, as soon as practical after incident occurrence during the day of the incident, for all Loss and Near Loss Incidents that occur on the project. Loss and Near Loss incident investigations shall be performed using the following incident investigation forms provided in Attachment 11:

- IRF
- Root Cause Analysis Form

All Loss and Near Loss incident involving personal injury, property damage or near loss incidents that could have resulted in serious consequences shall be investigated by completing the incident investigation forms and submitting them to the PM and HSM within 24 hours of incident occurrence. A preliminary Incident Investigation and Root Cause Analysis shall be submitted to the PM and HSM within 24 hours of incident occurs. The final Incident Investigation and Root Cause Analysis shall be submitted after completing a comprehensive investigation of the incident.

Attachments

Attachment 1:	Employee Signoff Sheet
Attachment 2:	Project-Specific Chemical Product Hazard Communication Form
Attachment 3:	Chemical Specific Training Form
Attachment 4:	Emergency Contacts List and Emergency Response Plan
Attachment 5:	Project Activity Self-Assessment Checklists
Attachment 6:	Project-Specific Material Safety Data Sheets
Attachment 7:	Initial Medical Treatment Form
Attachment 8:	Project Activity Hazard Analyses
Attachment 9:	Pre-Task Safety Plan
Attachment 10:	Safe Work Observation Form
Attachment 11:	Loss/Near-Loss Investigations
Attachment 12:	Equipment Inspection Form
Attachment 13:	Agency Inspection Target Zero Bulletin
Attachment 14:	Chemical Fact Sheet

Employee Signoff Sheet

CH2MHILL

EMPLOYEE SIGNOFF FORM

Health and Safety Plan

The CH2M HILL project employees and subcontractors listed below have been provided with a copy of this SSHP, have read and understood it, and agree to abide by its provisions.

Project Name:		Project Number:	
EMPLOYEE NAME (Please print)	EMPLOYEE SIGNATURE	COMPANY	DATE

Project-Specific Chemical Product Hazard Communication Form

CH2MHILL

Project-Specific Chemical Product Hazard Communication Form

This form must be completed prior to performing activities that expose personnel to hazardous chemicals products. Upon completion of this form, the SSC shall verify that training is provided on the hazards associated with these chemicals and the control measures to be used to prevent exposure to CH2M HILL and subcontractor personnel. Labeling and MSDS systems will also be explained.

Project Name: **Project Number:**

MSDSs will be maintained at the following location(s):

Hazardous Chemical Products Inventory

Chemical	Quantity	Chemical	Quantity	Chemical	

Chemical Specific Training Form

CH2MHILL

CHEMICAL-SPECIFIC TRAINING FORM

Location:	Project #:
HCC:	Trainer:

TRAINING PARTICIPANTS:

NAME	SIGNATURE	NAME	SIGNATURE

REGULATED PRODUCTS/TASKS COVERED BY THIS TRAINING:

The HCC shall use the product MSDS to provide the following information concerning each of the products listed above.

- ☐ Physical and health hazards
- ☐ Control measures that can be used to provide protection (including appropriate work practices, emergency procedures, and personal protective equipment to be used)
- ☐ Methods and observations used to detect the presence or release of the regulated product in the workplace (including periodic monitoring, continuous monitoring devices, visual appearance or odor of regulated product when being released, etc.)

Training participants shall have the opportunity to ask questions concerning these products and, upon completion of this training, will understand the product hazards and appropriate control measures available for their protection.

Copies of MSDSs, chemical inventories, and CH2M HILL's written hazard communication program shall be made available for employee review in the facility/project hazard communication file.

Emergency Contacts List and Emergency Response Plan

Emergency Contacts

24-hour CH2M HILL Serious Incident Reporting Contact/Pager – 720-286-4911

If injured on the job, notify your supervisor and then call 1-866-893-2514 to contact CH2MHILL's Occupational Nurse

Medical Emergency – Site Escort will contact emergency response while in the HPDTA boundary

When outside of the HPDTA boundary
Local Ambulance #: 252-465-9939

Note: Do not call 911 while in the HPDTA boundary.

CH2M HILL Medical Consultant
CH2M HILL- Medical Consultant
WorkCare
Dr. Peter Greaney M.D.
300 S. Harbor Blvd, Suite 600
Anaheim , CA 92805
800-455-6155
714-978-7488

Fire/Spill Emergency – Site Escort will contact emergency response while in the HPDTA boundary

When outside of the HPDTA boundary
Local Fire Dept #: 252-264-2047

CH2M HILL Director Security Operations
Thomas Horton/DEN
720/273-3100 (cell) or 720/286-0022 (office)

Security & Police – Site Escort will contact security and police while in the HPDTA boundary

When outside of the HPDTA boundary
Local Police #: 252-426-5615

CH2M HILL Regional Health, Safety & Environmental Manager
Name: Mark Orman
Phone: 414-847-0597

Utilities Emergency
Site Escort will contact utilities emergency response while in the HPDTA boundary

CH2M HILL Regional Environmental Compliance Coordinator
Name: Hope Wilson/ATL
Phone: 303- 885-9954

Site Safety Coordinator (SSC)
Name: Nate Price
Phone: 336-457-3094

CH2M HILL Human Resources Department
Name: One HR, (online)
Phone: 1-877-586-4411

Project Manager
Name: Janna Staszak/VBO
Phone: 757-671-6256

HPDTA Environmental and Safety Program Manager
Name: Brian Murphy
Phone: 252-426-4360

Federal Express Dangerous Goods Shipping
Phone: 800/238-5355
CH2M HILL Emergency Number for Shipping Dangerous Goods
Phone: 800/255-3924

Worker's Compensation:
Contact Business Group Human Resources (HR) dept. to have form completed or contact Jennifer Rindahl after hours: (720) 891-5382
Automobile Accidents
Rental: Linda Anderson/COR 720/286-2401
CH2M HILL owned vehicle: Linda George 720-286-2057

Contact the Project Manager. Generally, the Project Manager will contact relevant government agencies.

Facility Alarms: Sound Field Vehicle Horn (3x)

Evacuation Assembly Area(s): Field Vehicle

Facility/Site Evacuation Route(s): See Site Map

Hospital Name/Address:
Chowan Hospital
211 Virginia Road
Edenton, NC 27932

Hospital Phone #: 252-482-8451

Directions to Hospital

Head south towards Harvey Point Rd (0.2 mi)
Turn right onto Harvey Point Rd (0.6 mi)
Sharp left to stay on **Harvey Point Rd** (9.1 mi)
Turn left onto **US-17 S/Ocean Hwy S** (11.6 mi)
Take exit **227** for **N Carolina 32** toward **Edenton** (0.3 mi)
Turn left onto **N Carolina 32 S/Virginia Rd** (0.4 mi)

Emergency Response Plans

Emergency Preparedness Training

The emergency response plan will be reviewed during the initial arrival to the jobsite and occasionally during site safety briefings. The briefings should include:

- Emergency procedures for fires, explosions, chemical and vapor releases, personnel injuries, and suspected overexposure as they apply to the site
- Location of onsite emergency equipment and supplies of clean water
- Local emergency contacts, evacuation routes, and assembly points
- Site communication and location of phone and radio nearest
- Names of onsite personnel trained in first-aid and CPR

Emergency Equipment and Supplies

The SSC will verify that these supplies are available, as needed, and in proper working order, and mark the locations of emergency equipment on the site map when a map is provided.

Emergency Equipment and Supplies

Emergency Equipment and Supplies	Location
2 fire extinguishers (A, B, and C classes)	Field vehicle
First aid kit	Field vehicle
Eye wash	Field vehicle
Potable water	Field vehicle
Blood-borne pathogen kit	Field vehicle
Additional equipment (specify): Cell phone	SSC

Incident Response

In fires, explosions, or chemical releases, actions to be taken include the following:

- Shut down operations and evacuate the immediate area
- Notify the SSC and PM by the fastest means available.
- Account for personnel at the designated assembly area(s)
- Assess the need for site evacuation, and evacuate the site as warranted
- Instead of implementing a work-area evacuation, note that small fires or spills posing minimal safety or health hazards may be controlled

Emergency Medical Treatment

The procedures listed below may also be applied to nonemergency incidents. Injuries and illnesses (including overexposure to contaminants) must be reported to CH2M HILL HSM/Human Resources. If there is doubt about whether medical treatment is necessary, or if the injured person is reluctant to accept medical treatment, contact the CH2M HILL medical consultant (see Emergency Contacts List in Attachment 4). During non-emergencies, follow these procedures as appropriate.

- The site escort will notify the appropriate emergency response authorities.

- The SSC will assume charge during a medical emergency until the ambulance arrives or until the injured person is admitted to the emergency room.
- Prevent further injury.
- Initiate first aid and CPR (if needed) where feasible.
- Get medical attention immediately.
- Perform decontamination where feasible; lifesaving and first aid or medical treatment take priority.
- Make certain that the injured person is accompanied to the emergency room.
- When contacting the medical consultant, state that the situation is a CH2M HILL matter, and give your name and telephone number, the name of the injured person, the extent of the injury or exposure, and the name and location of the medical facility where the injured person was taken.

Evacuation Procedures

- Evacuation routes and assembly areas will be designated by the SSC before work begins.
- Personnel will assemble at the assembly area(s) upon hearing the emergency signal for evacuation.
- The SSC and a "buddy" will remain on the site after the site has been evacuated (if safe) to inform local responders of the nature and location of the incident.
- Each supervisor will account for their personnel at the assembly area, and report to the PM or CSP/HSM that either all personnel are accounted for, or the number of personnel who are unaccounted.
- The SSC will write up the incident as soon as possible after it occurs and submit a report to the PM and/or CSP/HSM.

Evacuation Signals

Signal	Meaning
Grasping throat with hand	Emergency-help me.
Thumbs up	OK; understood.
Grasping buddy's wrist	Leave area now.
Continuous sounding of horn	Emergency; leave site now.

Firefighting Plan

(References: Section 01.E.01 & 06.A.02, EM 385-1-1 and CH2M HILL SOP HSE-208, *Fire Prevention*)

The decision on whether or not to try to extinguish a fire using available site personnel and equipment will be made by the SSC, and is based on whether the fire is small or large, and involves explosives or flammable liquids/gases.

Location of Fire Extinguishers

Fire extinguishers will be located around the project sites as required. These will be located in the following places at a minimum:

- In each vehicle
- Near areas where flammable materials are stored or in use
- Locations where HOT Work permits are in place

All fire extinguishers will be kept clearly visible, marked, and placed where they are easily accessible.

Project Activity Self-Assessment Checklists

CH2MHILL

HS&E Self-Assessment Checklist -Vinyl Chloride

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI. This checklist is to be used at locations where CH2M HILL employees are exposed to vinyl chloride, or are required to perform oversight of a subcontractor whose personnel are exposed to vinyl chloride.

CH2M HILL staff shall not direct the means and methods of subcontractor vinyl chloride activities nor direct the details of appropriate corrective actions. The subcontractor must determine how to correct deficiencies and CH2M HILL staff must carefully rely on their expertise. Conditions considered to be imminently dangerous (possibility of serious injury or death) must be corrected immediately or all exposed personnel must be removed from the hazard until corrected.

Project Name: _____ Project No.: _____

Location: _____ PM:

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

☐ Evaluate CH2M HILL compliance with its Vinyl Chloride program (SOP HSE-512)

☐ Evaluate a CH2M HILL subcontractor's compliance with its Vinyl Chloride program

Subcontractors Name: _____

- Check "Yes" if an assessment item is complete/correct
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable
- Check "N/O" if an item is applicable but was not observed during the assessment

SECTION 1

	Yes	No	N/A	N/O
PERSONNEL SAFE WORK PRACTICES (5.1)				
COMPLIANCE PROGRAM (5.1.1)				
1. A written compliance program is established for work above the PEL.	☐	☐	☐	☐
2. The compliance program includes means of maintaining exposures below the PEL	☐	☐	☐	☐
3. The compliance program is based on the most recent air monitoring results.	☐	☐	☐	☐
4. Written compliance program is available to all affected employees.	☐	☐	☐	☐
5. Waste generated must be determined if considered hazardous waste.	☐	☐	☐	☐
EMPLOYEE INFORMATION (5.1.2)				
6. CH2M HILL personnel have completed the Vinyl Chloride Training Module.	☐	☐	☐	☐
7. Training on the Fact Sheet, HSP/FSI and OSHA standard has been met.	☐	☐	☐	☐
8. The selection of the appropriate respirator is based on the airborne vinyl concentration.	☐	☐	☐	☐
9. Written or verbal notification to owners, contractors or other personnel working in the area of vinyl chloride work activities.	☐	☐	☐	☐
10. Storage, waste or shipping containers have been properly labeled	☐	☐	☐	☐

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	Yes	No	N/A	N/O
REGULATED AREAS (5.1.3)				
11. Areas that exceed the PELs (TWA or STEL) have been designated as regulated areas.	☐	☐	☐	☐
12. Personnel do not enter regulated areas unless they meet training, medical and PPE requirements	☐	☐	☐	☐
13. Warning signs have been posted at all entrances to the regulated areas.	☐	☐	☐	☐
Exposure Assessment (5.2)				
14. Initial air monitoring (TWA & STEL) conducted over full shift for each job classification	☐	☐	☐	☐
15. Air monitoring has been repeated when a change in production or controls occurred.	☐	☐	☐	☐
16. Personnel exhibiting signs of exposure have been monitored.	☐	☐	☐	☐
17. EL> AL have been resampled in the last 6 months.	☐	☐	☐	☐
18. EL $\geq$ PEL have been resampled in the 3 months.	☐	☐	☐	☐
19. Air monitoring results above the STEL have been resampled according to frequency established by RHSM.	☐	☐	☐	☐
20. Employees are given opportunities to observe monitoring	☐	☐	☐	☐
21. Relevant employees are notified within 15 days in writing of the results of monitoring.	☐	☐	☐	☐
CONTROL METHODS (5.3)				
ENGINEERING AND WORK PRACTICE CONTROLS (5.3.1)				
22. Engineering controls and work practices are implemented to reduce exposures to below the PEL.	☐	☐	☐	☐
23. Engineering and work practices are implemented to achieve the lowest feasible exposures.	☐	☐	☐	☐
24. Employees are not allowed to eat, drink or smoke in regulated areas.	☐	☐	☐	☐
25. Action plans have been developed to respond to spills.	☐	☐	☐	☐
26. Employees responding to spills have been trained and supplied with PPE	☐	☐	☐	☐
27. Vinyl chloride-contaminated waste is properly handled.	☐	☐	☐	☐
RESPIRATORY PROTECTION (5.3.2)				
28. Respirators are used in areas where EL $\geq$ PEL.	☐	☐	☐	☐
29. A written respiratory protection program is in place where respirators are used.	☐	☐	☐	☐
30. Cartridges changed based on change schedule or at the beginning of each shift.	☐	☐	☐	☐
Personal Protective Equipment (5.3.3)				
31. PPE is provided by the employer at no cost to employees.	☐	☐	☐	☐
32. PPE is selected based on the materials, conditions, and hazards present.	☐	☐	☐	☐
33. PPE is provided clean and dry for each use	☐	☐	☐	☐
34. Personnel who clean or launder protective clothing are informed in writing of the hazards.	☐	☐	☐	☐

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SECTION 3

Complete this section for all items checked "No' in Sections 1 or 2. Deficient items must be corrected in a timely manner.

Item #	Corrective Action Planned/Taken	Date Corrected

Auditor: ________________________________ Project Manager: ___________________________

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CH2MHILL

Contracts and Subcontracts
Standard Operating Procedure HSE-215
Attachment: Subcontracting Checklist

Subcontracting Checklist

	Yes	No	N/A	Delegated To	Approved	Comments	Initials
Bid Package							
Insurance limits							
Bonding requirements							
Scope of work							
Training responsibilities/requirements							
Project HS&E Plan							
Work plan submittal requirements							
HSE Questionnaire							
Drug-free program (CCI/contract required)							
Contractor license (if required)							
Subcontract Documents:							
H&S review/modify project-specific T&Cs							
Verify HS&E roles/responsibilities defined							
Flow-downs included/incorporated							
Lower-tiered Subcontractors							
Acceptable documentation of flow-down							
Prior to Award							
HSE Questionnaire approved							
Prior to Notice to Proceed							
HSE procedures approved							
Acceptable Training Documentation							
Acceptable Medical Documentation							
Drug-free program submitted (CCI only)							
During Execution							
Self-assessment completed per schedule							
Comply with HSE regulations							
Oversee SC if needed							

Attachment: PPE Inspection Checklist

CH2MHILL

HS&E Self-Assessment Checklist: PPERSONAL PROTECTIVE EQUIPMENT

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI.

This checklist is to be used at locations where CH2M HILL employees are required to wear PPE or are required to perform oversight of a subcontractor using PPE or both.

CH2M HILL staff shall not direct the means and methods of subcontractor use of PPE nor direct the details of corrective actions. The subcontractor must determine how to correct deficiencies and CH2M HILL staff must carefully rely on their expertise. Conditions considered to be imminently dangerous (possibility of serious injury or death) must be corrected immediately or all exposed personnel must be removed from the hazard until corrected.

Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to (check only one of the boxes below):

☐ Evaluate CH2M HILL compliance with its PPE program (SOP HSE-117)
☐ Evaluate a CH2M HILL subcontractor's compliance with its PPE program
Subcontractor's Name: _____

Check the appropriate box, as follows:

- Check "Yes" if an assessment item is complete or correct.
- Check "No" if an item is incomplete or deficient. Section 2 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HSE-121.

SECTION 1	**Yes**	**No**	**N/A**	**N/O**
GENERAL				
1. Required PPE listed in HSP FSI or AHA.	☐	☐	☐	☐
2. PPE available for use by employees.	☐	☐	☐	☐
3. PPE cleaning supplies available for use.	☐	☐	☐	☐
4. PPE stored appropriately to prevent deformation or distortion.	☐	☐	☐	☐
5. PPE written certification has been completed.	☐	☐	☐	☐
EYEWEAR (Glasses/Goggles/Face Shields)				
6 Eyewear cleaning supplies available.	☐	☐	☐	☐
7 Safety glasses in good condition and lenses free of scratches.	☐	☐	☐	☐
8 Goggles adjustment strap not cracked or frayed, not deformed, or lenses not scratched.	☐	☐	☐	☐
9. Face shields in good condition, including adjustment band, and free of scratches or chips.	☐	☐	☐	☐

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CH2MHILL

HS&E Self-Assessment Checklist: PERSONAL PROTECTIVE EQUIPMENT

SECTION 1 (Continued)	**Yes**	**No**	**N/A**	**N/O**
HEAD PROTECTION				
10. Hard hat bill and suspension attached as allowed by manufacturer.	☐	☐	☐	☐
11. Shell is pliable, free of dents, cracks, nicks, or any damage due to impact.	☐	☐	☐	☐
12. Suspension maintained at 1.25 inches from inside of shell.	☐	☐	☐	☐
13. Suspension free of cuts or fraying, torn headband, adjustment strap workable.	☐	☐	☐	☐
14. Electrical hard hat matched to hazard classification.	☐	☐	☐	☐
15. Dated to determine whether within manufacturer's allowable 5-year use time period.	☐	☐	☐	☐
HAND PROTECTION				
16. Available in sizes matched to employee.	☐	☐	☐	☐
17. Gloves free of rips tears, abrasions, or holes.	☐	☐	☐	☐
18. Matched to manufacturer's specification for chemicals used onsite.	☐	☐	☐	☐
19. Electrical gloves matched to hazard and periodically inspected for insulating rating.	☐	☐	☐	☐
20. Maintained in a clean and sanitary condition, decontaminated or disposed properly.	☐	☐	☐	☐
BODY PROTECTION				
21. Available in sizes matched to employee.	☐	☐	☐	☐
22. Maintained in a clean and sanitary condition, decontaminated or disposed properly.	☐	☐	☐	☐
23. Vapor-tight fully encapsulated suits tested at required periodic intervals.	☐	☐	☐	☐
24. Flame-resistant clothing matched to electrical hazard and arc flash rating.	☐	☐	☐	☐
25 Welding gear matched to degree of hazard and free of cuts, tears or burn holes.	☐	☐	☐	☐
26 Flotation gear available for work near or on water and in good condition.	☐	☐	☐	☐
HOT AND COLD BODY PROTECTION				
27 Cooling gear available based on degree of heat stress hazard.	☐	☐	☐	☐
28 Cooling gear in operable, clean, and sanitary condition.	☐	☐	☐	☐
29 Cold-weather gear provided based on needs assessment.	☐	☐	☐	☐
30. Cold-weather gear available in sizes to match employees.	☐	☐	☐	☐
31 Cold-weather gear is in free of tears, rips, or holes and in maintained in a clean condition.	☐	☐	☐	☐
TRAINING				
32 Initial PPE training completed by employees.	☐	☐	☐	☐
33 Training conducted when new types or styles of PPE are issued.	☐	☐	☐	☐
34 PPE selection, use, and maintenance reviewed at daily safety briefings.	☐	☐	☐	☐

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SECTION 2

Complete this section for all items checked "No" in Section 1. Deficient items must be corrected in a timely manner.

Item #	Corrective Action Planned or Taken	Date Corrected

Auditor: ________________________________ Project Manager: ___________________________________

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Attachment: Self-Assessment Checklist—Manual Lifting

CH2MHILL

HSE Self-Assessment Checklist—Lifting

This checklist shall be used **only** by CH2M HILL personnel and shall be completed at the frequency specified in the project's HSP/FSI.

This checklist is to be used at locations where: (1) CH2M HILL employees perform manual lifting activities (office or projects), and/or (2) CH2M HILL provides oversight of a subcontractor performing manual lifting activities. SC or Office Safety Coordinators/Committee members may consult with subcontractors (if applicable) when completing this checklist but shall not direct the means and methods of activities nor direct the details of corrective actions. Subcontractors shall determine how to correct deficiencies, and we must carefully rely on their expertise. Conditions considered imminently dangerous (possibility of serious injury or death) shall be corrected immediately or all exposed personnel shall be removed from the hazardous area until corrected.
Complete the appropriate project or office information:

Project Information
Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

Office Information
Office Location: _____
Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:
☐ Evaluate CH2M HILL employee manual lifting activities.
☐ Evaluate a CH2M HILL subcontractor's manual lifting activities.
Subcontractor Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the subcontractor.
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HSE-112.

Planning Activities	**Yes**	**No**	**N/A**	**N/O**
1. Efforts have been made to inquire about receiving equipment or supplies in containers weighting less than 50 pounds (23 kilograms).	o	o	o	o
2. Equipment or supplies are being delivered as close as possible to their use point.	o	o	o	o
3. Heavy equipment or supplies are being stored off the ground and no lower than knee height.	o	o	o	o
4. Adequate space has been provided to access and lift equipment or supplies without reaching or twisting.	o	o	o	o

Safe Work Practices (5.1)	**Yes**	**No**	**N/A**	**N/O**
5. Tasks or activities have been modified to reduce or minimize manual lifting.	o	o	o	o
6. All employees performing manual lifting have received training on how to lift safely.	o	o	o	o

7. Manual lifting control measures are evaluated during assessments.	o	o	o	o
8. Manual lifting incidents are reviewed as part of the HSE Program reviews.	o	o	o	o
9. Manual lifting incidents are reviewed as part of the HSE Program reviews.	o	o	o	o
Office Environments (5.1.1)	**Yes**	**No**	**N/A**	**N/O**
10. Employees have received lifting training.	o	o	o	o
11. Mechanical devices are readily available to employees handling equipment or supplies weighing more than 40 pounds (18 kilograms).	o	o	o	o
Field Projects (5.1.2)	**Yes**	**No**	**N/A**	**N/O**
12. All manual lifting tasks or activities have been addressed in the written site safety plan.	o	o	o	o
13. Employees have received safe lifting training as required by the written site safety plan.	o	o	o	o
Mechanical Lifting (5.2)	**Yes**	**No**	**N/A**	**N/O**
14. Hand trucks and trolleys are visually inspected before use.	o	o	o	o
15. Hand trucks and trolleys do not have any broken or damaged parts.	o	o	o	o
16. Hand truck and trolley paths are free of uneven surfaces, water, oil, or cracks and holes.	o	o	o	o
17. Loads carried by hand trucks are balanced and sturdy.	o	o	o	o
18. Hand trucks or dollies are being pushed when on level ground.	o	o	o	o
19. When going up or down a slope using a hand truck or trolley, the load is downslope of the person.	o	o	o	o
20. Employees using hand trucks or dollies are moving slowly and cautiously.	o	o	o	o
21. Employees using hand trucks or trolleys are able to see over the load.	o	o	o	o
Assisted Lifting (5.3)	**Yes**	**No**	**N/A**	**N/O**
22. Personnel are not performing manual lifting beyond their physical capabilities.	o	o	o	o
23. Loads are evenly distributed when being handled by multiple people.	o	o	o	o
Manual Lifting (5.4)	**Yes**	**No**	**N/A**	**N/O**
24. Before the lift, the load and path was assessed.	o	o	o	o
25. Loads being lifted are free of sharp edges, slivers, or wet or greasy spots.	o	o	o	o
26. Gloves are used for manual lifts of loads with sharp or splintered edges.	o	o	o	o
27. Employees performing manual lifts use the proper lifting techniques.	o	o	o	o
28. Special tools fabricated for lifting grates or manhole covers are used.	o	o	o	o

Item #	Corrective Action Planned/Taken	Date Corrected

Auditor: _____ Project Manager: _____

CH2MHILL

HS&E Self-Assessment Checklist: HEARING CONSERVATION

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI. This checklist is to be used at locations where CH2M HILL employees are required to wear hearing protection or are required to perform oversight of a subcontractor using hearing protection or both.

CH2M HILL staff shall not direct the means and methods of subcontractor use of hearing protection nor direct the details of appropriate corrective actions. The subcontractor must determine how to correct deficiencies and CH2M HILL staff must carefully rely on their expertise. Conditions considered to be imminently dangerous (possibility of serious injury or death) must be corrected immediately or all exposed personnel must be removed from the hazard until corrected.

Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to (check only one of the boxes below):

☐ Evaluate CH2M HILL compliance with its Hearing Protection program (SOP HSQ-108)
☐ Evaluate a CH2M HILL subcontractor's compliance with its Hearing Conservation program
Subcontractor's Name: _____

- Check "Yes" if an assessment item is complete or correct.

Check "No" if an item is incomplete or deficient. Section 2 must be completed for all items checked "No."

- Check "N/A" if an item is not applicable.

- Check "N/O" if an item is applicable but was not observed during the assessment.

SECTION 1	Yes	No	N/A	N/O
NOISE ASSESSMENT				
1. Employee must shout to converse – conduct hearing assessment				
2. A noise survey has been performed	☐	☐	☐	☐
3. All affected employees are included in the sampling strategy	☐	☐	☐	☐
4. Instruments used to conduct noise survey have been calibrated	☐	☐	☐	☐
5. Survey results have been provided to affected employees	☐	☐	☐	☐
6. The employer maintains copies of noise surveys for at least two years	☐	☐	☐	☐
GENERAL				
7. Hearing protection required if employee must shout to converse	☐	☐	☐	☐
8. Required hearing protection listed in HSP, FSI, or AHA	☐	☐	☐	☐
9. Hearing protection available for use by employees	☐	☐	☐	☐
10. Hearing protection stored appropriately to prevent deformation or distortion	☐	☐	☐	☐
11. Prior to insertion, users' hands/fingers are in a clean/sanitary condition	☐	☐	☐	☐
12. Hearing protection is maintained in a clean and sanitary condition	☐	☐	☐	☐
13. Damaged hearing protection is not used	☐	☐	☐	☐
14. Signs are posted warning employees of the areas requiring hearing protection	☐	☐	☐	☐

	Yes	No	N/A	N/O
NOISE ATTENTUATION cont.'				
15. After NRR is calculated, hearing protection chosen is appropriate for noise levels	☐	☐	☐	☐
16. If noise levels change, NRR is recalculated to ensure appropriate hearing protection is provided	☐	☐	☐	☐
ENGINEEERING CONTROLS				
17. Engineering controls can be used to minimize noise exposure to personnel	☐	☐	☐	☐
18. Are engineering management controls available to reduce the noise exposure	☐	☐	☐	☐
19. If technically/economically feasible, client authorizes implementation of engineering controls	☐	☐	☐	☐
ADMINISTRATIVE CONTROLS				
20. Employees can be rotated to further reduce exposure	☐	☐	☐	☐
21. Work assignments/tasks can be moved out of the high noise level areas	☐	☐	☐	☐
HEARING PROTECTION DEVICES				
22. Hearing protection selected is appropriate for the job	☐	☐	☐	☐
23. Hearing protection selected does not interfere with the task	☐	☐	☐	☐
24. Hearing protector seals are intact and have an effective seal on the users	☐	☐	☐	☐
25. Hearing protection selected fits the users	☐	☐	☐	☐
26. Hearing protection selected is appropriate for the job	☐	☐	☐	☐
27. Hearing protection selected attenuates noise to below 90 dBA	☐	☐	☐	☐
MEDICAL/AUDIOGRAMS				
28. All employees assigned to high noise areas have received their baseline audiogram	☐	☐	☐	☐
29. All employees assigned to high noise areas have received an annual audiogram	☐	☐	☐	☐
30. Has an employee suffered a standard threshold shift in their latest audiogram	☐	☐	☐	☐
TRAINING				
31. Employees have been provided with appropriate training regarding the effects of noise on hearing	☐	☐	☐	☐
32. Employees have been provided with appropriate training regarding the hearing protection devices	☐	☐	☐	☐
33. Employees have been provided with annual training indicating the purpose of hearing protectors	☐	☐	☐	☐
34. Affected employees have been provided with annual training.	☐	☐	☐	☐

SECTION 2

Complete this section for all items checked “No” in Section 1. Deficient items must be corrected in a timely manner.

Item #	Corrective Action Planned or Taken	Date Corrected

Auditor: ________________________________ Project Manager: ___________________________________

Attachment: HS&E Self-Assessment Checklist—Excavations

This checklist shall be used by CH2M HILL personnel only and shall be completed at the frequency specified in the project's Health and Safety Plan/Field Safety Instruction (HSP/FSI).

This checklist is to be used at locations where: 1) CH2M HILL employees enter excavations (complete Sections 1 and 3), and/or 2) CH2M HILL oversight of an excavation subcontractor is required (complete entire checklist).

The SSC may consult with excavation subcontractors when completing this checklist, but shall not direct the means and methods of excavation operations nor direct the details of corrective actions. Excavation subcontractors shall determine how to correct deficiencies and we must rely on their expertise. Conditions considered imminently dangerous (possibility of serious injury or death) shall be corrected immediately or all exposed personnel shall be removed from the hazardous area until the situation is corrected.

Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

☐ Evaluate CH2M HILL employee exposures to excavation hazards
☐ Evaluate a CH2M HILL subcontractor's compliance with excavation HS&E requirements
Subcontractor Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the excavation subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

SECTION 1	Yes	No	N/A	N/O
EXCAVATION ENTRY REQUIREMENTS (4.1)				
1. Personnel have completed excavation safety training	☐	☐	☐	☐
2. Competent person has completed daily inspection and has authorized entry	☐	☐	☐	☐
3. Personnel are aware of entry requirements established by competent person	☐	☐	☐	☐
4. Protective systems are free from damage and in stable condition	☐	☐	☐	☐
5. Surface objects/structures secured from falling into excavation	☐	☐	☐	☐
6. Potential hazardous atmospheres have been tested and found to be at safe levels	☐	☐	☐	☐
7. Precautions have been taken to prevent cave-in from water accumulation in the excavation	☐	☐	☐	☐
8. Personnel wearing appropriate, PPE per HSP/SI	☐	☐	☐	☐

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SECTION 2	Yes	No	N/A	N/O
GENERAL (4.2.1)				
9. Daily safety briefing/meeting conducted with personnel	☐	☐	☐	☐
10. Excavation and protective systems adequately inspected by competent person	☐	☐	☐	☐
11. Defective protective systems or other unsafe conditions corrected before entry	☐	☐	☐	☐
12. Guardrails provided on walkways over excavation 6 ft (1.8m) or deeper	☐	☐	☐	☐
13. Barriers provided at excavations 6 ft or deeper when excavation not readily visible	☐	☐	☐	☐
14. Barriers or covers provided for wells, pits, shafts, or similar excavation 6 ft (1.8 m) or deeper	☐	☐	☐	☐
15. Earthmoving equipment operated safely (use earthmoving equipment checklist in HSE-306)	☐	☐	☐	☐
PRIOR TO EXCAVATING (4.2.2)				
16. Dig Permit obtained where required by client/facility	☐	☐	☐	☐
17. Location of underground utilities and installations identified	☐	☐	☐	☐
EXCAVATING ACTIVITIES (4.2.3)				
26. Rocks, trees, and other unstable surface objects removed or supported	☐	☐	☐	☐
27. Exposed underground utility lines supported	☐	☐	☐	☐
28. Undermined surface structures supported or determined to be in safe condition	☐	☐	☐	☐
29. Warning system used to remind equipment operators of excavation edge	☐	☐	☐	☐
EXCAVATION ENTRY (4.2.4)				
32. Trenches > 4 ft (1.2 m) deep provided with safe means of egress within 25 ft (7.6 m)	☐	☐	☐	☐
33. Structure ramps designed and approved by competent person	☐	☐	☐	☐
34. Potential hazardous atmospheres tested prior to entry	☐	☐	☐	☐
35. Rescue equipment provided where potential for hazardous atmosphere exists	☐	☐	☐	☐
36. Ventilation used to control hazardous atmosphere and air tested frequently	☐	☐	☐	☐
37. Appropriate respiratory protection used when ventilation does not control hazards	☐	☐	☐	☐
38. Precautions taken to prevent cave-in resulting from water accumulation in excavation	☐	☐	☐	☐
39. Precautions taken to prevent surface water from entering excavation	☐	☐	☐	☐
40. Protection provided from falling/rolling material originating from excavation face	☐	☐	☐	☐
41. Spoil piles, equipment, materials restrained or kept at least 2 ft (61 cm) from excavation edge	☐	☐	☐	☐
EXCAVATION PROTECTIVE SYSTEMS (4.2.5)				
42. Protective systems used for excavations 5 ft (1.5 m) or deeper, unless in stable rock	☐	☐	☐	☐
43. Protective systems for excavation deeper than 20 ft (6.1 m) designed by registered PE	☐	☐	☐	☐
44. If soil unclassified, maximum allowable slope is 34 degrees	☐	☐	☐	☐
45. Protective systems free from damage	☐	☐	☐	☐
46. Protective system used according to manufacturer's recommendations and not subjected to loads exceeding design limits	☐	☐	☐	☐
47. Protective system components securely connected to prevent movement or failure	☐	☐	☐	☐
48. Cave-in protection provided while entering/exiting shielding systems	☐	☐	☐	☐
49. Personnel removed from shielding systems when installed, removed, or if vertical movement	☐	☐	☐	☐

	Yes	No	N/A	N/O
PROTECTIVE SYSTEM REMOVAL AND BACKFILLING (4.2.6)				
50. Protective system removal starts and progresses from excavation bottom	☐	☐	☐	☐
51. Protective systems removed slowly and cautiously	☐	☐	☐	☐
52. Temporary structure supports used if failure of remaining components observed	☐	☐	☐	☐
53. Backfilling takes place immediately after protective system removal	☐	☐	☐	☐

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HSE Self-Assessment Checklist –Excavations

<u>SECTION 3</u>

Complete this section for all items checked “No” in Sections 1 or 2. Deficient items must be corrected in a timely manner.

Item #	Corrective Action Planned/Taken	Date Corrected

Auditor: ___________________________________ Project Manager: _____________________________________

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CH2MHILL

Attachment: HSE Self-Assessment Checklist-Earthmoving Equipment

CH2MHILL

HS&E Self-Assessment Checklist - EARTHMOVING EQUIPMENT

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI.

This checklist is to be used at locations where: 1) CH2M HILL employees are potentially exposed to the hazards of earthmoving equipment operations, 2) CH2M HILL employees are operating earthmoving equipment, and/or 3) CH2M HILL provides oversight of a subcontractor operating earthmoving equipment.

The CH2M HILL Safety Coordinator may consult with subcontractors operating earthmoving equipment when completing this checklist, but shall not direct the means and methods of equipment operations nor direct the details of corrective actions. Earthmoving equipment subcontractors shall determine how to correct deficiencies and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) shall be corrected immediately or all exposed personnel shall be removed from the hazard until corrected.

Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

☐ Evaluate CH2M HILL employee exposures to earthmoving equipment hazards (complete Section 1).
☐ Evaluate CH2M HILL employees operating earthmoving equipment (complete entire checklist).
☐ Evaluate CH2M HILL subcontractor's compliance with earthmoving equipment safety requirements (complete entire checklist). Subcontractors Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the earthmoving equipment subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HSE-306.

SAFE WORK PRACTICES (5.1) **SECTION 1**	**Yes**	**No**	**N/A**	**N/O**
1. Personnel maintaining safe distance from operating equipment	☐	☐	☐	☐
2. Positioning personnel in close proximity to operating equipment is avoided	☐	☐	☐	☐
3. Personnel wearing high-visibility and/or reflective vests when close to operating equipment	☐	☐	☐	☐
4. Personnel approach operating equipment safely	☐	☐	☐	☐
5. Personnel riding only in seats of equipment cab and using seat belts	☐	☐	☐	☐
6. Personnel not positioned under elevated portions of equipment	☐	☐	☐	☐
7. Personnel not positioned under hoisted loads	☐	☐	☐	☐
8. Personnel not hoisted by equipment	☐	☐	☐	☐
9. Personnel do not to approach equipment that has become electrically energized	☐	☐	☐	☐
10. Personnel wearing appropriate PPE, per HSP/FSI	☐	☐	☐	☐

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EQUIPMENT SAFETY REQUIREMENTS PRIOR TO OPERATING EQUIPMENT (5.2.1) SECTION 2	Yes	No	N/A	N/O
11. Only qualified and authorized personnel operating equipment	☐	☐	☐	☐
12. Daily safety briefing/meeting conducted with equipment operators	☐	☐	☐	☐
13. Daily inspection of equipment conducted and documented	☐	☐	☐	☐
14. Modifications and attachments used approved by equipment manufacturer	☐	☐	☐	☐
15. Backup alarm or spotter used when backing equipment	☐	☐	☐	☐
16. Operational horn provided on bi-directional equipment	☐	☐	☐	☐
17. Seat belts are provided and used	☐	☐	☐	☐
18. Rollover protective structures (ROPS) provided	☐	☐	☐	☐
19. Braking system capable of stopping full payload	☐	☐	☐	☐
20. Headlights and taillights operable when additional light required	☐	☐	☐	☐
21. Brake lights in operable condition	☐	☐	☐	☐
22. Cab glass provides no visible distortion to the operator	☐	☐	☐	☐
23. All machine guards are in place	☐	☐	☐	☐
24. Hauling equipment (dump trucks) provided with cab shield or canopy	☐	☐	☐	☐
25. Dump truck beds provided with positive means of support during maintenance or inspection	☐	☐	☐	☐
26. Dump truck operating levers provided with latch to prevent accidental dumping	☐	☐	☐	☐
27. Air monitoring conducted per HSP/FSI for hazardous atmospheres	☐	☐	☐	☐
EQUIPMENT PLACEMENT (5.2.2)				
28. Equipment position on firm/level surface, outriggers used	☐	☐	☐	☐
29. Location of underground utilities identified	☐	☐	☐	☐
30. Safe clearance distance maintained while working under overhead power lines	☐	☐	☐	☐
31. Safe distance is maintained while traveling under power lines	☐	☐	☐	☐
32. Warning system used to remind operator of excavation edge	☐	☐	☐	☐
33. Unattended equipment visibly marked at night	☐	☐	☐	☐
34. Tools lowered/parking brake set when not in use, wheels chocked when parked on incline	☐	☐	☐	☐
EQUIPMENT OPERATION (5.2.3)				
35. Equipment operated on safe roadways and grades	☐	☐	☐	☐
36. Equipment operated at safe speed	☐	☐	☐	☐
37. Operators maintain unobstructed view of travel path	☐	☐	☐	☐
38. Equipment not operated during inclement weather, lightning storms	☐	☐	☐	☐
39. Equipment started and moved safely	☐	☐	☐	☐
40. Operators keep body parts inside cab during operation	☐	☐	☐	☐
41. Vehicle occupants in safe position while loading/unloading	☐	☐	☐	☐
42. Signal person visible to operator when required	☐	☐	☐	☐
43. Equipment used for hoisting done according to equipment manufacturer specifications	☐	☐	☐	☐
44. Lifting and hauling capacities are not exceeded	☐	☐	☐	☐
EQUIPMENT MAINTENANCE (5.2.4)				
45. Defective components repaired immediately	☐	☐	☐	☐
46. Suspended equipment or attachments supported prior to work under or between	☐	☐	☐	☐
47. Lockout/tagout procedures used prior to maintenance	☐	☐	☐	☐
48. Tires on split rims removed using safety tire rack or cage	☐	☐	☐	☐
49. Good housekeeping maintained on and around equipment	☐	☐	☐	

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SECTION 3

Complete this section for all items checked "No" in Sections 1 or 2. Deficient items must be corrected in a timely manner.

Item #	Corrective Action Planned/Taken	Date Corrected

Auditor: _____ Project Manager: _____

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Attachment: HSE Self-Assessment Checklist - Drilling

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's written safety plan.

This checklist is to be used at locations where: 1) CH2M HILL employees are potentially exposed to drilling hazards, 2) CH2M HILL staff are providing support function related to drilling activities, and/or 3) CH2M HILL oversight of a drilling subcontractor is required.

Safety Coordinator may consult with drilling subcontractors when completing this checklist, but shall not direct the means and methods of drilling operations nor direct the details of corrective actions. Drilling subcontractors shall determine how to correct deficiencies and we must carefully rely on their expertise. Items considered being imminently dangerous (possibility of serious injury or death) shall be corrected immediately, or all exposed personnel shall be removed from the hazard until corrected.

Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

☐ Evaluate CH2M HILL employee exposures to drilling hazards (complete Section 1).
☐ Evaluate CH2M HILL support functions related to drilling activities (complete Section 2)
☐ Evaluate a CH2M HILL subcontractor's compliance with drilling safety requirements (complete entire checklist).
Subcontractors Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the drilling subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in SOP HSE-204.

SECTION 1 - SAFE WORK PRACTICES - 5.1

	Yes	No	N/A	N/O
1. Personnel cleared during rig start-up, positioning and setup	☐	☐	☐	☐
2. Personnel clear of rotating parts	☐	☐	☐	☐
3. Personnel not positioned under hoisted loads	☐	☐	☐	☐
4. Loose clothing and jewelry removed	☐	☐	☐	☐
5. Smoking is prohibited around drilling operation	☐	☐	☐	☐
6. Personnel wearing appropriate personal protective equipment (PPE), per HSP or FSI	☐	☐	☐	☐
7. Personnel instructed not to approach equipment that has become electrically energized	☐	☐	☐	☐

SECTION 2 - SUPPORT FUNCTIONS - 5.2

AQUIFER DESIGNATIONS (5.2.1)

8. Aquifer designations determined and BGEM consulted when required.	☐	☐	☐	☐

LOCATION OF UTILITIES (5.2.2)

9. Location of underground and overhead utilities and structures identified	☐	☐	☐	☐
10. Utility company contacted to de-energize/ground power lines due to clearance	☐	☐	☐	☐

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SUPPORRT FUNCTIONS – 5.2 (Continued)

WASTE MANAGEMENT (5.2.3)	**Yes**	**No**	**N/A**	**N/O**
11. Drill cuttings and purge water managed and disposed properly	☐	☐	☐	☐
12. Wastes generated evaluated for proper disposal	☐	☐	☐	☐
13. Appropriate decontamination procedures being followed, per project's written safety plan	☐	☐	☐	☐
DRILLING AT ORDNANCE EXPLOSIVES OR UNEXPLODED ORDNANCE SITES (5.2.4)				
14. MEC plan prepared and approved	☐	☐	☐	☐
15. MEC avoidance provided, routes and boundaries cleared and marked	☐	☐	☐	☐
16. Initial pilot hole established by UXO technician with hand auger	☐	☐	☐	☐
17. Personnel remain inside cleared areas	☐	☐	☐	☐
SECTION 3 - DRILLING SAFETY REQUIREMENTS -5.3				
GENERAL (5.3.1)				
18. Only authorized personnel operating drill rigs	☐	☐	☐	☐
19. Daily safety briefing/meeting conducted with crew	☐	☐	☐	☐
20. Daily inspection of drill rig and equipment conducted before use	☐	☐	☐	☐
21. Good housekeeping maintained on and around rig	☐	☐	☐	☐
SAFETY EQUIPMENT (5.3.2)				
22. Safety-toed boots, hardhats, safety glasses w/side shields, gloves and hearing protection worn	☐	☐	☐	☐
23. Drill rig equipped with fire extinguisher	☐	☐	☐	☐
24. Air monitoring instruments provided when required	☐	☐	☐	☐
25. Reflective/high visibility vests worn when required	☐	☐	☐	☐
26. PPE for protection from chemical hazards worn if required	☐	☐	☐	☐
BURIED UTILITY AND OVERHEAD CLEARANCE (5.3.3)				
27. Location of underground utilities and structures identified, including third party locate	☐	☐	☐	☐
28. 360^0 visual observation conducted	☐	☐	☐	☐
29. Hand digging, air knifing conducted to expose utilities before drilling	☐	☐	☐	☐
30. Safe clearance distance maintained from overhead power lines	☐	☐	☐	☐
31. Power lines de-energized and grounded when safe distances cannot be maintained	☐	☐	☐	☐
DRILL RIG PLACEMENT (5.3.4)				
32. Drilling pad established, when necessary	☐	☐	☐	☐
33. Drill rig leveled and stabilized	☐	☐	☐	☐
34. Additional precautions taken when drilling in restricted areas	☐	☐	☐	☐
35. In Karst topography use remote sensing or geologist review for sinkholes	☐	☐	☐	☐
DRILL RIG TRAVEL (5.3.5)				
36. Rig shut down and mast lowered and secured prior to rig movement	☐	☐	☐	☐
37. Tools and equipment secured prior to rig movement	☐	☐	☐	☐
38. Only personnel seated in cab wearing a seat belt are riding on rig during movement	☐	☐	☐	☐
39. Backup alarm or spotter used when backing rig	☐	☐	☐	☐
40. Spotter used when backing rig in tight or restricted areas or when low clearances exist	☐	☐	☐	☐
41. Safe clearance distance maintained while traveling under overhead power lines	☐	☐	☐	☐
EMERGENCY – CONTACT WITH OVERHEAD OR UNDERGROUND ELECTRICAL LINES (5.3.6)				
42. Personnel understand emergency procedures in the event of contact with overhead or underground electrical lines	☐	☐	☐	☐
DRILL RIG OPERATION (5.3.7)				
43. Drill rig operated in accordance with operators' manual	☐	☐	☐	☐
44. Personnel clear while mast is being raised	☐	☐	☐	☐
45. Kill switch clearly identified, operational, and in reach of the operator control station	☐	☐	☐	☐

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SECTION 3 - DRILLING SAFETY REQUIREMENTS - 5.3 (Continued)

46.	All machine guards are in place	☐	☐	☐	☐
47.	Rig ropes never wrapped around any part of the body	☐	☐	☐	☐
48.	Pressurized lines and hoses secured to prevent whipping hazards	☐	☐	☐	☐
49.	Drilling operation stopped during inclement weather	☐	☐	☐	☐
50.	Air monitoring conducted per written safety plan for hazardous atmospheres	☐	☐	☐	☐
51.	Rig gear boxes placed in neutral when operator not at controls	☐	☐	☐	☐
52.	Operator shuts rig engine down prior to leaving the drill rig vicinity	☐	☐	☐	☐
DRILL RIG SITE CLOSURE (5.3.8)					
53.	Ground openings/holes filled or barricaded	☐	☐	☐	☐
54.	Equipment and tools properly stored	☐	☐	☐	☐
55.	All vehicles locked and keys removed	☐	☐	☐	☐
DRILL RIG MAINTENANCE (5.3.9)					
56.	Rig properly maintained per drilling company's maintenance program and records on-site/available for review	☐	☐	☐	☐
57.	Defective components repaired immediately	☐	☐	☐	☐
58.	Lockout/tagout procedures used prior to maintenance	☐	☐	☐	☐
59.	Cathead in clean, sound condition	☐	☐	☐	☐
60.	Drill rig ropes in clean, sound condition	☐	☐	☐	☐
61.	Fall protection used for fall exposures of 6 feet (U.S.) 1.5 m or greater	☐	☐	☐	☐
62.	Rig in neutral and augers stopped rotating before cleaning	☐	☐	☐	☐
63.	Good housekeeping maintained on and around rig	☐	☐	☐	☐
	FORMS/PERMITS AND CHECKLISTS (7.0)				
64.	Driller license/certification obtained	☐	☐	☐	☐
65.	Well development/abandonment notifications and logs submitted and in project files	☐	☐	☐	☐
66.	Groundwater withdrawal permit obtained where required	☐	☐	☐	☐
67.	Dig permit obtained where required	☐	☐	☐	☐

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Item #	Corrective Action Planned/Taken	Date Corrected

Auditor: ______________________________ Project Manager: _________________________________

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CH2MHILL

HS&E Self-Assessment Checklist—CHAINSAW OPERATIONS

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI.

This checklist is to be used at locations where: (1) CH2M HILL employees are operating chainsaws, and/or (2) CH2M HILL is providing oversight of a subcontractor operating a chainsaw.

Safety Coordinators may consult with chainsaw subcontractors when completing this checklist, but shall not direct the means and methods of chainsaw operations nor direct the details of corrective actions. Chainsaw subcontractors shall determine how to correct deficiencies, and we must carefully rely on their expertise. Items considered to be imminently dangerous (possibility of serious injury or death) shall be corrected immediately or all exposed personnel shall be removed from the hazard until corrected.

Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

☐ Evaluate CH2M HILL employee exposures to chainsaw hazards
☐ Evaluate a CH2M HILL subcontractor's compliance with chainsaw HS&E requirements
Subcontractor Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the excavation subcontractor. Section 2 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

Numbers in parentheses indicate where a description of this assessment item can be found in Standard of Practice HS-49.

SECTION 1

	Yes	No	N/A	N/O
SAFETY EQUIPMENT (2.3)				
1. Chainsaw equipped with spark arrestor and fully functioning chain brake	☐	☐	☐	☐
2. Chainsaw operator's manual readily available	☐	☐	☐	☐
3. Fully stocked first aid kit and multipurpose fire extinguisher available	☐	☐	☐	☐
4. Appropriate personal protective equipment available and worn	☐	☐	☐	☐
5. Clothing free of loose edges that could become entangled in the saw	☐	☐	☐	☐
PLANNING ACTIVITIES (2.5)				
6. Operators have read the chainsaw operator's manual	☐	☐	☐	☐
7. If aerial lifts to be used, aerial lift training completed	☐	☐	☐	☐
8. Daily safety briefing/meeting conducted with project personnel to discuss planned work	☐	☐	☐	☐
9. Immediate area surrounding operation cleared of obstructions	☐	☐	☐	☐
10. Companion maintained within calling distance of the chainsaw operator	☐	☐	☐	☐

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SECTION 1 (Continued)

	Yes	No	N/A	N/O
INSPECTION (3.1.1)				
11. Chain tension, sharpness, condition, and guide gap checked	☐	☐	☐	☐
12. Chainsaw components checked for physical damage	☐	☐	☐	☐
13. Chain does not rotate at idle with chain brake off	☐	☐	☐	☐
14. Chain brake and stop switch operating correctly	☐	☐	☐	☐
15. Throttle trigger can not be engaged until throttle trigger lock out pressed	☐	☐	☐	☐
STARTING THE ENGINE (3.1.2)				
16. Chainsaw operator's manual consulted for proper starting procedures	☐	☐	☐	☐
17. Saw placed on level ground with guide bar and chain off the ground	☐	☐	☐	☐
18. Saw is not drop-started	☐	☐	☐	☐
SAFE OPERATION (3.1.3)				
19. Chainsaw handles kept dry, clean, and free of oil or fuel mixture	☐	☐	☐	☐
20. Chainsaws held firmly with both hands and used right-handed	☐	☐	☐	☐
21. Operator standing to the left of the saw out of the plane of the chain	☐	☐	☐	☐
22. Saw used between the waist and mid-chest level	☐	☐	☐	☐
23. Full throttle maintained while cutting	☐	☐	☐	☐
24. Operator aware of position of guide bar tip, does not contact tip with anything being cut	☐	☐	☐	☐
25. Bumper spikes maintained as close to the object as possible	☐	☐	☐	☐
26. Operator aware of what is in the saw's downward path after the cut	☐	☐	☐	☐
27. No attempt to made to cut material that is larger than the guide bar of the saw	☐	☐	☐	☐
28. Cuts avoided that will cause chain to jam	☐	☐	☐	☐
29. Non-metallic wedges used to prevent compression cuts from jamming the blade	☐	☐	☐	☐
30. Bystanders and helpers kept at a safe distance from operation	☐	☐	☐	☐
31. Chainsaw not operated when fatigued	☐	☐	☐	☐
32. Fire extinguisher present when operating the chainsaw in forest or brushy areas	☐	☐	☐	☐
ELECTRICAL CHAINSAW PRECAUTIONS (3.1.3)				
33. Extension cords approved for outdoor use	☐	☐	☐	☐
34. Electrical cords equipped with third-wire grounding	☐	☐	☐	☐
35. Ground fault circuit interrupter (GFCI) used	☐	☐	☐	☐
36. Electrical cord positioned carefully to avoiding cutting with saw or trip hazard	☐	☐	☐	☐
37. Saw switched to the off position before completing electrical connections	☐	☐	☐	☐
38. Saw unplugged before making adjustments and when not in use	☐	☐	☐	☐
REFUELING THE ENGINE (3.1.4)				
39. Fuel mixed in accordance with the manufacturer's recommendations	☐	☐	☐	☐
40. Fuel stored and transported in an approved safety container	☐	☐	☐	☐
41. Engine shut off and allowed to cool before refueling	☐	☐	☐	☐
42. Fire extinguisher present during fueling and refueling	☐	☐	☐	☐
43. Area around refueling site free from combustible materials	☐	☐	☐	☐
44. Smoking around fueling or refueling operations prohibited	☐	☐	☐	☐
45. Funnel/flexible nozzle used to avoid spilling fuel on the engine	☐	☐	☐	☐
TRANSPORT AND STORAGE (3.1.5)				
46. Chainsaws carried with engine off and guide bar pointing to rear	☐	☐	☐	☐
47. Chain guard attached or placed in carrying case prior to transporting	☐	☐	☐	☐
48. Fuel tank drained and spark plug disconnected for long-term storage	☐	☐	☐	☐
49. Chainsaw placed in scabbard or secured to platform prior to transporting in aerial lift	☐	☐	☐	☐

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SECTION 1 (Continued)

	Yes	No	N/A	N/O
TOPPING UTILITY POLES (3.2.1)				
50. CH2M HILL only topping utility poles from an aerial lift platform	☐	☐	☐	☐
51. Aerial lifts operated safely (use aerial lift checklist in HS-41)	☐	☐	☐	☐
52. Maximum length of pole section cut at one time does not exceed 2’	☐	☐	☐	☐
53. Pole tested for stray voltage with foreign voltage detector prior to cutting	☐	☐	☐	☐
54. Wiring, staples, nails, and other hardware removed within 4” of cut path	☐	☐	☐	☐
55. Saw handled between chest and waist level	☐	☐	☐	☐
56. Personnel below pole safe distance from the fall area	☐	☐	☐	☐
57. Cutting stopped leaving approximately one half inch of pole uncut	☐	☐	☐	☐
58. Pole section removed manually by pulling cut section towards body	☐	☐	☐	☐
59. Cut pole sections lowered by rope or placed in aerial lift platform	☐	☐	☐	☐
60. Rough edges hammered over after last cut	☐	☐	☐	☐
TREE FELLING (3.2.2)				
61. CH2M HILL not felling trees beyond scope of SOP HS-49	☐	☐	☐	☐
62. Power company contacted prior to felling trees within two tree lengths of power lines	☐	☐	☐	☐
63. Underground services checked that could be damaged when tree strikes the ground	☐	☐	☐	☐
64. Danger zone created two tree lengths from public areas, public removed from danger zone	☐	☐	☐	☐
65. Personnel maintain a distance equal to two tree lengths of the tree being felled	☐	☐	☐	☐
66. Intended direction of fall determined	☐	☐	☐	☐
67. Suitable escape path determined and maintained clear	☐	☐	☐	☐
68. Equipment needed to prevent tree from sitting back on the saw determined and readily available	☐	☐	☐	☐
69. Undercut notch cut on side of the tree in the direction of the fall line	☐	☐	☐	☐
70. Back cut started 1-2” inches above the undercut	☐	☐	☐	☐
71. As tree starts to fall, saw shut off and operator steps into the escape path	☐	☐	☐	☐
LIMBING STANDING TREES (3.2.3)				
72. CH2M HILL not operating chainsaws where overhead electrical power lines may be contacted	☐	☐	☐	☐
73. Only subcontractors with special training permitted to work around electrical power lines	☐	☐	☐	☐
74. Branches/limbs not cut above shoulder height	☐	☐	☐	☐
75. If limbing from a ladder, ladder secured in position and operator independently secured	☐	☐	☐	☐
76. Chainsaws not used from rope and harness unless operator has received specific training	☐	☐	☐	☐
LIMBING FALLEN TREES (3.2.4)				
77. No dead branches/other debris hanging above work that may fall	☐	☐	☐	☐
78. Personnel do not attempt to manually pull over elevated trees, mechanical equipment used	☐	☐	☐	☐
79. Springpoles cut safely, avoiding springback	☐	☐	☐	☐
80. Small-size brush and saplings cut with hand saws or other cutting tools	☐	☐	☐	☐
81. Operator standing uphill of tree unless secured to prevent rolling/sliding downhill	☐	☐	☐	☐
82. Cuts made with operator standing on the opposite side of the tree	☐	☐	☐	☐
83. Operator keeping sight of saw tip, avoiding kickback	☐	☐	☐	☐
84. Debris removed periodically to maintain clear vision and movement around tree	☐	☐	☐	☐
BUCKING TREES (3.2.5)				
85. Operator standing uphill of tree unless secured to prevent rolling/sliding downhill	☐	☐	☐	☐
86. Working from small end to larger to improve stability	☐	☐	☐	☐
87. If tree on level ground, cutting from upper side and avoiding running chain into ground	☐	☐	☐	☐
88. If tree supported at one end, cutting from lower side one-third, then upper side	☐	☐	☐	☐
89. If tree supported at both ends, cutting from upper side one-third, then lower side	☐	☐	☐	☐

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SECTION 2

Complete this section for all items checked “No” in Section 1. Deficient items must be corrected in a timely manner.

Item #	Corrective Action Planned/Taken	Date Corrected

Auditor: ________________________________ Project Manager: __________________________________

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HS&E Self-Assessment Checklist—Biological Prevention Measures

CH2MHILL

HS&E Self-Assessment Checklist

This checklist shall be used by Navy CLEAN personnel and shall be completed by each crew entering the work area at the frequency of one per day or otherwise specified in the project's Health and Safety Plan/Field Safety Instruction (HSP/FSI). The checklist should be completed prior to entry and at the end of the day to document that appropriate checks have been completed.

This checklist is to be used at locations where the possibility exists that contact with biological hazards is possible.

Site Safety Coordinator (SSC) will request any CH2M HILL subcontractor to take necessary precautions in eliminating the exposure to biological hazards, but shall not direct the means and methods.

Project Name: _____ Project No.: _____
Location: _____ PM: _____
Auditor: _____ Title: _____ Date: _____

- Check "Yes" if an assessment item is complete or correct.
- Check "No" if an item is incomplete or deficient. Section 2 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

SECTION 1 – PRE-ENTRY	Yes	No	N/A	N/O
SITE HAZARD EVALUATION				
1. Inform field members of hazards (types, symptoms)	☐	☐	☐	☐
2. Can work be completed without entering the work zone	☐	☐	☐	☐
3. Have controls been implemented where possible (clearing vegetation, spraying)	☐	☐	☐	☐
4. Has an inspection been made to identify nests, hives or areas where insects may concentrate	☐	☐	☐	☐
5. Will working at different time will reduce exposure	☐	☐	☐	☐
SENSATIVITIES				
6. Does any staff have existing reactions to stings or bites	☐	☐	☐	☐
7. If yes to #6, is special required and medication available on site (epi-pen)	☐	☐	☐	☐
8. Has anyone with an existing condition briefed other team members about symptoms and first aid which may be required	☐	☐	☐	☐
EMERGENCY RESPONSE				
9. Are first aid kits, along with tick removal kits, readily available to all staff	☐	☐	☐	☐
10. Does each member of the field staff have ability to communicate (phone, radios, and visual)	☐	☐	☐	☐
11. Are emergency contacts available (base emergency, local police, or local EMT	☐	☐	☐	☐
12. If working in remote areas, is transport readily available (less than 5 minutes)	☐	☐	☐	☐
13. Have you planned an emergency exit from the site in the event of a swarm	☐	☐	☐	☐

SECTION 2 - PPE	Yes	No	N/A	N/O
SELECTION OF PPE				
14. Will weather (heat, rain, ice) impact the safety of workers wearing protective suits	☐	☐	☐	☐
15. Will visibility be limited to unacceptable levels if a hood is worn	☐	☐	☐	☐
16. Will the use of equipment be difficult if a suit is worn	☐	☐	☐	☐
17. Will heavy vegetation be encountered that could rip or damage a suit	☐	☐	☐	☐
18. Will a Bug-Out suit or Tyvek suit be used by staff (if not, please give additional rationale in writing in Section 4)	☐	☐	☐	☐
TYPE OF PPE USED OTHER THAN BUG-OUT OR TYVEK SUIT				
19. Is staff wearing light-colored clothes	☐	☐	☐	☐
20. Is staff wearing long sleeve shirts	☐	☐	☐	☐
21. Are pant legs tucked into socks	☐	☐	☐	☐
22. Are shirts tucked into pants	☐	☐	☐	☐
23. Has tape been placed around sock/pant leg line and around waist	☐	☐	☐	☐
24. Have hand and wrist areas been sealed	☐	☐	☐	☐
25. Are hats being worn	☐	☐	☐	☐
26. Have clothes been pre treated with Permethrin	☐	☐	☐	☐
27. Has team member inspected coworker's suits or clothing to ensure no spaces exist for insects to penetrate	☐	☐	☐	☐

SECTION 3 – CHECKS AND DECONTAMINATION	Yes	No	N/A	N/O
DAILY CHECKS (TO BE COMPLETED DURING AND AT END OF DAY)				
28. Were tick/insect checks performed during the day (if not, please provide reason in Section 4)	☐	☐	☐	☐
29. Was one unclothed tick check completed	☐	☐	☐	☐
30. Were ticks found on the outerwear (if yes, please note the number in Section 4)	☐	☐	☐	☐
31. Were ticks found inside the Bug-Out, Tyvek, or personal clothing	☐	☐	☐	☐
32. Were suits turned inside out and inspected prior to putting away	☐	☐	☐	☐
33. Were showers taken by field staff immediately upon arrive from the field	☐	☐	☐	☐
34. Were clothing placed in a garbage bag and sealed to prevent any insects from spreading	☐	☐	☐	☐
35. If ticks were found embedding in skin, were they properly removed and saved	☐	☐	☐	☐
36. Have vehicles been inspected for ticks on a daily basis and before the vehicle is turned in	☐	☐	☐	☐
REPORTING				
37. If a tick was found on your skin, could you tell where it entered so that it could be addressed	☐	☐	☐	☐
38. If a tick was found embedded, did you contact the PM, complete a HITS form and contact the Occupational Physician at 1-866-893-2514	☐	☐	☐	☐
39. Did you contact field staff on the project to provide potential corrective measures	☐	☐	☐	☐
40. Did you follow the IM/RTW procedure to ensure you received the proper medical attention (if not, provide an explanation in Section 4)	☐	☐	☐	☐

SECTION 4

Complete this section for all items where further information was requested in the previous sections.

Item #	**Rationale**	**Corrected (either next day or intended on future projects)**

Auditor: ________________________________ Project Manager: _____________________________

CH2MHILL

HSE Self-Assessment Checklist—Arsenic

This checklist shall be used by CH2M HILL personnel **only** and shall be completed at the frequency specified in the project's HSP/FSI. This checklist is to be used at locations where CH2M HILL employees are exposed to arsenic, or are required to perform oversight of a subcontractor whose personnel are exposed to arsenic.

CH2M HILL staff shall not direct the means and methods of subcontractor arsenic activities nor direct the details of appropriate corrective actions. The subcontractor must determine how to correct deficiencies and CH2M HILL staff must carefully rely on their expertise. Conditions considered to be imminently dangerous (possibility of serious injury or death) must be corrected immediately or all exposed personnel must be removed from the hazard until corrected.

Project Name: _____ Project No.: _____

Location: _____ PM: _____

Auditor: _____ Title: _____ Date: _____

This specific checklist has been completed to:

☐ Evaluate CH2M HILL compliance with its Arsenic program (SOP HSE-501)
☐ Evaluate a CH2M HILL subcontractor's compliance with its Arsenic program
Subcontractors Name: _____

- Check "Yes" if an assessment item is complete/correct.
- Check "No" if an item is incomplete/deficient. Deficiencies shall be brought to the immediate attention of the subcontractor. Section 3 must be completed for all items checked "No."
- Check "N/A" if an item is not applicable.
- Check "N/O" if an item is applicable but was not observed during the assessment.

SECTION 1

	Yes	No	N/A	N/O
PERSONNEL SAFE WORK PRACTICES (5.1)				
COMPLIANCE PROGRAM (5.1.1)				
1. Where EL ≥ PEL, a written compliance program is implemented before commencing work	☐	☐	☐	☐
2. The compliance program is based on the most recent air monitoring/sampling results.	☐	☐	☐	☐
3. The compliance program is updated for new exposure monitoring data or every six months.	☐	☐	☐	☐
4. Written compliance program is available to all affected employees.	☐	☐	☐	☐
5. Waste generated must be determined if considered hazardous waste.	☐	☐	☐	☐
EMPLOYEE INFORMATION (5.1.2)				
6. Training on the Hazard Communication Standard has been met.	☐	☐	☐	☐
7. CH2M HILL personnel have completed the Arsenic Training Module.	☐	☐	☐	☐
8. Training on the Fact Sheet, HSP/FSI, and OSHA standard has been met.	☐	☐	☐	☐

CH2MHILL

HS&E Self-Assessment Checklist—Arsenic

	Yes	No	N/A	N/O
9. The selection of the appropriate respirator is based on the airborne arsenic concentration.	☐	☐	☐	☐
10. Personnel working near arsenic-contaminated soil or material shall use wet methods and work practices to control dust; wear disposable coveralls, and exercise personal hygiene practices.	☐	☐	☐	☐
11. Contact lenses are not to be worn when working with arsenic.	☐	☐	☐	☐
12. Written or verbal notification is given to owners, contractors, or other personnel working in the area of arsenic work activities.	☐	☐	☐	☐
13. Storage or shipping containers are properly labeled.	☐	☐	☐	☐
HOUSEKEEPING (5.1.3)				
14. All surfaces are free of accumulation of arsenic.	☐	☐	☐	☐
15. Cleaning methods minimize airborne arsenic activity.	☐	☐	☐	☐
16. Where vacuuming is used, vacuums are used and emptied to minimize airborne arsenic.	☐	☐	☐	☐
17. A written housekeeping and maintenance plan is in place and maintained.	☐	☐	☐	☐
18. Compressed air is not used to remove arsenic from surfaces.	☐	☐	☐	☐
REGULATED AREAS (5.1.4)				
19. Areas that exceed the PEL have been designated as regulated areas.	☐	☐	☐	☐
20. Personnel meet medical and training requirements.	☐	☐	☐	☐
21 No eating, drinking, and/or smoking is allowed in the regulated areas.	☐	☐	☐	☐
22 Warning signs have been posted at all entrances to the regulated areas.	☐	☐	☐	☐
23. Shower facilities are installed and used with cleaning agents and towels, where feasible.	☐	☐	☐	☐
24. Hand washing facilities are provided for use by employees before eating, drinking, smoking, etc.	☐	☐	☐	☐
25. Eating facilities free of arsenic are provided for employees working in regulated areas.	☐	☐	☐	☐
26. Change areas are provided where EL ≥ PEL or where employees are subject to eye or skin irritation.	☐	☐	☐	☐
EXPOSURE ASSESSMENTS (5.2)				
27. Initial air monitoring is conducted over full shift for each job classification.	☐	☐	☐	☐
28. Air sampling is conducted every 6 months when exposure limit (EL) ≥ AL but < PEL.	☐	☐	☐	☐
29. Air sampling of employees is conducted quarterly when EL ≥ PEL.	☐	☐	☐	☐
30. Additional air monitoring has been collected when there are any changes in operation.	☐	☐	☐	☐
31. Employees have been informed of air monitoring results within 5 days after receipt of results.	☐	☐	☐	☐
32. Where PEL is exceeded, affected employees have been notified of results and control measures to be used to reduce exposure below the PEL.	☐	☐	☐	☐
CONTROL METHODS (5.3)				
ENGINEERING AND WORK PRACTICE CONTROLS (5.3.1)				
33. Engineering controls and work practices have been used to reduce exposures below the PEL.	☐	☐	☐	☐
34. When controls are unable to reduce exposures below the PEL, respiratory protection is used.	☐	☐	☐	☐
35. Employees do not eat, drink, smoke, chew tobacco/gum, or apply cosmetics in regulated areas.	☐	☐	☐	☐
RESPIRATORY PROTECTION (5.3.2)				
36. Respirators are used in areas where EL ≥ PEL.	☐	☐	☐	☐
37. Respirator cartridges are replaced at the end of shift or service life indicator, where available.	☐	☐	☐	☐
38. PAPRs are provided to employees who request such a respirator.	☐	☐	☐	☐

PERSONAL PROTECTIVE EQUIPMENT (5.3.3)

39. PPE is supplied at no cost to employees.	☐	☐	☐	☐
40. Employee exposed to arsenic tri-chloride wear impervious clothing.	☐	☐	☐	☐
41 Clean and dry protective clothing is provided weekly. Daily if EL ≥ 100 $\mu g/m^3$.	☐	☐	☐	☐
42. Protective clothing is repaired or replaced if found to be ineffective.	☐	☐	☐	☐
43. Contaminated protective clothing is removed from change areas at the end of the shift.	☐	☐	☐	☐
44. All clothing requiring laundering is packaged in sealed, labeled containers.	☐	☐	☐	☐
45. Personnel or vendors who launder contaminated clothing are formally informed of the hazards.	☐	☐	☐	☐
46. Employee are not allowed to leave workplace wearing clothing worn during work shift.	☐	☐	☐	☐

CH2MHILL

HS&E Self-Assessment Checklist—Arsenic

SECTION 3

Complete this section for all items checked "No" in Section 1. Deficient items must be corrected in a timely manner.

Item #	Corrective Action Planned/Taken	Date Corrected

Auditor: _____ Project Manager: _____

Asdfdf

Project-Specific Material Safety Data Sheets

Project specific MSDS's will be added as chemicals are identified

Initial Medical Treatment Form

Initial Medical Treatment Form

To be completed by CH2M HILL Supervisor—Send with employee visiting medical facility or forward within 24 hours.

Employee name: _____
Date of Injury: _____
Supervisor: _____
HS Representative: _____
Visit Authorized by: _____
Phone #: _____

CH2M HILL Workers Compensation Administrator: Cambridge

Send Bills to: CH2M HILL
Attn: Jennifer Rindahl
P.O. Box 22508
Denver, Colorado 80222-0508

To be completed by medical provider:

Physician's name: _____ Phone #: _____
Address: _____
CH2M HILL employee: _____ has been treated for: _____

It is the policy of CH2M HILL to provide temporary modified duty whenever possible for employees with physical restrictions resulting from an occupational injury or illness.

☐ Released to full duty
☐ Released to restricted duty only (list restrictions below)
☐ Out of work until _____ (date)

Please list any physical restrictions:

_____

_____

Expected duration of restricted duty? _____

CH2M HILL would like the best and most efficient care extended to all our employees. Please recommend over-the-counter (OTC) medication as a suitable alternative when medically feasible.

☐ Prescribed medication: _____
☐ Recommended OTC alternative: _____

Date of follow-up appointment: _____

Physician's signature: _____ Date: _____

Please return this form to the injured employee and FAX to Health Resources at 1-800-853-2641. If you want to discuss the employee's work restrictions, please call the person listed in the "Visit Authorized by" field

Project Activity Hazard Analyses

CH2MHILL

Insert AHAs

Note: AHAs for subcontractor activities will be submitted prior to each respective contractor's mobilization

- 01 Mobilization and Demobilization
- 02 Utility Locating
- 03 Geophysical and Site Surveying
- 04 Vegetation Clearance
- 05 Test Pitting
- 06 Monitoring Well Installation
- 07 Groundwater Sampling and Water Level Measurements
- 08 Soil Sampling
- 09 IDW Handling and Management

Activity Hazard Analysis (AHA)

ACTIVITY/WORK TASK:	**Mobilization/Demobilization**	Overall Risk Assessment Code (RAC) (Use highest code)					**M**
	SIGNATURES	Activity #	1	AHA #			**1**
PWD/OICC/ROICC OFFICE		**Risk Assessment Code (RAC) Matrix**					
NAME & DATE ACCEPTED BY GDA:							
CONTRACT NUMBER:	**N62470-10-D-3009**	**Severity**	**Probability**				
TASK ORDER/DELIVERY #:	**20**						
PRIME CONTRACTOR:	**CH2M HILL**		Frequent	Likely	Occasional	Seldom	Unlikely
SUBCONTRACTOR:	**TBD**						
DATE OF PREPARATORY MEETING:		Catastrophic	**E**	**E**	**H**	**H**	**M**
DATE OF INITIAL INSPECTION:		Critical	**E**	**H**	**H**	**M**	**L**
CONTRACTOR COMPETENT PERSON:	TBD	Marginal	**H**	**M**	**M**	**L**	**L**
SITE SAFETY and HEALTH OFFICER		Negligible	**M**	**L**	**L**	**L**	**L**
ACCEPTANCE BY GOVERNMENT DESIGNATED AUTHORITY (GDA)		Review each **"Hazard"** with identified safety **"Controls"** and determine (RAC)					
E = EXTREMELY HIGH (PWO/OICC/ROICC)		Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" .Place the highest RAC at the top of AHA. This is the overall risk assessment code for this activity					
H = HIGH RISK (FEAD DIRECTOR)		**"Severity"** is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible after controls are in place					
M = MODERATE RISK (CM or ET or PAR)							
L = LOW RISK (ET or PAR)		**"Probability"** is the likelihood to cause an incident, near miss, or accident did occur and identified as: Frequent, Likely, Occasional, Seldom, or Unlikely after controls are put in place.					

Job Steps	Hazards	Controls	RAC
Mobilizing to Site **Driving** **Vehicle Backing**	• Traffic accident • Driver fatigue • Poor driving skills • Load shift • Traffic accident • Property damage	▪ Keep alert of your surroundings. Do not try to complete other tasks while driving that can distract your attention ▪ Do not drive when tired. Pull off at a safe location and walk around your vehicle and take a break if getting tired. ▪ Use your mirrors while driving. Do not use evasive driving actions. Obey traffic laws. ▪ Secure loads before starting your trip. Make frequent stops to check your load to make sure nothing has become loose. Retighten any loose straps. ▪ Check your surroundings when before backing. When possible use a spotter. ▪ Check for obstructions before backing. Walk around vehicle to make sure area is clear.	**L**

IAW EM 385 01.A.13 CONTRACTOR-REQUIRED AHA "WORK WILL NOT BEGIN UNTIL THE AHA FOR THE WORK ACTIVITY HAS BEEN ACCEPTED BY THE GDA"
THE AHA SHALL BE REVIEWED AND MODIFIED AS NECESSARY TO ADDRESS CHANGING SITE CONDITION, OPERATIONS OR CHANGE OF COMPETENT/QUALIFIED PERSON'S

Job Steps	Hazards	Controls	RAC
Unloading/placing equipment.	• Back strain • Hand Injuries; cuts, bruises, pinch points • Slips, Trips, & Falls • Contact with Heavy Equipment while in use.	• Use proper lifting techniques at all times. Request assistance from other personal when weight limits exceeds 50lbs. Mechanical means shall be used for gate relocation whenever possible rather than manual means to avoid the risk of strains and sprains. • Wear protective gloves; Use hand tools in a safe manner and keep hand tools in good working condition. • Use extreme caution when walking in work areas, working on or around truck beds and around equipment during unloading and staging activities. • Only trained and experienced personnel will be allowed to stage and unload heavy equipment. • Only certified operators will be authorized to operate equipment. Certifications must be on site at all times. • High visibility vests will be worn at all times while working in or around heavy equipment, trucks or other mechanized equipment. • All ground personal etc. must maintain eye contact with operators at all times. Do not proceed toward, or into blind spots of equipment without authorization to do so by operator. • All ground personal will stay outside the swing radius of equipment while in operation.	**L**
General Construction Hazards	• Accidents due to lack of training	• Copies of records will be kept by the SSO. • Worker will be trained prior to performing new activities. Copies of records will be kept by the SSO. This includes signature sheets for AHAs. HASP and any other training documents. • A daily tailgate safety meeting will be held prior to starting each shift. All personnel must attend review and sign the Safety Tailgate log before beginning work. CH2M HILL Staff should be present. • All site workers must understand all Emergency procedures, AHA and HASP procedures. • A copy of each Tailgate meeting must be supplied to the CH2M HILL onsite rep each day.	**L**
	• Electrical Hazards	• Do not open panels or cabinets that contain live electrical parts. • NFPA 70e training is required to work on or near live electrical parts.	**L**
	• Hearing Damage	• Workers will wear hearing protection whenever voices must be raised above normal conversational speech or when noise levels exceed 85 decibels due to a load noise source; such as working around heavy equipment. • Hearing protection will be worn by equipment operators when working in open cab equipment, or when doors/windows are open.	**L**

Equipment to be Used	Training Requirements and Competent or Qualified Personnel name(s)	Inspection Requirements	RAC
	• Injuries from slips, trips, and falls	• Walking/working surfaces will be kept free of clutter, debris, and congestion to the greatest extent possible. • Personnel will be briefed on the hazards of wet, muddy soil hazards and traversing uneven grades. • Walk or climb only on equipment and/or surfaces that are designed for personnel access. • Be aware of potential for poor footing while working on un-compacted backfill materials. • Use three-point contact when climbing onto equipment.	L
	• Accidents due to poor lighting	• Work at site is only expected to take place during daylight hours. If work after daylight hours or in dark areas of buildings, provide supplemental lighting.	L
	• Injury due to inclement weather	• Outdoor work will cease during extreme weather conditions, such as electrical storms, high wind rain, and extreme temperatures. • Shut all equipment down when lightning is visible and wait for "all-clear" from the SSHO. • Workers will take cover indoors or in vehicle. • Supervisors will monitor local forecasts for warnings about specific weather hazards. • Workers will comply with all evacuation orders regarding rough weather directives.	L
	• Heat Stress	▪ Workers will be trained in the recognition of heat stress and appropriate actions to take. ▪ Workers are encouraged to increase fluid intake while working. ▪ Workers should minimize or avoid alcohol intake the night before working in heat stress situations. ▪ Workers will increase the frequency and duration of rest breaks while working in heat stress situations. ▪ Workers will watch each other for signs and symptoms of heat exhaustion and fatigue.	L
	• Controlling work areas	• Fencing, tape, cones or other SSHO-approved boundaries will be erected to warn approaching personnel of the hazardous area. • Appropriate signs will be posted at the boundary to instruct personnel in entry requirements.	L
	• Injuries associated with insects, snakes, spiders and poisonous plants	• Workers will tuck pants into socks and wear long sleeves and sturdy leather boots when walking in tall grass. • Workers will use insect repellent when needed. • Workers will use buddy system to check for signs of insect and spider bites, such as redness, swelling, and flu-like symptoms if bitten. • If workers have known or suspected allergies, they will carry an Epi-Pen at all times and will notify supervision and co-workers of allergies. • If bitten by any insect notify the CH2M HILL (CCI) oversight rep immediately. This includes any type of injury that would require any type of First Aid.	L
Construction of Logistical Supplies	• Injuries associated with power tools	• Tools shall be carried in a safe and proper manner. • Tools shall not be carried up a ladder by hand; tools should be raised or lowered in a tool bag. • Defective tools shall be tagged immediately and removed from service. • Tools shall be used correctly and only for their intended purpose. • Hand tools will be inspected for mushroomed heads, broken or cracked handles, or loose heads prior to use.	L

Vegetation Removal	• Tree Felling	• Each worker shall be instructed as to exactly what he is to do. All workers not directly involved in the operation shall be kept clear of the work area. • Evaluate the following before felling trees; • 1) anything that may cause damage/accident/injury when the tree falls • 2) Evaluate the shape of tree(s), lean of the tree, and decayed or weak spots, • 3) Evaluate wind force and direction, • 4) the location of people, property & utilities and • 5) Electrical or above ground utility hazards. (Requires trees to be topped to a point where a hazard is not created.) • The minimum personal protective equipment (PPE) selection for site clearing operations shall be as follows. • Long trousers, chainsaw chaps appropriately sized for the use, sturdy, hard toe work boots that provide sufficient ankle support [American National Standards Institute (ANSI) rated]. • ANSI Z87 2003approved eyewear with a face shield. • A hardhat with the visor facing forward. • Leather work gloves/Long-sleeved shirt. • Ear muffs • The work area shall be cleared to permit an escape route shall be planned. • Use directional notching for tree felling (top cut ~60° angle to 20-25% tree diameter and bottom horizontal cut to meet termination point of top cut) before through-cutting of trunks/limbs. • Keep all personnel clear of the drop zone of the limbs or the topped sections. Create sufficient buffer zone of non-essential ground support personnel. Second tree worker must evaluate drop zone radius of felled limbs and topped tree sections. • Use only qualified and experienced personnel to perform land clearing, grinding and chipping operations. Only operators qualified by experience or training to operate heavy equipment and chainsaws/hydraulic grinders/axes. • Make eye contact with (chain saw/equipment) operators before approaching work area or drop zone(s). Do not disturb/distract personnel operating chainsaws or land clearing equipment. • When de-limbing a tree, workers shall work on the side on which the limb is being cut, whenever possible. Do not operate chainsaw at or above shoulder height. For large limbs, begin limb reduction from the tip of the limb and move towards the tree trunk. • Prohibit standing on, straddling logs while ground cutting. Stand uphill while ground cutting • Workers should not hold logs while being cut Stop saw motor to remove saw if pinched. Don't pull on saw. Bend open cut (i.e. wedge) until saw comes free.	**M**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
• Fire extinguisher (with fuel and electrical sources) • Eye wash (small portable type) • Miscellaneous power and manual hand tools. • First Aid/BbPK/CPR shield • Track excavator(s) with material handling attachment and/or skid steer brush hog • Chainsaws • Spill Kit • Communication devices	• Review APP by new site personnel. • 1st Aid/CPR (2 per site when medical attention a medical facility or physician is more than 5 minutes away to two or more employees. • Supervisors - BBLPS, 30 hour OSHA Construction Safety Training or equivalent • Heavy equipment operators qualified by previous training or experience. • Competent Person Requirement & Name: NA • ONLY AUTHORIZED PERSONNEL MAY OPERATE CHAINSAWS	• Visual Inspections of designated work areas identify and address hazardous conditions. • Equipment inspections and maintenance. • Chainsaw/brush cutter inspection/maintenance. • Chipper maintenance, if used. • Emergency Response equipment Inspections • (Fire Extinguishers, Eye wash First Aid/CPR etc.)

	PRINT	SIGNATURE	Date/Time
Supervisor Name:			/
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SITE PERSONNEL:			
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IAW EM 385 01.A.13 CONTRACTOR-REQUIRED AHA "WORK WILL NOT BEGIN UNTIL THE AHA FOR THE WORK ACTIVITY HAS BEEN ACCEPTED BY THE GDA"
THE AHA SHALL BE REVIEWED AND MODIFIED AS NECESSARY TO ADDRESS CHANGING SITE CONDITION, OPERATIONS OR CHANGE OF COMPETENT/QUALIFIED PERSON'S

Activity Hazard Analysis (AHA)

ACTIVITY/WORK TASK:	**Utility Location/Geophysical & Topographic Surveying**	Overall Risk Assessment Code (RAC) (Use highest code)			**L**
	SIGNATURES	Activity #	2	AHA #	**2**
PWD/OICC/ROICC OFFICE		**Risk Assessment Code (RAC) Matrix**			
NAME & DATE ACCEPTED BY GDA:					
CONTRACT NUMBER:	**N62470-10-D-3009**	**Severity**	**Probability**		
TASK ORDER/DELIVERY #:	**20**				
PRIME CONTRACTOR:	**CH2M HILL**				
SUBCONTRACTOR:	**TBD**				
DATE OF PREPARATORY MEETING:		Catastrophic	**E**	**E**	**H**	**H**	**M**
DATE OF INITIAL INSPECTION:		Critical	**E**	**H**	**H**	**M**	**L**
CONTRACTOR COMPETENT PERSON:	TBD	Marginal	**H**	**M**	**M**	**L**	**L**
SITE SAFETY and HEALTH OFFICER		Negligible	**M**	**L**	**L**	**L**	**L**
ACCEPTANCE BY GOVERNMENT DESIGNATED AUTHORITY (GDA)		Review each **"Hazard"** with identified safety **"Controls"** and determine (RAC)			
E = EXTREMELY HIGH (PWO/OICC/ROICC)		Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" .Place the highest RAC at the top of AHA. This is the overall risk assessment code for this activity			
H = HIGH RISK (FEAD DIRECTOR)		**"Severity"** is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible after controls are in place			
M = MODERATE RISK (CM or ET or PAR)					
L = LOW RISK (ET or PAR)		**"Probability"** is the likelihood to cause an incident, near miss, or accident did occur and identified as: Frequent, Likely, Occasional, Seldom, or Unlikely after controls are put in place.			

Job Steps	Hazards	Controls	RAC
Mobilizing to Site **Driving** **Vehicle Backing**	• Traffic accident • Driver fatigue • Poor driving skills • Load shift • Traffic accident • Property damage	• Keep alert of your surroundings. Do not try to complete other tasks while driving that can distract your attention • Do not drive when tired. Pull off at a safe location and walk around your vehicle and take a break if getting tired. • Use your mirrors while driving. Do not use evasive driving actions. Obey traffic laws. • Secure loads before starting your trip. Make frequent stops to check your load to make sure nothing has become loose. • Retighten any loose straps. • Check your surroundings when before backing. When possible use a spotter. • Check for obstructions before backing. Walk around vehicle to make sure area is clear.	**L**

IAW EM 385 01.A.13 CONTRACTOR-REQUIRED AHA "WORK WILL NOT BEGIN UNTIL THE AHA FOR THE WORK ACTIVITY HAS BEEN ACCEPTED BY THE GDA"
THE AHA SHALL BE REVIEWED AND MODIFIED AS NECESSARY TO ADDRESS CHANGING SITE CONDITION, OPERATIONS OR CHANGE OF COMPETENT/QUALIFIED PERSON'S

Job Steps	Hazards	Controls	RAC
Unloading/placing equipment.	• Back strain • Hand Injuries; cuts, bruises, pinch points • Slips, Trips, & Falls • Contact with Heavy Equipment while in use.	• Use proper lifting techniques at all times. Request assistance from other personal when weight limits exceeds 50lbs. Mechanical means shall be used for gate relocation whenever possible rather than manual means to avoid the risk of stains and sprains. • Wear protective gloves; Use hand tools in a safe manner and keep hand tools in good working condition. • Use extreme caution when walking in work areas, working on or around truck beds and around equipment during unloading and staging activities. • Only trained and experienced personnel will be allowed to stage and unload heavy equipment. • Only certified operators will be authorized to operate equipment. Certifications must be on site at all times. • High visibility vests will be worn at all times while working in or around heavy equipment, trucks or other mechanized equipment. • All ground personal etc. must maintain eye contact with operators at all times. Do not proceed toward, or into blind spots of equipment without authorization to do so by operator. • All ground personal will stay outside the swing radius of equipment while in operation.	**L**
General Activities Supporting Task	• Injuries from slips, trips, and falls	• Walking/working surfaces will be kept free of clutter, debris, and congestion to the greatest extent possible. • Personnel will be briefed on the hazards of wet, muddy soil hazards and traversing uneven grades. • Walk or climb only on equipment and/or surfaces that are designed for personnel access. • Be aware of potential for poor footing while working on un-compacted backfill materials. • Use three-point contact when climbing onto equipment.	**L**
	• Injury due to inclement weather	• Outdoor work will cease during extreme weather conditions, such as electrical storms, high wind rain, and extreme temperatures. • Shut all equipment down when lightning is visible and wait for “all-clear” from the SSHO. • Workers will take cover indoors or in vehicle. • Supervisors will monitor local forecasts for warnings about specific weather hazards. • Workers will comply with all evacuation orders regarding rough weather directives.	**L**
	• Heat Stress	• Workers will be trained in the recognition of heat stress and appropriate actions to take. • Workers are encouraged to increase fluid intake while working. • Workers should minimize or avoid alcohol intake the night before working in heat stress situations. • Workers will increase the frequency and duration of rest breaks while working in heat stress situations. • Workers will watch each other for signs and symptoms of heat exhaustion and fatigue.	**L**
	• Controlling work areas	• Fencing, tape, cones or other SSHO-approved boundaries will be erected to warn approaching personnel of the hazardous area. • Appropriate signs will be posted at the boundary to instruct personnel in entry requirements.	**L**

Job Steps	Hazards	Controls	RAC
Utility Locate	• Traffic • Carrying equipment • Minor excavation by hand (to recover survey points) • Poisonous plants • Biting insects • Heat exhaustion • Hand equipment use	• Use traffic cones where parking; wear reflective clothing (vest or jacket – required at all NAVFAC sites) and work signs as appropriate • Follow safe lifting procedures for bulky or heavy equipment • Be prepared to recognize plants (e.g. Poison Ivy) and avoid them if possible; wear long pants and shirt with sleeves • Use insect spray prior to the start of work following manufactures directions; wear long pants and long sleeved shirt • Hydrate prior to the start of work and keep a supply of cool water available; take frequent breaks, wear sunscreen • Follow safe practices while using hand equipment (shovel, trowel, etc.).	**L**
Conduct topographic and geophysical surveys	• Carrying equipment • Minor excavation by hand (to recover survey points) • Poisonous plants • Biting insects • Heat exhaustion • Hand equipment use	• Follow safe lifting procedures for bulky or heavy equipment • Have site pre-marked for utilities • Be prepared to recognize plants (e.g. Poison Ivy) and avoid them if possible; wear long pants and shirt with sleeves • Use insect spray prior to the start of work following manufactures directions; wear long pants and long sleeved shirt • Hydrate prior to the start of work and keep a supply of cool water available; take frequent breaks, wear sunscreen • Follow safe practices while using hand equipment (shovel, trowel, etc.)	**L**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
• Fire extinguisher (with fuel and electrical sources) • Miscellaneous power and manual hand tools. • First Aid/BbPK/CPR shield • Communication devices	• Review APP by new site personnel. • 1st Aid/CPR (2 per site when medical attention a medical facility or physician is more than 5 minutes away to two or more employees. • Supervisors - BBLPS, 30 hour OSHA Construction Safety Training or equivalent	• Visual Inspections of designated work areas identify and address hazardous conditions. • Equipment inspections and maintenance. • Emergency Response equipment Inspections • (Fire Extinguishers, Eye wash First Aid/CPR etc.)

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THE AHA SHALL BE REVIEWED AND MODIFIED AS NECESSARY TO ADDRESS CHANGING SITE CONDITION, OPERATIONS OR CHANGE OF COMPETENT/QUALIFIED PERSON'S

Activity Hazard Analysis (AHA)

ACTIVITY/WORK TASK:	**Groundwater Sampling & Water Level Measurement**	Overall Risk Assessment Code (RAC) (Use highest code)			**L**
	SIGNATURES	Activity #	7	AHA #	**3**
PWD/OICC/ROICC OFFICE		**Risk Assessment Code (RAC) Matrix**			
NAME & DATE ACCEPTED BY GDA:					
CONTRACT NUMBER:	**N62470-10-D-3009**	**Severity**	**Probability**		
TASK ORDER/DELIVERY #:	**20**				
PRIME CONTRACTOR:	**CH2M HILL**		Frequent	Likely	Occasional	Seldom	Unlikely
SUBCONTRACTOR:	**NA**						
DATE OF PREPARATORY MEETING:		Catastrophic	**E**	**E**	**H**	**H**	**M**
DATE OF INITIAL INSPECTION:		Critical	**E**	**H**	**H**	**M**	**L**
CONTRACTOR COMPETENT PERSON:	NA	Marginal	**H**	**M**	**M**	**L**	**L**
SITE SAFETY and HEALTH OFFICER		Negligible	**M**	**L**	**L**	**L**	**L**
ACCEPTANCE BY GOVERNMENT DESIGNATED AUTHORITY (GDA)		Review each **"Hazard"** with identified safety **"Controls"** and determine (RAC)					
E = EXTREMELY HIGH (PWO/OICC/ROICC)		Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" .Place the highest RAC at the top of AHA. This is the overall risk assessment code for this activity					
H = HIGH RISK (FEAD DIRECTOR)		**"Severity"** is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible after controls are in place					
M = MODERATE RISK (CM or ET or PAR)							
L = LOW RISK (ET or PAR)		**"Probability"** is the likelihood to cause an incident, near miss, or accident did occur and identified as: Frequent, Likely, Occasional, Seldom, or Unlikely after controls are put in place.					

Job Steps	Hazards	Controls	RAC
Mobilizing to Site **Driving** **Vehicle Backing**	• Traffic accident • Driver fatigue • Poor driving skills • Load shift • Traffic accident • Property damage	• Keep alert of your surroundings. Do not try to complete other tasks while driving that can distract your attention • Do not drive when tired. Pull off at a safe location and walk around your vehicle and take a break if getting tired. • Use your mirrors while driving. Do not use evasive driving actions. Obey traffic laws. • Secure loads before starting your trip. Make frequent stops to check your load to make sure nothing has become loose. • Retighten any loose straps. • Check your surroundings when before backing. When possible use a spotter. • Check for obstructions before backing. Walk around vehicle to make sure area is clear.	**L**

Job Steps	Hazards	Controls	RAC
Unloading/placing equipment.	• Back strain • Hand Injuries; cuts, bruises, pinch points • Slips, Trips, & Falls • Contact with Heavy Equipment while in use.	• Use proper lifting techniques at all times. Request assistance from other personal when weight limits exceeds 50lbs. Mechanical means shall be used for gate relocation whenever possible rather than manual means to avoid the risk of strains and sprains. • Wear protective gloves; Use hand tools in a safe manner and keep hand tools in good working condition. • Use extreme caution when walking in work areas, working on or around truck beds and around equipment during unloading and staging activities. • Only trained and experienced personnel will be allowed to stage and unload heavy equipment. • Only certified operators will be authorized to operate equipment. Certifications must be on site at all times. • High visibility vests will be worn at all times while working in or around heavy equipment, trucks or other mechanized equipment. • All ground personal etc. must maintain eye contact with operators at all times. Do not proceed toward, or into blind spots of equipment without authorization to do so by operator. • All ground personal will stay outside the swing radius of equipment while in operation.	**L**
General Activities Supporting Task	• Injuries from slips, trips, and falls	• Walking/working surfaces will be kept free of clutter, debris, and congestion to the greatest extent possible. • Personnel will be briefed on the hazards of wet, muddy soil hazards and traversing uneven grades. • Walk or climb only on equipment and/or surfaces that are designed for personnel access. • Be aware of potential for poor footing while working on un-compacted backfill materials. • Use three-point contact when climbing onto equipment.	**L**
	• Injury due to inclement weather	• Outdoor work will cease during extreme weather conditions, such as electrical storms, high wind rain, and extreme temperatures. • Shut all equipment down when lightning is visible and wait for "all-clear" from the SSHO. • Workers will take cover indoors or in vehicle. • Supervisors will monitor local forecasts for warnings about specific weather hazards. • Workers will comply with all evacuation orders regarding rough weather directives.	**L**
	• Heat Stress	▪ Workers will be trained in the recognition of heat stress and appropriate actions to take. ▪ Workers are encouraged to increase fluid intake while working. ▪ Workers should minimize or avoid alcohol intake the night before working in heat stress situations. ▪ Workers will increase the frequency and duration of rest breaks while working in heat stress situations. ▪ Workers will watch each other for signs and symptoms of heat exhaustion and fatigue.	**L**
	• Controlling work areas	• Fencing, tape, cones or other SSHO-approved boundaries will be erected to warn approaching personnel of the hazardous area. • Appropriate signs will be posted at the boundary to instruct personnel in entry requirements.	**L**
Setting up Site/Exclusion Zone	• Uneven ground, holes, stumps, extension cords/slips, trips and falls • Site visitors/unauthorized site entrants • Electrical hazards/shock from	• Recon site, flag potential trip hazards (flags, cones), organize site to minimize walking areas • Establish suitable exclusion zone (caution tape, rope) • Use GFCI and grounding rods • Place generator at extension cord length distance downwind of site and place generator on bermed	**L**

Job Steps	Hazards	Controls	RAC
	generator • Generator/noise hazard, spill hazard	poly sheeting	
Accessing and opening well/vault	• Over tightened bolts, rusty locks/slipping causing cuts/abrasions to hands. • PID readings > 5ppm • Contact with potentially contaminated water. • Entering/exiting vault • Heavy well covers	• Know the limitations of all hand tools. Use socket wrenches and bolt cutters, as necessary, to remove old, rusty locks • Allow well to vent, if readings continue over 5 ppm then recap and advise management. • Wear nitrile gloves • Watch for slippery ladder/watch head. • Use partners help with equipment. • PID • Nitrile gloves • Boots, hard hat • Work gloves • Crow bars	**L**
Water level measurement	• Winding of meter/repetitive motion, probe recoiling too quickly striking personnel, hunching over well	• Share physical aspects of job with partner • Recoil meter slowly as the probe reaches meter	**L**
Sample Collection	• Pinch points • Sampler preservatives/vapors released once water is added or splashing of preservative on skin • Tape Gun – sharp edge	• Watch hands and fingers when attaching sample ports. • Hold sample containers away from face when filling and wear proper PPE • To extent possible, prepare tape strips separately and apply to sample bottles by hand; break tape by pushing tape gun away from you; ensure hands and legs are not in the path of the tape gun	**L**
Sample Preparation & Packaging **Preparation of sample containers**	• Handling of chemicals/spilling of chemicals on skin, clothes or eyes.	• Never leave open chemicals unattended. • Know location of nearest eyewash station. • Wear proper PPE. (nitrile gloves, safety glasses, acid apron) • Keep prep and pack area well ventilated (open window) • Know location of MSDS, absorbent spill cloth, Hazmat spill kit • Make sure all caps are secure • Know location of MSDS forms	**L**
Receiving pre-preserved bottles	• Glass containers/broken glass, cuts to hands • Packaging material / acid leak	• Use caution when opening package • Wear proper PPE (nitrile gloves, safety glasses)	**L**
Receiving coolers from the field	• Heavy coolers/back injury • Ticks, insects/Lyme Disease, spider bites and stings • Poison Ivy, Sumac/ rash	• Bend at knees, ask for assistance • Use hand truck when necessary • Use caution when taking contents out of cooler. Inspect coolers for ticks/spiders • Apply ivy block	**L**
Preparing coolers for delivery	• Strapping machine/ tripping over unrolled tape. • Tape gun/cuts to hands • Heavy coolers/back injury	• Make sure strapping machine is properly rolled. • Use caution, be aware of cutting edge; To extent possible, break tape by pushing tape gun away from you; ensure hands and legs are not in the path of the tape gun • Bend at knees, ask for assistance • Use hand truck as necessary	**L**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
• Fire extinguisher (with fuel and electrical sources) • Miscellaneous power and manual hand tools. • First Aid/BbPK/CPR shield • Communication devices	• Review APP by new site personnel. • 1st Aid/CPR (2 per site when medical attention a medical facility or physician is more than 5 minutes away to two or more employees. • Supervisors - BBLPS, 30 hour OSHA Construction Safety Training or equivalent	• Visual Inspections of designated work areas identify and address hazardous conditions. • Equipment inspections and maintenance. • Emergency Response equipment Inspections • (Fire Extinguishers, Eye wash First Aid/CPR etc.)

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Activity Hazard Analysis (AHA)

ACTIVITY/WORK TASK:	**Soil Sampling**	Overall Risk Assessment Code (RAC) (Use highest code)						**L**
	SIGNATURES	Activity #	8	AHA #				**4**
PWD/OICC/ROICC OFFICE		**Risk Assessment Code (RAC) Matrix**						
NAME & DATE ACCEPTED BY GDA:								
CONTRACT NUMBER:	**N62470-10-D-3009**	**Severity**	**Probability**					
TASK ORDER/DELIVERY #:	**20**							
PRIME CONTRACTOR:	**CH2M HILL**		Frequent	Likely	Occasional	Seldom	Unlikely	
SUBCONTRACTOR:	**NA**							
DATE OF PREPARATORY MEETING:		Catastrophic	**E**	**E**	**H**	**H**	**M**	
DATE OF INITIAL INSPECTION:		Critical	**E**	**H**	**H**	**M**	**L**	
CONTRACTOR COMPETENT PERSON:	NA	Marginal	**H**	**M**	**M**	**L**	**L**	
SITE SAFETY and HEALTH OFFICER		Negligible	**M**	**L**	**L**	**L**	**L**	
ACCEPTANCE BY GOVERNMENT DESIGNATED AUTHORITY (GDA)		Review each **"Hazard"** with identified safety **"Controls"** and determine (RAC)						
E = EXTREMELY HIGH (PWO/OICC/ROICC)		Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" .Place the highest RAC at the top of AHA. This is the overall risk assessment code for this activity						
H = HIGH RISK (FEAD DIRECTOR)		**"Severity"** is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible after controls are in place						
M = MODERATE RISK (CM or ET or PAR)								
L = LOW RISK (ET or PAR)		**"Probability"** is the likelihood to cause an incident, near miss, or accident did occur and identified as: Frequent, Likely, Occasional, Seldom, or Unlikely after controls are put in place.						

Job Steps	Hazards	Controls	RAC
Mobilizing to Site **Driving** **Vehicle Backing**	• Traffic accident • Driver fatigue • Poor driving skills • Load shift • Traffic accident • Property damage	• Keep alert of your surroundings. Do not try to complete other tasks while driving that can distract your attention • Do not drive when tired. Pull off at a safe location and walk around your vehicle and take a break if getting tired. • Use your mirrors while driving. Do not use evasive driving actions. Obey traffic laws. • Secure loads before starting your trip. Make frequent stops to check your load to make sure nothing has become loose. • Retighten any loose straps. • Check your surroundings when before backing. When possible use a spotter. • Check for obstructions before backing. Walk around vehicle to make sure area is clear.	**L**

Job Steps	Hazards	Controls	RAC
Unloading/placing equipment.	• Back strain • Hand Injuries; cuts, bruises, pinch points • Slips, Trips, & Falls • Contact with Heavy Equipment while in use.	• Use proper lifting techniques at all times. Request assistance from other personal when weight limits exceeds 50lbs. Mechanical means shall be used for gate relocation whenever possible rather than manual means to avoid the risk of strains and sprains. • Wear protective gloves; Use hand tools in a safe manner and keep hand tools in good working condition. • Use extreme caution when walking in work areas, working on or around truck beds and around equipment during unloading and staging activities. • Only trained and experienced personnel will be allowed to stage and unload heavy equipment. • Only certified operators will be authorized to operate equipment. Certifications must be on site at all times. • High visibility vests will be worn at all times while working in or around heavy equipment, trucks or other mechanized equipment. • All ground personal etc. must maintain eye contact with operators at all times. Do not proceed toward, or into blind spots of equipment without authorization to do so by operator. • All ground personal will stay outside the swing radius of equipment while in operation.	**L**
General Activities Supporting Task	• Injuries from slips, trips, and falls	• Walking/working surfaces will be kept free of clutter, debris, and congestion to the greatest extent possible. • Personnel will be briefed on the hazards of wet, muddy soil hazards and traversing uneven grades. • Walk or climb only on equipment and/or surfaces that are designed for personnel access. • Be aware of potential for poor footing while working on un-compacted backfill materials. • Use three-point contact when climbing onto equipment.	**L**
	• Injury due to inclement weather	• Outdoor work will cease during extreme weather conditions, such as electrical storms, high wind rain, and extreme temperatures. • Shut all equipment down when lightning is visible and wait for “all-clear” from the SSHO. • Workers will take cover indoors or in vehicle. • Supervisors will monitor local forecasts for warnings about specific weather hazards. • Workers will comply with all evacuation orders regarding rough weather directives.	**L**
	• Heat Stress	▪ Workers will be trained in the recognition of heat stress and appropriate actions to take. ▪ Workers are encouraged to increase fluid intake while working. ▪ Workers should minimize or avoid alcohol intake the night before working in heat stress situations. ▪ Workers will increase the frequency and duration of rest breaks while working in heat stress situations. ▪ Workers will watch each other for signs and symptoms of heat exhaustion and fatigue.	**L**
	• Controlling work areas	• Fencing, tape, cones or other SSHO-approved boundaries will be erected to warn approaching personnel of the hazardous area. • Appropriate signs will be posted at the boundary to instruct personnel in entry requirements.	**L**
Setting up Site/Exclusion Zone	• Uneven ground, holes, stumps, extension cords/slips, trips and falls • Site visitors/unauthorized site entrants	• Recon site, flag potential trip hazards (flags, cones), organize site to minimize walking areas • Establish suitable exclusion zone (caution tape, rope) • Use GFCI and grounding rods	**L**

Job Steps	Hazards	Controls	RAC
	• Electrical hazards/shock from generator • Generator/noise hazard, spill hazard	• Place generator at extension cord length distance downwind of site and place generator on bermed poly sheeting	
Sampling with long handled tools	• Muscle/back strain, over-exertion, body torque, improper position, fatigue • Hand fatigue, blisters • Handle striking body or head • Exposure to COC vapors	• Do not twist at the waist, maintain an upright posture, handle should be between the workers thigh and lower chest. • Do not over exert, do not jerk • Take breaks • Wear proper PPE • Monitor breathing zone	**L**
Sample Preparation & Packaging **Preparation of sample containers**	• Handling of chemicals/spilling of chemicals on skin, clothes or eyes.	• Never leave open chemicals unattended. • Know location of nearest eyewash station. • Wear proper PPE. (nitrile gloves, safety glasses, acid apron) • Keep prep and pack area well ventilated (open window) • Know location of MSDS, absorbent spill cloth, Hazmat spill kit • Make sure all caps are secure • Know location of MSDS forms	**L**
Receiving pre-preserved bottles	• Glass containers/broken glass, cuts to hands • Packaging material / acid leak	• Use caution when opening package • Wear proper PPE (nitrile gloves, safety glasses)	**L**
Receiving coolers from the field	• Heavy coolers/back injury • Ticks, insects/Lyme Disease, spider bites and stings • Poison Ivy, Sumac/ rash	• Bend at knees, ask for assistance • Use hand truck when necessary • Use caution when taking contents out of cooler. Inspect coolers for ticks/spiders • Apply ivy block	**L**
Preparing coolers for delivery	• Strapping machine/ tripping over unrolled tape. • Tape gun/cuts to hands • Heavy coolers/back injury	• Make sure strapping machine is properly rolled. • Use caution, be aware of cutting edge; To extent possible, break tape by pushing tape gun away from you; ensure hands and legs are not in the path of the tape gun • Bend at knees, ask for assistance • Use hand truck as necessary	**L**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
• Fire extinguisher (with fuel and electrical sources) • Miscellaneous power and manual hand tools. • First Aid/BbPK/CPR shield • Communication devices	• Review APP by new site personnel. • 1st Aid/CPR (2 per site when medical attention a medical facility or physician is more than 5 minutes away to two or more employees. • Supervisors - BBLPS, 30 hour OSHA Construction Safety Training or equivalent	• Visual Inspections of designated work areas identify and address hazardous conditions. • Equipment inspections and maintenance. • Emergency Response equipment Inspections • (Fire Extinguishers, Eye wash First Aid/CPR etc.)

IAW EM 385 01.A.13 CONTRACTOR-REQUIRED AHA "WORK WILL NOT BEGIN UNTIL THE AHA FOR THE WORK ACTIVITY HAS BEEN ACCEPTED BY THE GDA"
THE AHA SHALL BE REVIEWED AND MODIFIED AS NECESSARY TO ADDRESS CHANGING SITE CONDITION, OPERATIONS OR CHANGE OF COMPETENT/QUALIFIED PERSON'S

	PRINT	SIGNATURE	Date/Time
Supervisor Name:			/
SSHO Name:			/
SITE PERSONNEL:			
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PRE-TASK SAFETY PLAN

Pre-Task Safety Plan (PTSP) and Safety Meeting Sign-in Sheet

Project: _____ Location: _____ Date: _____

Supervisor: _____

Job Activity: _____

_____

_____

Attendees: Print Name Sign Name

_____

_____

_____

_____

_____

_____

_____

List Tasks and verify that applicable AHAs have been reviewed:

_____

_____

_____

Tools/Equipment Required for Tasks (ladders, scaffolds, fall protection, cranes/rigging, heavy equipment, power tools):

_____

_____

_____

Potential H&S Hazards, including chemical, physical, safety, biological and environmental (check all that apply):

__ Chemical burns/contact	__ Trench, excavations, cave-ins	__ Ergonomics
__ Pressurized lines/equipment	__ Overexertion	__ Chemical splash
__ Thermal burns	__ Pinch points	__ Poisonous plants/insects
__ Electrical	__ Cuts/abrasions	__ Eye hazards/flying projectile
__ Weather conditions	__ Spills	__ Inhalation hazard
__ Heights/fall > 6 feet	__ Overhead Electrical hazards	__ Heat/cold stress
__ Noise	__ Elevated loads	__ Water/drowning hazard
__ Explosion/fire	__ Slips, trip and falls	__ Heavy equipment
__ Radiation	__ Manual lifting	__ Aerial lifts/platforms
__ Confined space entry	__ Welding/cutting	__ Demolition
__Underground Utilities	__ Security	__ Poor communications

Other Potential Hazards (Describe):

_____

_____

_____

Hazard Control Measures (Check All That Apply):			
PPE __ Thermal/lined __ Eye __ Dermal/hand __ Hearing __ Respiratory __ Reflective vests __ Flotation device __ Hard Hat	Protective Systems __ Sloping __ Shoring __ Trench box __ Barricades __ Competent person __ Locate buried utilities __ Daily inspections __ Entry Permits/notification	Fire Protection __ Fire extinguishers __ Fire watch __ Non-spark tools __ Grounding/bonding __ Intrinsically safe equipment	Electrical __ Lockout/tagout __ Grounded __ Panels covered __ GFCI/extension cords __ Power tools/cord inspected __ Overhead line clearance __ Underground utils ID'd
Fall Protection __ Harness/lanyards __ Adequate anchorage __ Guardrail system __ Covered opening __ Fixed barricades __ Warning system	Air Monitoring __ PID/FID __ Detector tubes __ Radiation __ Personnel sampling __ LEL/O2 __ No visible dust __ Other	Proper Equipment __ Aerial lift/ladders/scaffolds __ Forklift/heavy equipment __ Backup alarms __ Hand/power tools __ Crane with current inspection __ Proper rigging __ Operator qualified	Welding & Cutting __ Cylinders secured/capped __ Cylinders separated/upright __ Flash-back arrestors __ No cylinders in CSE __ Flame retardant clothing __ Appropriate goggles
Confined Space Entry __ Isolation __ Air monitoring __ Trained personnel __ Permit completed __ Rescue	Medical/ER __ First-aid kit __ Eye wash __ FA-CPR trained personnel __ Route to hospital	Heat/Cold Stress __ Work/rest regime __ Rest area __ Liquids available __ Monitoring __ Training	Vehicle/Traffic __ Traffic control __ Barricades __ Flags __ Signs
Permits __ Hot work __ Confined space __ Lockout/tagout __ Excavation __ Demolition __ Energized work	Demolition __ Pre-demolition survey __ Structure condition __ Isolate area/utilities __ Competent person __ Hazmat present	Inspections: __ Ladders/aerial lifts __ Lanyards/harness __ Scaffolds __ Heavy equipment __ Drill rigs/geoprobe rigs __ Cranes and rigging __ Utilities marked	Training: __ Hazwaste (current) __ Construction __ Competent person __ Task-specific __ FA/CPR __ Confined Space __ Hazcom
Underground Utilities __Dig alert called __3rd Party locater __As-builts reviewed __Interview site staff __Client review __soft locate necessary?	Incident Communications __Work stops until cleared by TM/CM __Immediate calls to TM/CM __Client notification __24 hour notification setup __Clear communications	AHA' s __reviewed and approved by HSM __on site and current __applicable for this day's work __Communication and incident processes included?	

Field Notes (including observations from prior day, etc.):

_____

_____

_____

Name (Print): _____

Signature: _____ Date: _____

SAFE WORK OBSERVATION FORM

CH2MHILL

Safe Behavior Observation Form

☐ Federal ☐ Commercial (check one) ☐ International	☐ Construction or ☐ Consulting (check one)
Project Number:	Client/Program:
Project Name:	Observer: Date:
Position/Title of worker observed:	Background Information/comments:
Task/Observation Observed:	

- Identify and reinforce safe work practices/behaviors
- Identify and improve on at-risk practices/acts
- Identify and improve on practices, conditions, controls, and compliance that eliminate or reduce hazards
- Proactive PM support facilitates eliminating/reducing hazards (do you have what you need?)
- Positive, corrective, cooperative, collaborative feedback/recommendations

Actions & Behaviors	Safe	At-Risk	Observations/Comments
Current & accurate Pre-Task Planning/Briefing (Project safety plan, STAC, AHA, PTSP, tailgate briefing, etc., as needed)			**Positive Observations/Safe Work Practices:**
Properly trained/qualified/experienced			
Tools/equipment available and adequate			
Proper use of tools			**Questionable Activity/Unsafe Condition Observed:**
Barricades/work zone control			
Housekeeping			
Communication			
Work Approach/Habits			
Attitude			
Focus/attentiveness			**Observer's Corrective Actions/Comments:**
Pace			
Uncomfortable/unsafe position			
Inconvenient/unsafe location			
Position/Line of fire			
Apparel (hair, loose clothing, jewelry)			
Repetitive motion			**Observed Worker's Corrective Actions/Comments:**
Other…			

For ES Federal Sector projects please email completed forms to: CH2MHILLESFEDSafeBehaviorObservation@ch2m.com
For ES Commercial Sector projects please email completed forms to: SafeBehaviorObservations@ch2m.com
For CNR ES staff please email completed forms to: cnressafe@ch2m.com
For International ES projects please e-mail completed forms to: ESINTLSafeBehaviorObservation@ch2m.com

LOSS/NEAR-LOSS INVESTIGATION

Root Cause Investigation

This attachment is provided to assist in accessing, completing, and reviewing an incident investigation. It is important to remember the following when conducting an investigation:

- Gather relevant facts, focusing on fact-finding, not fault-finding.
- Draw conclusions, putting facts together into a probable scenario.
- Determine incident root cause(s), the basic causes why an unsafe act/condition existed.
- Develop and implement solutions, matching all identified root causes with solutions.

Documentation

The following should be included to document the incident.

Description

- Provide a description of the event and the sequence of events and actions that took place prior to the incident. Start with the incident event and work backwards in time through all of the preceding events that directly contributed to the incident. The information should identify why the event took place as well as who was involved, when and where the event took place, and what actions were taken.

Cause Analysis

Using the form and flowchart (provided below) the root cause of the incident will be determined. This form must be retained in the project and/or regional HS&E files.

Immediate Causes—List the substandard actions or conditions that directly affected the incident. The following are examples of immediate causes:

- ***Substandard Actions*:** Operating equipment without authority; failure to warn; failure to secure; operating at improper speed; making safety device inoperable; using defective equipment; failing to use PPE; improper loading; improper lifting; improper position for task; under influence of alcohol or drugs; horseplay.
- ***Substandard Conditions:*** Exposure to hazardous materials; exposure to extreme temperatures; improper lighting; improper ventilation; congestion; exposure to fire and explosive hazard; defective tools, equipment or materials; exposure to extreme noise; poor ventilation; poor visibility; poor housekeeping.

Basic Causes—List the personal and job factors that caused the incident. The following are examples of basic causes:

- ***Personal Factors:*** Capability; knowledge; skill; stress; motivation.
- ***Job Factors:*** Abuse or misuse; engineering; maintenance; purchasing; supervision; tools and equipment; wear and tear; work standards.

Corrective Action Plan

Include all corrective actions taken or those that should be taken to prevent recurrence of the incident. Include the specific actions to be taken, the employer and personnel responsible for implementing the actions, and a time frame for completion. Be sure the corrective actions address the causes. For example, training may prevent recurrence of an incident caused by a lack of knowledge, but it may not help an incident caused by improper motivation.

The following are examples of management programs that may be used to control future incidents. These programs should be considered when determining specific corrective actions:

- ***Management Programs***: Accident/incident analysis; emergency preparedness; engineering controls; general promotion; group meetings; health control; hiring and placement; leadership and administration; management training; organizational rules; personal protective equipment; planned inspections; program audits; program controls; purchasing controls; task analysis and procedures; task observation.

Incident & Near-Loss Investigation Report Form

Employer Information

Company Name: _____

Project Name: _____ Task Order: _____

Project Location: _____

Task Location: _____

Job Assignment: _____

Preparer's Name: _____ Preparer's Employee Number: _____

Incident Specific Information

Date of Incident: _____ Time of Incident: _____a.m./p.m.

Location of incident:

☐ Company premises

☐ Field

☐ In Transit

☐ Other: _____

Address where the incident occurred: _____

Equipment Malfunction: Yes ☐ No ☐

Activity was a Routine Task: Yes ☐ No ☐

Describe any property damage: _____

Specific activity the employee was engaged in when the incident occurred:

_____

_____

_____

All equipment, materials, or chemicals the employee was using when the incident occurred:

_____

_____

_____

Describe the specific incident and how it occurred:

_____

_____

_____

_____

_____

Describe how this incident may have been prevented:

_____
_____
_____
_____
_____

Contributing Factors (Describe in detail why incident occurred):

_____
_____
_____
_____
_____

Date employer notified of incident: _____ To whom reported: _____

Witness Information (First Witness)

Name: _____
Employee Number: _____
Address: _____
City:_____
Zip Code: _____
Phone: _____

Witness Information (Second Witness)

Name: _____
Employee Number: _____
Address: _____
City:_____
Zip Code: _____
Phone: _____

Additional information or comments:

_____
_____
_____

A ROOT CAUSE ANALYSIS FORM MUST BE COMPLETED FOR ALL INJURIES AND ILLNESSES OR ACTUAL LOSSES.

COMPLETION OF THE ROOT CAUSE ANALYSIS FORM FOR NEAR LOSSES IS OPTIONAL, AT THE DISCRETION OF THE HEALTH AND SAFETY MANAGER.

Root Cause Analysis Form

Root Cause Analysis (RCA)

Root Cause Categories (RCC): In the first column, enter the appropriate RCC from the choices below that applies to the root cause (RC) and/or contributing factor (CF) of the incident. Describe the specific root cause and corrective actions in their respective columns.

1. **Lack of skill or knowledge**
2. **Lack of or inadequate operational procedures or work standards**
3. **Inadequate communication of expectations regarding procedures or work standards**
4. **Inadequate tools or equipment**
5. **Correct way takes more time and/or requires more effort**
6. **Shortcutting standard procedures is positively reinforced or tolerated**
7. **Person thinks there is no personal benefit to always doing the job according to standards**

RCC #	Root Cause(s)	Corrective Actions	RC[1]	CF[2]	Due Date	Completion Date	Date Verified

[1] RC = Root Cause; [2] CF = Contributing Factors (check which applies)

Investigation Team Members

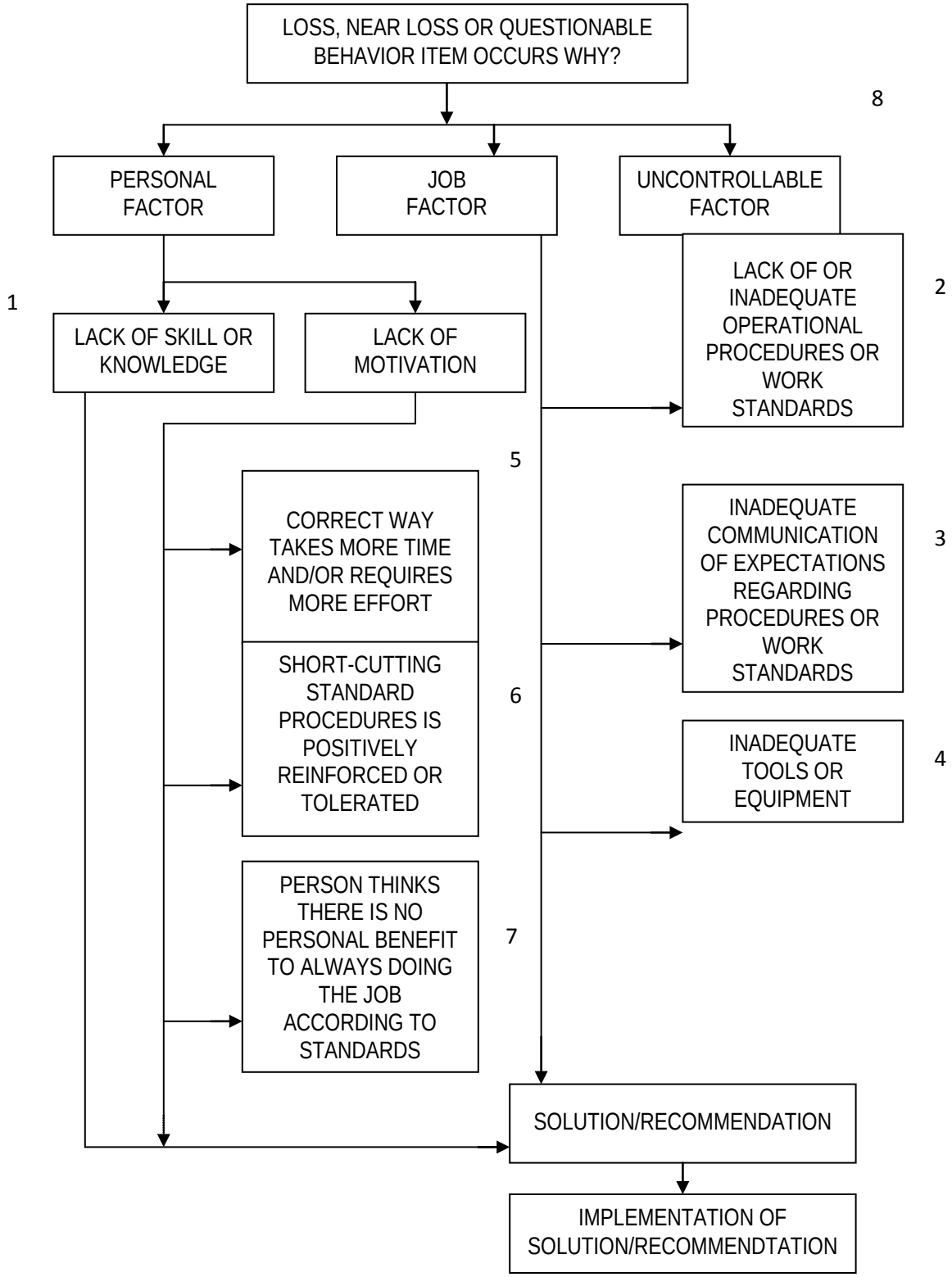
Name	Job Title	Date

Results of Solution Verification and Validation

Reviewed By

Name	Job Title	Date

Root Cause Analysis Flow Chart



Equipment Inspection Form

EQUIPMENT INSPECTION FORM

This form will be used to document the CH2MHILL earthmoving equipment inspections. Equipment will be inspected each day and shift prior to use. All components will be inspected for damage and proper operation. Any component failing the inspection will be corrected prior to earthmoving equipment use. Check each box after passing inspection and initial bottom of form each day.

Equipment Name: _____ Identification #: _____ Week of: _____

INSPECTION ITEM	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Visual Checks							
Operating manual – present							
Controls - labeled as to their function, visible and legible, safety latches/guards present							
Tires/tracks – proper inflation/tension, not excessively worn or damaged							
Fluid levels/leaks - engine, transmission, hydraulic, radiator, swing motor and PTO oils.							
Lubrication - to the manufacturer's specifications							
Air filter gauge - gauge is not in the red zone.							
Hydraulics – no fluid leaks, connections tight, hoses, cylinders free of damage.							
Hoses/belts – held securely, not loose or rubbing, no excessive wear or							
Fuel system - tank free of damage, all valves/hoses secure, no leaks							
Body & ground-engaging tools – no damage, cracks, bends, or excessive wear.							
Cylinders/articulation joints– no worn pins, loose connections or other damage.							
Roll-over protective structures (ROPS) - no damage, no cracks or bends							
Seat belt/bar – required unless operator stands or no ROPS							
Handrails, steps, platforms – clean, free from grease, oil, clear of obstructions.							
Cab glass – safety glass, clean, no cracks or visible distortion							
Mirrors – properly adjusted, no cracks or visible distortion							
Windshield wipers, fluid, and defroster - functioning							
Machine guards – present and in good condition							
Fire extinguisher – present and charged							
Operational Checks – check items through normal maneuvers							
Horn & back-up alarm – operating and distinguishable from surrounding noise							
Lights, directional signals, and brake lights - functioning							
Gauges/indicators – visible and working properly							
Operating controls - lift and tilt functioning properly							
Outriggers, if present – functioning properly							
Accelerator - even acceleration, does not stick							
Brakes (service & parking) - brings to complete stop, holds in fixed position							
Steering – responsive, minimal looseness							
Exhaust system – guarded if potential for contact, no signs of sparks/leaks							
Operator's Initials							

Agency Inspection Target Zero Bulletin

HSSE

Lessons Learned

[Date] ESBG LL-11-xx

Subject	**[Insert Descriptive Name of Lessons Learned]**
CH2M HILL Project?	[Yes or No]
Situation	[Describe incident or situation that occurred in general terms. Try to be brief and avoid unnecessary details such as names of people or projects, business groups, divisions, dates, location, etc.]
Lessons Learned (Recommendations and Comments)	• Bullet out any lessons learned, recommendations or other important "take away" information that would benefit others. Tie the recommendations to the incident or event, and avoid including information that is not directly tied to the event.
Submitted By	[Name/Office Location/Phone]
Additional Information Contact	[Name/Office Location/Phone]
Keywords/Categories	[Insert any keywords or incident categories that would aid in a search for this lessons learned]

Send completed Lessons Learned to the ESBG HSSE Director for posting and distribution. Please include a recommended distribution list.

Environmental Services Business Group

TARGET ZERO BULLETIN

Subject: HSSE Agency Inspections (OSHA, EPA, DOT, State Health Department)

Do you know what YOU would do if an agency inspector arrived at your site unannounced?

Recently, a State Occupational Safety and Health Administration (OSHA) inspector made an unannounced visit to one of our Federal project sites. OSHA, U.S. Environmental Protection Agency (EPA), and authorized state or local agencies have authority to inspect any facility that is subject to health, safety, and environmental legislation. Inspections may be announced or unannounced. This particular inspector indicated that the project was targeted for an inspection because the work was funded by the American Recovery and Reinvestment Act (ARRA).

Enterprise Standard Operating Procedure (SOP) HSE-201, *Agency Inspections and Communications,* describes the responsibilities, procedures, and requirements associated with inspections conducted by external regulatory agencies, as well as the methods for communicating information to key individuals. This Target Zero Bulletin is a brief summary of what to do in the event of an agency inspection at your site. Refer to the SOP for more specific guidance.

Notification of Inspections

- If the inspection is an announced regulatory agency inspection, the Project Manager (PM) should notify the Responsible Health and Safety Manager (HSM) and Responsible Environmental Manager (REM) well in advance of the inspection.
- If an unannounced agency inspector visits one of our projects, Field personnel must immediately notify the project Emergency Response Coordinator (ERC). Typically the ERC is the Safety Coordinator (SC).
- The ERC must immediately notify the HSM/REM, as appropriate, of unannounced inspections, or designate someone to call the HSM/REM. The HSM/REMs can provide guidance to the field staff and PM.

Inspector Credential Verification

- Upon arrival, the ERC must request the inspector to provide official credentials. Record the inspector's name and office phone number or obtain the inspector's business card.
- The inspector shall sign the visitors log and be given a site-specific health, safety, and environmental protection briefing.
- The inspector shall meet any site access requirements associated with security clearances, specialized training, and medical monitoring. The CH2M HILL representative shall verify that the inspector possesses these requirements; access will only be granted to those areas where appropriate access requirements are met. Some inspectors have the authority to gain access to any work area at any time, such as an inspector with a search warrant. In these cases, we can stop work operations as necessary to protect the safety of the inspector(s).

Opening Conference

- The CH2M HILL Project Manager, ERC, HSM, or REM, and the inspector shall determine attendees for the opening conference. The HSM (for OSHA and other worker health and safety inspections) or REM (for environmental inspections) shall join the opening conference via conference call.
- The inspector shall inform CH2M HILL of the purpose of the inspection and provide a copy of the complaint, if applicable.
- The inspector shall outline the scope of the inspection, including employee interviews conducted in private, physical inspection of the workplace and records, possible referrals, discrimination complaints, and the closing conference(s).

Requests for OSHA Logs

- An OSHA inspector may request to review the project OSHA Injury/Illness log, better known as the OSHA 300 Log. Contact your HSM for assistance in obtaining the OSHA 300 Log.
- Field projects with a continuous duration of one year or longer are considered to be separate establishments and are required to maintain an OSHA 300 log specific to the project. The project OSHA 300 log should be maintained onsite and kept current.

- Recordable injuries and illnesses sustained on field projects less than one year in duration are maintained on the CH2M HILL office log where the injured employee is based.

The Inspection

- The scope of the inspection shall be limited to that indicated by the inspector in the opening conference. The inspector shall be escorted to relevant areas only. The ERC or other designated by the HSM or REM must accompany the inspector during the inspection.
- Ensure that the inspection is limited to the scope that the inspector disclosed during the opening conference. The ERC should always take notes which identify: areas inspected, machinery or equipment and materials examined, employees or other persons interviewed, and photographs taken by the inspector.
- The inspector will observe safety, health, and environmental conditions and practices and document the inspection process. The inspector may also take photos and instrument readings, examine records, collect air samples, measure noise levels, survey existing engineering controls, and monitor employee exposure to toxic vapors, gases, and dusts.
- CH2M HILL should gather duplicate information (photographs, readings, samples) in the same manner and condition as the inspector. If the equipment needed to take duplicate samples is not onsite, ask the inspector if the sampling can wait until the equipment is available. If samples are taken, request a description of the tests that the agency intends to perform on the samples and request results as soon as they are available.
- Employees may be questioned during the inspection tour. The employee can refuse to speak to an inspector, can speak to the inspector with a company representative (including management) present, or can speak to the inspector privately. It is CH2M HILL policy that employees who wish to speak to the inspector are not discriminated against, intimidated, or otherwise mistreated for exercising their rights during compliance inspections.
- Copies of documents should not be provided to the inspector without the approval of the HSM or REM or Legal Insurance Department (LID). **DO NOT** voluntarily release documents. Respond only to inspection team requests.
- During the course of the inspection, the inspector may point out violations. For each violation, the CH2M HILL representative should ask the inspector to discuss possible corrective action. Where possible, violations detected by the inspector should be corrected immediately and noted by the inspector as corrected.
- For those items which cannot be corrected immediately, an action plan shall be formulated for timely correction. In any instance, employees exposed to hazards shall be removed from the area.

Closing Conference

After the inspection, a closing conference is normally held as follows:

- The CH2M HILL PM, ERC, HSM or REM shall be involved via conference call in the closing conference, at a minimum;
- The inspector shall describe the apparent violations found during the inspection and other pertinent issues as deemed necessary by the inspector. CH2M HILL shall be advised of their rights to participate in any subsequent conferences, meetings or discussions. Any unusual circumstances noted during the closing conference shall be documented by the ERC;
- The inspector shall discuss violations observed during the inspection and indicate for which violations a citation and a proposed penalty may be issued or recommended;
- The ERC shall request receipts for all samples and approved documents photocopied by the inspector, request a photocopy of the inspector's photograph log, and request a copy of the final inspection report; and
- Any documentation from an agency inspection must be transmitted immediately to the HSM or REM, and LID.

Unannounced regulatory agency inspections may happen at any time on our projects -

Get your HSM/REM and PM involved immediately if an Inspector arrives

Chemical Fact Sheets

CH2MHILL

Enterprise Standard Operating Procedure HSE-501

Arsenic Fact Sheet

Uses and Occurrences

The manufacture and transportation of arsenic compounds; used in the manufacture of herbicide, pesticide, fungicides, and defoliants; used in the manufacture and handling of calcium arsenate; used in the manufacture of electrical semiconductors, diodes, and solar batteries; used as an additive for food and drinking water for animals; used as a preharvest desiccant, sugarcane ripener, soil sterilant, or for timber thinning; used as a bronzing or decolorizing addition in glass manufacturing; used in the production of opal glass and enamels; used as an addition to alloys to increase hardening and heat resistance; used during smelting of ores; used during the cleanup of soil contaminated with arsenic; used military applications; and used in the general handling, storage, and use of arsenic.

Physical Characteristics

Appearance:	Gray metal or white powder
Odor:	Odorless solid, garlic-like when heated
Flammable:	None
Flash Point:	None
Flammable Range:	None
Specific Gravity:	5.73 for arsenic metal, 3.74 for arsenic trioxide
Stability:	Stable
Incompatibilities:	Heat, hydrogen gas, and oxidizing agents
Melting Point:	Sublimes at 613°C (1135°F); 315°C (599 ^{o}F) for arsenic trioxide
Boiling Point:	Sublimes at 613°C (1135°F); 465°C (869 ^{o}F) for arsenic trioxide

Signs and Symptoms of Exposure

Short-term (Acute): Nausea, vomiting, diarrhea, weakness, loss of appetite, cough, chest pain, giddiness, headache, and breathing difficulty.

Long-term (Chronic): Numbness and weakness in the legs and feet, skin and eye irritation, hyperpigmentation, thickening of palms and soles (hyperkeratosis), contact dermatitis, skin sensitization, warts, ulceration, perforation of the nasal septum, and lung and lymphatic cancer.

Modes of Exposure

Inhalation: Dusts and Vapors

Absorption: Liquid

Ingestion: Dusts and Liquid

Exposure Limits

Action level (AL) 5 $\mu g/m^3$

PEL 10 $\mu g/m^3$

STEL None

TLV 10 $\mu g/m^3$

Exposure Level vs. Regulatory Requirements

EXPOSURE LEVEL (EL)	REGULATORY REQUIREMENTS
EL < AL	Maintain exposure as low as reasonably achievable.
AL > EL, EL < PEL	Implement portions of the OSHA Arsenic Standard and training.
EL > PEL	Implement all portions of the OSHA Arsenic Standard, including training, medical surveillance, engineering controls, establishment of work areas, etc.

PPE

Eye: Safety glasses; contact lenses should **not** be worn.

Skin: Chemical protective gloves and body protection.

Respiratory: Air purifying respirators and supplied air respirators, depending on the exposure.

First Aid

Inhalation: Move to fresh air; seek medical attention promptly.

Skin: Quick drenching with water; wash skin with soap and water; seek medical attention promptly.

Eyes: Flush with water for 15 minutes, lifting the lower and upper lids occasionally; seek medical attention promptly.

Ingestion: Seek medical attention promptly.

CH2MHILL

Enterprise Standard Operating Procedure HSE-512

Vinyl Chloride Fact Sheet

Uses and Occurrences

Polyvinyl chloride and copolymers, organic synthesis, adhesives for plastics, and as a precursor in the production of the common plastic polyvinyl chloride (PVC). It is often a degradation product of a number of chlorinated compounds, including tetra-chloroethylene and trichloroethylene, at hazardous waste sites in soils and groundwater. It can also be a breakdown product of the combustion of PVC or other chlorinated compounds.

Physical Characteristics

Appearance:	Colorless gas
Odor:	Sweet; Odor threshold: 3,000 ppm
Flammable:	Class IA Flammable Liquid Gas; NFPA Rating: 4
Flash Point:	-78 ^{o}C (-108°F)
Flammable Limits:	3.6% - 33.0% (% by volume in air)
Specific gravity:	0.91; (water = 1.0)
Stability:	Stable under ordinary conditions of use and storage
Vapor Pressure:	2300 mm Hg (at 20 ^{o}C)
Incompatibilities:	Atmospheric oxygen and strong oxidizers may react to produce peroxide, which can initiate a violent polymerization reaction
Melting Point:	-155.7 ^{o}C (-248°F)
Boiling Point:	-14 ^{o}C (7°F)

Signs and Symptoms of Exposure

Inhalation:	Short Term: Dizziness, light-headedness, nausea, dullness of visual and auditory responses, drowsiness, and unconsciousness Long Term: Thickening of skin, contact and allergic dermatitis, fatigue, coughing and sneezing, abdominal pain, gastrointestinal bleeding, nausea, vomiting, indigestion, diarrhea, jaundice, weight loss, anorexia, and cold and tingling sensations of the hands and feet, carcinogen.
Skin contact:	Short Term: Skin contact with liquid can cause frostbite. Long Term: Dermatitis
Eye contact:	Vapors can cause eye irritation. Contact can produce pain, inflammation and temporal eye damage.

Modes of Exposure

Inhalation:	Vapor
Absorption:	Liquid causes frostbite
Ingestion:	Ingestion of contaminated water

Exposure Limits

Action level	0.5 ppm
PEL	1 ppm

STEL	None
PEL-C	5 ppm
TLV	1 ppm

Exposure Level vs. Regulatory Requirements

EXPOSURE LEVEL (EL)	REGULATORY REQUIREMENTS
EL < AL	Maintain exposure as low as reasonably achievable
EL > AL, EL < PEL	Implement portions of the OSHA Vinyl chloride standard and Training
EL > PEL	Implement all portions of the OSHA Vinyl Chloride Standard including training, medical surveillance, engineering controls, establishment of work areas, etc.

PPE

Eye:	Safety glasses, chemical goggles, face shield
Skin:	Tychem SL or other full-body clothing, depending on the exposure. Nitrile, Viton or laminated film gloves.
Respiratory:	Air purifying respirators and supplied air respirators, depending on the exposure.

First Aid

Inhalation:	Move to fresh air, begin rescue breathing if breathing has stopped and CPR if heart action has stopped, transfer promptly to a medical facility.
Skin:	Immerse affected part in warm water. Seek medical attention.
Eyes:	Flush with large amounts of water for at least 15 minutes. Seek medical attention immediately.
Ingestion:	Contact a physician.

Appendix E
SOPs

STANDARD OPERATING PROCEDURE

Civil Surveying

I. Purpose and Scope

The SOP describes survey procedures to be used on CLEAN projects. Modified third-order survey procedures will be used for most surveying. Geographic Positioning System techniques will be used for measurement of some horizontal coordinates.

II. Records and Definitions

All field notes should be kept in bound books. Each book should have an index. Each page of field notes should be numbered and dated and should show the initials of all crew members. The person taking field notes will be identified in the log. Information on weather (wind speed/wind direction, cloud cover, etc.) and on other site conditions should also be entered in the notes. Notes should also include instrument field identification number and environmental settings. Graphite pencils or waterproof ballpoint pens should be used. Erasing is not acceptable; use a single-strike-through and initial it. The notekeeping format should conform to the *Handbook of Survey Notekeeping* by William Pafford. A survey work drawing with grid lines and at the scale of the topographic map should be prepared for all survey field work. Field notebooks will be available on site.

The following terms are defined to clarify discussion in this SOP:

- North American Datum (NAD) -The standard geodetic datum on the North American continent.
- National Geodetic Vertical Datum (NGVD) - The vertical-control datum used (1929 or later) by the National Geodetic Survey for vertical control.
- Horizontal Control - Horizontal location of an object from surveyed corners or other features on permanent land monuments in the immediate site area. Will be based on North American Datum (NAD) 1983 and state plane grid systems.
- Vertical Control - Vertical location of an object compared to the adjacent ground surface.
- Bench Mark - Precisely determined elevation above or below sea level. May also have horizontal control (northing, easting) determined for location.

III. Surveying

Horizontal Survey

Horizontal angular measurements shall be made with a 20-second or better theodolite or transit. When using a 20-second instrument the horizontal angles shall be turned four times (two each direct and inverted) with the mean of the fourth

angle being within 5 seconds of the mean of the second angle. When using a 10-second or better instrument the angles shall be doubled (once each direct and inverted), with the mean of the second angle within 5 seconds of the first angle. The minimum length of any traverse courses shall be 300 feet.

Distance measurements shall be made with a calibrated steel tape corrected for temperature and tension or a calibrated electronic distance meter (EDM). When using an EDM the parts per million (PPM), curvature and refraction corrections shall be made. Vertical angle measurements used for distance slope corrections shall be recorded to the nearest 20 seconds of arc deviation from the horizontal plane. Horizontal locations will be surveyed to within 0.05-foot of the true location.

Horizontal traverse stations shall be established and referenced for future use. All stations shall be described in the field notes with sufficient detail to facilitate their recovery at a later date. The station shall consist of a permanent mark scribed on facilities such as sidewalks, curbs, concrete slabs, or iron rod and cap.

The horizontal location will be referenced to NAD83 and the appropriate state plane grid system.

Some horizontal coordinates will be measured using Geographic Positioning System (GPS) equipment. This approach will be used in particular for determining the coordinates of surface-water and sediment sampling locations, and may be used also for determining the locations of piezometers and monitoring wells. The GPS survey will be performed by staff trained in the use of the equipment and will conform to guidance provided by the manufacturer.

Vertical Survey

When practical, vertical control will be referenced to the National Geodetic Vertical Datum (NGVD) of 1929, obtained from a permanent benchmark. If practical, level circuits should close on a known benchmark other than the starting benchmark. The following criteria shall be met in conducting the survey:

- Instruments shall be pegged weekly or after any time it is dropped or severely jolted.
- Foresight and backsight distances shall be reasonably balanced and shall not be greater than 250 feet in length.
- No side shot shall be used as a beginning or ending point in another level loop.
- Rod readings shall be made to 0.01-foot and estimated to 0.005-foot.
- Elevations shall be adjusted and recorded to 0.01-foot.

Temporary benchmarks (TBMs) shall be established and referenced for future use. All TBMs shall be described in the field notes with sufficient detail to facilitate their recovery at a later date. The TBMs shall consist of a permanent mark scribed on facilities such as sidewalks, curbs, concrete slabs, etc. or spikes set in the base of trees (not power poles), or tops of anchor bolts for transmission line towers, etc.

(Horizontal traverse stations will not be considered as a TBM, but may be used as a permanent turning point.)

Traverse Computations and Adjustments

Traverses will be closed and adjusted in the following manner:

- Step One—Coordinate closures will be computed using unadjusted bearings and unadjusted field distances.
- Step Two—Coordinate positions will be adjusted (if the traverse closes within the specified limits) using the compass rule.
- Step Three—Final adjusted coordinates will be labeled as "adjusted coordinates." Field coordinates should be specifically identified as such.
- Step Four—The direction and length of the unadjusted error of closure, the ratio of error, and the method of adjustment shall be printed with the final adjusted coordinates.

Level Circuit Computations and Adjustments

Level circuits will be closed and adjusted in the following manner:

- For a single circuit, elevations will be adjusted proportionally, provided the raw closure is within the prescribed limits for the circuit.
- In a level net where the elevation of a point is established by more than one circuit, the method of adjustment should consider the length of each circuit, the closure of each circuit, and the combined effect of all the separate circuit closures on the total net adjustments.

Piezometer and Monitoring-Well Surveys

Piezometer and monitoring-well locations will be surveyed only after the installation of the protective casing, which is set in concrete. The horizontal plane survey accuracy is ±0.05-foot and is measured to any point on the protective-casing cover. The vertical plane survey must be accurate to ±0.01-foot. The following two elevations will be measured at piezometers and monitoring wells:

- Top of the piezometer or well riser (not on the protective casing), preferably on the north side
- Ground surface, preferably on the north side of the well

If no notch or mark exists, the point at which the elevation was measured on the inner casing shall be described so that water-level measurements may be taken from the same location.

Grid Surveys

Selected soil boring locations may be located by the survey crew after the soil borings are complete. The selected borings will be staked in the field by the field team leader. The stake will be marked with the boring number for reference. The

horizontal plane survey accuracy is ± 1 foot and is measured to any point on the ground surface immediately adjacent to the stake.

Exhibit A
STANDARDS FOR MODIFIED THIRD-ORDER PLANE SURVEYS

Traverse	
Max Number of bearing courses between azimuth checks	30
Astronomical bearings: standard error of results	6"
Azimuth closure at azimuth checkpoint not to exceed	20" $\sqrt{N}$
Standard error of the mean for length measurements	1 in 50,000
Position closure per loop in feet before azimuth adjustment	1:10,000
Leveling	
Levels error of closure per loop in feet	0.05 $\sqrt{M}$

N = the number of stations for carrying bearing
M = the distance in miles

STANDARD OPERATING PROCEDURE

Decontamination of Personnel and Equipment

I. Purpose

To provide general guidelines for the decontamination of personnel, sampling equipment, and monitoring equipment used in potentially contaminated environments.

II. Scope

This is a general description of decontamination procedures.

III. Equipment and Materials

- Demonstrated analyte-free, deionized ("DI") water (specifically, ASTM Type II water or lab-grade DI water)
- Potable water; must be from a municipal water supplier, otherwise an analysis must be run for appropriate volatile and semivolatile organic compounds and inorganic chemicals (e.g., Target Compound List and Target Analyte List chemicals)
- 2.5% (W/W) Liquinox® (or Alconox®) and water solution
- Concentrated (V/V) pesticide grade isopropanol (DO NOT USE ACETONE)
- Large plastic pails or tubs for Liquinox® and water, scrub brushes, squirt bottles for Liquinox® solution, methanol and water, plastic bags and sheets
- DOT approved 55-gallon drum for disposal of waste
- Personal Protective Equipment as specified by the Health and Safety Plan
- Decontamination pad and steam cleaner/high pressure cleaner for large equipment

IV. Procedures and Guidelines

A. PERSONNEL DECONTAMINATION

To be performed after completion of tasks whenever potential for contamination exists, and upon leaving the exclusion zone.

1. Wash boots in Liquinox® solution, then rinse with water. If disposable latex booties are worn over boots in the work area, rinse with Liquinox® solution, remove, and discard into DOT-approved 55-gallon drum.

2. Wash outer gloves in Liquinox® solution, rinse, remove, and discard into DOT-approved 55-gallon drum.

3. Remove disposable coveralls ("Tyveks") and discard into DOT-approved 55-gallon drum.

4. Remove respirator (if worn).

5. Remove inner gloves and discard.

6. At the end of the work day, shower entire body, including hair, either at the work site or at home.

7. Sanitize respirator if worn.

B. SAMPLING EQUIPMENT DECONTAMINATION—GROUNDWATER SAMPLING PUMPS

Sampling pumps are decontaminated after each use as follows.

1. Don phthalate-free gloves.

2. Spread plastic on the ground to keep equipment from touching the ground

3. Turn off pump after sampling. Remove pump from well and remove and dispose of tubing. Place pump in decontamination tube.

4. Turn pump back on and pump 1 gallon of Liquinox® solution through the sampling pump.

5. Rinse with 1 gallon of 10% isopropanol solution pumped through the pump. (DO NOT USE ACETONE).

6. Rinse with 1 gallon of tap water.

7. Rinse with 1 gallon of deionized water.

8. Keep decontaminated pump in decontamination tube or remove and wrap in aluminum foil or clean plastic sheeting.

9. Collect all rinsate and dispose of in a DOT-approved 55-gallon drum.

10. Decontamination materials (e.g., plastic sheeting, tubing, etc.) that have come in contact with used decontamination fluids or sampling equipment will be disposed of in either DOT-approved 55-gallon drums or with solid waste in garbage bags, dependent on Facility/project requirements.

C. SAMPLING EQUIPMENT DECONTAMINATION—OTHER EQUIPMENT

Reusable sampling equipment is decontaminated after each use as follows.

1. Don phthalate-free gloves.
2. Before entering the potentially contaminated zone, wrap soil contact points in aluminum foil (shiny side out).
3. Rinse and scrub with potable water.
4. Wash all equipment surfaces that contacted the potentially contaminated soil/water with Liquinox® solution.
5. Rinse with potable water.
6. Rinse with distilled or potable water and isopropanol solution (DO NOT USE ACETONE).
7. Air dry.
8. Rinse with deionized water.
9. Completely air dry and wrap exposed areas with aluminum foil (shiny side out) for transport and handling if equipment will not be used immediately.
10. Collect all rinsate and dispose of in a DOT-approved 55-gallon drum.
11. Decontamination materials (e.g., plastic sheeting, tubing, etc.) that have come in contact with used decontamination fluids or sampling equipment will be disposed of in DOT-approved 55-gallon drums or with solid waste in garbage bags, dependent on Facility/project requirements.

D. HEALTH AND SAFETY MONITORING EQUIPMENT DECONTAMINATION

1. Before use, wrap soil contact points in plastic to reduce need for subsequent cleaning.
2. Wipe all surfaces that had possible contact with contaminated materials with a paper towel wet with Liquinox® solution, then a towel wet with methanol solution, and finally three times with a towel wet with distilled water. Dispose of all used paper towels in a DOT-approved 55-gallon drum or with solid waste in garbage bags, dependent on Facility/project requirements.

E. SAMPLE CONTAINER DECONTAMINATION

The outsides of sample bottles or containers filled in the field may need to be decontaminated before being packed for shipment or handled by personnel without hand protection. The procedure is:

1. Wipe container with a paper towel dampened with Liquinox® solution or immerse in the solution AFTER THE CONTAINERS HAVE BEEN SEALED. Repeat the above steps using potable water.

2. Dispose of all used paper towels in a DOT-approved 55-gallon drum or with solid waste in garbage bags, dependent on Facility/project requirements.

F. HEAVY EQUIPMENT AND TOOLS

Heavy equipment such as drilling rigs, drilling rods/tools, and the backhoe will be decontaminated upon arrival at the site and between locations as follows:

1. Set up a decontamination pad in area designated by the Facility

2. Steam clean heavy equipment until no visible signs of dirt are observed. This may require wire or stiff brushes to dislodge dirt from some areas.

V. Attachments

None.

VI. Key Checks and Items

- Clean with solutions of Liquinox®, methanol, and distilled water.
- Do not use acetone for decontamination.
- Drum all contaminated rinsate and materials.
- Decontaminate filled sample bottles before relinquishing them to anyone.

STANDARD OPERATING PROCEDURE

Decontamination of Drilling Rigs and Equipment

I. Purpose and Scope

The purpose of this guideline is to provide methods for the decontamination of drilling rigs, downhole drilling tools, and water-level measurement equipment. Personnel decontamination procedures are not addressed in this SOP; refer to the site safety plan and SOP *Decontamination of Personnel and Equipment*. Sample bottles will not be field decontaminated; instead they will be purchased with certification of laboratory sterilization.

II. Equipment and Materials

- Portable steam cleaner and related equipment
- Potable water
- Phosphate-free detergent such as Liquinox®
- Buckets
- Brushes
- Isopropanol, pesticide grade
- Personal Protective Equipment as specified by the Health and Safety Plan
- ASTM–Type II grade water or Lab Grade DI Water
- Aluminum foil

III. Procedures and Guidelines

A. Drilling Rigs and Monitoring Well Materials

Before the onset of drilling, after each borehole, before drilling through permanent isolation casing, and before leaving the site, heavy equipment and machinery will be decontaminated by steam cleaning at a designated area. The steam-cleaning area will be designed to contain decontamination wastes and waste waters and can be an HDPE-lined, bermed pad. A pumping system will be used to convey decontaminated water from the pad to drums.

Surface casings may be steam cleaned in the field if they are exposed to contamination at the site prior to use.

B. Downhole Drilling Tools

Downhole tools will be steam cleaned before the onset of drilling, prior to drilling through permanent isolation casing, between boreholes, and prior to leaving the site. This will include, but is not limited to, rods, split spoons or similar samplers, coring equipment, augers, and casing.

Before the use of a sampling device such as a split-spoon sampler for the collection of a soil sample for physical characterization, the sampler shall be cleaned by scrubbing with a detergent solution followed by a potable water rinse.

Before the use of a sampling device such as a split-spoon sampler for the collection of a soil sample for chemical analysis, the sampler shall be decontaminated following the procedures outlined in the following subsection.

C. Field Analytical Equipment

1. Water Level Indicators

   Water level indicators that consist of a probe that comes into contact with the groundwater must be decontaminated using the following steps:

   a. Rinse with tap water
   b. Rinse with de-ionized water
   c. Solvent rinse with isopropanol
   d. Rinse with de-ionized water

2. Probes

   Probes, for example, pH or specific ion electrodes, geophysical probes, or thermometers that would come in direct contact with the sample, will be decontaminated using the procedures specified above unless manufacturer's instructions indicate otherwise. For probes that make no direct contact, for example, OVM equipment, the probe will be wiped with clean paper-towels or cloth wetted with isopropanol.

IV. Attachments

None.

V. Key Checks and Preventative Maintenance

- The effectiveness of field cleaning procedures may be monitored by rinsing decontaminated equipment with organic-free water and submitting the rinse water in standard sample containers for analysis.

STANDARD OPERATING PROCEDURE

Sampling Contents of Tanks and Drums

I. Scope and Application

This procedure provides an overview approach and guidelines for the routine sampling of drums and tanks. Its purpose is to describe standard procedures and precautions which are applied in sampling drums and tanks. Procedures for opening drums with the individual instruments are included in Attachment D.

The samples obtained may be used to obtain physical chemical or radiological data. The resulting data may be qualitative or quantitative in nature, and are appropriate for use in preliminary surveys as well as confirmatory sampling.

II. Summary of Methods

Drums are generally sampled by means of sampling tubes such as glass sample tubes or COLIWASA samplers. In either case, the sampling tube is manually inserted into the waste material. A sample of the drum contents is withdrawn by the sampling device. Should a drum contain bottom sludge, a glass tube will be used to retrieve a sample of this as well.

Storage tank and tank trailers, because of their greater depths, require sampling devices that can be lowered from the top, filled at a particular depth, then withdrawn. Such devices are a COLIWASA, a Kemmerer depth sampler, or a Bacon Bomb. Where samples of bottom sludge are desired, a gravity corer can be utilized. This heavy tube with a tapered nose piece will penetrate the sludge as it free falls through the tank.

III. Comments

The sampling of tanks, containers, and drums present unique problems not associated with environmental samples. Containers of this sort are generally closed except for small access ports, manways, or hatches on the larger vessels, or taps and bungs on smaller drums. The physical size, shape, construction material, and location of access limit the types of equipment and methods of collection that can be used.

When liquids are contained in sealed vessels, gas vapor pressure can build up, sludges can settle out, and density layerings (stratification) can develop. Bulging drums may be under pressure and extreme caution should be exercised. The potential exists for explosive reactions or the release of noxious gases when containers are opened. All vessels should be opened with extreme caution. Check the HSP for the level of personnel protection to be worn. A preliminary sampling of any headspace gases is warranted. As a minimum, a preliminary check with an

explosimeter and an organic vapor analyzer may be of aid in selecting a sampling method.

In most cases it is impossible to observe the contents of these sealed or partially sealed vessels. Since some layering or stratification is likely in any solution left undisturbed over time, a sample must be taken that represents the entire depth of the vessel.

IV. Required Equipment and Apparatus

A. **Health and safety equipment/materials**: As listed in the site safety plan.

B. **Sampling equipment**: COLIWASA, glass sample tubes, Kemmerer depth sampler, Bacon Bomb, gravity corer.

C. **Tools**: Rubber mallet, bung wrench, speed wrench with socket, etc., (all non-sparking), paint marker.

D. **Heavy equipment**: Backhoe equipped with explosion shield, drum grappler, and 3-foot copper-beryllium (non-sparking) spike with 6-inch collar (to puncture top of drums for sampling, if necessary).

E. **Sample Containers**: As specified in the field sampling plan.

V. Procedures

A. Drums

NOTE: DO NOT open more than one drum at a time. Each drum must be handled and sampled as a separate entity to reduce vapors in the sampling area.

1. Drums will be sampled on an area-by-area basis. Drums will be sampled after they have been placed in overpack drums but before they are transferred from the excavation to the onsite storage area.

2. Record, in logbook, all pertinent information from visual inspection of drum (e.g., physical condition, leaks, bulges, and labels). Label each drum with a unique identifying number.

3. If possible, stage drums for easy access.

4. If necessary, attach ground strap to drums and grounding point.

5. Remove any standing material (water, etc.) from container top.

6. Using non-sparking tools, carefully remove the bung or lid while monitoring air quality with appropriate instruments. If necessary (and as a last resort), the non-sparking spike affixed to the backhoe can also be used to puncture the drum for sampling. See Attachment D for method of drum opening. Record air-quality monitoring results.

7. When sampling a previously sealed vessel, a check should be made for the presence of bottom sludge. This is accomplished by measuring the depth to apparent bottom, then comparing it to the known interior depth.

8. Agitation to disrupt the layers and rehomogenize the sample is physically difficult and almost always undesirable. If the vessel is greater than 3 feet in depth (say, a 55-gallon drum), the appropriate sampling method is to slowly lower the sampling device (i.e., suction line of peristaltic pump, glass tube) in known increments of length. Discrete samples can be collected from various depths, then combined or analyzed separately. If the depth of the vessel is greater than the lift capacity of the pump, an at-depth water sampler, such as the Kemmerer or Bacon Bomb type, may be required.

9. Extract a representative sample from the drum using a glass rod, COLIWASA, Bacon Bomb, Kemmerer bottle, or gravity corer (See Attachments). Ensure that the entire depth of material is penetrated. Depending on the size of the opening of the drum, three to four takes should be collected from random locations across the drum surface, to ensure a representative sample. Any observed stratification must be recorded in logbook, including number and thickness of the layers and a conceptualized sketch.

10. Record a visual description of the sample (e.g., liquid, solid, color, viscosity, and percent layers).

11. When possible, sampling equipment (like glass tubes) should be expendable and be left inside the drum for disposal with drum contents, once sampling is completed.

12. Place lid, bung, cap, etc., back in place on drum. Tighten hand tight. If necessary, the sampling port can be sealed using a cork.

13. Wipe up spilled material with lab wipes. Wipe off sample containers.

14. Mark the drum with a unique sample identification number and date using a paint marker.

15. Samples will be handled as high hazard samples. Samples will be placed in containers defined according to the analytical needs, wiped clean, and then packed in paint cans for shipping. Packaging, labeling, and preparation for shipment procedures will follow procedures as specified in the field sampling plan.

B. Underground Storage Tanks

1. A sampling team of at least two people is required for sampling—one will collect samples, the other will relay required equipment and implements.

2. Sampling team will locate a sampling port on the tank. Personnel should be wearing appropriate protective clothing at this time and carrying sampling gear.

3. Do not attempt to climb down into tank. Sampling MUST BE accomplished from the top.

4. Collect a sample from the upper, middle, and lower section of the tank contents with one of the recommended sampling devices.

5. If compositing is necessary, ship samples to laboratory in separate containers for laboratory compositing.

6. Samples will be handled as hazardous. Samples will be placed in appropriate containers and packed with ice in a cooler. Packaging, labeling, and preparation for shipment will follow procedures specified in the field sampling plan.

C. Tank Trailers or Above-Ground Storage Tanks

1. A sampling team of two is required. One will collect samples, the other will relay required equipment and implements.

2. Samples will be collected through the manhole (hatch) on top of the tanker or the fill port. Do not open valves at the bottom. Before opening the hatch, check for a pressure gauge or release valve. Open the release valve slowly to bring the tank to atmospheric pressure.

3. If tank pressure is too great, or venting releases large amounts of toxic gas, discontinue venting and sampling immediately. Measure vented gas with organic vapor analyzer and explosimeter.

4. If no release valve exists, slowly loosen hatch cover bolts to relieve pressure in the tank. (Again, stop if pressure is too great.)

5. Once pressure in tank has been relieved, open the hatch and withdraw sample using one of the recommended sampling devices.

6. Sample each trailer compartment.

7. If compositing is necessary, ship samples to laboratory in separate containers for laboratory compositing.

8. Samples will be handled as hazardous. Samples will be placed in appropriate containers and packed with ice in a cooler. Packaging, labeling, and preparation for shipment will follow procedures specified in the field sampling plan.

D. Refer to Attachment B for procedures for sampling with appropriate devices as follows:

<u>Drum</u>

Glass tube — Procedure 1

COLIWASA	–	Procedure 2

<u>Storage Tank and Tank Trailer</u>

COLIWASA	–	Procedure 2
Bacon Bomb	–	Procedure 3
Gravity Corer (for bottom sludge)	–	Procedure 4

VI. Contamination Control

Sampling tools, instruments, and equipment will be protected from sources of contamination prior to use and decontaminated after use as specified in SOP *Decontamination of Personnel and Equipment*. Liquids and materials from decontamination operations will be handled in accordance with the waste management plan. Sample containers will be protected from sources of contamination. Sampling personnel shall wear chemical resistant gloves when handling any samples. Gloves will be decontaminated or disposed of between samples.

VIII. Attachments

A. Collection of Liquid-Containerized Wastes Using Glass Tubes

B. Sampling Containerized Wastes Using the Composite Liquid Waste Sample (COLIWASA)

C. Sampling Containerized Wastes Using the Bacon Bomb Sampler

D. Gravity Corer for sampling Sludges in Large Containers

E. Construction of a Typical COLIWASA

F. Drum Opening Techniques and Equipment

IX. References

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X. Field Checklist

_____ Sampling Instruments

_____ Tools

_____ Rubber Mallet

_____ Logbook

_____ Safety Glasses or Monogoggles

_____ Safety Shoes

_____ Ice/Cooler, as required

_____ Custody Seals, as required

_____ Chain-of-Custody Forms

_____ Drum Labels, as required

_____ Paint Marker, if drum sampling

_____ Black Indelible Pen

_____ Monitoring Instruments

_____ Labels

_____ Sampling and Analysis Plan

_____ Health and Safety Plan

_____ Decontamination Equipment

_____ Lab Wipes

_____ Lab Spatulas or Stainless Steel Spoons

_____ Chemical Preservatives, as required

_____ Appropriate Containers for Waste and Equipment

_____ Duct Tape

_____ Plastic Sheeting

Attachment A Collection of Liquid-Containerized Wastes Using Glass Tubes

Discussion

Liquid samples from opened containers (i.e., 55-gallon drums) are collected using lengths of glass tubing. The glass tubes are normally 122 centimeters long and 6 to 16 millimeters inside diameter. Larger diameter tubes may be used for more viscous fluids if sampling with the small diameter tube is not adequate. The tubing is broken and discarded in the container after the sample has been collected, eliminating difficult cleanup and disposal problems. This method should not be attempted with less than a two-person sampling team.

Uses

This method provides for a quick, relatively inexpensive means of collecting concentrated containerized wastes. The major disadvantage is from potential sample loss that is especially prevalent when sampling low-viscosity fluids. Splashing can also be a problem and proper protective clothing should always be worn.

Note: A flexible tube with an aspirator attached is an alternative method to the glass tube, and allows various levels to be sampled discretely.

Procedures for Use

1. Remove cover from sample container.
2. Insert glass tubing almost to the bottom of the container. Tubing should be of sufficient length so that at least 30 centimeters extend above the top of the container.
3. Allow the waste in the drum to reach its natural level in the tube.
4. Cap the top of the tube with a safety-gloved thumb or a stopper.
5. Carefully remove the capped tube from the drum. If the tube has passed through more than one layer, the boundary should be apparent in the glass tube.
6. Insert the bottom, uncapped end into the sample container.
7. Partially release the thumb or stopper on the top of the tube and allow the sample to slowly flow into the sample container. If separation of phases is desired, cap off tube before the bottom phase has completely emptied. It may be advisable to have an extra container for "waste," so that the fluid on either side of the phase boundary can be directed into a separate container, allowing collection of pure phase liquids in the sample containers. The liquid remaining after the boundary fluid is removed is collected in yet a third container. NOTE: It is not necessary to put phases in separate containers if analysis of separate phases is not desired.
8. Repeat steps 2 through 6 if more volume is needed to fill the sample container.

9. Remove the tube from the sample container and replace the tube in the drum, breaking it, if necessary, in order to dispose of it in the drum.

Optional Method (if sample of bottom sludge is desired)

1. Remove the cover from the container opening.
2. Insert glass tubing slowly almost to the bottom of the container. Tubing should be of sufficient length so that at least 30 cm extends above the top of the container.
3. Allow the waste in the drum to reach its natural level in the tube.
4. Gently push the tube towards the bottom of the drum into the sludge layer. Do not force it.
5. Cap the top of the tube with a safety-gloved thumb or stopper.
6. Carefully remove the capped tube from the drum and insert the uncapped end into the sample container.
7. Release the thumb or stopper on the top of the tube and allow the sample container to fill to approximately 90 percent of its capacity. If necessary, the sludge plug in the bottom of the tube can be dislodged with the aid of the stainless steel laboratory spatula.
8. Repeat if more volume is needed to fill sample container and recap the tube.

Note:

1. If a reaction is observed when the glass tube is inserted (violent agitation, smoke, light, etc.), the investigators should leave the area immediately.
2. If the glass tube becomes cloudy or smoky after insertion into the drum, the presence of hydrofluoric acid maybe indicated, and a comparable length of rigid plastic tubing should be used to collect the sample.
3. When a solid is encountered in a drum (either layer or bottom sludge) the optional method described above may be used to collect a core of the material, or the material may be collected with a disposable scoop attached to a length of wooden or plastic rod.

Attachment B: Sampling Containerized Wastes using the Composite Liquid Waste Sampler (COLIWASA)

Discussion

The COLIWASA is a much-cited sampler designed to permit representative sampling of multiphase wastes from drums and other containerized wastes. The sampler is commercially available or can be easily fabricated from a variety of materials, including PVC, glass, or Teflon. In its usual configuration it consists of a 152 cm by 4 cm (inside diameter) section of tubing with a neoprene stopper at one end attached by a rod running the length of the tube to a locking mechanism at the other end. Manipulation of the locking mechanism opens and closes the sampler by raising and lowering the neoprene stopper. See Attachment E: Construction of a COLIWASA.

Uses

The COLIWASA is primarily used to sample containerized liquids. The PVC COLIWASA is reported to be able to sample most containerized liquid wastes except for those containing ketones, nitrobenzene, dimethylforamide, mesityloxide, and tetrahydrofuran. A glass COLIWASA is able to handle all wastes unable to be sampled with the plastic unit except strong alkali and hydrofluoric acid solutions. Due to the unknown nature of many containerized wastes, it would therefore be advisable to eliminate the use of PVC materials and use samplers composed of glass or Teflon.

The major drawback associated with using a COLIWASA is concern for decontamination and costs. The sampler is difficult, if not impossible, to decontaminate in the field, and its high cost in relation to alternative procedures (glass tubes) makes it an impractical throwaway item. It still has applications, however, especially in instances where a true representation of a multiphase waste is absolutely necessary.

Procedures for Use

1. Check to make sure the sampler is functioning properly. Adjust the locking mechanism, if present, to make sure the neoprene rubber stopper provides a tight closure.

2. Put the sampler in the open position by placing the stopper rod handle in the T-position and pushing the rod down until the handle sits against the sampler's locking block.

3. Slowly lower the sampler into the liquid waste. Lower the sampler at a rate that permits the levels of the liquid inside and outside the sampler tube to be about the same. If the level of the liquid in the sample tube is lower than that outside the sampler, the sampling rate is too fast and will result in a non-representative sample.

4. When the sampler stopper hits the bottom of the waste container, push the sampler tube downward against the stopper to close the sampler. Lock the sampler in the closed position by turning the T-handle until it is upright and one end rests tightly on the locking block.

5. Slowly withdraw the sampler from the waste container with one hand while wiping the sampler tube with a laboratory wipe with the other hand. A phase boundary, if present, can be observed through the tube.

6. Carefully discharge the sample into a suitable sample container by slowly pulling the lower end of the T-handle away from the locking block while the lower end of the sampler is positioned in a sample container.

7. Unscrew the T-handle of the sampler and disengage the locking block.

Attachment C: Sampling Containerized Wastes using the Bacon Bomb Sampler

Discussion

The Bacon Bomb is designed for the withdrawal of samples from various levels within a storage tank. It consists of a cylindrical body with an internal tapered plunger that acts as a valve to admit the sample. A line attached to the top of the plunger is used to open and close the valve. A removable cover provides a point of attachment for the sample line and has a locking mechanism to keep the plunger closed after sampling. The Bacon Bomb is usually constructed of chrome-plated brass and bronze with a rubber O-ring acting as the plunger-sealing surface. Stainless steel versions are also available. The volumemetric capacity is 8, 16, or 32 oz (237, 473, or 946 ml).

Uses

The Bacon Bomb is a heavy sampler suited best for viscous materials held in large storage tanks or in lagoons. If a more non-reactive sampler is needed, the stainless steel version would be used, or any of the samplers could be coated with Teflon.

Procedures for Use

1. Attach the sample line and the plunger line to the sampler.
2. Measure and then mark the sampling line at the desired depth.
3. Gradually lower the sampler by the sample line until the desired level is reached.
4. When the desired level is reached, pull up on the plunger line and allow the sampler to fill for a sufficient length of time before releasing the plunger line to seal off the sampler.
5. Retrieve the sampler by the sample line, being careful not to pull up on the plunger line, thereby accidentally opening the bottom valve.
6. Wipe off the exterior of the sampler body.
7. Position the sampler over the sample container and release its contents by pulling up on the plunger line.

Attachment D: Gravity Corer for Sampling Sludges in Large Containers

Discussion

A gravity corer is a metal tube with a replaceable tapered nosepiece on the bottom and a ball or other type of check valve on the top. The check valve allows water to pass through the corer on descent but prevents a washout during recovery. The tapered nosepiece facilitates cutting and reduces core disturbance during penetration. Most corers are constructed of brass or steel and many can accept plastic liners and additional weights.

Uses

Corers are capable of collecting samples of most sludges and sediments. They collect essentially undisturbed samples that represent the strata profile that may develop in sediments and sludges during variations in the deposition process. Depending on the density of the substrate and the weight of the corer, penetration to depths of 75 cm (30 in.) can be attained. Exercise care when using gravity corers in vessels or lagoons that have liners because penetration depths could exceed those of the substrate; this could result in damage to the liner material.

Procedures for Use

1. Attach a precleaned corer to the required length of sample line. Solid braided 5-mm (3/16-in.) nylon line is sufficient; however, 20-mm (3/4-in.) nylon is easier to grasp during hand hoisting. An additional weight can be attached to the outside of the corer if necessary.
2. Secure the free end of the line to a fixed support to prevent accidental loss of the corer.
3. Allow corer to free fall through the liquid to the bottom.
4. Retrieve corer with a smooth, continuous, up-lifting motion. Do not bump corer because this may result in some sample loss.
5. Remove nosepiece from corer and slide sample out of corer into stainless steel or Teflon pan (preferred).
6. Transfer sample into appropriate sample bottle with a stainless steel lab spoon or laboratory spatula.

Attachment E: Construction of a Typical COLIWASA

The sampling tube consists of a 1.52-m (5-ft) by 4.13-cm (1-5/8 in) I.D. translucent plastic pipe, usually polyvinyl chloride (PVC) or borosilicate glass plumbing tube. The closure-locking mechanism consists of a short-length, channeled aluminum bar attached to the sampler's stopper rod by an adjustable swivel. The aluminum bar serves both as a T-handle and lock for the samplers' closure system. When the sampler is in the open position, the handle is placed in the T-position and pushed down against the locking block. This manipulation pushes out the neoprene stopper and opens at the sampling tube. In the closed position, the handle is rotated until one leg of the T is squarely perpendicular against the locking block. This tightly seats the neoprene stopper against the bottom opening of he sampling tube and positively locks the sampler in the closed position. The closure tension can be adjusted by shortening or lengthening the stopper rod by screwing it in or out of the T-handle swivel. The closure system of the sampler consists of a sharply tapered neoprene stopper attached to a 0.95-cm (3/8-in) O.D. rod, usually PVC. The upper end of the stopper rod is connected to the swivel of the aluminum T-handle. The sharply tapered neoprene stopper can be fabricated according to specifications by plastic-products manufacturers at an extremely high price, or it can be made in-house by grinding down the inexpensive stopper with a shop grinder.

COLIWASA samplers are typically made out of plastic or glass. The plastic type consists of translucent plastic (usually PVC) sampling tube. The glass COLIWASA uses borosilicate glass plumbing pipe as the sampling tube and a Teflon plastic stopper rod. For purpose of multiphase sampling, clear plastic or glass is desirable in order to observe the profile of the multiphase liquid.

The sampler is assembled as follows:

a. Attach the swivel to the T-handle with the 3.18-cm (1-1/4 in) long bolt and secure with the 0.48-cm (3/16-in) National Coarse (NC) washer and lock nut.

b. Attach the PFTE stopper to one end of the stopper rod and secure with the 0.95-cm (3/8-in) washer and lock nut.

c. Install the stopper and stopper rod assembly in the sampling tube.

d. Secure the locking block sleeve on the block with glue or screw. This block can also be fashioned by shaping a solid plastic rod on a lathe to the required dimension.

e. Position the locking block on top of the sampling tube such that the sleeveless portion of the block fits inside the tube, the sleeve sits against the top end of the tube, and the upper end of the stopper rod slips though the center hole of the block.

f. Attach the upper end of the stopper rod to the swivel of the T-handle.

g. Place the sampler in the close position and adjust the tension on the stopper by screwing the T-handle in or out.

Attachment F: Drum Opening Techniques and Equipment [1]

I. Introduction

The opening of closed drums prior to sampling entails considerable risk if not done with the proper techniques, tools, and safety equipment. The potential for vapor exposure, skin exposure due to splash or spraying, or even explosion resulting from sparks produced by friction of the tools against the drum, necessitate caution when opening any closed container. Both manual drum opening and remote drum opening will be discussed in the following paragraphs. When drums are opened manually risks are greater than when opened remotely; for this reason, the remote opening of drums is advised whenever possible.

Prior to sampling, the drums should be staged to allow easy access. Also, any standing water or other material should be removed from the container top so that the representative nature of the sample is not compromised when the container is opened. There is also the possibility of encountering a water-reactive substance.

II. Manual Drum Opening

A. Bung Wrench

A common method for opening drums manually is using a universal bung wrench. These wrenches have fittings made to remove nearly all commonly encountered bungs. They are usually constructed of cast iron, brass, or a bronze-beryllium (a non-sparking alloy formulated to reduce the likelihood of sparks). The use of bung wrenches marked "NON SPARKING" is encouraged. However, the use of a "NON SPARKING" wrench does not completely eliminate the possibility of spark being produced. Such a wrench only prevents a spark caused by wrench-to-bung friction, but it cannot prevent sparking between the threads on the drum and the bung.

A simple tool to use, the fitting on the bung wrench matching the bung to be removed is inserted into the bung and the tool is turned counterclockwise to remove the bung. Since the contents of some drums may be under pressure (especially, when the ambient temperature is high), the bung should be turned very slowly. If any hissing is heard, the person opening the drum should back off and wait for the hissing to stop. Since drums under pressure can spray out liquids when opened, the wearing of appropriate eye and skin protection in addition to respiratory protection is critical.

B. Drum Deheader

One means by which a drum can be opened manually when a bung is not removable with a bung wrench is by using a drum deheader. This tool is

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[1] Taken from EPA Training Course: "Sampling for Hazardous Materials," U.S. Environmental Protection Agency, Office of Emergency and Remedial Response Support Division, March 24, 1987.

constructed of forged steel with an alloy steel blade and is designed to cut the lid of a drum off or part way off by means of a scissors-like cutting action. A limitation of this device is that it can be attached only to closed head drums (i.e., DOT Specification 17E and 17F drums); drums with removable heads must be opened by other means.

Drums are opened with a drum deheader by first positioning the cutting edge just inside the top chime and then tightening the adjustment screw so that the deheader is held against the side of the drum. Moving the handle of the deheader up and down while sliding the deheader along the chime will enable the entire top to be rapidly cut off if so desired. If the top chime of a drum has been damaged or badly dented it may not be possible to cut the entire top off. Since there is always the possibility that a drum may be under pressure, the initial cut should be made very slowly to allow for the gradual release of any built-up pressure. A safer technique would be to employ a remote pressure release method prior to using the deheader.

C. Hand Pick or Spike

When a drum must be opened and neither a bung wrench nor a drum deheader is suitable, then it can be opened for sampling by using a hand pick, pickaxe, or spike. These tools are usually constructed of brass or a non-sparking alloy with a sharpened point that can penetrate the drum lid or head when the tool is swung. The hand picks or pickaxes that are most commonly used are commercially available, whereas the spikes are generally uniquely fabricated 4- foot long poles with a pointed end. Often the drum lid or head must be hit with a great deal of force in order to penetrate it. Because of this, the potential for splash or spraying is greater than with other opening methods and therefore this method of drum opening is not recommended, particularly when opening drums containing liquids. Some spikes used for drum opening have been modified by the addition of a circular splash plate near the penetrating end. This plate acts as a shield and reduces the amount of splash in the direction of the person using the spike. Even with this shield, good splash gear is essential.

Since drums, some of which may be under pressure, cannot be opened slowly with these tools, “sprayers” may result and appropriate safety measures must be taken. The pick or spike should be decontaminated after each drum is opened to avoid cross contamination and/or adverse chemical reaction from incompatible materials.

III. Remote Opening

A. Backhoe Spike

The most common means used to open drums remotely for sampling is the use of a metal spike attached or welded to a backhoe bucket. In addition to being very efficient, this method can greatly reduce the likelihood of personnel exposure.

Drums should be “staged,” or placed in rows with adequate aisle space to allow ease in backhoe maneuvering. Once staged, the drums can be quickly opened by punching a hole in the drum head or lid with the spike.

The spike should be decontaminated after each drum is opened to prevent cross contamination. Even though some splash or spray may occur when this method is used, the operator of the backhoe can be protected by mounting a large shatter-resistant shield in front of the operator's cage. This, combined with the normal sampling safety gear, should be sufficient to protect the operator. Additional respiratory protection can be afforded by providing the operator with an on-board airline system. The hole in the drum can be sealed with a cork.

B. Hydraulic Devices

Recently, remotely operated hydraulic devices have been fabricated to open drums remotely. One such device is discussed here. This device uses hydraulic pressure to pierce through the wall of a drum. It consists of a manually operated pump that pressurizes oil through a length of hydraulic line. A piercing device with a metal point is attached to the end of this line and is pushed into the drum by the hydraulic pressure. The piercing device can be attached so that a hole for sampling can be made in either the side or the head/lid of the drum. Some of the metal piercers are hollow or tube-like so that they can be left in place, if desired, and serve as a permanent tap or sampling port. The piercer is designed to establish a tight seal after penetrating the container.

C. Pneumatic Devices

Pneumatically-operated devices utilizing compressed air have been designed to remove drum bungs remotely. A pneumatic bung remover consists of a compressed air supply (usually SCBA cylinders) that is controlled by a heavy-duty, 2-stage regulator. A high pressure air line of desired length delivers compressed air to a pneumatic drill that is adapted to turn a bung fitting (preferably, a bronze-beryllium alloy) selected to fit the bung to be removed. An adjustable bracketing system has been designed to position and align the pneumatic drill over the bung. This bracketing system must be attached to the drum before the drill can be operated. Once the bung has been loosened, the bracketing system must be removed before the drum can be sampled. This attachment and removal procedure is time-consuming and is the major drawback of this device. This remote bung opener does not permit the slow venting of the container, and therefore appropriate precautions must be taken. It also requires the container to be upright and relatively level. Bungs that are rusted shut cannot be removed with this device.

IV. Summary

The opening of closed containers is one of the most hazardous site activities. Maximum efforts would be made to ensure the safety of the sampling team. Proper protective equipment and a general wariness of the possible dangers will minimize the risk inherent to sampling operations. Employing proper drum opening techniques and equipment will also safeguard personnel. The use of remote sampling equipment whenever feasible is highly recommended.

STANDARD OPERATING PROCEDURE

Disposal of Waste Fluids and Solids

I. Purpose and Scope

This SOP describes the procedures used to dispose of hazardous fluid and solid materials generated as a result of the site operations. This SOP does not provide guidance on the details of Department of Transportation regulations pertaining to the transport of hazardous wastes; the appropriate Code of Federal Regulations (49 CFR 171 through 177) should be referenced. Also, the site investigation-derived waste management plan should be consulted for additional information and should take precedence over this SOP.

II. Equipment and Materials

A. Fluids

- DOT-approved 55-gallon steel drums or Baker® Tanks
- Tools for securing drum lids
- Funnel for transferring liquid into drum
- Labels
- Paint Pens
- Marking pen for appropriate labels
- Seals for 55-gallon steel drums

B. Solids

- DOT-approved 55-gallon steel drums or rolloffs
- Tools for securing drum lids
- Paint Pens
- Plastic sheets
- Labels
- Marking pen for appropriate labels

III. Procedures and Guidelines

A. Methodology

Clean, empty drums or rolloffs or Baker® Tanks will be brought to the site by the drilling subcontractor for soil and groundwater collection and storage. The empty drums will be located at the field staging area and moved to drilling locations as required. The drums will be filled with the drilling and well installation wastes, capped, sealed, and moved to the onsite drum storage area by the drilling subcontractor. The full drums will separate types of wastes by media. The drums will

be labeled as they are filled in the field and labels indicating that the contents are pending analysis affixed.

The drum contents will be sampled to determine the disposal requirements of the drilling wastes. The drum sampling will be accomplished through the collection and submittal of composite samples, one sample per 10 drums (check with disposal facility to determine sample frequency) containing the same media. Similar compositing will be performed in each rolloff to obtain a representative sample. The compositing of the sample will be accomplished by collecting a specific volume of the material in each drum into a large sample container. When samples from each of the drums being sampled in a single compositing are collected, the sample will be submitted for TCLP, ignitability, corrosivity, and reactivity analysis. The analysis will be used to determine if drilling wastes are covered by land disposal restrictions.

If rolloffs are used, compositing and sampling of soil will comply with applicable state and federal regulations.

B. Labels

Drums and other containers used for storing wastes from drilling operations will be labeled when accumulation in the container begins. Labels will include the following minimum information:

- Container number
- Container contents
- Origin (source area including individuals wells, piezometers, and soil borings)
- Date that accumulation began
- Date that accumulation ended
- Generator Contact Information
- When laboratory results are received, drum labels will be completed or revised to indicate the hazardous waste constituents in compliance with Title 40 of the Code of Federal Regulations, Part 262, Subpart C if the results indicate hazardous waste or labeled as non-hazardous if applicable.

C. Fluids

Drilling fluids generated during soil boring and groundwater discharged during development and purging of the monitoring wells will be collected in 55-gallon, closed-top drums. When a drum is filled, the bung will be secured tightly. Fluids may also be transferred to Baker® Tanks after being temporarily contained in drums to minimize the amount of drums used.

When development and purging is completed, the water will be tested for appropriate hazardous waste constituents. Compositing and sampling of fluids will comply with applicable state and federal regulations.

D. Solids

The soil cuttings from well and boring drilling will constitute a large portion of the solids to be disposed of.

The solid waste stream also will include plastic sheeting used for decontamination pads, Tyveks, disposable sampling materials, and any other disposable material used during the field operations that appears to be contaminated. These materials will be placed in designated drums.

E. Storage and Disposal

The wastes generated at the site at individual locations will be transported to the drum storage area by the drilling services subcontractor. Drums should be stored on pallets on plastic sheeting with a short berm wall (hay bales or 2 x 4 planks or equivalent) to capture small spills.

Waste solid materials that contain hazardous constituents will be disposed of at an offsite location in a manner consistent with applicable solid waste, hazardous waste, and water quality regulations. Transport and disposal will be performed by a commercial firm under subcontract.

The liquid wastes meeting acceptable levels of discharge contamination may be disposed of through the sanitary sewer system at the site. However, prior to disposal to the sanitary sewer system, approval and contract arrangements will be made with the appropriate authorities. Wastes exceeding acceptable levels for disposal through the sanitary sewer system will be disposed of through contract with a commercial transport and disposal firm.

IV. Attachments

None.

V. Key Checks and Preventative Maintenance

- Check that representative samples of the containerized materials are obtained.
- Be sure that all state and federal regulations are considered when classifying waste for disposal.

STANDARD OPERATING PROCEDURE

Direct-Push Soil Sample Collection

I. Purpose

To provide a general guideline for the collection of soil samples using direct-push (e.g., Geoprobe®) sampling methods.

II. Scope

Standard direct-push (e.g., Geoprobe®) soil sampling methods.

III. Equipment and Materials

- Truck-mounted hydraulic percussion hammer
- Sampling rods
- Sampling tubes and acetate liners
- Pre-cleaned sample containers and stainless-steel sampling implements
- Personal Protective Equipment as specified by the Health and Safety Plan

IV. Procedures and Guidelines

1. Decontaminate sampling tubes and other non-dedicated downhole equipment in accordance with SOP *Decontamination of Personnel and Equipment*.

2. Drive sampling tube to the desired sampling depth using the truck-mounted hydraulic percussion hammer. If soil above the desired depth is not to be sampled, first drive the lead rod, without a sampling tube, to the top of the desired depth.

3. Remove the rods and sampling tube from the borehole and remove the sampling tube from the lead rod.

4. Cut open the acetate liner using a specific knife designed to slice the acetate liners (see below).

5. Fill all sample containers, beginning with the containers for VOC analysis, using a decontaminated or dedicated sampling implement. For the VOC samples, place the sample into a pre-preserved VOA vial or direct sample container such as an **En Core®** or **Terra Core®** sampler and seal the cap tightly. Ideally, the operation should be completed in one minute. Label the vials and place on ice for shipment to the laboratory.

6. Decontaminate all non-dedicated downhole equipment (rods, sampling tubes, etc.) in accordance with SOP *Decontamination of Personnel and Equipment*.

7. Backfill borehole at each sampling location with grout or bentonite and repair the surface with like material (bentonite, asphalt patch, concrete, etc.), as required.

V. Key Checks and Items

1. Verify that the hydraulic percussion hammer is clean and in proper working order.

2. Ensure that the direct-push operator thoroughly completes the decontamination process between sampling locations.

3. Verify that the borehole made during sampling activities has been properly backfilled.

STANDARD OPERATING PROCEDURE

Preparing Field Log Books

I. Purpose

This SOP provides general guidelines for entering field data into log books during site investigation and remediation activities.

II. Scope

This is a general description of data requirements and format for field log books. Log books are needed to properly document all field activities in support of data evaluation and possible legal activities.

III. Equipment and Materials

- Log book
- Indelible pen

IV. Procedures and Guidelines

Properly completed field log books are a requirement for much of the work we perform under the Navy CLEAN contract. Log books are legal documents and, as such, must be prepared following specific procedures and must contain required information to ensure their integrity and legitimacy. This SOP describes the basic requirements for field log book entries.

A. PROCEDURES FOR COMPLETING FIELD LOG BOOKS

1. Field notes commonly are kept in bound, hard-cover logbooks used by surveyors and produced, for example, by Peninsular Publishing Company and Sesco, Inc. Pages should be water-resistant and notes should be taken only with water-proof, non-erasable permanent ink, such as that provided in Sanford Sharpie® permanent markers.

2. On the inside cover of the log book the following information should be included:

   - Company name and address
   - Log-holders name if log book was assigned specifically to that person
   - Activity or location

- Project name
- Project manager's name
- Phone numbers of the company, supervisors, emergency response, etc.

3. All lines of all pages should be used to prevent later additions of text, which could later be questioned. Any line not used should be marked through with a line and initialed and dated. Any pages not used should be marked through with a line, the author's initials, the date, and the note "Intentionally Left Blank."

4. If errors are made in the log book, cross a single line through the error and enter the correct information. All corrections shall be initialed and dated by the personnel performing the correction. If possible, all corrections should be made by the individual who made the error.

5. Daily entries will be made chronologically.

6. Information will be recorded directly in the field log book during the work activity. Information will not be written on a separate sheet and then later transcribed into the log book.

7. Each page of the log book will have the date of the work and the note takers initials.

8. The final page of each day's notes will include the note-takers signature as well as the date.

9. Only information relevant to the subject project will be added to the log book.

10. The field notes will be copied and the copies sent to the Project Manager or designee in a timely manner (at least by the end of each week of work being performed).

B. INFORMATION TO BE INCLUDED IN FIELD LOG BOOKS

1. Entries into the log book should be as detailed and descriptive as possible so that a particular situation can be recalled without reliance on the collector's memory. Entries must be legible and complete.

2. General project information will be recorded at the beginning of each field project. This will include the project title, the project number, and project staff.

3. Scope: Describe the general scope of work to be performed each day.

4. Weather: Record the weather conditions and any significant changes in the weather during the day.

5. Tail Gate Safety Meetings: Record time and location of meeting, who was present, topics discussed, issues/problems/concerns identified,

and corrective actions or adjustments made to address concerns/ problems, and other pertinent information.

6. Standard Health and Safety Procedures: Record level of personal protection being used (e.g., level D PPE), record air monitoring data on a regular basis and note where data were recording (e.g., reading in borehole, reading in breathing zone, etc). Also record other required health and safety procedures as specified in the project specific health and safety plan.

7. Instrument Calibration; Record calibration information for each piece of health and safety and field equipment.

8. Personnel: Record names of all personnel present during field activities and list their roles and their affiliation. Record when personnel and visitors enter and leave a project site and their level of personal protection.

9. Communications: Record communications with project manager, subcontractors, regulators, facility personnel, and others that impact performance of the project.

10. Time: Keep a running time log explaining field activities as they occur chronologically throughout the day.

11. Deviations from the Work Plan: Record any deviations from the work plan and document why these were required and any communications authorizing these deviations.

12. Heath and Safety Incidents: Record any health and safety incidents and immediately report any incidents to the Project Manager.

13. Subcontractor Information: Record name of company, record names and roles of subcontractor personnel, list type of equipment being used and general scope of work. List times of starting and stopping work and quantities of consumable equipment used if it is to be billed to the project.

14. Problems and Corrective Actions: Clearly describe any problems encountered during the field work and the corrective actions taken to address these problems.

15. Technical and Project Information: Describe the details of the work being performed. The technical information recorded will vary significantly between projects. The project work plan will describe the specific activities to be performed and may also list requirements for note taking. Discuss note-taking expectations with the Project Manager prior to beginning the field work.

16. Any conditions that might adversely affect the work or any data obtained (e.g., nearby construction that might have introduced excessive amounts of dust into the air).

17. Sampling Information; Specific information that will be relevant to most sampling jobs includes the following:

- Description of the general sampling area – site name, buildings and streets in the area, etc.
- Station/Location identifier
- Description of the sample location – estimate location in comparison to two fixed points – draw a diagram in the field log book indicating sample location relative to these fixed points – include distances in feet.
- Sample matrix and type
- Sample date and time
- Sample identifier
- Draw a box around the sample ID so that it stands out in the field notes
- Information on how the sample was collected – distinguish between "grab," "composite," and "discrete" samples
- Number and type of sample containers collected
- Record of any field measurements taken (i.e. pH, turbidity, dissolved oxygen, and temperature, and conductivity)
- Parameters to be analyzed for, if appropriate
- Descriptions of soil samples and drilling cuttings can be entered in depth sequence, along with PID readings and other observations. Include any unusual appearances of the samples.

C. SUGGESTED FORMAT FOR RECORDING FIELD DATA

1. Use the left side border to record times and the remainder of the page to record information (see attached example).

2. Use tables to record sampling information and field data from multiple samples.

3. Sketch sampling locations and other pertinent information.

4. Sketch well construction diagrams.

V. Attachments

Example field notes.

0715 ARRIVE ON SITE AT XYZ SITE.
CH2M HILL STAFF:
John Smith: FIELD TEAM LEADER
Bob Builder: SITE SAFETY COORD.
WEATHER: OVERCAST + COOL, 45°F
CHANCE OF LATE SHOWERS
SCOPE: • COLLECT GROUNDWATER SAMPLES for LTM work at SITE 14
• SUPERVISE SURVEY CREW AT SITE 17
0725 BB ~~Con~~ ~~JS~~ (JS) Calibrates PID: 101 ppm/100 ppm ok
PID Model #, SERIAL #
0730 BB Calibrates HORIBA METER
Model #, SERIAL #
→ List calibration Results
0738 Survey CREW ARRIVES on SITE
→ List NAMES
0745 BB Holds H+S TALK on Slips, Trips, Falls, Ticks + AIR MONITORING
JS + SURVEY CREW ATTEND
No H+S ISSUES IDENTIFIED as CONCERNS. All work is in "Level D."
0755 JS Conducts site-WIDE AIR Monitoring
All readings = 0.0 ppm in

JS 5-12-03

SITE 14 LTM
BREATHING ZONE (BZ)
0805 Mobilize to well MW-22 to SAMPLE, surveyors SETTING UP AT SITE 17
0815 PM (PAUL PAPER PUSHER) CALLS AND INFORMS JS to collect GW SAMPLE AT well MW-44 today for 24 hour TAT ANALYSIS OF VOC'S
0820 Purging MW-22
→ RECORD WATER QUALITY DATA
JS 5-12-03
0843 Collect SAMPLE AT MW-22 for total TAL Metals and VOC'S. No Dissolved Metals Needed PER PM.
0905 JS + BB Mobilize to SITE 17 to show surveyors wells to Survey.
0942 Mobilize to well MW-22 to Collect SAMPLE
0950 CAN not ACCESS WELL MW-22 due to BASE OPERATIONS; CONTACT PAUL PAPERPUSHER AND HE STATED he will check on GAINING ACCESS with BASE contact.
0955 Mobilize to well MW-19

JS 5-12-03

STANDARD OPERATING PROCEDURE

General Guidance for Monitoring Well Installation

I. Purpose

To provide site personnel with a review of the well installation procedures that will be performed. These procedures are to be considered general guidelines only and are in no way intended to supplement or replace the contractual specifications in the driller's subcontract.

II. Scope

Monitoring well installations are planned for shallow and/or deep unconsolidated aquifers and/or for bedrock aquifers. The SOPs *Installation of Shallow Monitoring Wells, Installation of Surface-Cased Monitoring Wells, Installation of Bedrock Monitoring Wells,* and *Installation of Monitoring Wells Using Sonic Drilling* provide more specifics.

III. Equipment and Materials

1. Drilling rig (hollow stem auger, sonic, air hammer, air rotary, or mud rotary)
2. Well-construction materials (i.e., surface casing, screens, riser, casing, caps, bottom plugs, centering guides, sand, bentonite, grout, and surface-finish materials)
3. Development equipment

IV. Procedures and Guidelines

1. Wells will be installed in accordance with standard EPA procedures. Note that USEPA Region III requires any well penetrating a confining layer to be double-cased.
2. The threaded connections will be water-tight.
3. Well screens generally will be constructed of 10-slot or 20-slot Schedule 40 PVC and will be 5 to 10 feet in length depending on saturated thickness of unconsolidated sediments. The exact slot size and length will be determined by the field team supervisor. Stainless steel may be required under certain contaminant conditions.
4. Stick-up wells will be surrounded by four concrete-filled guard posts at least 2 inches in diameter.

5. A record of the finished well construction will be compiled.

6. All soils and liquids generated during well installations will be drummed for proper disposal.

Monitoring Well Installation

- 2″ monitoring wells in unconsolidated materials will be installed in at least 6-inch-diameter boreholes to accommodate well completion materials in designated locations.

- All monitoring wells penetrating a confining layer will be surface-cased from the ground surface to approximately 5 feet into the confining layer. Exceptions to this may be allowed under certain circumstances (e.g., evidence of significant natural gaps in the confining layer).

- Monitoring wells in unconsolidated materials will be constructed of 2-inch-diameter, factory manufactured, flush-jointed, Schedule 40 PVC (or stainless steel) screen with threaded bottom plug and riser.

- Screens will be filter packed with a properly sized and graded, thoroughly washed, sound, durable, well-rounded basalt or siliceous sand. When using hollow-stem augers, the filter pack will be installed by slowly pouring the sand into the annular space while simultaneously raising the augers and using a weighted tape to sound for the sand surface. For rotary-drilled wells, the height of the sand pack also will be sounded with a weighted tape.

- The primary filter sand pack (typically Morie #00 or DSI #1 for a 10-slot screen) will extend from 1 to 2 feet below the base to 2 feet above the top of the screen; filter pack will be allowed to settle before final measurement is taken. For wells deeper than 30 feet, the filter pack will be placed using a tremie pipe and flowing water.

- A secondary filter sand pack (typically a fine sand seal) 1-foot thick may be placed above the primary sand pack.

- Annular well seals will consist of 2 feet of pelletized, chip, or granular bentonite clay placed above the filter pack. If necessary the pellets will be hydrated using potable water. For wells installed using hollow-stem augers, the bentonite will be poured into the annular space while slowly raising the augers and sounding for the top of the bentonite with a weighted tape. A high-solids bentonite slurry using powdered bentonite introduced with a side-discharging tremie pipe will be used for the bentonite seals in wells greater than 30 feet deep. For rotary-drilled wells, the height of the well seal also will be sounded with a weighted tape. High-solids slurries will have solids content of at least 20 percent.

- The top of the annular seal will be measured after the bentonite seal has been allowed to hydrate and before the grout is applied. The seal will be allowed to hydrate for at least 30 minutes before work in the well continues.

- The annular space above the bentonite seal will be filled to grade with a bentonite-cement slurry grout mixture.
- The grout mixture consists of 6 to 8 gallons of water per 94-pound bag of Portland cement; 3 to 6 pounds of bentonite added per bag of cement to reduce shrinkage.
- The grout mix will be carefully applied to avoid disturbing the bentonite seal; the method of grout placement must force grout from the top of the bentonite seal to ground surface.
- After allowing the grout to settle and set up overnight, additional grout will be added to maintain grade.
- A protective steel casing equipped with keyed alike locking caps will be grouted in place for each new well; the casing will extend at least 2 feet above grade and 3 feet below grade, and will be painted a bright color.

Well Development

- New monitoring wells will be developed after the well has been completely installed and the grout has hardened (at least 24 hours)
- The well will be developed by surging and pumping.
- Equipment placed in the well will be decontaminated before use.
- If information is available, begin developing in the least-contaminated well first.
- Development will include surging the well by either abruptly stopping flow and allowing water in the well column to fall back into the well or through the use of a surge block that is slightly smaller in diameter than the well casing inner diameter.
- Pipes and pumps must not be fitted with foot valves or other devices that might inhibit the return flow of water to the well.
- Surging should continue throughout the development process.
- The air-lift method may be used to pump materials out of the well. The air compressor will be fitted with filters to remove all oil and the air lift hose used will be made of inert materials.
- Well development will continue until the water produced is free of turbidity, sand, and silt. A Horiba-U22 meter, YSI meter with separate Hanna turbidity meter, or equivalent should be used to determine when the turbidity is low and parameters have stabilized.
- Development water will be considered hazardous and placed in sealed 55-gallon U.S. DOT approved steel drums. CH2M HILL will label and date the drums as pending analysis, and transport the drums to a designated site for storage.

V. Attachments

None.

VI. Key Check and Items

- Ensure that all equipment is properly decontaminated as needed.
- Only new, sealed materials (e.g., screens, risers, and sand) will be used in constructing the well.
- Care shall be taken when making downhole measurements to ensure that proper heights of sand, seal, and grout are achieved.

PROJECT NUMBER	WELL NUMBER SHEET 1 OF 1

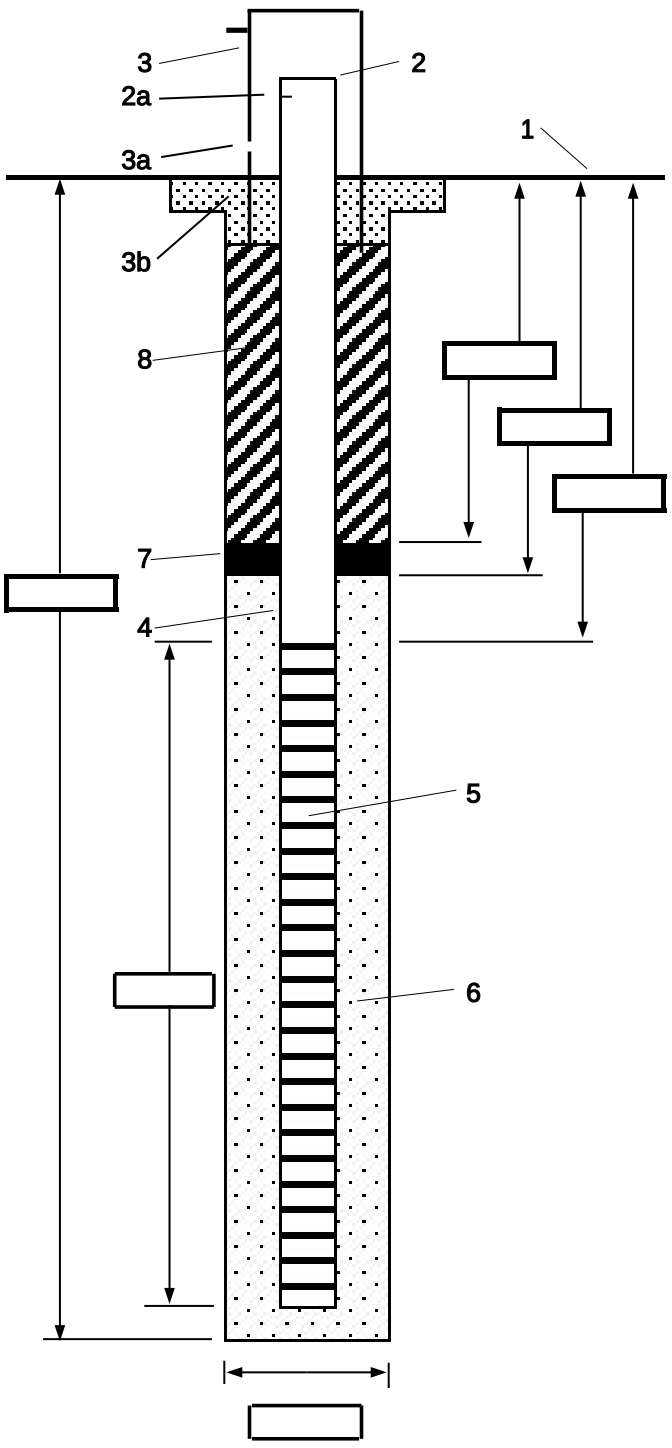
WELL COMPLETION DIAGRAM

PROJECT : LOCATION :

DRILLING CONTRACTOR :

DRILLING METHOD AND EQUIPMENT USED :

WATER LEVELS : START : END : LOGGER :



1- Ground elevation at well _____

2- Top of casing elevation _____
   a) vent hole? _____

3- Wellhead protection cover type _____
   a) weep hole? _____
   b) concrete pad dimensions _____

4- Dia./type of well casing _____

5- Type/slot size of screen _____

6- Type screen filter _____
   a) Quantity used _____

7- Type of seal _____
   a) Quantity used _____

8- Grout
   a) Grout mix used _____
   b) Method of placement _____
   c) Vol. of well casing grout _____

Development method _____

Development time _____

Estimated purge volume _____

Comments _____

STANDARD OPERATING PROCEDURE

Groundwater Sampling from Monitoring Wells – EPA Region I and III

I. Purpose and Scope

This procedure presents general guidelines for collecting groundwater samples from monitoring wells. The procedure does not address purging and sampling using "low-flow" techniques (see SOP *Low-Flow Groundwater Sampling from Monitoring Wells – EPA Region I and III)*. Operations manuals should be consulted for specific calibration and operating procedures.

II. Equipment and Materials

- Peristaltic pump, pneumatic bladder pump, or electric submersible pump, pump shroud, tubing, support cables, air compressor, control box, and power supply
- Water quality meter, such as Horiba® U-22 or a combination of equivalent devices for monitoring pH, specific conductance, turbidity, dissolved oxygen, oxidation-reduction potential (ORP), and temperature
- Flow through cell with inlet/outlet ports for purged groundwater and watertight ports for each water quality probe
- Disposable 0.45µm filters (QED® FF8100 or equivalent), if applicable
- Bailer (Teflon or stainless steel) and nylon cord, if applicable

Note: bailers and peristaltic pumps should only be used when site access or other limitations prevent the use of sampling pumps

III. Procedures and Guidelines

A. Setup and Purging

1. Obtain information on well location, diameter(s), depth, and screened interval(s), and the method for disposal of purged water.
2. A pump will be used for well purging if the well yield is adequate; otherwise, a bailer may be used depending on project requirements.
3. Sampling equipment is cleaned and decontaminated prior to sampling in accordance with SOP *Decontamination of Personnel and Equipment*.

4. Instruments are calibrated according to manufacturer's instructions.

5. The well number, site, date, and condition are recorded in the field logbook.

6. Plastic sheeting is placed on the ground, and the well is unlocked and opened.

7. Water level measurements are collected in accordance with the *Water Level Measurement* SOP.

8. The volume (v) of water in a well casing is calculated as follows:

$$v = 7.48(\pi r^2 h)$$

where: $\pi = 3.14$
v=volume of water in well (gallons)
r = Radius of the well (feet)
h = height of water in well (feet)

The volume of water in common well casing diameters may be calculated as follows:

2-inch diameter well:
0.163 gal/ft x ___ (linear feet of water) = gallons

4-inch diameter well:
0.653 gal/ft x ___ (linear feet of water) = gallons

6-inch diameter well:
1.469 gal/ft x ___ (linear feet of water) = gallons

9. Attach tubing, support cable or rope, and air line (if applicable) to the pump. The support line should bear the weight of the pump. Set pump in the well at the desired sampling interval, typically mid-screen, and begin purging. If a bailer is being used, it is removed from its protective covering and attached to a cord compatible with constituents.

10. If a RediFlo or other similar electric submersible pump is to be used in a large diameter well (greater than 4 inches), a pump shroud should be used to direct the flow of water across the pump motor. Failure to use a shroud in this situation can lead to overheating of the motor and loss of volatiles from the pump discharge.

11. If a bailer is being used, it should be removed from its protective covering and attached to a cord compatible with the site contaminants. The bailer should be lowered into the top of the water column, allowed to fill, and removed. It is critical that bailers be slowly and gently immersed into the top of the water column, particularly during final stages of purging, to minimize turbidity and disturbance of volatile organic constituents. The use of bailers for purging and sampling is

discouraged because the correct technique is highly operator dependent and improper use may result in an unrepresentative sample.

12. Field parameters including pH, ORP, turbidity, dissolved oxygen, specific conductance, and temperature are measured and recorded in the field logbook. The water quality probes are inserted into a flow-through cell. The purged groundwater is directed through the cell by connecting the pump discharge tubing to the bottom port on the flow through cell, allowing measurements to be collected before the water contacts the atmosphere.

13. During purging, the water quality parameters are measured at least once for each well volume. A minimum of three well volumes must be purged (up to 5 well volumes may be purged if water quality parameters do not stabilize) prior to sampling. In nonproductive wells, if the well is purged dry, it is <u>not necessary to remove a minimum of three well volumes</u>; however, the well should be allowed to recover sufficiently to allow collection of all samples.

14. Three to five well volumes are purged (more may be purged if parameters do not stabilize). Purging is stopped when field parameters have stabilized over three consecutive well volumes. Field Water quality parameters are considered stable when pH measurements agree within 0.1 units, specific conductance measurements agree within 3 percent, ORP measurements agree within 10 mV, dissolved oxygen measurements agree within 10 percent, and turbidity measurements agree within 10 percent or are as low as practicable given sampling conditions.

B. Sample Collection

Once purging is complete the well is ready to sample. The elapsed time between completion of purging and collection of the groundwater sample should be minimized. Typically, the sample is collected immediately after the well has been purged, but this is also dependent on well recovery.

Samples will be placed in sample containers that have been cleaned to laboratory standards and are preserved in accordance with the analytical method. The containers are typically pre-preserved, if required.

The steps to be followed for sample collection are as follows:

1. The cap is removed from the sample bottle, and the bottle is tilted slightly.

2. The sample is slowly poured from the bailer or discharged from the pump so that it runs down the inside of the sample bottle with a minimum of disturbance. The pumping rate should be reduced to approximately 100 ml per minute when sampling VOCs.

3. Inorganics, including metals, may be collected and preserved in the filtered form as well as the unfiltered form. Disposable in-line filters

(0.45 micron filter), connected to the end of the sample tubing,, are typically used for field filtration. Samples are field filtered as the water is being placed into the sample container. If a bailer is used, filtration may be driven by a peristaltic pump.

4. Adequate space is left in the bottle to allow for expansion, except for VOC vials, which are filled to the top with a positive meniscus.

5. The bottle is capped and clearly labeled.

6. Samples are placed in appropriate containers and, if necessary, packed with ice in coolers as soon as practical.

7. If the sample tubing or bailer is dedicated, it is returned to the well and the well is capped and locked. Nondedicated equipment is cleaned and decontaminated in accordance with the *Decontamination of Personnel and Equipment* SOP.

The following information, at a minimum, will be recorded in the log book:

1. Sample identification (site name, location, and project number; sample name/number and location; sample type and matrix; time and date; sampler's identity)

2. Sample source and source description

3. Field observations and measurements (appearance, volatile screening, field chemistry, sampling method), volume of water purged prior to sampling, number of well volumes purged, and field parameter measurements

4. Sample disposition (preservative; laboratory name, date and time sent; laboratory sample number, chain-of-custody number, sample bottle lot number)

Additional remarks

IV. Attachments

None.

V. Key Checks and Preventative Maintenance

- Use of peristaltic pumps and bailers should be avoided, if possible.
- Allow the field parameters to stabilize within the specified criteria as much as possible.
- Fill bottles for VOC samples first.
- Be sure the sample identification is properly specified.

- Maintain field equipment in accordance with the manufacturer's recommendations. This may include, but is not limited to:
  - Inspect sampling pump regularly and replace as warranted
  - Bring supplies for replacing the bladder and "O" rings if using a positive-displacement bladder pump
  - Inspect tubing regularly and replace as warranted
  - Inspect air/sample line quick-connects regularly and replace as warranted
  - Verify battery charge, calibration, and proper working order of field measurement equipment prior to initial mobilization and daily during field efforts

STANDARD OPERATING PROCEDURE

Low-Flow Groundwater Sampling from Monitoring Wells – EPA Region I and III

I. Purpose and Scope

This SOP presents general guidelines for the collection of groundwater samples from monitoring wells using low-flow purging and sampling procedures. Operations manuals should be consulted for specific calibration and operating procedures.

II. Equipment and Materials

- Adjustable-rate positive-displacement pump, submersible pump, or peristaltic pump
- Horiba® U-22 or equivalent water quality meters to monitor pH, specific conductance, turbidity, dissolved oxygen, oxidation-reduction potential (ORP), and temperature
- Flow-through cell with inlet/outlet ports for purged groundwater and watertight ports for each probe
- Generator or alternate power source depending on pump type
- Water-level indicator
- Disposable Teflon, Teflon-lined polyethylene tubing or polyethylene tubing for metals and other inorganics
- Plastic sheeting
- Well-construction information
- Calibrated container and stopwatch to determine flow rate
- Sample containers
- In-line disposable 0.45µm filters (QED® FF8100 or equivalent)
- Shipping supplies (labels, coolers, and ice)
- Field book

III. Procedures and Guidelines

A. Setup and Purging

1. Obtain information on well location, diameter(s), depth, and screen interval(s), and the method for disposal of purged water.
2. Calibrate instruments according to manufacturer's instructions.
3. The well number, site, date, and condition are recorded in the field logbook.

4. Plastic sheeting is placed on the ground, and the well is unlocked and opened. All decontaminated equipment to be used in sampling will be placed only on the plastic sheeting until after the sampling has been completed. To avoid cross-contamination, do not let any downhole equipment touch the ground.

5. All sampling equipment and any other equipment to be placed in the well is cleaned and decontaminated before sampling in accordance with SOP *Decontamination of Personnel and Equipment*.

6. Water level measurements are collected in accordance with the *Water Level Measurements* SOP. **Do not measure the depth to the bottom of the well at this time**; this reduces the possibility that any accumulated sediment in the well will be disturbed. Obtain depth to bottom information from well construction log.

7. Attach and secure the tubing to the low-flow pump. Lower the pump slowly into the well and set it at approximately the middle of the screen. Place the pump intake in the middle of the saturated screen length and should be at least two feet above the bottom of the well to avoid mobilization of any sediment present in the bottom.

8. Insert the measurement probes into the flow-through cell. The purged groundwater is directed through the cell, allowing measurements to be collected before the water contacts the atmosphere.

9. If using a generator, locate it 30 feet downwind from the well to avoid exhaust fumes contaminating the samples.

10. Start purging the well at 0.2 to 0.5 liters per minute. Avoid surging. Purging rates for more transmissive formations could be started at 0.5-liter to 1 liter per minute. The initial field parameters of pH, specific conductance, dissolved oxygen, ORP, turbidity, and temperature of water are measured and recorded in the field logbook.

11. The water level should be monitored during purging, and, ideally, the purge rate should equal the well recharge rate so that there is little or no drawdown in the well (i.e., less than 0.3-foot). The water level should stabilize for the specific purge rate. There should be at least 1 foot of water over the pump intake so there is no risk of the pump suction being broken, or entrainment of air in the sample. Record adjustments in the purge rate and changes in depth to water in the logbook. Purge rates should, if needed, be decreased to the minimum capabilities of the pump (0.1- to 0.2-liter per minute) to avoid affecting well drawdown.

12. During purging, the field parameters are measured frequently (every 5 minutes) until the parameters have stabilized. Field parameters are considered stable when measurements meet the following criteria:

    - pH: within 0.1 pH units

- Specific conductance: within 3 percent
- Dissolved oxygen: within 10 percent
- Turbidity: within 10 percent for values greater than 5 NTU; if 3 turbidity values are less than 5 NTU, consider the values as stabilized
- ORP: within 10 mV
- Temperature: within 3 percent

B. Sample Collection

Once purging is complete the well is ready to sample. The elapsed time between completion of purging and collection of the groundwater sample should be minimized. Typically, the sample is collected immediately after the well has been purged, but this is also dependent on well recovery.

Samples will be placed in sample containers that have been cleaned to laboratory standards and are preserved in accordance with the analytical method. The containers are typically pre-preserved, if required.

VOC samples are normally collected first and directly into pre-preserved sample containers.

During purging and sampling, the centrifugal/peristaltic pump tubing must remain filled with water to avoid aeration of the groundwater. It is recommended that ¼ or 3/8 inch inside diameter tubing be used to help insure that the sample tubing remains water filled. If the pump tubing is not completely filled to the sampling point, collect non-VOC dissolved gasses samples first, then increase flow rate slightly until water completely fills the tubing and collect the VOC/dissolved gases samples. Record new flow rate and drawdown depth.

The steps to be followed for sample collection are as follows:

1. The cap is removed from the sample bottle, and the bottle is tilted slightly.
2. The sample is slowly poured from the bailer or discharged from the pump so that it runs down the inside of the sample bottle with a minimum of splashing. The pumping rate should be reduced to approximately 100 ml per minute when sampling VOCs.
3. Inorganics, including metals, may be collected and preserved in the filtered form as well as the unfiltered form. Disposable in-line filters (0.45 micron filter), connected to the end of the sample tubing,, are typically used for field filtration. Samples are field filtered as the water is being placed into the sample container. If a bailer is used, filtration may be driven by a peristaltic pump.

4. Adequate space is left in the bottle to allow for expansion, except for VOC vials, which are filled to the top with a positive meniscus.

5. The bottle is capped and clearly labeled.

6. Samples are placed in appropriate containers and, if necessary, packed with ice in coolers as soon as practical.

7. Nondedicated equipment is cleaned and decontaminated in accordance with the *Decontamination of Personnel and Equipment* SOP.

The following information, at a minimum, will be recorded in the log book:

1. Sample identification (site name, location, and project number; sample name/number and location; sample type and matrix; time and date; sampler's identity)

2. Sample source and source description

3. Field observations and measurements (appearance, volatile screening, field chemistry, sampling method), volume of water purged prior to sampling, number of well volumes purged, and field parameter measurements

4. Sample disposition (preservative; laboratory name, date and time sent; laboratory sample number, chain-of-custody number, sample bottle lot number)

5. Additional remarks

C. Additional remarks

1. If the well goes dry during purging, wait until it recovers sufficiently to remove the required volumes to sample all parameters. It may be necessary to return periodically to the well but a particular sample (e.g., large amber bottles for semivolatile analysis) should be filled at one time rather than over the course of two or more visits to the well.

2. Disposable tubing is disposed of with PPE and other site trash.

IV. Attachments

White paper on reasons and rationale for low-flow sampling.

V. Key Checks and Preventative Maintenance

- The drawdown in the well should be minimized as much as possible (preferably no more than 0.5-foot to 1 foot) so that natural groundwater-flow conditions are maintained as closely as possible.

- The highest purging rate should not exceed 1 liter per minute. This is to keep the drawdown minimized.

- Stirring up of sediment in the well should be avoided so that turbidity containing adsorbed chemicals is not suspended in the well and taken in by the pump.
- Overheating of the pump should be avoided to minimize the potential for losing VOCs through volatilization.
- Keep the working space clean with plastic sheeting and good housekeeping.
- Maintain field equipment in accordance with the manufacturer's recommendations. This will include, but is not limited to:
    - Inspect sampling pump regularly and replace as warranted
    - Inspect quick-connects regularly and replace as warranted
    - Verify battery charge, calibration, and proper working order of field measurement equipment prior to initial mobilization and daily during field efforts

Attachment to the SOP on Low-Flow Sampling Groundwater Sampling from Monitoring Wells

White Paper on Low-Flow Sampling

EPA recommends low-flow sampling as a means of collecting groundwater samples in a way that minimizes the disturbance to the natural groundwater flow system and minimizes the introduction of contamination into the samples from extraneous sources. The following are details about these issues.

When a pump removes groundwater from the well at the same rate that groundwater enters the well through the screen, the natural groundwater-flow system around the well experiences a minimum of disturbance. Some disturbance is bound to occur because you are causing groundwater to flow to the well in a radial fashion that otherwise would have flowed past it. However, the resulting low-flow sample provides the most-representative indication we can get of groundwater quality in the immediate vicinity of the well.

Normally, when a well is pumped at an excessive rate that drops the water level in the well below the water level in the aquifer, the water cascades down the inside of the well screen when it enters the well. The turbulence from this cascading causes gases such as oxygen and carbon dioxide to mix with the water in concentrations that are not representative of the native groundwater and are higher than expected. This causes geochemical changes in the nature of the water that can change the concentrations of some analytes, particularly metals, in the groundwater sample, not mention it's effect on the dissolved oxygen levels that then will be measured in the flow-through cell. Such turbulence also may cause lower-than-expected concentrations of volatile organic compounds due to volatilization.

For wells in which the water level is above the top of the screen, the water up in the riser is out of the natural circulation of the groundwater and, therefore, can become stagnant. This stagnant water is no longer representative of natural groundwater quality because its pH, dissolved-oxygen content, and other geochemical characteristics change as it contacts the air in the riser. If we minimize the drawdown in the well when we pump, then we minimize the amount of this stagnant water that is brought down into the well screen and potentially into the pump. As a result, a more-representative sample is obtained.

Typically, wells contain some sediment in the bottom of the well, either as a residue from development that has settled out of the water column or that has sifted through the sand pack and screen since the well was installed. This sediment commonly has adsorbed on it such analytes as metals, SVOCs, and dioxins that normally would not be dissolved in the groundwater. If these sediments are picked up in the groundwater when the well is disturbed by excessive pumping, they can:

- Make filtering the samples for metals analysis more difficult
- Add unreasonably to the measured concentration of SVOCs and other organic compounds

The SOP for low-flow sampling has been modified recently and should be consulted for additional information about low-flow sampling and ways of dealing with wells in which the water level cannot be maintained at a constant level.

STANDARD OPERATING PROCEDURE

Soil Boring Drilling and Abandonment

I. Purpose and Scope

The purpose of this guideline is to describe methods to obtain samples of subsurface soil using either hollow-stem auger, rotary or sonic drilling methods, or tripod-mounted rig and then backfill boreholes to the surface. The guideline covers both split-spoon sampling and thin-walled tube sampling and includes soil borings through surface casings installed to prevent potential contamination in shallow water-bearing units from migrating downward into deeper units.

II. Equipment and Materials

- Truck-mounted drilling rig, skid rig, or tripod rig
- Hollow-stem augers and associated equipment or either rotary-drilling or sonic-drilling equipment
- Black iron steel or Schedule 80 PVC casing, at least 6-inch inside diameter (if surface casing is required), or sonic rig with telescoping casing
- Split-spoon or thin-walled tube samplers
- Downhole compacting tool (e.g., a pipe with a flat plate attached to the bottom)
- Cement
- Bentonite

III. Procedures and Guidelines

A. Drilling

Continuous-fight hollow-stem augers (HSA) with an inside diameter of at least 3.25 inches typically are used. The use of water or other fluid to assist in hollow-stem drilling will be avoided. Rotary drilling will be with a similar minimum diameter.

The bit of the auger or drill is placed on the ground at the location to be drilled and then turned with the drilling or soil-coring rig. The drilling is advanced to a depth just above the top of the interval to be sampled. For sonic drilling, a continuous core is collected and the sample interval is selected from the length of core run.

While advancing the auger or drill to the full borehole depth, the soils removed from the boring will be screened using a portable volatile organics detector.

A tripod drilling rig is generally a tripod equipped to collect soil samples using a hammer-driven sampler. The soil sample collection will be the same as that outlined for hollow-stem and rotary drilling. Borehole collapse due to soft sediments may occur when collecting samples using a tripod drilling rig.

Temporary surface casing may be installed where soil borings will penetrate a confining layer. The surface casing will be installed to prevent potential contamination in shallow water-bearing units from migrating downward into deeper units. Typically, surface casing has a 6-inch inside diameter (ID).

If the split-spoon sampling is to be advanced with a 3.25-inch ID and 7.25-inch outside diameter (O.D.) HSA, it will be necessary to pull the 3.25-inch augers and ream the hole with a minimum 10.25-inch ID HAS for the installation of the temporary surface casing. Alternatively, if the split-spoon sampling is advanced with mud-rotary drilling, it would require a 10.25-inch rotary bit to make room for the 6-inch I.D. surface casing.

The surface casing will be seated at least 5 feet into an underlying clay or silt layer and will be sealed in place using a bentonite slurry or bentonite pellets. This seal will prevent movement of groundwater downward from the shallow water-bearing unit but will allow the casing to be removed easily when the split-spoon sampling is completed. The split-spoon sampling will then be advanced with a 6-inch mud-rotary bit.

B. Sampling

Using the drilling rig, a hole is advanced to the desired depth. For split-spoon sampling, the samples are then collected following the ASTM D 1586 standard (attached). The sampler is lowered into the hole and driven to a depth equal to the total length of the sampler; typically this is 24 inches. The sampler is driven in 6-inch increments using a 140-pound weight ("hammer") dropped from a height of 30 inches. The number of hammer blows for each 6-inch interval is counted and recorded on the boring log and/or field notebook. To obtain enough volume of sample for subsequent laboratory analysis, use of a 3-inch ID sampler may be required. Blow counts obtained with a 3-inch ID spoon would not conform to ASTM D 1586 and would therefore not be used for geotechnical evaluations. Samples will be collected from the soil borings at 2-foot to 5-foot intervals. For sonic drilling, a continuous core is collected and the sample interval is selected from the length of core run.

Once retrieved from the hole, the sampler is carefully split open. Care should be taken not to allow material in the sampler to fall out of the open end of the sampler. Samples may be collected for chemical analysis. These samples are collected in either decontaminated stainless-steel split-spoon samplers or new plastic sleeves for sonic drilling. Sampling the soil for chemical analysis is described in SOP *Soil Boring Sampling – Split Spoon.*

Undisturbed fine-grained samples may be collected for analysis for geotechnical parameters such as vertical hydraulic conductivity. These samples will be collected using thin-walled sampling tubes (sometimes called Shelby tubes). Tubes will be 24- to 36 inches long and 3- to 4-inches in diameter, depending upon the quantity of sample required. Undisturbed samples will be obtained by smoothly pressing the sampling tube through the interval to be sampled using the weight of the drilling rig. Jerking the sample should be avoided. Once the sample is brought to the surface, the ends will be sealed with bees wax and then sealed with end caps and heavy tape. The sample designation, data and time of sampling, and the up direction will be noted on the

sampling tube. The tube shall be kept upright as much as possible and will be protected from freezing, which could disrupt the undisturbed nature of the sample. Samples for geochemical analysis normally are not collected from thin-walled tube samples. More details are provided in the ASTM D 1587 standard (attached).

C. Abandonment

The borehole will be grouted from total depth to the surface with bentonite-cement grout. The cement-bentonite grout will be installed continuously in one operation from the bottom of the space to be grouted to the ground surface. When installing grout in soil borings, the grout will be installed through a tremie pipe that is placed inside the augers or to the bottom of the borehole. The grouting will be completed before the augers or any temporary casing or drilling mud is removed.

D. Decontamination and Waste Disposal

Before sampling begins, equipment will be decontaminated according to the procedures identified in SOPs *Decontamination of Personnel and Equipment* and *Decontamination of Drilling Rig and Equipment.* The location to be sampled is cleared of debris and trash, and the location is noted in the logbook.

The soil cuttings are to be drummed and managed as described in SOP *Disposal of Waste Fluids and Soils* and the investigation-derived waste management plan.

IV. Attachments

ASTM D 1586 *Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils*

ASTM D 1587 *Standard Practice for Thin-Walled Tube Sampling of Soils*

V. Key Checks and Preventative Maintenance

- Check that the drilling rig or soil-coring rig is in working order.
- Check that the borehole is grouted to the ground surface at the completion of drilling and sampling.

STANDARD OPERATING PROCEDURE

Logging of Soil Borings

I. Purpose and Scope

This SOP provides guidance to obtain accurate and consistent descriptions of soil characteristics during soil-sampling operations. The characterization is based on visual examination and manual tests, not on laboratory determinations.

II. Equipment and Materials

- Indelible pens
- Tape measure or ruler
- Field logbook
- Spatula
- HCL, 10 percent solution
- Squirt bottle with water
- Rock- or soil-color chart (e.g., Munsell)
- Grain-size chart
- Hand lens
- Unified Soil Classification System (USCS) index charts and tables to help with soil classification (attached)

III. Procedures and Guidelines

This section covers several aspects of soil characterization: instructions for completing the CH2M HILL soil boring log Form D1586 (attached), field classification of soil, and standard penetration test procedures.

A. Instructions for Completing Soil Boring Logs

Soil boring logs will be completed in the field log books or on separate soil boring log sheets. Information collected will be consistent with that required for Form D1586 (attached), a standard CH2M HILL form (attached), or an equivalent form that supplies the same information.

The information collected in the field to perform the soil characterization is described below.

Field personnel should review completed logs for accuracy, clarity, and thoroughness of detail. Samples also should be checked to see that information is correctly recorded on both jar lids and labels and on the log sheets.

B. Heading Information

Boring/Well Number. Enter the boring/well number. A numbering system should be chosen that does not conflict with information recorded for previous exploratory work done at the site. Number the sheets consecutively for each boring.

Location. If station, coordinates, mileposts, or similar project layout information is available, indicate the position of the boring to that system using modifiers such as "approximate" or "estimated" as appropriate.

Elevation. Elevation will be determined at the conclusion of field activities through a survey.

Drilling Contractor. Enter the name of the drilling company and the city and state where the company is based.

Drilling Method and Equipment. Identify the bit size and type, drilling fluid (if used), and method of drilling (e.g., rotary, hollow-stem auger). Information on the drilling equipment (e.g., CME 55, Mobile B61) also is noted.

Water Level and Date. Enter the depth below ground surface to the apparent water level in the borehole. The information should be recorded as a comment. If free water is not encountered during drilling or cannot be detected because of the drilling method, this information should be noted. Record date and time of day (for tides, river stage) of each water level measurement.

Date of Start and Finish. Enter the dates the boring was begun and completed. Time of day should be added if several borings are performed on the same day.

Logger. Enter the first and last name.

C. Technical Data

Depth Below Surface. Use a depth scale that is appropriate for the sample spacing and for the complexity of subsurface conditions.

Sample Interval. Note the depth at the top and bottom of the sample interval.

Sample Type and Number. Enter the sample type and number. SS-1 = split spoon, first sample. Number samples consecutively regardless of type. Enter a sample number even if no material was recovered in the sampler.

Sample Recovery. Enter the length to the nearest 0.1-foot of soil sample recovered from the sampler. Often, there will be some wash or caved material above the sample; do not include the wash material in the measurement. Record soil recovery in feet.

Standard Penetration Test Results. In this column, enter the number of blows required for each 6 inches of sampler penetration and the "N" value, which is the sum of the blows in the middle two 6-inch penetration intervals. A typical standard penetration test involving successive blow counts of 2, 3, 4, and 5 is recorded as 2-3-4-5 and (7). The standard penetration test is terminated if the sampler encounters refusal. Refusal is a penetration of less than 6 inches with a blow count of 50. A

partial penetration of 50 blows for 4 inches is recorded as 50/4 inches. Penetration by the weight of the slide hammer only is recorded as "WOH."

Samples should be collected using a 140-pound hammer and 2-inch diameter split spoons. Samples may be collected using direct push sampling equipment. However, blow counts will not be available. A pocket penetrometer may be used instead to determine relative soil density of fine grained materials (silts and clays).

Sample also may be collected using a 300-pound hammer or 3-inch-diameter split-spoon samples at the site. However, use of either of these sample collection devices invalidates standard penetration test results and should be noted in the comments section of the log. The 300-pound hammer should only be used for collection of 3-inch-diameter split-spoon samples. Blow counts should be recorded for collection of samples using either a 3-inch split-spoon, or a 300-pound hammer. An "N" value need not be calculated.

Soil Description. The soil classification should follow the format described in the "Field Classification of Soil" subsection below.

Comments. Include all pertinent observations (changes in drilling fluid color, rod drops, drilling chatter, rod bounce as in driving on a cobble, damaged Shelby tubes, and equipment malfunctions). In addition, note if casing was used, the sizes and depths installed, and if drilling fluid was added or changed. You should instruct the driller to alert you to any significant changes in drilling (changes in material, occurrence of boulders, and loss of drilling fluid). Such information should be attributed to the driller and recorded in this column.

Specific information might include the following:

- The date and the time drilling began and ended each day
- The depth and size of casing and the method of installation
- The date, time, and depth of water level measurements
- Depth of rod chatter
- Depth and percentage of drilling fluid loss
- Depth of hole caving or heaving
- Depth of change in material
- Health and safety monitoring data
- Drilling interval through a boulder

D. Field Classification of Soil

This section presents the format for the field classification of soil. In general, the approach and format for classifying soils should conform to ASTM D 2488, Visual-Manual Procedure for Description and Identification of Soils (attached).

The Unified Soil Classification System is based on numerical values of certain soil properties that are measured by laboratory tests. It is possible, however, to estimate these values in the field with reasonable accuracy using visual-manual procedures (ASTM D 2488). In addition, some elements of a complete soil

description, such as the presence of cobbles or boulders, changes in strata, and the relative proportions of soil types in a bedded deposit, can be obtained only in the field.

Soil descriptions should be precise and comprehensive without being verbose. The correct overall impression of the soil should not be distorted by excessive emphasis on insignificant details. In general, similarities rather than differences between consecutive samples should be stressed.

Soil descriptions must be recorded for every soil sample collected. The format and order for soil descriptions should be as follows:

1. Soil name (synonymous with ASTM D 2488 Group Name) with appropriate modifiers. Soil name should be in all capitals in the log, for example "POORLY-GRADED SAND."
2. Group symbol, in parentheses, for example, "(SP)."
3. Color, using Munsell color designation
4. Moisture content
5. Relative density or consistency
6. Soil structure, mineralogy, or other descriptors

This order follows, in general, the format described in ASTM D 2488.

E. Soil Name

The basic name of a soil should be the ASTM D 2488 Group Name on the basis of visual estimates of gradation and plasticity. The soil name should be capitalized.

Examples of acceptable soil names are illustrated by the following descriptions:

- A soil sample is visually estimated to contain 15 percent gravel, 55 percent sand, and 30 percent fines (passing No. 200 sieve). The fines are estimated as either low or highly plastic silt. This visual classification is SILTY SAND WITH GRAVEL, with a Group Symbol of (SM).
- Another soil sample has the following visual estimate: 10 percent gravel, 30 percent sand, and 60 percent fines (passing the No. 200 sieve). The fines are estimated as low plastic silt. This visual classification is SANDY SILT. The gravel portion is not included in the soil name because the gravel portion was estimated as less than 15 percent. The Group Symbol is (ML).

The gradation of coarse-grained soil (more than 50 percent retained on No. 200 sieve) is included in the specific soil name in accordance with ASTM D 2488. There is no need to further document the gradation. However, the maximum size and angularity or roundness of gravel and sand-sized particles should be recorded. For fine-grained soil (50 percent or more passing the No. 200 sieve), the name is modified by the appropriate plasticity/elasticity term in accordance with ASTM D 2488.

Interlayered soil should each be described starting with the predominant type. An introductory name, such as "Interlayered Sand and Silt," should be used. In addition, the relative proportion of each soil type should be indicated (see Table 1 for example).

Where helpful, the evaluation of plasticity/elasticity can be justified by describing results from any of the visual-manual procedures for identifying fine-grained soils, such as reaction to shaking, toughness of a soil thread, or dry strength as described in ASTM D 2488.

F. Group Symbol

The appropriate group symbol from ASTM D 2488 must be given after each soil name. The group symbol should be placed in parentheses to indicate that the classification has been estimated.

In accordance with ASTM D 2488, dual symbols (e.g., GP-GM or SW-SC) can be used to indicate that a soil is estimated to have about 10 percent fines. Borderline symbols (e.g., GM/SM or SW/SP) can be used to indicate that a soil sample has been identified as having properties that do not distinctly place the soil into a specific group. Generally, the group name assigned to a soil with a borderline symbol should be the group name for the first symbol. The use of a borderline symbol should not be used indiscriminately. Every effort should be made to first place the soil into a single group.

G. Color

The color of a soil must be given. The color description should be based on the Munsell system. The color name and the hue, value, and chroma should be given.

H. Moisture Content

The degree of moisture present in a soil sample should be defined as dry, moist, or wet. Moisture content can be estimated from the criteria listed on Table 2.

I. Relative Density or Consistency

Relative density of a coarse-grained (cohesionless) soil is based on N-values (ASTM D 1586 [attached]). If the presence of large gravel, disturbance of the sample, or non-standard sample collection makes determination of the in situ relative density or consistency difficult, then this item should be left out of the description and explained in the Comments column of the soil boring log.

Consistency of fine-grained (cohesive) soil is properly based on results of pocket penetrometer or torvane results. In the absence of this information, consistency can be estimated from N-values. Relationships for determining relative density or consistency of soil samples are given in Tables 3 and 4.

J. Soil Structure, Mineralogy, and Other Descriptors

Discontinuities and inclusions are important and should be described. Such features include joints or fissures, slickensides, bedding or laminations, veins, root holes, and wood debris.

Significant mineralogical information such as cementation, abundant mica, or unusual mineralogy should be described.

Other descriptors may include particle size range or percentages, particle angularity or shape, maximum particle size, hardness of large particles, plasticity of fines, dry strength, dilatancy, toughness, reaction to HCl, and staining, as well as other information such as organic debris, odor, or presence of free product.

K. Equipment and Calibration

Before starting the testing, the equipment should be inspected for compliance with the requirements of ASTM D 1586. The split-barrel sampler should measure 2-inch or 3-inch O.D., and should have a split tube at least 18 inches long. The minimum size sampler rod allowed is "A" rod (1-5/8-inch O.D.). A stiffer rod, such as an "N" rod (2-5/8-inch O.D.), is required for depths greater than 50 feet. The drive weight assembly should consist of a 140-pound or 300-pound hammer weight, a drive head, and a hammer guide that permits a free fall of 30 inches.

IV. Attachments

Soil Boring Log (Sample Soil Boring Log.xls)

CH2M HILL Form D1586 and a completed example (Soil_Log_Examp.pdf)

ASTM D 2488 *Standard Practice for Description and Identification of Soils (Visual-Manual Procedures)* (ASTM D2488.pdf)

ASTM 1586 *Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils* (ASTM D1586.pdf)

Tables 1 through 4 (Tables 1-4.pdf)

V. Key Checks and Preventive Maintenance

- Check entries to the soil-boring log and field logbook in the field; because the samples will be disposed of at the end of fieldwork, confirmation and corrections cannot be made later.
- Check that sample numbers and intervals are properly specified.
- Check that drilling and sampling equipment is decontaminated using the procedures defined in SOP *Decontamination of Drilling Rigs and Equipment*.

CH2MHILL

PROJECT NUMBER	BORING NUMBER

SOIL BORING LOG

PROJECT : LOCATION :

ELEVATION : DRILLING CONTRACTOR :

DRILLING METHOD AND EQUIPMENT USED :

ATD WATER LEVEL : START : END : LOGGER :

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	SAMPLE #/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N')	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	USCS	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. DRILLING ACTIONS/DRILLER COMMENTS PID Readings: Breathing Zone: Above Hole:

CH2M HILL

PROJECT NUMBER	BORING NUMBER SHEET OF

SOIL BORING LOG

PROJECT _____ LOCATION _____

ELEVATION _____ DRILLING CONTRACTOR _____

DRILLING METHOD AND EQUIPMENT _____

WATER LEVELS _____ START _____ FINISH _____ LOGGER _____

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	RECOVERY (FT)	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION

Figure 1
SOIL BORING LOG, FORM D1586

CH2M HILL

PROJECT NUMBER	BORING NUMBER	SHEET 1 OF 3
DEN22371.G5	BL-3	

SOIL BORING LOG

PROJECT Howard Ave. Landslide LOCATION Howard & 24th Ave, Centennial, CO
ELEVATION 5136 Feet DRILLING CONTRACTOR Kendall Explorations, Ashcan, Colorado
DRILLING METHOD AND EQUIPMENT 4"-inch H.S. Augers, Mobil B-61 rotary drill rig
WATER LEVELS 3.2 Feet, 8/5/89 START August 4, 1989 FINISH August 8, 1989 LOGGER J.A. Michner

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0					Surface material consist of 4 inches AC underlain by 6 inches of 3/4 inch minus base rock	Start Drilling @ 3:00
	2.5					
	4.0	1-S	1.5	2-3-4 (7)	POORLY-GRADED SAND WITH SILT, (SP-SM), fine, light brown, wet, loose	Driller notes water at 4 feet
	5.0					
5	6.5	2-S	0.9	WOH/12"-1	ORGANIC SILT, (OL), very dark, gray to black, wet, very soft; strong H_2S odor, many fine roots up to about 1/4 inch	Driller notes very soft drilling 4 ft. dark grey, wet silty cuttings.
	8.0					
	10.0	3-ST	1.3	—	ORGANIC SILT, similar to 2-S, except includes fewer roots (by volume)	
10	11.5	4-S	1.3	2-2-2 (4)	SILT, (ML), very dark gray to black, wet, soft	water level @ 3.2 feet on 8/5/89 @ 0730
						Driller notes rough drilling action and chatter @ 13 ft
	15.0					
15	15.5	5-S	0.5	60/6"	SILTY GRAVEL, (GM), rounded gravel up to about 1 inch maximum observed size, wet, very dense	
	20.0					Driller notes smoother, firm drilling @ 19 ft
20	21.0	6-S	1.0	12-50/6"	LEAN CLAY WITH SAND, (CL), medium to light green, moist, very stiff	some angular rock chips @ bot. tip of 6-S, poss boulders or rock
	23.0					Driller notes very hard, slow grinding, smooth drilling action from 21 to 23 ft, possibly bedrock
	23.1	7-S	-0-	50/1"	NO RECOVERY	
					END SOIL BORING @ 23.1 FEET SEE ROCK CORE LOG FOR CONTINUATION OF BL-3	

Figure 2
EXAMPLE OF COMPLETED LOG FORM

STANDARD OPERATING PROCEDURE

Shallow Soil Sampling

I. Purpose

To provide general guidelines for the collection and handling of surface soil samples during field operations.

II. Scope

The method described for surface soil sampling is applicable for loosely packed earth and is used to collect disturbed-soil samples.

III. Equipment and Materials

- Sample jars.
- A hand auger or other device that can be used to remove the soil from the ground. Only stainless steel, Teflon, or glass materials should be used. The only exception is split spoons, which are most commonly available in carbon steel; these are acceptable for use only if they are not rusty.
- A stainless steel spatula or disposable plastic scoop should be used to remove material from the sampling device.
- Unpainted wooden stakes or pin flags
- Fiberglass measuring tape (at least 200 feet in length)
- GPS Unit (if available)

IV. Procedures and Guidelines

A. Wear protective gear, as specified in the Health and Safety Plan.

B. To locate samples, identify the correct location using the pin flags or stakes. Proceed to collect a sample from the undisturbed soil adjacent to the marker following steps C and D. If markers are not present, the following procedures will be used.

1. For samples on a grid:

a. Use measuring tape to locate each sampling point on the first grid line as prescribed in the sampling plan. As each point is located, drive a numbered stake in the ground and record its location on the site map and in the logbook.

b. Proceed to sample the points on the grid line.

c. Measure to location where next grid line is to start and stake first sample. For subsequent samples on the line take two orthogonal measurements: one to the previous grid line, and one to the previous sample on the same grid line.

d. Proceed to sample the points on the grid line as described in Section C below.

e. Repeat 1c and 1d above until all samples are collected from the area.

f. Or, a GPS unit can be used to identify each location based on map coordinated, if available.

2. For non-grid samples:

a. Use steel measuring tape to position sampling point at location described in the sampling plan by taking two measurements from fixed landmarks (e.g., corner of house and fence post).

b. Note measurements, landmarks, and sampling point on a sketch in the field notebook, and on a site location map.

c. Proceed to sample as described in Section C below.

d. Repeat 2a through 2c above until all samples are collected from the area.

e. Or, a GPS unit can be used to identify each location based on map coordinated, if available.

C. To the extent possible, differentiate between fill and natural soil. If both are encountered at a boring location, sample both as prescribed in the field sampling plan. Do not locate samples in debris, tree roots, or standing water. In residential areas, do not sample in areas where residents' activities may impact the sample (e.g., barbecue areas, beneath eaves of roofs, driveways, garbage areas). If an obstacle prevents sampling at a measured grid point, move as close as possible, but up to a distance of one half the grid spacing in any direction to locate an appropriate sample. If an appropriate location cannot be found, consult with the Field Team Leader (FTL). If the FTL concurs, the sampling point will be deleted from the program. The FTL will contact the CH2M HILL project manager (PM) immediately. The PM and Navy Technical Representative (NTR) will discuss whether the point should be deleted from the program. If it is deleted, the PM will follow-up with the NTR in writing.

D. To collect samples:

1. Use a decontaminated stainless steel scoop/trowel or disposable plastic scoop to scrape away surficial organic material (grass, leaves, etc.) adjacent to

the stake. New disposable scoops or trowels may also be used to reduce the need for equipment blanks.

2. If sampling:

   a. Surface soil: Obtain soil sample by scooping soil using the augering scoop/trowel, starting from the surface and digging down to a depth of about 6 inches, or the depth specified in the workplan.

   b. Subsurface soil: Obtain the subsurface soil sample using an auger down to the depths prescribed in the field sampling plan.

3. Take a photo ionization detector (PID) reading of the sampled soil if organics are anticipated to be present and record the response in the field notebook. Also record lithologic description and any pertinent observations (such as discoloration) in the logbook.

4. Empty the contents of the scoop/trowel into a decontaminated stainless steel pan or dedicated sealable bag.

5. Repeat this procedure until sufficient soil is collected to meet volume requirements.

6. For TCL VOC and field GC aliquots, fill sample jars directly with the trowel or scoop or specialized sampling equipment (i.e. Encore® or Terra Core® sampler) and cap immediately upon filling. DO NOT HOMOGENIZE.

7. For TCL pesticides/PCBs and SVOCs, TAL metals, and field XRF aliquots, homogenize cuttings in the pan using a decontaminated stainless steel utensil in accordance with SOP *Decontamination of Drilling Rigs and Equipment*.

8. Transfer sample for analysis into appropriate containers with a decontaminated utensil.

9. Backfill the hole with soil removed from the borehole. To the extent possible, replace topsoil and grass and attempt to return appearance of sampling area to its pre-sampled condition. For samples in non-residential, unmowed areas, mark the sample number on the stake and leave stake in place. In mowed areas, remove stake.

V. Attachments

None.

VI. Key Checks and Items

- Use phthalate-free latex or surgical gloves and other personal protective equipment.
- Transfer volatiles first, avoid mixing.
- Decontaminate utensils before reuse, or use dedicated, disposable utensils.

STANDARD OPERATING PROCEDURE

Soil Boring Sampling–Split Spoon

I. Purpose

To provide a general procedure for sampling subsurface soil produced from a split spoon.

II. Scope

The scope of this procedure is to cover the sample team's responsibility beginning with the opening of the split spoon.

III. Equipment and Materials

- Latex or surgical gloves
- Stainless steel tray or pan or disposable sealable bags
- Field notebook
- Stainless steel spoon or spatula or disposable plastic scoop
- Sampling jars
- Decontamination solutions and equipment

IV. Procedures and Guidelines

1. Field team personnel will wear latex or surgical inner gloves and nitrile or neoprene outer gloves to protect from potential dermal contact with hazardous substances.

2. After the split spoon is removed from the borehole and opened by the driller or driller's assistant, it will be turned over to field team personnel.

3. The sample description, depth, time, and date will be logged in the field notebook.

4. Samples for laboratory analysis will be separated and transferred from the split spoon half into the sample jars by a decontaminated stainless steel utensil or plastic disposable scoop. Samples for VOC analysis will be separated and transferred first, followed by semivolatile samples. For volatile samples, avoid mixing soil before or during transfer. Homogenize the rest of the sample according to SOP *Homogenization of Soil and Sediment Samples.*

5. Split spoon and media transfer tools will be decontaminated before being used again.

V. Attachments

None.

VI. Key Checks and Items

- Latex or surgical gloves.
- Decontaminate split spoon and transfer tools before next sample.
- Sample volatiles first, then semivolatiles.
- Avoid mixing for volatiles samples.

STANDARD OPERATING PROCEDURE

Trenching for Landfill Delineation

I. Purpose

To provide reference material and general guidance on test pitting using a backhoe during landfill boundary confirmation activities.

II. Equipment and Materials

- Backhoe
- Shovels, picks, scoops
- Camera, dry-erase board (or other erasable material)
- Plastic sheeting and stakes and/or sand bags to cover test pits and excavated soil
- Barricades to secure area around excavation
- Onsite decontamination pad
- Level D personnel protection equipment and onsite site safety officer

III. Procedures and Guidelines

General Considerations

Test pits will be excavated along the landfill boundary as indicated by the results of soil borings and/or geophysical surveys.

The onsite crew will photograph any significant features exposed by the test pit. Photographs will include a dry erase board (or other marker) marked with (at a minimum) test pit number, date and time of photograph, description of feature, and size scale (i.e., tape measurer). Other observations (including soil descriptions) will be recorded in the logbook.

Once test pitting is complete, the pits will be backfilled with the stockpiled soil and re-graded to mimic the original ground surface contour.

Trenching Activities

1. Establish work zone according to the site safety plan.

2. Calibrate all air quality monitoring instruments.

3. Using a clean backhoe (decontaminated following SOP *Decontamination of Personnel and Equipment*), begin excavating perpendicular to and just outside of the area defined as the landfill boundary during the geophysical survey. Carefully excavate towards

the boundary, recording all observations in the logbook, until buried material is encountered. Remove only enough soil to identify the landfill boundary.

4. Monitor the air quality in the breathing zone at 5-minute intervals during trenching activities to ensure the proper level of respiratory protection in being worn by all field team members.

5. Photograph and document the trenching activities as appropriate. Backfill and re-grade the test pit, discard plastic sheeting, decontaminate the backhoe, and set up at the next trenching location.

IV. Attachments

None.

V. Key Checks and Items

Staff will not enter the trench when it exceeds depth limitations specified by OSHA.

Standard Operating Procedure

Locating and Clearing Underground Utilities

I. Purpose

The purpose of this SOP is to provide general guidelines and specific procedures that must be followed on Navy CLEAN projects for locating underground utilities and clearing dig locations in order to maximize our ability to avoid hitting underground utilities and to minimize liabilities to CH2M HILL and its subcontractors and health and safety risks to our project staff.

This SOP shall be used by Activity Managers and Project Managers to, in-turn, develop Activity-specific and project-specific utility location procedures. The activity and project-specific procedures will become part of work plans and project instructions and will be used to prepare scopes of work (SOWs) for the procurement of utility location subcontractors to meet the needs of individual projects.

This SOP also identifies the types of utility locating services that are available from subcontractors and the various tools that are used to locate utilities, and discusses when each type of service and tool may or may not be applicable.

II. Scope

Depending on the Navy/Marine Activity we typically find ourselves in one of two scenarios:

Scenario 1

The Activity provides utility locating (or dig clearance) services through the public works department or similar organization, or has a contract with an outside utility clearance service. Some of these services are provided in the form of dig permits which are required before you can dig or drill. In other cases no official permit is required and the process is somewhat vague.

Scenario 2

The Activity does not get involved in any utility locating processes aside from possibly providing the most recent utility maps, and relies on CH2M HILL to clear the dig locations.

Table 1 provides an up to date summary of which scenarios apply to the various primary Activities served under the Navy CLEAN program.

Scenario 1 is preferred because under this scenario the Navy tends to assume the responsibility if the location is improperly cleared, a utility is struck, and property damage results. However, our experience has been that the clearance services provided

by the Navy do not meet the standards that we consider to be adequate, in that they often simply rely on available base maps to mark utilities and do not verify locations using field geophysics. And if they do use locating tools, they do not provide adequate documentation or marking to confirm that a location has been cleared. So while the Navy's process may protect us from liability for property damage, it does not adequately protect our staff and subcontractors from health risks nor does it compensate us for down time, should a utility be hit.

Therefore, regardless of what services the Navy provides, in most cases we still need to supplement this effort with clearance services from our own third party utility location subcontractor following the procedures and guideline outlined in Section IV of this SOP. The cost implications of providing this service will range from $500 to several $1,000 depending on the size of the project.

The scope of services that we ask our subcontractors to provide can involve utility marking/mapping or the clearing of individual dig locations. In the former we ask our subs to mark all utilities within a "site" and often ask them to prepare a map based on their work. In the later, we ask them to clear (identify if there are any utilities within) a certain radius of a proposed dig/drill location.

The appropriate requested scope of services for a project will depend on the project. Clearing individual boreholes is often less expensive and allows the sub to concentrate their efforts on a limited area. However if the scope of the investigation is fluid (all borehole locations are not predetermined) it may be best to mark and map an entire site or keep the subcontractor on call.

Clearance of individual dig locations should be done to a minimum 20 foot radius around the location.

An example SOW for a utility subcontractor procurement is provided in Attachment A.

III. Services and Equipment

This section provides a general description of the services available to help us locate subsurface utilities and describes the types of equipment that these services may (or may not) use to perform their work. It identifies the capabilities of each type of equipment to help the PM specify what they should require from our utility location subs.

Services

The services that are available to us for identifying and marking underground utilities are:

- The local public/private utility-run service such as Miss Utility
- Utility location subcontractors (hired by us)

Attachment B provides a detailed description of each type of organization. It also provides contact numbers and web sites for the various Miss-Utility-type organizations in the areas where we do work for the Navy and contacts and services provided by several subcontractors that we have used or spoken to in the past.

Equipment

Attachment C provides a summary of the various types of equipment used for subsurface utility location. It describes the capabilities and limitations of each in order to help the PM determine if the equipment being used by a subcontractor is adequate.

It is important to make the potential subcontractors aware of the possible types of utilities (and utility materials) that are at the site, and to have them explain in their bid what types of equipment they will use to locate utilities /clear dig locations, and what the limitations of these equipment are.

A list of in-house experts that can be used to help you evaluate bids or answer questions you may have is provided in **Appendix C.**

IV. Procedures and Guidelines

This section presents specific procedures to be followed for the utility location work to be conducted by CH2M HILL and our subcontractors. In addition, a PM will have to follow the procedures required by the Activity to obtain their approvals, clearances and dig permits where necessary. These "dig permit" requirements vary by Activity and must be added to the project-specific SOP, or project instructions. It is preferable that the Activity perform their clearance processes before we follow up with our clearance work.

Activity Notification and Dig Permit Procedures

Identify Activity-specific permit and/or procedural requirements for excavation and drilling activities. Contact the Base Civil Engineer and obtain the appropriate form to begin the clearance process.

Activity Specific: To be provided by Activity or Project Manager

CH2M HILL Utility Clearance Procedures

Do not begin subsurface construction activities (e.g., trenching, excavation, drilling, etc.) until a check for underground utilities and similar obstructions has been conducted by CH2M HILL as a follow-up to the services provided by the Navy. The use of as-built drawings and utility company searches must be supplemented with a geophysical or other survey by a qualified, independent survey contractor (subcontracted to CH2M HILL) to identify additional and undiscovered buried utilities.

Examples of the type of geophysical technologies include (these are further described in Attachment C):

- **Ground Penetrating Radar (GPR),** which can detect pipes, including gas pipes, tanks, conduits, cables etc, both metallic and non-metallic at depths up to 30 feet depending on equipment. Sensitivity for both minimum object size and maximum depth detectable depends on equipment selected, soil conditions, etc.
- **Radio Frequency (RF),** involves inducing an RF signal in the pipe or cable and using a receiver to trace it. Some electric and telephone lines emit RF naturally and can be

detected without an induced signal. This method requires knowing where the conductive utility can be accessed to induce RF field if necessary.

- **Dual RF**, a modified version of RF detection using multiple frequencies to enhance sensitivity but with similar limitations to RF
- **Ferromagnetic Detectors**, are metal detectors that will detect ferrous and non-ferrous utilities. Sensitivity is limited, e.g. a 100 mm iron disk to a depth of about one meter or a 25 mm steel paper clip to a depth of about 20 cm.
- **Electronic markers,** are emerging technologies that impart a unique electronic signature to materials such as polyethylene pipe to facilitate location and tracing after installation. Promising for future installations but not of help for most existing utilities already in place.

The following procedures shall be used to identify and mark underground utilities during subsurface construction activities on the project:

- Contact utility companies or the state/regional utility protection service (such as Miss Utility) at least two (2) working days prior to intrusive activities to advise of the proposed work, and ask them to establish the location of the utility underground installations prior to the start of actual excavation: this is a law. These services will only mark the location of public-utility-owned lines and not Navy-owned utilities. In many cases there will not be any public-utility-owned lines on the Activity. There may also be Base-access issues to overcome.
- Procure and schedule the independent survey.
- The survey contractor shall determine the most appropriate geophysical technique or combinations of techniques to identify the buried utilities on the project site, based on the survey contractor's experience and expertise, types of utilities anticipated to be present and specific site conditions. ***The types of utilities must be provided to the bidding subcontractors in the SOW and procedures to be used must be specified by the bidder in their bid. It is extremely helpful to provide the sub with utility maps, with the caveat that all utilities are not necessarily depicted.***
- The survey subcontractor shall employ the same geophysical techniques used to identify the buried utilities, to survey the proposed path of subsurface investigation/construction work to confirm no buried utilities are present.
- Obtain utility clearances for subsurface work on both public and private property.
- Clearances provided by both the "Miss Utility" service and the CH2M HILL-subcontracted service are to be in writing, signed by the party conducting the clearance. The Miss Utility service will have standard notification forms/letters which typically simply state that they have been to the site and have done their work. The CH2M HILL subcontractor shall be required to fill out the form provided in Attachment D (this can be modified for a particular project) indicating that each dig/drill location has been addressed. ***This documentation requirement (with a copy of the form) needs to be provided in the subcontractor SOW.***

- Marking shall be done using the color coding presented in Attachment E. The type of material used for marking must be approved by the Activity prior to marking. Some base commanders have particular issues with persistent spray paint on their sidewalks and streets. ***Any particular marking requirements need to be provided in the subcontractor SOW.***
- Protect and preserve the markings of approximate locations of facilities until the markings are no longer required for safe and proper excavations. If the markings of utility locations are destroyed or removed before excavation commences or is completed, the Project Manager must notify the utility company or utility protection service to inform them that the markings have been destroyed.
- Perform a field check prior to drilling/digging (preferably while the utility location sub is still at the site) to see if field utility markings coincide with locations on utility maps. Look for fire hydrants, valves, manholes, light poles, lighted signs, etc to see if they coincide with utilities identified by the subcontractor.
- Underground utility locations must be physically verified (or dig locations must be physically cleared) by hand digging using wood or fiberglass-handled tools, air knifing, or by some other acceptable means approved by CH2M HILL, when the dig location (e.g. mechanical drilling, excavating) is expected to be within 5 feet of a marked underground system. Hand clearance shall be done to a depth of four feet unless a utility cross-section is available that indicates the utility is at a greater depth. In that event, the hand clearance shall proceed until the documented depth of the utility is reached.
- Conduct a site briefing for employees at the start of the intrusive work regarding the hazards associated with working near the utilities and the means by which the operation will maintain a safe working environment. Detail the method used to isolate the utility and the hazards presented by breaching the isolation.
- Monitor for signs of utilities during advancement of intrusive work (e.g., sudden change in advancement of auger or split spoon during drilling or change in color, texture or density during excavation that could indicate the ground has been previously disturbed).

IV. Attachments

A- Example SOW for Utility Location Subcontractor Procurement
B - Services Available for Identifying and Marking Underground Utilities
C – Equipment Used for Identifying Underground Utilities
D – Utility Clearance Documentation Form
E – Utility Marking Color Codes

Attachment A – Example SOW for Subcontracting Underground Utilities Locating Services

CTO-XXX

Scope of Work

Subsurface Utility Locating

Site XX

Navy Activity

City, State

A licensed and insured utility locator will be subcontracted to identify and mark out subsurface utilities for an environmental investigation/remediation project at Site XX of <<insert name of base, city, and state>>. The subcontractor will need to be available beginning at <<insert time>> on <<insert date>>. It is estimated that the work can be completed within XX days.

Proposed Scope of Work

The subcontractor will identify and mark all subsurface utilities (CHOOSE 1) that lie within a radius of 20 feet of each of XX sampling locations at Site XX shown on the attached Figure 1; (OR) that lie within the bounds of Site XX as delineated on the attached Figure 1. (If multiple sites are to be cleared, provide maps of each site with sample locations or clearance boundaries clearly delineated and a scale provided.)

Utilities will be identified using all reasonably available as-built drawings, electronic locating devices, and any other means necessary to maintain the safety of drilling and sampling personnel and the protection of the base infrastructure. The location of utilities identified from as-built drawings or other maps must be verified in the field prior to marking.

Base utility drawings for the Site(s) (CHOOSE 1) can be found at <<insert specific department and address or phone number on the base>> and should be reviewed by the subcontractor and referenced as part of the utility locating. (OR), will be provided to the subcontractor by CH2M HILL upon the award of the subcontract. (OR), are not available. Utility drawings shall not be considered definitive and must be field verified.

Field verification will include detection using nonintrusive subsurface detection equipment (magnetometers, GPR, etc) as well as opening manhole covers to verify pipe directions. As part of the bid, the Subcontractor shall provide a list of the various subsurface investigation tools they propose to have available and use at the site and what the limitations are of each tool.

A CH2M HILL representative shall be present to coordinate utility clearance activities and identify points and features to be cleared.

Field Marking and Documentation

All utilities located within **(CHOOSE 1)** ***a 20-ft radius of the XX proposed soil boring locations*** **(OR)** ***within the boundary of the site(s)*** as identified on the attached figure(s) will be marked using **paint** ***(some Bases such as the WNY may have restrictions on the use of permanent paint)*** and/or pin flags color coded to indicate electricity, gas, water, steam, telephone, TV cable, fiber optic, sewer, etc. The color coding shall match the industry standard as described on the attached form. In addition, the ***Buried Utility Location Tracking Form*** (attached) will be completed by the Subcontractor based upon what is identified in the field during the utility locating and submitted back to CH2M HILL (field staff or project manager) within 24 hours of completing the utility locating activities.

(OPTIONAL) ***The subcontractor shall also provide a map (or hand sketch) of the identified utilities to the Engineer within XX days of field demobilization. The map shall include coordinates or ties from fixed surface features to each identified subsurface utility.***

Bid Sheet/Payment Units

The subcontractor will bid on a time and materials basis for time spent on site and researching utility maps. Mobilization (including daily travel to the site) should be bid as a lump sum, as well as the preparation of the AHA and any required mapping. The per diem line item should be used if the field crew will require overnight accommodations at the project site.

Health and Safety Requirements

The utility locating subcontractor is to provide and assume responsibility for an adequate corporate Health and Safety Plan for onsite personnel. Standard personal safety equipment including: hard hat, safety glasses, steel-toed boots, gloves are recommended for all project activities. Specific health and safety requirements will be established by the Subcontractor for each project. The health and safety requirements will be subject to the review of CH2M HILL.

The subcontractor shall also prepare and provide to the Engineer, at least 48 hours prior to mobilization, an acceptable Activity Hazard Analysis (AHA) using the attached AHA form or similar.

It is also required that all subcontractor personnel who will be on site attend the daily 15-minute health and safety tailgate meeting at the start of each day in the field.

Subcontractor personnel showing indications of being under the influence of alcohol or illegal drugs will be sent off the job site and their employers will be notified. Subcontractor personnel under the influence of prescription or over-the-counter medication that may impair their ability to operate equipment will not be permitted to do so. It is expected that the subcontractor will assign them other work and provide a capable replacement (if necessary) to operate the equipment to continue work.

Security

The work will be performed on US Navy property. CH2M HILL will identify the Subcontractor personnel who will perform the work to the appropriate Navy facility point-of-contact, and will identify the Navy point-of-contact to the Subcontractor crew. The Subcontractor bears final responsibility for coordinating access of his personnel onto Navy property to perform required work. This responsibility includes arranging logistics and providing to CH2M HILL, in advance or at time of entry as specified, any required identification information for the Subcontractor personnel. Specifically, the following information should be submitted with the bid package for all personnel that will perform the work in question (this information is required to obtain a base pass):

- Name
- Birth Place
- Birth Date
- Social Security Number
- Drivers License State and Number
- Citizenship

Please be advised that no weapons, alcohol, or drugs will be permitted on the Navy facility at any time. If any such items are found, they will be confiscated, and the Subcontractor will be dismissed.

Quality Assurance

The Subcontractor will be licensed and insured to operate in the State of <<state>> and will comply with all applicable federal, state, county and local laws and regulations. The subcontractor will maintain, calibrate, and operate all electronic locating instruments in accordance with the manufacturer's recommendations. Additionally, the Subcontractor shall make all reasonable efforts to review as-built engineering drawings maintained by Base personnel, and shall notify the CH2M HILL Project Manager in writing (email is acceptable) whenever such documentation was not available or could not be reviewed.

Subcontractor Standby Time

At certain periods during the utility locating activities, the Subcontractor's personnel may be asked to stop work and standby when work may normally occur. During such times, the Subcontractor will cease activities until directed by the CH2M HILL representative to resume operations. Subcontractor standby time also will include potential delays caused by the CH2M HILL representative not arriving at the site by the agreed-upon meeting time for start of the work day. Standby will be paid to the

Subcontractor at the hourly rate specified in the Subcontractor's Bid Form attached to these specifications.

Cumulative Subcontractor standby will be accrued in increments no shorter than 15 minutes (i.e., an individual standby episode of less than 15 minutes is not chargeable).

During periods for which standby time is paid, the surveying equipment will not be demobilized and the team will remain at the site. At the conclusion of each day, the daily logs for the Subcontractor and CH2M HILL representative will indicate the amount of standby time incurred by the Subcontractor, if any. Payment will be made only for standby time recorded on CH2M HILL's daily logs.

Down Time

Should equipment furnished by the Subcontractor malfunction, preventing the effective and efficient prosecution of the work, or inclement weather conditions prevent safe and effective work from occurring, down time will be indicated in the Subcontractor's and CH2M Hill representative's daily logs. No payment will be made for down time.

Schedule

It is anticipated that the subsurface utility locating activities will occur on <<insert date>>. It is estimated that the above scope will be completed within XXX days.

Attachment B - Services Available for Identifying and Marking Underground Utilities

The services that are available to us for identifying and marking underground utilities are:

- The Activity's PWC (or similar organization)
- The local public/private utility -run service such as Miss Utility
- Utility location subcontractors (hired by CH2M HILL)

Each are discussed below.

Navy Public Works Department

A Public Works Department (PWD) is usually present at each Activity. The PWD is responsible for maintaining the public works at the base including management of utilities. In many cases, the PWD has a written permit process in place to identify and mark-out the locations of Navy-owned utilities [Note: The PWD is usually NOT responsible for the locations/mark-outs of non-Navy owned, public utilities (e.g., Washington Gas, Virginia Power, municipal water and sewer, etc.). Therefore, it is likely that we will have to contact other organizations besides the PWD in order to identify non-Navy owned, public utilities].

At some Activities, there may not be a PWD, the PWD may not have a written permit process in place, or the PWD may not take responsibility for utility locating and mark-outs. In these cases, the PWD should still be contacted since it is likely that they will have the best understanding of the utility locations at the Activity (i.e., engineering drawings, institutional knowledge, etc.). Subsequently, the PWD should be brought into a cooperative arrangement (if possible) with the other services employed in utility locating and mark-out in order to have the most comprehensive assessment performed.

At all Activities we should have a contact (name and phone number), and preferably an established relationship, with PWD, either directly or through the NAVFAC Atlantic, Midlant, or Washington NTR or Activity Environmental Office that we can work with and contact in the event of problems.

Miss Utility or "One Call" Services for Public Utility Mark-outs

Miss Utility or "One Call" service centers are information exchange centers for excavators, contractors and property owners planning any kind of excavation or digging. The "One Call" center notifies participating public utilities of the upcoming excavation work so they can locate and mark their underground utilities in advance to prevent possible damage to underground utility lines, injury, property damage and service outages. In some instances, such with southeastern Virginia bases, the Navy has entered into agreement with Ms. Utilities and is part of the response process for Miss

Utilities. Generally, a minimum of 48 hours is required for the public utility mark-outs to be performed. The "One Call" services are free to the public. Note that the "One Call" centers only coordinate with participating public utilities. There may be some public utilities that do NOT participate in the "One Call" center which may need to be contacted separately. For example, in Washington, DC, the Miss Utility "One Call" center does not locate and mark public sewer and water lines. Therefore, the municipal water and sewer authority must be contacted separately to have the sewer and water lines marked out. The AM should contact the appropriate one-call center to determine their scope of services.

For the Mid-Atlantic region, the following "One Call" service centers are available.

Name	Phone	Website	Comments
Miss Utility of DELMARVA	800-257-7777	www.missutility.net	Public utility mark-outs in Delaware, Maryland, Washington, DC, and Northern Virginia
Miss Utility of Southern Virginia (One Call)	800-552-7001	not available	Public utility mark-outs in Southern Virginia
Miss Utility of Virginia	800-257-7777 800-552-7007	www.missutilityofvirginia.com	General information on public utility mark-outs in Virginia, with links to Miss Utility of DELMARVA and Miss Utility of Southern Virginia (One Call)
Miss Utility of West Virginia, Inc	800-245-4848	none	Call to determine what utilities they work with in West Virginia
North Carolina One Call Center	800-632-4949	www.ncocc.org/ncocc/default.htm	Public Utility Markouts in North Carolina

Private Subcontractors

1. Utility-locating support is required at some level for most all CH2M HILL field projects in "clearing" proposed subsurface boring locations on the project site. Utility location and sample clearance can include a comprehensive effort of GIS map interpretation, professional land surveying, field locating, and geophysical surveying. Since we can usually provide our own GIS-related services for projects and our professional land surveying services are normally procured separately, utility-locating subcontractors will normally only be required for some level of geophysical surveying support in the field. This level of geophysical surveying support can range widely from a simple electromagnetic (EM) survey over a known utility line, to a blind geophysical effort, including a ground-penetrating radar (GPR) survey and/or a comprehensive EM survey to delineate and characterize all unknown subsurface anomalies.

   The level of service required from the subcontractor will vary depending on the nature of the site. At sites where utility locations are well defined on the maps and recent construction is limited, CH2M HILL may be confident with a limited effort from a traditional utility-locating subcontractor providing a simple EM survey. At

sites where utility locations are not well defined, where recent constructions may have altered utility locations, or the nature of the site makes utility location difficult, CH2M HILL will require the services of a comprehensive geophysical surveying subcontractor, with a wide range of GPR and EM services available for use on an "as-needed" basis. Typical costs for geophysical surveying subcontractors will range from approximately $200 per day for a simple EM effort (usually one crew member and one instrument) to approximately $1,500 per day for a comprehensive geophysical surveying effort (usually a two-person crew and multiple instruments). Comprehensive geophysical surveying efforts may also include field data interpretation (and subsequent report preparation) and non-destructive excavation to field-verify utility depths and locations.

The following table provides a list of recommended geophysical surveying support subcontractors that can be used for utility-locating services:

Company Name and Address	Contact Name and Phone Number	Equipment[1]					Other Services[2]		
		1	2	3	4	5	A	B	C
US Radar, Inc.* PO Box 319 Matawan, NJ 07747	Ron LaBarca 732-566-2035			4					
Utilities Search, Inc.*	Jim Davis 703-369-5758	4				4	4	4	4
So Deep, Inc.* 8397 Euclid Avenue Manassas Park, VA 20111	703-361-6005	4					4	4	4
Accurate Locating, Inc. 1327 Ashton Rd., Suite 101 Hanover, MD 21076	Ken Shipley 410-850-0280	4	4						
NAEVA Geophysics, Inc. P.O. Box 7325 Charlottesville, VA 22906	Alan Mazurowski 434-978-3187	4	4	4	4	4	4	4	4
Earth Resources Technology. Inc. 8106 Stayton Rd. Jessup, MD 20794	Peter Li 240-554-0161	4	4	4	4	4	4	4	
Geophex, Ltd 605 Mercury Street Raleigh, NC 27603	I. J. Won 919-839-8515	4	4	4	4	4	4	4	4

Notes:

*Companies denoted with an asterisk have demonstrated reluctance to assume responsibility for damage to underground utilities or an inability to accommodate the insurance requirements that CH2M HILL requests for this type of work at many Navy sites.

[1]Equipment types are:

1. Simple electromagnetic instruments, usually hand-held
2. Other, more innovative, electromagnetic instruments, including larger instruments for more area coverage
3. Ground-penetrating radar systems of all kinds
4. Audio-frequency detectors of all kinds
5. Radio-frequency detectors of all kinds

[2]Other services include:

A. Data interpretation and/or report preparation to provide a permanent record of the geophysical survey results and a professional interpretation of the findings, including expected accuracy and precision.

B. Non-destructive excavation to field-verify the depths, locations, and types of subsurface utilities.

C. Concrete/asphalt coring and pavement/surface restoration.

Attachment C – Equipment Used for Identifying Underground Utilities

This attachment provides a summary of the various types of equipment used for subsurface utility location. It describes the capabilities and limitations of each in order to help the AM and PM determine if the equipment being proposed by a subcontractor or Navy is adequate. A list of in-house experts that can be used to answer questions you may have is provided below.

CH2M HILL In-house Utility Location Experts

Tamir Klaff/WDC

Home Office Phone – 703-669-9611

Electromagnetic Induction (EMI) Methods

EMI instruments, in general, induce an electromagnetic field into the ground (the primary field) and then record the response (the secondary field), if any. Lateral changes in subsurface conductivity, such as caused by the presence of buried metal or by significant soil variations, cause changes in the secondary field recorded by the instrument and thus enable detection and mapping of the subsurface features. It should be noted that EMI only works for electrically conductive materials--plastic or PVC pipes are generally not detected with EMI. Water and gas lines are commonly plastic, although most new lines include a copper "locator" strip on the top of the PVC to allow for detection with EMI.

EMI technology encompasses a wide range of instruments, each with inherent strengths and weaknesses for particular applications. One major division of EMI is between "time-domain" and "frequency-domain" instruments that differ in the aspect of the secondary field they detect. Another difference in EMI instruments is the operating frequency they use to transmit the primary field. Audio- and radio-frequencies are often used for utility detection, although other frequencies are also used. Consideration of the type of utility expected, surface features that could interfere with detection, and the "congestion" of utilities in an area, should be made when choosing a particular EMI instrument for a particular site.

One common EMI tool used for utility location is a handheld unit that can be used to quickly scan an area for utilities and allows for marking locations in "real time". This method is most commonly used by "dig-safe" contractors marking out known utilities prior to excavation. It should be noted that this method works best when a signal (the primary field) can be placed directly onto the line (i.e., by clamping or otherwise connecting to the end of the line visible at the surface, or for larger utilities such as sewers, by running a transmitter through the utility). These types of tools also have a limited capability to scan an area for unknown utilities. Usually this requires having enough area to separate a hand held transmitter at least a hundred feet from the

receiver. Whether hunting for unknown, or confirming known, utilities, this method will only detect continuous lengths of metallic conductors.

In addition to the handheld EMI units, larger, more powerful EMI tools are available that provide more comprehensive detection and mapping of subsurface features. Generally, data with these methods are collected on a regular grid in the investigation area, and are then analyzed to locate linear anomalies that can be interpreted as utilities. These methods will usually detect *all* subsurface metal (above a minimum size), including pieces of abandoned utilities. In addition, in some situations, backfill can be detected against native soils giving information on trenching and possible utility location. Drawbacks to these methods are that the secondary signals from utilities are often swamped (i.e., undetectable) close to buildings and other cultural features, and that the subsurface at heavily built-up sites may be too complicated to confidently interpret completely.

Hand-held metal detectors (treasure-finders) are usually based on EMI technology. They can be used to locate shallow buried metal associated with utilities (e.g., junctions, manholes, metallic locators). Advantages of these tools is the ease of use and real-time marking of anomalies. Drawbacks include limited depths of investigations and no data storage capacity.

Ground Penetrating Radar (GPR)

GPR systems transmit radio and microwave frequency (e.g., 80 megaHertz to 1,000 megaHertz) waves into the ground and then record reflections of those waves coming back to the surface. Reflections of the radar waves typically occur at lithologic changes, subsurface discontinuities, and subsurface structures. Plastic and PVC pipes can sometimes be detected in GPR data, especially if they are shallow, large, and full of a contrasting material such as air in a wet soil, or water in a dry soil. GPR data are usually collected in regular patterns over an area and then analyzed for linear anomalies that can be interpreted as utilities. GPR is usually very accurate in x-y location of utilities, and can be calibrated at a site to give very accurate depth information as well. A significant drawback to GPR is that depth of investigation is highly dependant on background soil conductivity, and it will not work on all sites. It is not uncommon to get only 1-2 feet of penetration with the signal in damp, clayey environments. Another drawback to GPR is that sites containing significant fill material (e.g., concrete rubble, scrap metal, garbage) will result in complicated anomalies that are difficult or impossible to interpret.

Magnetic Field Methods

Magnetic field methods rely on detecting changes to the earth's magnetic field caused by ferrous metal objects. This method is usually more sensitive to magnetic metal (i.e., deeper detection) than EMI methods. A drawback to this method is it is more susceptible to being swamped by surface features such as fences and cars. In addition, procedures must usually be implemented that account for natural variations in the earth's background field as it changes throughout the day. One common use of the method is to measure and analyze the gradient of the magnetic field, which eliminates most of the drawbacks to the method. It should be noted this method only detects

ferrous metal, primarily iron and steel for utility location applications. Some utility detector combine magnetic and EMI methods into a single hand-held unit.

Optical Methods

Down the hole cameras may be useful in visually reviewing a pipe for empty conduits and/or vaults.

Attachment D – Utility Clearance Documentation Form

Attachment E – Utility Marking Color Codes

The following is the standard color code used by industry to mark various types of utilities and other features at a construction site.

White – Proposed excavations and borings

Pink – Temporary survey markings

Red – Electrical power lines, cables, conduits and lighting cables

Yellow – Gas, oil, steam, petroleum or gaseous materials

Orange – Communication, alarm or signal lines, cables, or conduits

Blue – Potable water

Purple – Reclaimed water, irrigation and slurry lines

Green – Sewer and storm drain lines

Buried Utility Location Tracking Form

(Submit to CH2M HILL PM within 24 hrs of location activities)

Project Location:
CH2M HILL Project No.:
CH2M HILL Project Manager: Name/Phone:
Fax:
Email:
CH2M HILL Field Team Leader: Name/Phone:

CH2M HILL Purchase Order:

Utility Location Subcontractor:
Subcontractor POC:

Dates of location activities:

Check each box using an "X" if a buried utility is present within 5 feet of a marked Station ID. If color of the flag or paint differs from listed color, note change in color on the form.

Station ID	Gas (Yellow)	Electric (Red)	Fiber optic (Orange)	Cable (Orange)	Water (Blue)	San. Sewer (Green)	Storm Sewer (Green)	Steam (Yellow)	Petroleum (Yellow)	Compressed air (Yellow)	Other ____	Other ____	Other ____	Other ____	Date completed	Technician initials	Notes (methods/tools used)

The findings of the buried utility location activities summarized herein were conducted in strict accordance with the CH2M HILL scope of work.

Subcontractor's Signature

Date

PMS 219

PMS 1795*

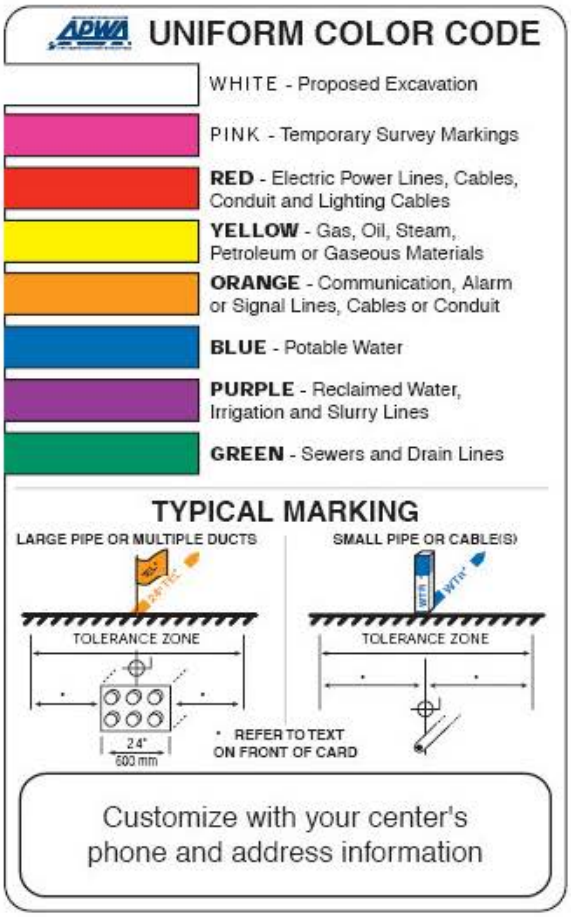
PMS 108

PMS 144*

13.5 parts process
2.5 parts reflex

PMS 253

PMS 3415



GUIDELINES FOR UNIFORM TEMPORARY MARKING OF UNDERGROUND FACILITIES

This marking guide provides for universal use and understanding of the temporary marking of subsurface facilities to prevent accidents and damage or service interruption by contractors, excavators, utility companies, municipalities or any others working on or near underground facilities.

ONE-CALL SYSTEMS
The One-Call damage prevention system shall be contacted prior to excavation.

PROPOSED EXCAVATION
Use white marks to show the location, route or boundary of proposed excavation. Surface marks on roadways do not exceed 1.5" by 18" (40 mm by 450 mm). The facility color and facility owner identity may be added to white flags or stakes.

USE OF TEMPORARY MARKING
Use color-coded surface marks (i.e., paint or chalk) to indicate the location or route of active and out-of-service buried lines. To increase visibility, color coded vertical markers (i.e., stakes or flags) should supplement surface marks. Marks and markers indicate the name, initials or logo of the company that owns or operates the line, and width of the facility if it is greater than 2" (50 mm). Marks placed by other than line owner/operator or its agent indicate the identity of the designating firm. Multiple lines in joint trench are marked in tandem. If the surface over the buried line is to be removed, supplementary offset markings are used. Offset markings are on a uniform alignment and clearly indicate the actual facility is a specific distance away.

TOLERANCE ZONE
Any excavation within the tolerance zone is performed with non-powered hand tools or non-invasive method until the marked facility is exposed. The width of the tolerance zone may be specified in law or code. If not, a tolerance zone including the width of the facility plus 18" (450 mm) measured horizontally from each side of the facility is recommended.

ADOPT UNIFORM COLOR CODE
The American Public Works Association encourages public agencies, utilities, contractors, other associations, manufacturers and all others involved in excavation to adopt the APWA Uniform Color Code, using ANSI standard Z535.1 Safety Colors for temporary marking and facility identification.

Rev. 4/99

STANDARD OPERATING PROCEDURE

Water-Level Measurements

I. Purpose and Scope

The purpose of this procedure is to provide a guideline for the measurement of the depth to groundwater in piezometers and monitoring wells, even where a second phase of floating liquid (e.g., gasoline) is encountered, and on staff gages in surface-water bodies. This SOP includes guidelines for discrete measurements of static water levels and does not cover the use of continuously recording loggers (see SOP *Use of Data Loggers and Pressure Transducers)*.

II. Equipment and Materials

- Electronic water-level meter (Solinst® or equivalent) with a minimum 100-foot tape; the tape should have graduations in increments of 0.01 feet or less
- Interface probe (Solinst® Model 122 Interface Meter or equivalent)

III. Procedures and Guidelines

Verify that the unit is turned on and functioning properly. Slowly lower the probe on its cable into the piezometer or well until the probe just contacts the water surface; the unit will respond with a tone or light signal. Note the depth from a reference point indicated on the piezometer or well riser. Typically this is the top of the PVC casing. If no reference is clearly visible, measure the depth to water from the northern edge of the PVC casing. If access to the top of the PVC casing is difficult, sight across the top of the locking casing adjacent to the measuring point, recording the position of the cable when the probe is at the water surface.

Measure the distance from this point to the closest interval marker on the tape, and record the water level reading in the logbook. Water levels will be measured to the nearest 0.01-foot. Also when specified in the project plans, measure and record the depth of the piezometer or well. The depth of the piezometer or well may be measured using the water-level probe with the instrument turned off.

Free product light or dense nonaqueous phase liquid may be present in the piezometer or well. If the presence of free product is suspected, the thickness of the product should be determined using appropriate equipment (e.g., Solinst® Model 122 Interface Meter). The depth to water also is determined with this equipment and the water-level meter should not be used in the piezometer or well as long as product is present. Typically, a constant sound is emitted from the device when free product is encountered and an alternating on/off beep sound is emitted when water is encountered.

The apparent elevation of the water level in the well or piezometer is determined by measuring both the apparent depth to water and the thickness of free product. The corrected water-level elevation is calculated by the following equation:

$$WL_c = Wl_a + (\text{Free-product thickness} \times 0.80)$$

Where WL_c = Corrected water-level elevation

Wl_a = Apparent water-level elevation

0.80 = Typical value for the density of petroleum hydrocarbon products.

If free product is detected on the surface of the water in the piezometer or well, the value of sampling should be reconsidered because of the potential for contaminating the sampling equipment.

Staff gages may be installed in some surface-water bodies. These facilities typically are constructed by attaching a calibrated, marked staff gage to a wood or metal post, driving the post into the bottom of the surface-water body, and surveying the elevation of the top of the post to a resolution or 0.01-foot. The elevation of the water in the surface-water body then can be determined by reading off the distance the water level is from the top of the post. A shield or other protection may be needed to calm the fluctuations in water level if the gage is installed at a location exposed to wind or wave.

IV. Attachments

None.

V. Key Checks

- Before each use, verify that the battery is charged by pressing the test button on the water-level meter.
- Verify that the unit is operating correctly by testing the probe in distilled or de-ionized water. Leave the unit turned off when not in use.

Appendix F
Erosion and Sediment Control Plan

STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF WATER QUALITY

GENERAL PERMIT – NCG 010000

TO DISCHARGE STORMWATER UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
for

CONSTRUCTION ACTIVITIES

In compliance with the provision of North Carolina General Statute 143-215.1, other lawful standards and regulations promulgated and adopted by North Carolina Environmental Management Commission and the Federal Water Pollution Control Act as amended:

> All owners or operators of stormwater point source discharges associated with construction activities including clearing, grading or excavation activities resulting in the disturbance of land greater than or equal to one acre, or that are part of a common plan of development of that size, are hereby authorized to discharge stormwater to the surface waters of North Carolina or to a separate storm sewer system conveying stormwater to the surface waters in accordance with the terms and conditions set forth herein. Failure to receive coverage under this permit or violations of any of the conditions listed may result in assessment of state or federal civil or criminal penalties for each day of violation.

The General Permit shall become effective on August 3, 2011.
The General Permit shall expire at midnight on July 31, 2016.

Signed this day July 28th, 2011

Coleen H. Sullins, Director
Division of Water Quality
By the Authority of the Environmental Management Commission

PRELIMINARY DRAWINGS

EROSION AND SEDIMENT CONTROL PLAN

TOWERS ROAD DISPOSAL AREAS
HERTFORD, NORTH CAROLINA

PREPARED FOR

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND ATLANTIC
NORFOLK, VIRGINIA

VICINITY MAP

INDEX TO DRAWINGS

SHEET NO	DRAWING NUMBER	TITLE
GENERAL		
1	G-1	COVER SHEET/INDEX OF DRAWINGS
CIVIL		
2	C-1	SITE EROSION AND SEDIMENT CONTROL PLAN
DETAILS		
3	EC-1	EROSION AND SEDIMENT CONTROLS DETAILS AND NOTES

FOR PROJECT INFORMATION, CONTACT:

JANNA STASZAK
CH2M HILL
5701 CLEVELAND STREET SUITE 200
VIRGINIA BEACH, VA 23462
(757) 671-6256

CH2M HILL

CH2M HILL PROJECT NO. 439611
OCTOBER 2012

SYM	DESCRIPTION	DATE	APPR

NAVFAC

SEAL

CH2MHILL

A/E INFO

APPROVED

FOR COMMANDER NAVFAC

ACTIVITY

SATISFACTORY TO DATE

DES NP DRW DS CHK JS

PM/DM

BRANCH MANAGER

CHIEF ENG/ARCH

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL FACILITIES ENGINEERING COMMAND ATLANTIC
TOWERS ROAD DISPOSAL AREAS
HERTFORD, NORTH CAROLINA
REMEDIAL INVESTIGATION
COVER SHEET/INDEX OF DRAWINGS

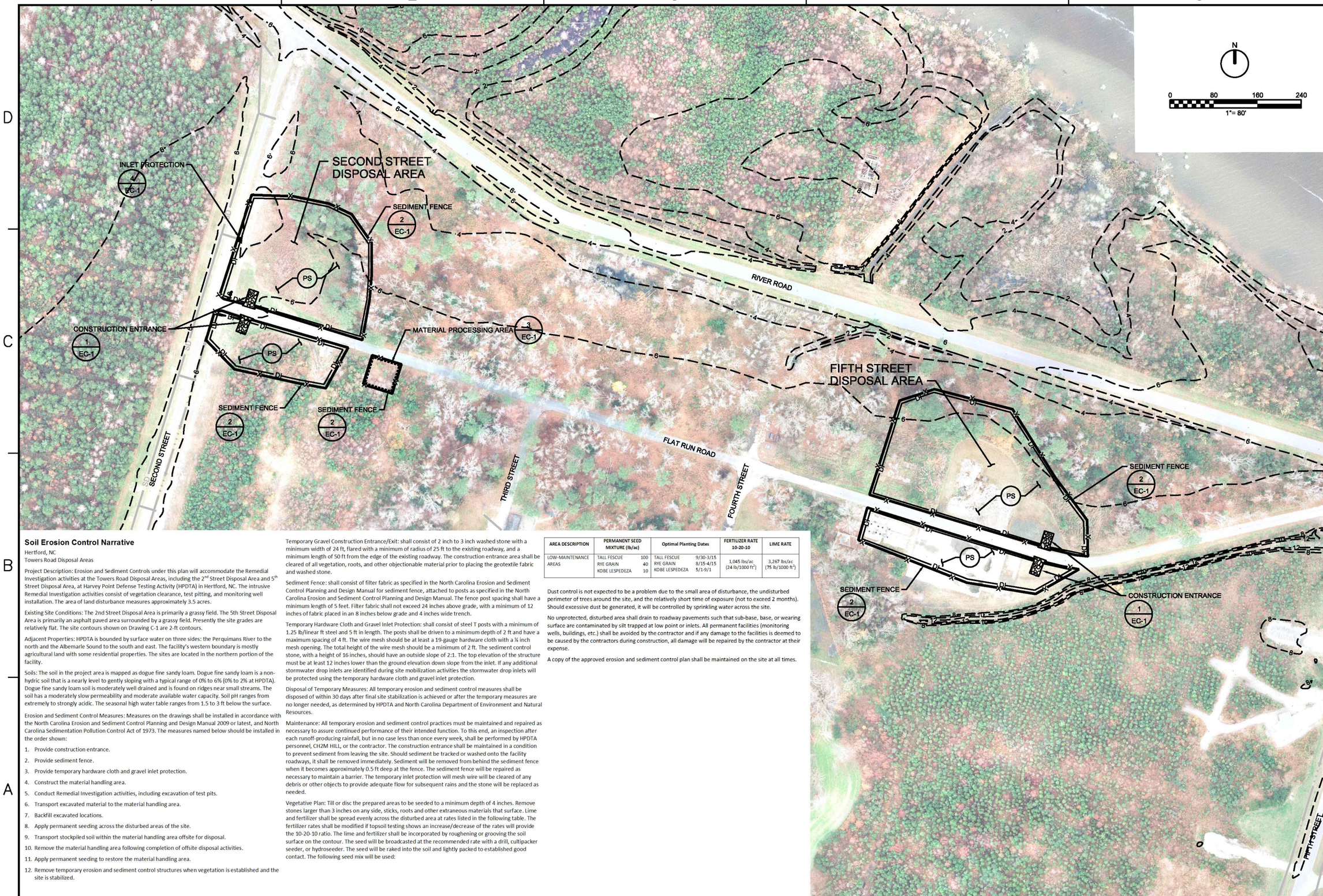
SCALE: AS NOTED
EPROJECT NO.: –
CONSTR. CONTR. NO. –
NAVFAC DRAWING NO.
SHEET 1 OF 3

G-1

PRELIMINARY DRAWING

DRAWFORM REVISION: 10 MARCH 2009

FILENAME: 001-G-001_439611.dgn PLOT DATE: 10/18/2012 PLOT TIME: 10:35:04 AM



Soil Erosion Control Narrative

Hertford, NC
Towers Road Disposal Areas

Project Description: Erosion and Sediment Controls under this plan will accommodate the Remedial Investigation activities at the Towers Road Disposal Areas, including the 2nd Street Disposal Area and 5th Street Disposal Area, at Harvey Point Defense Testing Activity (HPDTA) in Hertford, NC. The intrusive Remedial Investigation activities consist of vegetation clearance, test pitting, and monitoring well installation. The area of land disturbance measures approximately 3.5 acres.

Existing Site Conditions: The 2nd Street Disposal Area is primarily a grassy field. The 5th Street Disposal Area is primarily an asphalt paved area surrounded by a grassy field. Presently the site grades are relatively flat. The site contours shown on Drawing C-1 are 2-ft contours.

Adjacent Properties: HPDTA is bounded by surface water on three sides: the Perquimans River to the north and the Albemarle Sound to the south and east. The facility's western boundary is mostly agricultural land with some residential properties. The sites are located in the northern portion of the facility.

Soils: The soil in the project area is mapped as dogue fine sandy loam. Dogue fine sandy loam is a non-hydric soil that is a nearly level to gently sloping with a typical range of 0% to 6% (0% to 2% at HPDTA). Dogue fine sandy loam soil is moderately well drained and is found on ridges near small streams. The soil has a moderately slow permeability and moderate available water capacity. Soil pH ranges from extremely to strongly acidic. The seasonal high water table ranges from 1.5 to 3 ft below the surface.

Erosion and Sediment Control Measures: Measures on the drawings shall be installed in accordance with the North Carolina Erosion and Sediment Control Planning and Design Manual 2009 or latest, and North Carolina Sedimentation Pollution Control Act of 1973. The measures named below should be installed in the order shown:

1. Provide construction entrance.
2. Provide sediment fence.
3. Provide temporary hardware cloth and gravel inlet protection.
4. Construct the material handling area.
5. Conduct Remedial Investigation activities, including excavation of test pits.
6. Transport excavated material to the material handling area.
7. Backfill excavated locations.
8. Apply permanent seeding across the disturbed areas of the site.
9. Transport stockpiled soil within the material handling area offsite for disposal.
10. Remove the material handling area following completion of offsite disposal activities.
11. Apply permanent seeding to restore the material handling area.
12. Remove temporary erosion and sediment control structures when vegetation is established and the site is stabilized.

Temporary Gravel Construction Entrance/Exit: shall consist of 2 inch to 3 inch washed stone with a minimum width of 24 ft, flared with a minimum of radius of 25 ft to the existing roadway, and a minimum length of 50 ft from the edge of the existing roadway. The construction entrance area shall be cleared of all vegetation, roots, and other objectionable material prior to placing the geotextile fabric and washed stone.

Sediment Fence: shall consist of filter fabric as specified in the North Carolina Erosion and Sediment Control Planning and Design Manual for sediment fence, attached to posts as specified in the North Carolina Erosion and Sediment Control Planning and Design Manual. The fence post spacing shall have a minimum length of 5 feet. Filter fabric shall not exceed 24 inches above grade, with a minimum of 12 inches of fabric placed in an 8 inches below grade and 4 inches wide trench.

Temporary Hardware Cloth and Gravel Inlet Protection: shall consist of steel T posts with a minimum of 1.25 lb/linear ft steel and 5 ft in length. The posts shall be driven to a minimum depth of 2 ft and have a maximum spacing of 4 ft. The wire mesh should be at least a 19-gauge hardware cloth with a ¼ inch mesh opening. The total height of the wire mesh should be a minimum of 2 ft. The sediment control stone, with a height of 16 inches, should have an outside slope of 2:1. The top elevation of the structure must be at least 12 inches lower than the ground elevation down slope from the inlet. If any additional stormwater drop inlets are identified during site mobilization activities the stormwater drop inlets will be protected using the temporary hardware cloth and gravel inlet protection.

Disposal of Temporary Measures: All temporary erosion and sediment control measures shall be disposed of within 30 days after final site stabilization is achieved or after the temporary measures are no longer needed, as determined by HPDTA and North Carolina Department of Environment and Natural Resources.

Maintenance: All temporary erosion and sediment control practices must be maintained and repaired as necessary to assure continued performance of their intended function. To this end, an inspection after each runoff-producing rainfall, but in no case less than once every week, shall be performed by HPDTA personnel, CH2M HILL, or the contractor. The construction entrance shall be maintained in a condition to prevent sediment from leaving the site. Should sediment be tracked or washed onto the facility roadways, it shall be removed immediately. Sediment will be removed from behind the sediment fence when it becomes approximately 0.5 ft deep at the fence. The sediment fence will be repaired as necessary to maintain a barrier. The temporary inlet protection will mesh wire will be cleared of any debris or other objects to provide adequate flow for subsequent rains and the stone will be replaced as needed.

Vegetative Plan: Till or disc the prepared areas to be seeded to a minimum depth of 4 inches. Remove stones larger than 3 inches on any side, sticks, roots and other extraneous materials that surface. Lime and fertilizer shall be spread evenly across the disturbed area at rates listed in the following table. The fertilizer rates shall be modified if topsoil testing shows an increase/decrease of the rates will provide the 10-20-10 ratio. The lime and fertilizer shall be incorporated by roughening or grooving the soil surface on the contour. The seed will be broadcasted at the recommended rate with a drill, cultipacker seeder, or hydroseeder. The seed will be raked into the soil and lightly packed to established good contact. The following seed mix will be used:

AREA DESCRIPTION	PERMANENT SEED MIXTURE (lb/ac)		Optimal Planting Dates		FERTILIZER RATE 10-20-10	LIME RATE
LOW-MAINTENANCE AREAS	TALL FESCUE	100	TALL FESCUE	9/30-3/15	1,045 lbs/ac (24 lb/1000 ft^2)	3,267 lbs/ac (75 lb/1000 ft^2)
	RYE GRAIN	40	RYE GRAIN	8/15-4/15		
	KOBE LESPEDEZA	10	KOBE LESPEDEZA	5/1-9/1		

Dust control is not expected to be a problem due to the small area of disturbance, the undisturbed perimeter of trees around the site, and the relatively short time of exposure (not to exceed 2 months). Should excessive dust be generated, it will be controlled by sprinkling water across the site.

No unprotected, disturbed area shall drain to roadway pavements such that sub-base, base, or wearing surface are contaminated by silt trapped at low point or inlets. All permanent facilities (monitoring wells, buildings, etc.) shall be avoided by the contractor and if any damage to the facilities is deemed to be caused by the contractors during construction, all damage will be repaired by the contractor at their expense.

A copy of the approved erosion and sediment control plan shall be maintained on the site at all times.

NAVFAC

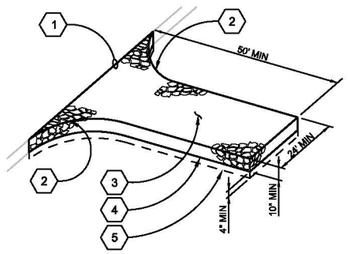
CH2MHILL®

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL FACILITIES ENGINEERING COMMAND ATLANTIC
TOWERS ROAD DISPOSAL AREAS
HERTFORD, NORTH CAROLINA
REMEDIAL INVESTIGATION
SITE EROSION AND SEDIMENT CONTROL PLAN

SCALE: AS NOTED
EPROJECT NO.: –
CONSTR. CONTR. NO. –
NAVFAC DRAWING NO.
SHEET 2 OF 3
C-1

PRELIMINARY DRAWING

FILENAME: 005-C-001_439611.dgn PLOT DATE: 11/14/2012 PLOT TIME: 1:23:20 PM



KEYNOTES:

1. EXISTING PAVEMENT OR APPROVED ACCESS POINT.
2. 25' R, MIN.
3. CLEAN PIT RUN OR 2 1/2" MINUS GRAVEL (OR LARGER IF REQUIRED).
4. FREE DRAINING EXCAVATED MATERIAL.
5. GEOTEXTILE.

GENERAL NOTES:

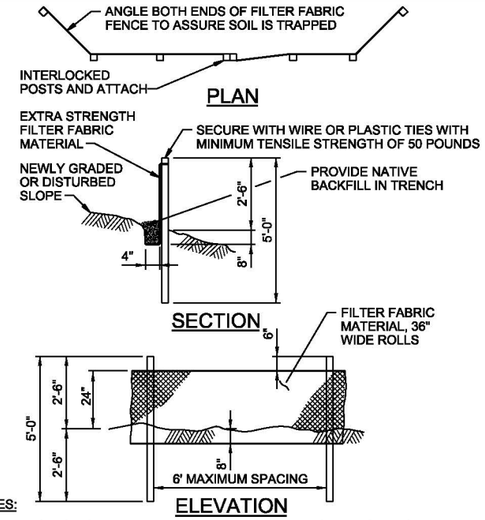
A. ADDITIONAL GRAVEL SHALL BE ADDED PERIODICALLY TO MAINTAIN PROPER FUNCTION OF THE PAD.

B. REMOVE GRAVEL ENTRANCE AND REPLACE WITH NEW BASE COURSE PRIOR TO COMPLETION OF ACCESS ROAD.

1 CONSTRUCTION ENTRANCE

NTS

C-1



NOTES:

1. BURY BOTTOM OF FILTER FABRIC 8" VERTICALLY BELOW FINISHED GRADE.
2. 4" DIAMETER PINE OR 1.33 LB/FT STEEL FENCE POSTS.
3. STITCHED LOOPS TO BE INSTALLED DOWNHILL SIDE OF SLOPE.
4. COMPACT ALL AREAS OF FILTER FABRIC TRENCH.
5. FILTER FABRIC WILL BE AT LEAST 95% BY WEIGHT POLYOLEFINS OR POLYESTER, CERTIFIED BY MANUFACTURER OR SUPPLIER AS COMPLYING WITH REQUIREMENTS IN ASTM D6461. FILTER FABRIC SHOULD CONTAIN ULTRAVIOLET RAY INHIBITORS AND STABILIZERS TO PROVIDE A MINIMUM OF 6 MONTHS OF EXPECTED USABLE CONSTRUCTION LIFE AT A TEMPERATURE OF 0 TO 120 DEGREES FAHRENHEIT.

2 SEDIMENT FENCE

NTS

C-1

GENERAL SITE NOTES:

SOURCE OF TOPOGRAPHY SHOWN ON THE CIVIL PLANS ARE BASE MAPS PROVIDED BY HPDTA.

EXISTING CONDITIONS MAY VARY FROM THOSE SHOWN ON THESE PLANS. THE CONTRACTOR SHALL VERIFY EXISTING CONDITIONS AND ADJUST WORK PLAN ACCORDINGLY PRIOR TO BEGINNING CONSTRUCTION.

EXISTING STRUCTURES AND SITE FEATURES ARE SHOWN SCREENED AND/OR LIGHT-LINED.
EXISTING TOPOGRAPHY, NEW STRUCTURES, AND SITE FEATURES ARE SHOWN HEAVY-LINED.

HORIZONTAL DATUM: NAD83

VERTICAL DATUM: NAVD88

MAINTAIN, RELOCATE, OR REPLACE EXISTING SURVEY MONUMENTS, CONTROL POINTS, AND STAKES WHICH ARE DISTURBED OR DESTROYED. PERFORM THE WORK TO PRODUCE THE SAME LEVEL OF ACCURACY AS THE ORIGINAL MONUMENT(S) IN A TIMELY MANNER, AND AT THE CONTRACTOR'S EXPENSE.

CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTING AND MAINTAINING EROSION CONTROL DEVICES DURING CONSTRUCTION.

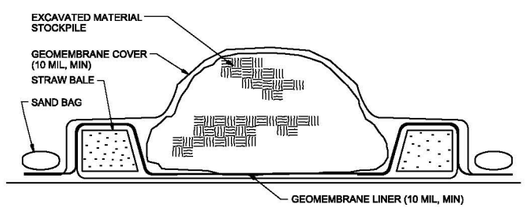
CONTRACTOR SHALL TAKE ALL OTHER MEASURES TO POSITIVELY PRECLUDE EROSION MATERIALS FROM LEAVING THE SITE.

INDICATED SCALES ARE BASED ON FULL-SIZE DRAWINGS, AND IF DRAWINGS ARE REDUCED, SCALES MUST BE ADJUSTED ACCORDINGLY.

LIMIT CONSTRUCTION OPERATIONS TO WITHIN THE RIGHT-OF-WAY, EASEMENTS AND ANY OTHER DESIGNATED WORK AREAS AS INDICATED. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ANY DAMAGES AS A RESULT OF CONSTRUCTION ACTIVITIES OUTSIDE OF RIGHT-OF-WAYS, EASEMENTS AND ANY OTHER DESIGNATED WORK AREAS SHOWN ON THE DRAWINGS.

RESTORE ALL AREAS DISTURBED BY CONSTRUCTION ACTIVITIES AS INDICATED.

THERE ARE ADDITIONAL UTILITIES WITHIN THE VICINITY OF THE DISPOSAL AREAS THAT ARE NOT SHOWN ON DRAWING C-1. IN ADDITION TO CONDUCTING AN UNDERGROUND UTILITY SURVEY PRIOR TO BEGINNING INTRUSIVE ACTIVITIES, FIGURE 2-1 (SITE LOCATION) OF THE WORK PLAN SHOULD BE REFERENCED.



SPECIFICATIONS FOR STAGING OF EXCAVATED MATERIAL

1. THE MATERIAL PROCESSING AREA WILL HAVE EROSION AND SEDIMENT CONTROLS IN PLACE AND BE APPROVED BY HPDTA PRIOR TO BEGINNING EXCAVATION.
2. ALL EXCAVATED MATERIAL WILL EITHER BE REMOVED FROM THE SITE BY HPDTA PERSONNEL FOR OFF-SITE MANAGEMENT OR WILL BE PLACED INSIDE THE MATERIAL PROCESSING AREA.
3. ALL EXCAVATED MATERIAL WILL BE COVERED WITH A GEOMEMBRANE COVER AND SECURED WITH SAND BAGS DURING INCLIMENT WEATHER AND AT THE END OF EACH WORKING DAY. MATERIAL WILL BE COVERED UNTIL REMOVED FROM THE SITE.
4. EXCAVATED MATERIAL WILL NOT EXCEED 5 FT IN HEIGHT.
5. A CONTINUOUS GEOMEMBRANE COVER SHOULD COVER THE BOTTOM AREA OF THE MATERIAL PROCESSING AREA.
6. A BERM OF 18 INCH HIGH STRAW BALES SHALL BE PLACED ON THE BOTTOM GEOMEMBRANE LINER, AND THE GEOMEMBRANE LINER FOLDED OVER INTO THE MATERIAL PROCESSING AREA TO PREVENT FLOWS FROM INSIDE THE MATERIAL PROCESSING AREA FROM EXITING THE MATERIAL PROCESSING AREA.
7. CAUTION SHOULD BE TAKEN NOT TO RIP OR TEAR THE BOTTOM GEOMEMBRANE LINER WHEN HANDLING OR REMOVING MATERIAL.
8. ALL EXCAVATED MATERIAL WILL BE REMOVED FROM THE SITE AS SOON AS POSSIBLE OR WITHIN 90 DAYS.

NOTE: USE IF EXCAVATED SOIL MUST BE TEMPORARILY STOCKPILED OUTSIDE EXCAVATION

3 MATERIAL PROCESSING AREA

NTS

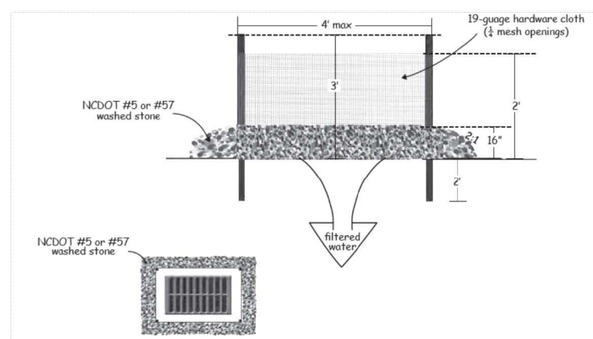
C-1

ABBREVIATIONS

AC	ACRE
FT	FOOT/FEET
HPDTA	HARVEY POINT DEFENSE TESTING ACTIVITY
LB	POUND
MIL	MILLIMETER
MIN	MINIMUM
N	NORTH/NORTHING
NAD	NORTH AMERICAN DATUM
NAVD	NORTH AMERICAN VERTICAL DATUM
NAVFAC	NAVAL FACILITIES ENGINEERING COMMAND
NTS	NOT TO SCALE
SF	SEDIMENT FENCE

EROSION CONTROL LEGEND

PRACTICES	SYMBOL
SEDIMENT FENCE	X——X
PERMANENT SEEDING AND PLANTING	PS
CONSTRUCTION ENTRANCE	
LIMITS OF DISTURBANCE	— DI ——— DI —
INLET PROTECTION	



CONSTRUCTION SPECIFICATIONS

1. UNIFORMLY GRADE A SHALLOW DEPRESSION APPROACHING THE INLET.
2. DRIVE 5-FT STEEL POSTS 2 FT INTO THE GROUND SURROUNDING THE INLET.
3. SPACE POSTS EVENLY AROUND THE PERIMETER OF THE INLET, A MAXIMUM OF 4 FT APART.
4. SURROUND THE POSTS WITH WIRE MESH HARDWARE CLOTH. SECURE THE WIRE MESH TO THE STEEL POSTS AT THE TOP, MIDDLE, AND BOTTOM. PLACING A 2-FT FLAP OF THE WIRE MESH UNDER THE GRAVEL FOR ANCHORING IS RECOMMENDED.
5. PLACE CLEAN GRAVEL (NC DOT #5 OR #57 STONE) ON A 2:1 SLOPE WITH A HEIGHT OF 16 INCHES AROUND THE WIRE, AND SMOOTH TO AN EVEN GRADE.
6. ONCE THE CONTRIBUTING DRAINAGE AREA HAS BEEN STABILIZED, REMOVE ACCUMULATED SEDIMENT, AND ESTABLISH FINAL GRADING ELEVATIONS.
7. COMPACT THE AREA PROPERLY AND STABILIZED IT WITH GROUNDCOVER.

4 INLET PROTECTION

NTS

C-1

SECTION / DETAIL DESIGNATIONS

ON DRAWING WHERE SECTION OR DETAIL IS TAKEN:

1 / C-3 — DRAWING NUMBER WHERE SHOWN

2 DETAIL

SCALE

C-3

ON DRAWING WHERE DETAIL IS SHOWN:

DRAWING NUMBER(S) WHERE TAKEN

CIVIL LEGEND

— — · 6 — —	CONTOUR
→ · · ·	STORMWATER OPEN DRAINAGE
—— SD ——	STORM WATER PIPE

DEPARTMENT OF THE NAVY	NAVAL FACILITIES ENGINEERING COMMAND ATLANTIC
NAVAL FACILITIES ENGINEERING COMMAND	
TOWERS ROAD DISPOSAL AREAS	HERTFORD, NORTH CAROLINA
REMEDIAL INVESTIGATION	
EROSION AND SEDIMENT CONTROLS DETAILS AND NOTES	
SCALE:	AS NOTED
EPROJECT NO.:	–
CONSTR. CONTR. NO.	–
NAVFAC DRAWING NO.	
SHEET	3 OF 3
	EC-1

NAVFAC

CH2MHILL

PRELIMINARY DRAWING

FILENAME: 005-EC-01_439611.dgn PLOT DATE: 10/18/2012 PLOT TIME: 10:33:23 AM

Appendix G
Field Forms

FIELD CHANGE REQUEST FORM

CH2MHILL

CONTRACT NO. **PROJECT NO.**

PROJECT TITLE & LOCATION:

BRIEF DESCRIPTION OF FCR:

TO:	NAME	TITLE
FROM:	NAME	TITLE

Date Submitted:		FCR No	
Please Respond By:		Page:	of

REFERENCES	
Document *(Work Plan, APP, SOW, etc.)*	
Drawing(s)/Specs *(Drawing no., Spec. No., etc)*	
Detail/Section *(Page No., Section No., Paragraph, No., etc.)*	

Schedule Impact? **Yes** ☐ **No** ☐ **Cost Impact?** **Yes** ☐ **No** ☐

1) REQUEST:

NAME/COMPANY TITLE

2) REPLY:

NAME/COMPANY	TITLE	DATE OF RESPONSE

3) RESPONSE/DISPOSITION CONCURRENCE:

NAME/COMPANY	TITLE	DATE OF RESPONSE/DISPOSITION CONCURRENCE

REVIEW DISTRIBUTION			FINAL DISTRIBUTION		
☐ CLIENT RPM	☐ JVII PROJ ENG	☐ Project Files	☐ CLIENT RPM	☐ JVII PROJ ENG	☐ Project Files
☐ CLIENT CM	☐ SITE SUPER	☐ Other	☐ CLIENT CM	☐ SITE SUPER	☐ Other
☐ JVII PM	☐ SITE QC	☐	☐ JVII PM	☐ SITE QC	☐

Storm Water Pollution Prevention Plan Inspection List
Date: _____ Time: _____ Inspector Name: _____

Inspections will include evaluation of the following standard criteria:

- ☐ Inspection performed as part of routine maintenance?
- ☐ Inspection performed following precipitation? Date and amount of precipitation: _____
- ☐ Have all denuded areas requirement temporary or permanent stabilization been stabilized? Seeded? yes / no Mulched ? yes/no Graveled? Yes/no
- ☐ Are soil stockpiles adequately stabilized with seeding and/or sediment trapping measures?
- ☐ Does permanent vegetation provide adequate stabilization?
- ☐ Have sediment trapping facilities been constructed as a first step in land disturbing activities?
- ☐ Are silt fences and diversion berm installed where needed?
- ☐ Are finished cut and fill slopes adequately stabilized?
- ☐ Is in-stream construction conducted using measures to minimize channel damage?
- ☐ Are temporary stream crossing of non erodible material installed where applicable?
- ☐ Is necessary re-stabilization of in-stream construction complete?
- ☐ Are soil and mud kept off public roadways at intersections with site access roads?
- ☐ Have all temporary control structures that are no longer needed been removed?
- ☐ Have all control structure repairs and sediment removal been performed?
- ☐ Are properties and waterways downstream from development adequately protected from erosion and sediment deposition due to increases in peak stormwater runoff?

Inspection Notes:

***Add additional pages of notes / observations/ and action items as required.

CH2MHILL.

GROUNDWATER SAMPLING DATA SHEET

Well Number:

PROJECT: Towers Road Disposal Area Phase 1 RI **Project Number: 439611.01.RI** **DATE:**

CLIENT/LOCATION: HPDTA, Hertford, NC **WEATHER:**

PUMP TYPE (circle one): **FIELD TEAM:**

PURGING/SAMPLING METHOD (circle one): **LOW-FLOW** **BAILER**

INSIDE DIAMETER OF WELL: _____ (IN) DEPTH OF PUMP INTAKE: _____ (FT BTOC)

TOTAL DEPTH OF WELL: _____ (FT BTOC) Time arrived at well: _____

INITIAL DEPTH TO WATER: (-) _____ (FT BTOC) Purging start time: _____

SCREENED INTERVAL: _____ (FT)

TOTAL PURGE VOLUME: (Liters) *WATER QUALITY INSTRUMENT SERIAL#:*

WATER QUALITY PARAMETERS

Time	DTW (feet)	Flow/Purge Rate (Liters/min.)	Cummulative Volume Purged in Liters	pH	Specific Conductance (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)
Stability Criterion:	<0.5 ft Δ	0.1 L to 0.5 L	-	± 0.1	± 3%	± 10% (extent practical)	± 0.10 mg/L or 10% of value	± 1.0 °C	± 10 mV

SAMPLE INFORMATION

Analytical Parameters/Methods:	Container Quantity, Size, Type:	Preservatives:

Notes (Color/Odor if any):

Sample Name/Time: _____ / **DO by CHEMets®** _____ mg/L

Sample Name/Time: _____ / **Fe by HACH®** _____ mg/L

Sample Name/Time: _____ / Bladder\Tubing Lot #: _____

Signed By: _____ Date: _____

2" casing (DTW-DTB)*0.62L/ft 0.5" tubing = 0.037 liters per foot ID OF WELL/VOLUME CONV (GAL/FT): 2" = 0.163 4" = 0.653

4" casing (DTW-DTB)*2.47L/ft 0.75" tubing = 0.087 liters per foot ID OF TUBING/VOLUME CONV (GAL/FT): 1/2" = 0.0102, 3/4" = 0.0230

1 US gallon = 3.785 liters 1 Liter = 0.264 Gallons ID OF TUBING/VOLUME CONV (L/FT): 0.17-inch = 0.0045, 3/8" = 0.022

Client:	HPDTA	**Project Number/CTO:**	439611.01.RI
Site:	Towers Road Disposal Area	**Sampling Team:**	
Date:			

Water Level Measurement Form

Well ID	TOC Elevation (ft above msl)	Total Well Depth* (ft BTOC)	Measured Total Well Depth (ft BTOC)	Depth to Water (ft BTOC)	Groundwater Elevation** (ft above msl)	Comments

Notes:
*Depth of well based on drilling construction logs
**Groundwater Elevation = TOC Elevation - Depth to Water
msl - mean sea level
btoc - below top of casing
ft - feet

Appendix H
Quality Assurance Project Plan

Quality Assurance Project Plan
Towers Road Disposal Areas
Remedial Investigation

Hertford, North Carolina

Multimedia Contract Task Order 20

April 2013

Prepared for

Department of the Navy
Naval Facilities Engineering Command
Atlantic

Under the

NAVY Multimedia Program
Contract No. N62470-10-D-3009

Prepared by

CH2MHILL

Virginia Beach, VA

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Acronyms and Abbreviations

ASTM	American Society for Testing And Materials
CA	Corrective Action
CAS	Columbia Analytical Services
COC	Chain of Custody
CTO	Contract Task Order
DHC	Dehalococcoides
DL	detection limit
DoD	Department of Defense
DQE	data quality evaluation
DQO	data quality objective
EDD	electronic data deliverable
ELAP	Environmental Laboratory Accreditation Program
ERB	Equipment Rinsate Blank
HSM	Health and Safety Manager
ICS	Interference Check Sample
IDW	investigation-derived waste
LOD	limit of detection
LOQ	limit of quantitation
MS/MSD	Matrix Spike/Matrix Spike Duplicate
M&TE	measuring and test equipment
MPP	Master Project Plans
N/A	not applicable
NAVFAC	Naval Facilities Engineering Command
Navy	Department of the Navy
NCDENR	North Carolina Department of the Environment and Natural Resources
PA	Preliminary Assessment
PAL	Project Action Limit
PARCC	Precision, Accuracy, Representativeness, Comparability, and Completeness
PC	Project Chemist
PCB	Polychlorinated Biphenyl
PM	Project Manager
PQO	project quality objective
QA	quality assurance
QAM	Quality Assurance Manual
QAP	Quality Assurance Plan
QAPP	Quality Assurance Project Plan
QC	quality control
REC	Registered Environmental Consultant
RPD	relative percent difference
RSL	Regional Screening Level
RSM	Registered Site Manager

SAP	Sampling and Analysis Plan
SI	Site Investigation
SOP	Standard Operating Procedure
SSC	Site Safety Coordinator
STC	Senior Technical Consultant
SVOC	Semivolatile Organic Compound
UFP	Uniform Federal Policy
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
WP	Work Plan

QAPP Identifying Information

Site Name/Number: Towers Road Disposal Areas

Operable Unit: Not Applicable (N/A)

Contractor Name: CH2M HILL

Contract Number: N62470-10-D-3009

Contract Title: Naval Facilities Engineering Command (NAVFAC), Navy Multimedia Contract

Work Assignment Number (optional): Contract Task Order (CTO) 20

1. This Quality Assurance Project Plan (QAPP) was prepared in accordance with the requirements of:
   - *Uniform Federal Policy for Quality Assurance Project Plans* (USEPA, 2005)
   - *EPA Guidance for Quality Assurance Project Plans, EPA QA/G-5 QAMS* (USEPA, 2002).
   - Identify any additional guidance used to prepare the Sampling and Analysis Plan (SAP): *Registered Environmental Consultant Program Implementation Guidance* [North Carolina Department of Environment and Natural Resources (NCDENR), 2011]
2. Identify regulatory program:
   - North Carolina Registered Environmental Consultant (REC) Program
3. This QAPP is <u>project-specific</u>.
4. List dates of scoping sessions that were held:
   - Formal scoping sessions were not used as they are not a requirement of the REC program.
5. List dates and titles of any SAP documents written for previous site work that are relevant to the current investigation.
   - N/A
6. List organizational partners (stakeholders) and connection with lead organization:
   - NCDENR, governing body of REC program
7. Lead organization
   - Department of the Navy (Navy) – Naval Facilities Engineering Command (NAVFAC) Atlantic
8. If any required SAP elements or required information are N/A to the project or are provided elsewhere, then note the omitted SAP elements and provide an explanation for their exclusion, as follows:
   - The following crosswalk table references the location of all 37 required elements of the Uniform Federal Policy (UFP)-SAP. They are either provided in this QAPP or ***Towers Road Disposal Areas Remedial Investigation Work Plan***.

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Crosswalk to Related Information

UFP-SAP Worksheet #	Required Information	Crosswalk to Related Information
1.0 Introduction and Project Organization		
Documentation		
1	Title and Approval Page	Page 1
2	Table of Contents Acronym and Abbreviation List QAPP Identifying Information	Pages 3-6
3	Distribution List	Table 1 of **Attachment I**
4	Project Personnel Sign-off Sheet	Table 1 of **Attachment I**
Project Organization		
5	Project Organizational Chart	Table 1 of **Attachment I** Section 5.0 of the Towers Road Disposal Areas Remedial Investigation Work Plan
6	Communication Pathways	Table 1 of **Attachment I** Section 1.3.1 of the QAPP
7	Personnel Responsibilities and Qualifications Table	Table 1 of **Attachment I**
8	Special Personnel Training Requirements Table	Section 1.7 of the QAPP
Project Planning/Problem Definition		
9	Project Planning Session Documentation (including Data Needs tables) Project Scoping Session Participants Sheet	N/A
10	Problem Definition, Site History, and Background. Site Maps (historical and present)	Section 1.4 of the QAPP Section 2.0 of the Towers Road Disposal Areas Remedial Investigation Work Plan
11	Site-Specific Project Quality Objectives (PQOs)	Section 1.6.4 of the QAPP
12	Measurement Performance Criteria Table	Table 9-1 through 9-12 of **Attachment I**
13	Sources of Secondary Data and Information Secondary Data Criteria and Limitations	Tables 2-2 and 2-3 of the Towers Road Disposal Areas Remedial Investigation Work Plan
14	Summary of Project Tasks	Section 1.5 of the QAPP Towers Road Disposal Areas Remedial Investigation Work Plan
15	Reference Limits and Evaluation Table	Table 6-1 through 6-12 of **Attachment I**
16	Project Schedule/Timeline Table	Section 5.2 of the Towers Road Disposal Areas Remedial Investigation Work Plan
B. Measurement Data Acquisition		
Sampling Tasks		
17	Sampling Design and Rationale	Section 3.0 of the Towers Road Disposal Areas Remedial Investigation

UFP-SAP Worksheet #	Required Information	Crosswalk to Related Information
		Work Plan
18	Sample Location Map	Figures 2-2 and 3-1 of the Towers Road Disposal Areas Remedial Investigation Work Plan
19	Analytical Methods/Standard Operating Procedure (SOP) Requirements Table	Table 5 of **Attachment I**
20	Field Quality Control (QC) Sample Summary Table	Table 2 of **Attachment I**
21	Project Sampling SOP References Table Sampling SOPs	**Appendix E of the** Towers Road Disposal Areas Remedial Investigation Work Plan
22	Field Equipment Calibration, Maintenance, Testing, and Inspection Table	Section 2.7.1 of the QAPP
Analytical Tasks		
23	Analytical SOP References Table	Table 3 of **Attachment I**
24	Analytical Instrument Calibration Table	Table 11 of **Attachment I**
25	Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table	Table 10 of **Attachment I**
Sample Collection		
26	Sample Handling System, Documentation Collection, Tracking, Archiving, and Disposal	Section 2.3 of the QAPP
27	Sample Custody Requirements, Procedures/SOPs, Sample Container Identification	Section 2.3 of the QAPP
Quality Control Samples		
28	QC Samples Table	Table 8-1 through 8-20 of **Attachment I** Section 2.5 of the QAPP
Data Management Tasks		
29	Project Documents and Records	Section 1.8 of the QAPP Table 7 of Attachment I Table 13 of **Attachment I**
30	Analytical Services Table Analytical and Data Management SOPs	Table 4 of **Attachment I** Table 3 of Attachment I, Section 1.8 of the QAPP
C. Assessment Oversight		
31	Planned Project Assessments Audit Checklists	Section 3.0 of the QAPP Table 12 of **Attachment I**
32	Assessment Findings and Corrective Action Responses	Section 3.1 of the QAPP
33	Quality Assurance (QA) Management Reports	Section 3.2 of the QAPP
D. Data Review		
34	Verification Process	Section 4.2.1
35	Validation Process	Section 4.2.2
36	Validation Summary	Section 4.2.2
37	Usability Assessment	Section 4.3

SECTION 1

Introduction and Project Organization

1.1 Introduction

This QAPP describes the data quality objectives (DQOs), specific quality assurance (QA) and quality control (QC) activities, and laboratory activities necessary to achieve the DQOs of the project.

This QAPP provides QA/QC requirements for sampling activities, sample analyses, and other tests that will generate data as part of the activities performed for the Preliminary Assessment/Site Inspection. This QAPP is a component of the Work Plan (WP) and has been prepared in accordance with the *EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations* (USEPA, 2001).

The requirements of this document apply to contractors and subcontractors. Subcontractors will be required to review the site-specific QAPP and will be expected to adhere to the procedures specified in these documents. Deviations from these procedures will be documented.

All field activities will be conducted by CH2M HILL.

Section 1 provides an overview of project management and addresses the following topics:

- Project organization and roles and responsibilities
- Project definition and background
- Project description
- Quality objectives and criteria for measurement data
- Documentation and records management

1.2 Project Organization Roles and Responsibilities

This subsection identifies key project team information associated with the planned sampling work and lists the responsibilities associated with each position. The organizational structure and responsibilities are designed to provide project control and QA for the proposed investigation.

Please refer to ***Table 1 of Attachment I*** for the list of key team members for each project, the QA/QC responsibilities associated with each position, and a description of the communication procedures that will be followed throughout the specific project.

Additional information pertaining to project organization roles and responsibilities can be found under ***Section 5.1 of the Towers Road Disposal Areas Remedial Investigation Work Plan***.

1.2.1 Senior Technical Consultant (STC)

The STC is responsible for technical content of the deliverables, and will provide technical guidance throughout the project in order to effectively implement quality and technical risk management. All deliverables will be reviewed by the STC prior to submittal for client review. The STC is responsible for oversight of all site related documents.

1.2.2 Registered Site Manager (RSM)

The RSM is responsible for technical direction of the investigation and ensuring that the investigation is conducted in accordance with the Inactive Hazardous Sties statute and the REC Program rules. The RSM will serve as the main point of contact for the client. All deliverables will be reviewed by the RSM prior to submittal for STC and/or client review. The RSM is responsible for the implementation and oversight of all site investigation and cleanup activities.

1.2.3 Project Manager (PM)

The PM is responsible for overall activities for the project. The PM is responsible for cost and schedule control and for technical quality; in addition, the PM develops the WP and monitors contract task order (CTO) activities to ensure compliance with project objectives and scope. The PM also communicates with the RSM, client, and NCDENR as appropriate regarding project progress.

The PM has ultimate responsibility within the project team for producing deliverables that are technically adequate and satisfactory to Naval Facilities Engineering Command (NAVFAC) Atlantic. To accomplish this, the PM develops an internal project review schedule, provides written instructions and frequent guidance to the project team, and monitors budgets and schedules. The PM works with the project team to select an internal QA/QC review team and to coordinate review efforts, and works with the project team in addressing review comments and adjudicating technical disagreements.

1.2.4 Field Team Leader (FTL)

The Field Team Leader reports to the PM and is responsible for the coordination of field efforts, provides for the availability and maintenance of sampling equipment and materials, and provides shipping and packing materials. The FTL will supervise completion of all chain-of-custody (COC) records, supervise the proper handling and shipping of samples, and be responsible for accurate completion of the field notebooks. As the lead field representative, the FTL will be responsible for consistently implementing program QA/QC measures at the site and for performing field activities in accordance with approved WPs, policies, and field procedures.

1.2.5 Project Chemist (PC)

The PC assists with the preparation of the project work planning documents, provides a point of contact (POC) between the laboratory and the project team, supervises the analytical data quality evaluation (DQE), and participates in preparing deliverables for the client. The PC coordinates with the project team and the analytical laboratory during the field activities and is responsible for tracking the data. The PC also is responsible for monitoring project-specific laboratory activities (including checking laboratory invoices and reports) and may audit the laboratory operations at the PM's direction. The PC monitors field and laboratory activities such that QA/QC requirements described in this project-specific QAPP are coordinated effectively.

1.2.6 Site Safety Coordinator (SSC)

The SSC refines and implements the project Accident Prevention Plan (APP) in the field. The SSC will assist in conducting site briefings and perform all final safety checks. The SSC is responsible for stopping any investigation-related operation that threatens the health and safety of the field team or surrounding populace.

1.2.7 Health and Safety Manager (HSM)

The program HSM reviews and approves the project-specific APP. The program HSM serves as the POC for the SSC for any health- and safety-related issues, and may conduct project audits. The program HSM also is responsible for investigating accidents should any occur during the course of the project.

1.3 Distribution List and Project Personnel Sign-off Sheet and Communication Pathways and Procedures

1.3.1 Project Communication

Effective communication among all project personnel will be established and maintained throughout the course of the project and is essential for effective implementation of field activities.

Table 1 of Attachment I, Communication Pathway and Procedures, Distribution List, and Project Personnel Sign-off Sheet, provides the following information:

- Distribution list and Project Personnel Sign-off Sheet: A list of all recipients of the QAPP. This project-specific list is not exclusively for CH2M HILL personnel and includes regulatory stakeholder and subcontractor

(laboratory) information. Returned signed copies of this table will be kept in project files as documentation that project personnel have read the QAPP.

- Communication pathways and procedures for each specific project personnel.

At the beginning of the project, and/or at the start or end of major milestones, the PM will prepare written project instructions that will be distributed to all CH2M HILL team members. These instructions will document project and task objectives and each team member's responsibility in meeting the objectives, as well as a budget and schedule for successfully executing the work.

Before field activity begins, a CH2M HILL project team meeting will be held to review the project objectives. Periodic meetings will be held to review data validity, technical evaluations, major decisions, and overall progress toward completing the project. Additionally, a team kickoff meeting will be held before work on each task is started. Senior personnel may participate in the meetings to help focus the project approach and to define specific issues.

During the field sampling phases of this project, the field team will meet daily to review the status of the project and to discuss technical and safety issues. When necessary, other meetings will be scheduled or the FTL will meet individually with field personnel or other stakeholders to resolve problems.

During the field effort, the FTL will be in regular telephone or face-to-face contact with the project team. When significant problems or decisions requiring additional authority occur, the FTL will immediately contact the PM for assistance. The PC will coordinate communication with the laboratory through sample collection, sample analysis, and DQE and consult with the PM as needed.

All analytical laboratory QA/QC issues will be reported the same day the issue is identified to the PC. Should analytical corrective actions (CAs) be warranted, they will be communicated to the PC on a same day basis. The PC will facilitate resolution to ensure WP requirements are met by the laboratory. Communications with subs shall be by phone, followed up with e-mail to document decisions and actions as soon as issues are identified.

The PC will track data from sample collection through upload to the database. Issues will be reported to the PM as they are identified.

1.3.2 Laboratory Work Group

The selected laboratories are responsible for analyzing samples collected during field activities, in accordance with this QAPP, the ***Towers Road Disposal Areas Remedial Investigation Work Plan,*** and the most current version of the *Department of Defense Quality Systems Manual for Environmental Laboratories* (DoD, 2010).

The laboratory Project Manager (PM) or Client Service Manager acts as a liaison between the PC and the field and laboratory operations and is responsible for the following:

- Receipt of sample custody from the field team members, verification of sample integrity, and transfer of sample fractions to the appropriate analytical departments
- Coordination of sample analyses to meet project objectives
- Preparation of analytical reports
- Review of laboratory data for compliance with method requirements
- Review of any QC deficiencies reported by the analytical department manager
- Coordination of any data changes resulting from review by the project QA supervisor or the PM
- Completion of data package deliverables
- Communication with the PC pertaining to analytical and QC issues
- Response to questions from the project team during the DQE process

1.4 Problem Definition and Background

The Towers Road Disposal Areas consists of the 2nd Street Disposal Area and 5th Street Disposal Area. In 2012, the site was transferred to the North Carolina Division of Waste Management Inactive Hazardous Sites Branch (IHSB) as Site ID Number NONCD0002893. An Administrative Agreement for Registered Environmental Consultant (REC)-directed voluntary assessment and remedial action was initiated in July 2012. The Administrative Agreement specifies that HPDTA (the remediating party) is responsible for the assessment and remediation of the areas contaminated through previous disposal practices and is pending final signature. HPDTA selected CH2M HILL as the REC for the Towers Road Disposal Areas.

Refer to ***Section 2.0 of the Towers Road Disposal Areas Remedial Investigation Work Plan*** for the site background.

1.5 Project Description

The REC Program encourages a phased investigation approach.

- Phase 1 is intended to identify all releases of hazardous substances, characterize the chemical nature of releases, and collect sufficient data to establish remediation goals.
- Phase 2 is intended to delineate the lateral and vertical extent of contamination in each area of concern and characterize site conditions sufficiently to conduct a Feasibility Study to support a proposed remedy.

To achieve these objectives, the following field investigation activities will be implemented:

- Land surveying
- Geophysical surveying
- Test pitting
- Groundwater sampling
- Surface and subsurface soil sampling

Additional information regarding the overall objectives and general sampling approach is presented in the ***Towers Road Disposal Areas Remedial Investigation Work Plan***.

1.6 Quality Objectives and Criteria for Measurement Data

QA involves all those planned and systematic actions necessary to provide adequate confidence that field activities are planned and performed according to accepted standards and practices. This process ensures that the resulting data are valid and retrievable, while continuing to meet minimum safety requirements. QC is an integral part of the overall QA function and is composed of all those actions necessary to control and verify that project activities and resulting data meet established requirements.

To ensure that a minimum level of certainty about the quality of field data is being met, the following elements will be addressed to meet the requirements specified by the client and regulatory agencies:

- Field operations will be conducted in accordance with field Standard Operating Procedures (SOPs) and the ***Towers Road Disposal Areas Remedial Investigation Work Plan***.
- To maintain accuracy within necessary limits, measuring and test equipment (M&TE) used in field investigations will be calibrated against traceable standards at specific intervals, using approved SOPs or manufacturer's instructions.
- When M&TE is found to be out of specification, the previous inspection or test results will be evaluated for validity and acceptability. This evaluation will be documented.
- Before project field work begins, all project staff will be trained to ensure that they are familiar with project Work Plans and associated documents.

- Internal audits may be performed to assess the quality of project activities and to evaluate compliance with established QA requirements.
- QC samples will be used to monitor the quality of field and laboratory techniques and of the data.

1.6.1 Levels of Data Quality

The following subsection lists the levels of data. The level of data quality is dependent on the objective use of the results supported by the data.

The data use determines the required levels of data quality. The two categories of data quality established by the United States Environmental Protection Agency (USEPA), ***screening*** and ***definitive***, are defined as follows:

Screening data are generated by rapid methods of analysis with less rigorous sample preparation, calibration, and/or QC requirements, as compared to the requirements for producing definitive data. Screening data may provide analyte identification and quantitation, although the quantitation may be relatively imprecise unless USEPA reference methods are used. Depending on the DQOs, screening methods may require confirmation samples that generate definitive data. Confirmation samples will be selected to include both detected and non-detected results from the screening technique.

Definitive data are generated using rigorous analytical methods such as approved USEPA reference methods. Data are analyte-specific, and both identification and quantitation are confirmed. These methods have standardized QC and documentation requirements. Definitive data are not restricted in their use unless quality problems require data qualification.

Three levels of data reporting will be performed as part of this field effort, with each level having different supporting QA/QC documentation. The three levels correspond to QC Levels I, II, and IV (Level III data packages will not be requested for this project):

- Level I – Field Surveys: Encompasses field monitoring or screening activities and does not require formal data package deliverables. Level I activities are focused on easily measured bulk characteristics of a sample such as pH, conductivity, ORP, and DO. Monitoring results, as well as pertinent data concerning the sampling event, will be documented in the bound field book. Level I documentation will consist of the following:
  - Instrument identification
  - Calibration information (standards used and results)
  - Date and time of calibration and field measurements
  - Field measurement results

  The logbooks will be reviewed daily by the FTL for completeness and correctness. No additional documentation or DQE is required.
- Level II – Screening Activities, Physical Parameters, and Investigation-derived Waste Analyses: includes the analyses submitted to the laboratories for screening, physical parameter testing, and analyses associated with the characterization of the investigation-derived waste (IDW) samples. Samples submitted for analysis under Level II will require the delivery of an analytical data package. Level II documentation will consist of the following:
  - Case narrative
  - Sample results
  - Selected QC information such as surrogate recovery
  - Associated blank results
    Completed COC and any sample receipt information
- Level IV – Laboratory Analysis: This level provides the most stringent level of documentation, and allows the data reviewer or data validator to recreate the analytical sequence and evaluate raw data such as

quantitation reports generated from the instrumentation used in the analyses. The list of methods and the corresponding target analytes have been designed to evaluate the potential for contamination at the site.

1.6.2 Data Quality Objective Development

DQOs are both qualitative and quantitative statements that define the type, quality, and quantity of data necessary to support the decision-making process during project activities. The intended final use of the data determines the DQOs, which are developed before Quality Assurance Project Plans (QAPPs).

The credibility of the data is strengthened by the level of the supporting QA/QC documentation. The greater the importance of the data or the resulting decision, the more QA/QC information is needed to validate the data. This reasoning must be applied to the data collected for any project. The DQO process used for this project follows the *USEPA Guidance for the Data Quality Objectives Process (QA/G-4)* (USEPA, 2000).

1.6.3 Quality of Data

Analytical performance requirements are expressed in terms of Precision, Accuracy, Representativeness, Comparability, and Completeness (PARCC).

1.6.3.1. Precision

Precision is a measure of the agreement or repeatability of a set of replicate results obtained from duplicate analyses made under identical conditions. Precision can be estimated by comparing duplicate matrix spike concentrations and field duplicate sample results. The precision of a duplicate determination can be expressed as the relative percent difference (RPD), calculated as:

$$\text{RPD} = \left\{ \frac{|X_1 - X_2|}{\frac{(X_1 + X_2)}{2}} \right\} x100$$

Where X_1 is the result from the native sample, and X_2 is the result from the duplicate sample.

1.6.3.2. Accuracy

Accuracy is a measure of the agreement between an experimental determination and the true value of the parameter being measured. Accuracy is estimated through the use of known reference materials and matrix spikes. It is calculated from analytical data and is not measured directly. Spiking of reference materials into a sample matrix provides a measure of the matrix effects on analytical accuracy. Spiking of reference materials into a “non-matrix”, such as deionized (DI) water or Ottawa sand, provides a measure of the accuracy of the analytical method itself. Accuracy, defined as percent recovery (P), is calculated as:

$$\text{P} = \left[\frac{(\text{SSR - SR})}{\text{SA}} \right] \text{x } 100$$

Where SSR is the spiked sample result, SR is the sample result (native), and SA is the spike concentration added to the spiked sample.

1.6.3.3. Representativeness

Representativeness is a measure of the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is a qualitative parameter that is most concerned with the proper design of the sampling program. Representativeness is demonstrated by providing full descriptions in the project planning documents of the sampling techniques and by making certain that the sampling locations are selected and the number of samples collected such that the accuracy and precision criteria are met.

1.6.3.4. Comparability

Comparability is another qualitative measure designed to express the confidence with which one data set may be compared to another. Sample collection and handling techniques, sample matrix type, and analytical method all affect comparability. Comparability is limited by the other PARCC parameters because data sets can be compared with confidence only when precision and accuracy are known. Data from one phase of an investigation can be compared to others when similar methods are used and similar data packages are obtained.

1.6.3.5. Completeness

Completeness is defined as the percentage of measurements judged to be valid, compared to the total number of measurements made for a specific sample matrix and analysis. Completeness is calculated using the formula:

$$Completeness = \frac{Valid\ Measurements}{Total\ Measurements} x100$$

Experience on similar projects has shown that laboratories typically achieve approximately 95 percent completeness. During the QC process, an assessment will be made of whether the data are sufficient to meet project objectives.

1.6.4 Project Quality/Systematic Planning Process Statements and Data Quality Objectives

The data will be used by the Department of the Navy (Navy) andCH2M HILL. Within each organization, the data will be used by staff scientists, engineers, and PMs.

What are the Project Action Limits (PALs)?

PALs are discussed in the following bullets, and PAL values are provided in ***Attachment I, Tables 6-1 through 6-12, Reference Limits and Evaluation Table.***

- Groundwater analytical results will, at a minimum, be compared to drinking water maximum contaminant levels (MCLs), NCGWQS (NCDENR, 2012), and the USEPA RSLs for tap water (USEPA, 2012), which have been adjusted for cancer and non-cancer endpoints. For select parameters[1], groundwater analytical results will also be compared to concentrations detected at background sample locations during this investigation.
- Surface soil and subsurface soil analytical results will, at a minimum, be compared to the NCDENR PSRGs (Preliminary Residential Health-based and Protection of Groundwater) and the USEPA RSLs for residential soil (USEPA, 2012), which have been adjusted for cancer and non-cancer endpoints. For select parameters[1], soil analytical results will also be compared to concentrations detected at background sample locations during this investigation.
- Wastes generated for offsite disposal/treatment will be compared to hazardous waste criteria and transport, storage, and disposal facility acceptance criteria.

Project Indicator Limits (PILs) were established for wet chemistry data. PILs and their associated rationale are tabulated below:

Project Indicator Levels

Parameter	PIL	Justification
Dehalococcoides sp. (DHC)	>103 cells per milliliter (mL)	A result of >103 cells per mL is indicative of conditions optimal for reductive dechlorination of vinyl chloride; however, the presence (detection) of DHC can indicate conditions favorable for slower rates of natural attention or conditions favorable for enhanced reductive dechlorination (ERD).

[1] Samples collected from background sample locations will initially be analyzed for metals, mercury, and hexavalent chromium. If the site data indicate concentrations of SVOCs and pesticides at levels greater than screening values at site sample locations, additional collection of background data for these chemicals may be completed for the purpose of determining any widespread anthropogenic sources which may be unrelated to the areas.

Project Indicator Levels

Parameter	PIL	Justification
Methane	> 0.5 mg/L	Elevated methane levels are expected to be seen under highly reducing conditions as a byproduct of degradation by methanogenic bacteria and are a positive indicator that degradation of VOCs and some explosives can occur. Additionally, reducing conditions may be indicative of conditions favorable for mobilization or immobilization of certain metals.
Sulfide	> 1 mg/L	If sulfur compounds are present in the aquifer, higher concentrations of sulfide are more favorable to reductive dechlorination. Therefore, ideal conditions for vinyl chloride degradation will maintain higher sulfide levels. High sulfide may also indicate conditions favorable for mobilization or immobilization of certain metals.
Total organic carbon (TOC)	> 20 mg/L	TOC is an indicator of the total amount of organic matter available to microbial communities to use as a carbon source in the degradation of VOCs such as vinyl chloride.
Nitrate	Baseline value to later determine decreasing trend	Nitrate data will be collected in the event that a natural attenuation or enhanced biological remedy is later needed for the sites to address vinyl chloride concentrations. Enhanced biological treatment methods that reduce aquifer conditions are generally expected to result in decreasing concentrations of nitrate.
Nitrite	Baseline value to later determine increasing trend	Nitrite data will be collected in the event that a natural attenuation or enhanced biological remedy is later needed for the site to address vinyl chloride. Enhanced biological treatment methods which reduce aquifer conditions are generally expected to result in increasing concentrations of nitrite.
Chloride	Baseline value to later determine increasing trend	Chloride data will be collected in the event that a natural attenuation or enhanced biological remedy is later needed for the site. Enhanced biological treatment methods which reduce aquifer conditions are generally expected to result in increasing concentrations of chloride, if chlorinated compounds are being degraded.
Ethene and Ethane	Baseline value to later determine increasing trend	Ethene and Ethane are innocuous breakdown products of chlorinated ethenes, such as vinyl chloride. Under conditions favorable for reductive dechlorination, ethene and ethane concentrations are expected to increase over time.
Alkalinity	> 50 mg/L	A measurement of the available buffering capacity against pH change, which can affect the rate of degradation of chemicals. Decreasing alkalinity may indicate that pH conditions are becoming less optimal for reductive dechlorination of VOCs, such as vinyl chloride. Alkalinity may also impact the ability to mobilize certain metals during implementation of treatment technologies.

What will the data be used for?

The analytical results will be used to characterize the chemical nature of releases, determine soil and groundwater background concentrations, and identify releases of hazardous substances.

What types of data are needed?

- Matrixes and analytical groups for the sampling activities are defined in ***Attachment I, Table 2, Sample Analysis Summary Table***.
- Field activities will be recorded in a field notebook to document adherence to the approved ***Towers Road Disposal Areas Remedial Investigation Work Plan***. The CH2M HILL SOP entitled *Preparing Field Log Books* describes the necessary documentation required for log book completion.

How "good" must the data be to support the environmental decision?

- The data need to be of sufficient quality for determining the concentration of constituents in media collected such that the project objectives can be achieved.
- During the investigation, field QA/QC samples will be collected per ***Table 9-1 through 9-12 of Attachment I*** as a check on sampling and analytical protocol.

How much data should be collected (number of samples for each analytical group, matrix, and concentration)? Where, when, and how should the data be collected/ generated?

- Sample quantities, including QA/QC samples, for each chemical analysis are discussed in ***Attachment I, Table 2, Sample Analysis Summary Table***.
- The laboratory will generate data in accordance with the SOPs presented in ***Attachment I, Table 3, Analytical SOP References Table***.

Who will collect and generate the data? How will the data be reported?

- Chemical analyses will be performed by ENCO Laboratories in Orlando and Jacksonville, Florida; Columbia Analytical Services (CAS) in Rochester, New York; and Microbial Insights in Rockford, Tennessee. ENCO and CAS are Department of Defense (DoD) Environmental Laboratory Accreditation Program (ELAP)-certified laboratories under subcontract to CH2M HILL. Refer to **Attachment II** for a copy of each laboratory's DoD ELAP Acceptance letter. qPCR analytical results (analysis is to be performed by Microbial Insights) is considered screening level data, therefore, DoD ELAP certification is not required for this parameter.
- All chemical data will be presented in the Towers Road Disposal Areas RI reports.

How will the data be archived?

- All data and information (original and copies) of any type whatsoever shall be surrendered to the HPDTA Environmental Manager upon completion of the project.

Project quality objectives (PQOs) listed in the form of if/then qualitative and quantitative statements:

- If the geophysical survey identifies areas of elevated electromagnetic induction response beyond the current horizontal extent, then the test pitting locations will be adjusted to determine the horizontal extent of buried debris.
- If buried debris is identified during test pitting activities and likely sources of contamination are noted in specific areas, then the proposed well and soil sample locations will be selected to ensure that the sample results are indicative of the site conditions within the most likely source areas.
- If buried debris is identified during test pitting activities and the debris appears uniform with no areas more likely to be associated with sources than other areas, then sample and well locations will default to locations based on previous analytical data, as specified in the work plan.
- If no buried debris is encountered during test pitting activities, then sample and well locations will default to locations based on previous analytical data, as specified in the work plan.
- If groundwater data collected from the sampling locations within the investigation areas during the Phase I RI indicate concentrations of the analytes at levels greater than the screening values and background concentrations, then additional groundwater sampling will be completed to meet the objectives of the Phase II RI.
- If groundwater data collected from the sampling locations within the investigation areas during the Phase I RI indicate concentrations of the analytes at levels less than the screening values and background concentrations, then no additional action or investigation for groundwater will be required.
- If the initial analysis of the groundwater data collected from within the disposal areas indicates concentrations of SVOCs and pesticides at levels greater than screening values, then additional collection of background groundwater data for these chemicals may be completed for the purpose of determining any widespread anthropogenic sources which may be unrelated to the areas.

- If soil data collected from the sampling locations within the investigation areas during the Phase I RI indicates concentrations of the analytes at levels greater than the screening values, then additional soil sampling will be completed to meet the objectives of the Phase II RI.
- If the initial analysis of the soil data collected from within the disposal areas indicates concentrations of SVOCs and pesticides at levels greater than screening values, then additional collection of background soil data for these chemicals may be completed for the purpose of determining any widespread anthropogenic sources which may be unrelated to the areas.

1.7 Special Training, Requirements, and Certifications

The PM works with the project delivery manager to assemble a project team that has the necessary experience and technical skills. Part of the work planning process is to identify special training requirements or certifications necessary to execute the project successfully. Special training or certifications required beyond the normal routine requirements have not been identified for this project.

1.8 Documentation and Records

This subsection defines which records are critical to the project and what information needs to be included in reports, as well as the data reporting format and the document control procedures. It is imperative for the defensibility of critical decisions made at the site that proper documents and records be maintained for the field and offsite data gathering activities, so that specific events can be recreated or independently evaluated. The PM and RSM will be responsible for organizing, storing, and cataloging all project information. The PM and RSM are also responsible for collecting records and support data from all project team members. All project documents and records, both original and copies, will be forwarded to the HPDTA Environmental Manager upon completion of the project.

1.8.1 Field Documentation

- Soil boring logs
- Field logbook to record data collection activities and observations (including date and time, sample locations, depth, health and safety measures, weather conditions, sampling personnel, analyses requested, and sketches)
- Sample collection field sheets or COC documentation
- Field instrument calibration and maintenance logs
- Additionally, field QC and CA documents may be generated as a result of field audits

Field documentation will be stored with the project records.

1.8.2 Laboratory Documentation

Calculations to be used for data reduction are specified in the referenced analytical methods. Whenever possible, analytical data will be transferred directly from the instrument to a computerized data system. Raw data will be stored electronically, and a hard copy file will be maintained. Laboratory data entered will be sufficient to document information used to arrive at reported values. Electronic data storage will be utilized when possible. All electronic data will be maintained in a manner that prevents inadvertent loss, corruption, and inappropriate alteration. Raw data will be examined to assess compliance with QC guidelines. Deviations from guidelines will call for corrective action. Deviations determined to be caused by factors outside the laboratory's control, such as matrix interference, will be noted with an explanation in the report narrative. Calculations will be checked and the report reviewed for errors and oversights.

Upon completion, a report will be reviewed for discrepancies, errors, or omissions. Data will then be submitted to the laboratory Quality Assurance Manual (QAM), however named, for review and approval. The laboratory QAM

will review the package, ensure that any necessary corrections are made, and give the package to the laboratory PM for review. A copy of the data package will be filed in the project file. Mailed data packages, along with applicable electronic data deliverables (EDDs), will be sealed in an appropriate shipping container and logged into a document mailing log.

The requested turn-around time for definitive data will be 28 calendar days from the time of sample receipt at the laboratory.

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SECTION 2

Measurement and Data Acquisition

Section 2 describes the measurement and data acquisition procedures and the analytical methods to be performed in support of this monitoring. It addresses the following aspects of measurement and data acquisition:

- Sampling process design
- Sampling method requirements
- Sample handling and custody requirements
- Analytical method requirements
- QC requirements
- Instrument and equipment testing, inspection, and maintenance requirements
- Instrument calibration and frequency
- Inspection and acceptance requirements for supplies and consumables
- Data acquisition requirements

2.1 Sampling Process Design

Refer to ***Section 3.0 of the Towers Road Disposal Areas Remedial Investigation Work Plan*** for details pertaining to sampling design and rationale.

2.2 Sampling Method Requirements

Refer to ***Sections 3.8 and 3.9 of the Towers Road Disposal Areas Remedial Investigation Work Plan***.

2.3 Sample Handling and Custody Requirements

Proper sample handling, preservation, shipment, and maintenance of a COC are key components to building the documentation and support for data within the evidentiary process in order that the data can be used for decision-making. It is essential that all sample handling and sample COC requirements be performed in a complete, accurate, and consistent manner. Sample handling and custody requirements must be followed for all samples collected as part of the investigation.

The FTL is responsible for proper sampling, labeling, preserving, and shipping samples to the laboratory to meet the required holding times.

2.3.1 Sample Identification

Sample labels will include, at a minimum, client name, site, sample ID, date/time collected, preservative, analysis group or method, and sampler's initials. A standardized nomenclature system will be used to ensure accurate data retrieval of all samples collected. Each sample will be designated by an alphanumeric code that will identify the facility, site, station ID, matrix sampled, and/or date and depth sampled. QA/QC samples will have a unique sample designation. Nomenclature for samples and field QA/QC is specified on ***Table 2 of Attachment I***.

The field logbook will identify the sample ID with the location, depth, date/time collected, and the parameters requested.

2.3.2 Sample Custody

The sample custody and documentation procedures described in this subsection will be followed throughout all sample collection activities. Components of sample custody procedures include the use of field logbooks, sample labels, custody seals, and COC forms. Each person involved with sample handling must be trained in COC procedures before the start of the field project. The COC form must accompany the samples during shipment from the field to the laboratory.

A sample is under custody under the following conditions:

- It is in one's actual possession
- It is in one's view, after being in one's physical possession
- It was in one's physical possession and that person locks it up to prevent tampering
- It is in a designated and identified secure area

2.3.3 Field Custody

The following procedures must be used to document, establish, and maintain custody of field samples:

- Sample labels must be completed for each sample with waterproof ink, ensuring that the labels are legible and affixed firmly on the sample container.
- All sample-related information must be recorded in the project logbook.
- The field sampler must retain custody of samples until they are transferred or properly dispatched.
- One individual from the field sampling team should be designated as the individual responsible for all sample transfer activities. This field investigator will be responsible for the care and custody of samples until they are properly transferred to another person or facility.
- All samples will be accompanied by a COC record. This record documents the transfer of custody of samples from the field investigator to another person, to the laboratory, or to other organizational entities. Each change of possession must be accompanied by an authorized signature for relinquishment and receipt of the samples.
- Completed COC forms will be enclosed in a "sealed" plastic Zip-Lock® bag (or its equivalent) and placed inside the shipping container used for sample transport from the field to the laboratory.
- When samples are relinquished to a shipping company for transport, the tracking number from the shipping bill or receipt will be recorded on the COC form.
- Custody seals must be affixed on shipping containers when samples are shipped to the laboratory to prevent sample tampering during transportation. If seals are numbered, record the numbers on the chain of custody and in the field log book.

2.3.4 Laboratory Sample Custody

Each laboratory receiving samples must comply with the laboratory sample custody requirements outlined in the subcontract document and its own QAP. The PC will notify the laboratory of upcoming field sampling activities and the subsequent transfer of samples to the laboratory. This notification will include information concerning the number and type of samples to be shipped and the expected date of arrival.

The following procedures will be used by the laboratory sample custodian, once the samples have arrived at the laboratory:

- The laboratory will designate a sample custodian who will be responsible for maintaining custody of the samples and for maintaining all associated records documenting that custody.
- Upon receipt of the samples, the custodian will check the original chain of custody and request-for-analysis documents and compare them with the labeled contents of each sample container for corrections and traceability. The sample custodian will sign the chain of custody and record the date and time received. The sample custodian also will assign a unique laboratory sample number to each sample.
- Cooler temperature (temperature blank) will be checked and recorded.
- Care will be exercised to annotate any labeling or descriptive errors. If discrepancies occur in the documentation, the laboratory will immediately contact the PC as part of the CA process. A qualitative

assessment of each sample container will be performed to note anomalies, such as broken or leaking bottles. This assessment will be recorded as part of the incoming chain of custody procedure.

- If all data and samples are correct and there has been no tampering with the custody seals, the "Received by Laboratory" box will be signed and dated.
- Samples will be stored in a secured area and at a temperature of approximately 4 degrees Celsius (°C), if necessary, until analyses are to begin.
- The laboratory will send a sample acknowledgment letter to the PC as a record that the shipment arrived and noting the conditions of the containers upon arrival. Any discrepancy will be identified and CAs performed. These remarks will be documented on a “sample receipt checklist” or its equivalent. The PC may need to be contacted to provide guidance concerning additional CAs or guidance. The PM and PC will retain copies of the sample acknowledgment with the COC.
- All samples will be accompanied by a COC form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents transfer of custody of samples from the field sampler to another person or to the laboratory. Overnight carriers will be treated as a single entity, and a single signature will be required when samples are delivered to the laboratory.
- A laboratory chain of custody form will accompany the sample or sample fraction through final analysis for control.
- Copies of the COC and request-for-analysis forms will accompany the laboratory report and will become a permanent part of the project records.
- Samples must be properly packaged for shipment and dispatched to the appropriate laboratory for analysis with a separate signed COC form enclosed in each sample box or cooler.
- All packages must be accompanied by a chain of custody form identifying the contents. The original record must accompany the shipment, and the FTL must retain a copy. Additional details about laboratory sample custody are included in the laboratories’ sample receipt SOP which can be made available upon request.

2.3.5 Sample Packing and Shipping

Samples will be cushioned with packaging material and placed into coolers containing enough ice to keep the samples below 6 °C until they are received by the laboratory. The chain of custody will also be placed into the cooler. Coolers will be shipped to the laboratory via FedEx, with the airbill number indicated on the chain of custody (to relinquish custody). The FTL is responsible for the care and custody of samples until they are shipped or otherwise delivered to the laboratory custodian).

2.4 Analytical Methods Requirements

Samples will be analyzed using USEPA-approved methods or other recognized standard methods (USEPA, 1992). The principal source for analytical methods is:

- Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (USEPA, 1998)
- Methods for Chemical Analysis of Water and Wastes (USEPA, 1983)
- qPCR analysis per MI SOP-qPCR 1.0 (updated June 2012, Microbial Insights) and and MI SOP-ABI7300 (updated June 2012, Microbial Insights)

Refer to ***Attachment I, Table 5, Analytical SOP Requirements Table,*** for analytical methods to be used for the analysis of the target compounds and the containers needed for sampling, including preservation requirements and maximum holding times.

2.4.1 Analytical Methods

Refer to ***Attachment I, Table 4, Analytical Services Table,*** for the list of analytical methods to be used.

Refer to ***Attachment I, Table 3, Analytical SOP References Table,*** for the list of analytical SOPs to be followed during analysis. Copies of laboratory SOPs will be made available upon request.

2.4.2 Detection, Quantitation, and Reporting Limits

2.4.2.1. Detection Limits

The detection limit (DL) is the minimum amount of an analyte that can be routinely identified using a specific method and instrument measured and reported with 99 percent confidence that the analyte concentration is greater than zero.

2.4.2.2. Limit of Detection

The limit of detection (LOD) is the smallest amount or concentration of a substance that must be present in a sample in order to be detected at a 99 percent confidence level. All non-detects are to be reported at the LOD. The LOD is equal to or greater than the DL and is verified quarterly.

2.4.2.3. Limit of Quantitation

Quantitative results can only be achieved at or above the limit of quantitation (LOQ). The LOQ is defined as the lowest concentration of a substance that produces a quantitative result within specified limits of precision and bias. For results falling between the DL and the LOQ, a "J" flag will be applied to the results, indicating the variability associated with the result.

2.4.3 Target Analytes and Reporting Limits

Refer to ***Attachment I, Tables 6-1 through 6-12, Reference Limits and Evaluation Tables****.*

2.4.4 Data Package Deliverables

Refer to ***Attachment I, Table 7, Data Package Deliverable Table****.*

2.5 Quality Control Requirements

Refer to ***Attachment I, Tables 8-1 through 8-20, Laboratory QC Samples Table*** and ***Table 9-1 through 9-12, Field QC Samples Table****.*

The following text describes this project's QC requirements:

2.5.1 Field QC Blank Samples

For the purposes of this project, field QC samples will be utilized.

The type and frequency of field QC samples should be evaluated as part of the project planning process. In the following subsections, typical field QC blank samples and duplicate field samples are defined.

Blank samples should not contain any target parameter of interest. There are certain organic compounds known to be common laboratory contaminants, such as acetone, methylene chloride, and the common phthalates. However, the laboratory must make all efforts to eliminate these compounds as contaminants.

Equipment Rinsate Blank Samples

Equipment rinsate blanks (ERBs) are samples of ASTM Type II water passed through and over the surface of decontaminated sampling equipment. The rinse water is collected in sample bottles, preserved, and handled in the same manner that is used when collecting aqueous samples, even if the ERBs are being collected for soil samples. ERBs are used to monitor the effectiveness of the decontamination process. One ERB will be collected per type of sampling equipment lot and analyzed for the same parameters as the corresponding samples.

Trip Blanks

Trip blanks are sent with each cooler shipped to the offsite laboratory containing samples requiring volatile organic compounds (VOCs) analysis. Trip blanks consist of a sample of analyte-free media taken from the laboratory to the sampling site and returned to the laboratory unopened. A trip blank is used to document contamination attributable to shipping and field handling procedures. This type of blank is useful in documenting contamination of VOC samples. One trip blank will be shipped with each cooler containing VOC samples.

Temperature Blanks

Temperature blanks are sent with each cooler shipped to the offsite laboratory containing samples requiring preservation at 4°C. Temperature blanks consist of a non-preserved volatile organic compounds (VOC) vial, or similar laboratory container, filled with ASTM reagent grade water. Temperature blanks are measured at the laboratory upon receipt to verify the temperature of the samples contained in the cooler. One temperature blank will be shipped with each cooler to each offsite laboratory.

Duplicate Field Samples

Duplicate field samples are collected to monitor the precision of the field sampling process. The FTL will choose at least 10 percent (per matrix) of the total number of sample locations known or suspected to contain moderate contamination, and duplicate field samples will then be collected at these locations. The identity of the duplicate samples will be recorded in the field sampling logbook, and this information will be forwarded to the DQE team to aid in reviewing and evaluating the data.

2.5.2 Laboratory QC Blank and Matrix Spike Samples

Laboratory Method/Preparation Blanks

Laboratory method blanks are blank matrices (such as ASTM Type II water or Ottawa sand) that are treated as environmental samples, being prepared and analyzed along with the field samples. Laboratory method blanks are used to monitor laboratory performance and to check for contamination introduced during the preparation and analytical procedures. A method blank is required for every 20 field samples or for each analytical batch, whichever is more frequent.

Blank samples should not contain any target parameter of interest. There are certain organic compounds known to be common laboratory contaminants, such as acetone, methylene chloride, and the common phthalates. However, the laboratory must make all efforts to eliminate these compounds as contaminants. The concentration of all target compounds must be less than the RL, except for the common contaminants; the concentration of the common contaminants must be less than five times the RL.

Surrogate Spikes

Surrogate spike compounds are added to each sample for the organic analytical methods. Surrogate spike compounds are structurally similar (but not identical) to target compounds and should behave in a similar manner during analysis. Surrogate spike recoveries are used to monitor both laboratory performance and matrix interferences. Surrogate spike recoveries from field and laboratory blanks are used to evaluate laboratory performance because these blanks represent an ideal sample matrix. Surrogate spike recoveries for field samples are used to evaluate the potential for matrix interferences. When surrogate spike recoveries for field samples fall outside the method target acceptance windows, the samples are re-extracted if appropriate, then re-analyzed. If the surrogate spike recovery is still outside the acceptance window for the re-analyzed sample, then the sample results are qualified as affected by matrix interferences.

Laboratory Control Spike Samples

The LCSs are analyte-free water (for aqueous analyses) or Ottawa sand (for soil analyses) (except metals where glass beads of 1-millimeter [mm] diameter or smaller may be used) spiked with all target analytes. The

appropriate spiking concentration will be spiked at a level less than or equal to the midpoint of the calibration curve for each analyte.

The LCS will be carried through the complete sample preparation and analysis procedure. The LCS is used to evaluate each preparation and analytical batch and to determine if the method is in control. The LCS cannot be used as the continuing calibration verification (CCV). One LCS will be included in every preparation and analytical batch. If more than on LCS is analyzed in an analytical batch, results from all LCSs analyzed will be reported.

Whenever an analyte in a LCS is outside the acceptance limit, CA will be performed. After the system problems have been resolved and system control has been reestablished, all samples in the analytical batch will be reanalyzed for the out-of-control analyte(s). When an analyte in a LCS exceeds the upper or lower control limit and no CA is performed or the CA was ineffective, the laboratory should discuss the issue with the PC or QAM personnel.

Interference Check Samples

The interference check sample (ICS), used in ICP analyses only, contains both interfering and analyte elements of known concentrations. The ICS is used to verify background and interelement correction factors and is run at the beginning and end of each run sequence.

When the ICS results are outside of the acceptance limits as prescribed in the method, CA will be performed. After the system problems have been resolved and system control has been re-established, re-analyze the ICS. If the ICS result is acceptable, re-analyze all affected samples.

Internal Standards

Internal standards (ISs) are known amounts of certain compounds added after preparation or extraction of a sample. These compounds are used in an IS calibration method to correct sample results affected by column injection losses, purging losses, or viscosity effects. ISs will be added to environmental samples, control samples, and blanks in accordance with the method requirements.

When the IS results are outside of the acceptance limits, CAs will be performed. After the system problems have been resolved and system control has been reestablished, all samples analyzed while the system was malfunctioning will be reanalyzed.

2.5.3 Retention Time Windows

Retention time windows are established to compensate for minor shifts in absolute retention times resulting from normal chromatographic variability. Absolute retention times are used for analyte identification in all gas chromatography (GC) and HPLC methods that do not employ IS calibration. Retention time windows are used in GC and HPLC analysis for qualitative identification of analytes. They are calculated from replicate analyses of a standard on multiple days. If the analyte retention time is outside the established window, new retention windows must be established.

2.5.4 Confirmation of Identification

Quantitative confirmation of results at or above the RL for samples analyzed by GC or HPLC will be required and will be completed within the method-required holding times. For GC methods, a second column is used for confirmation. For HPLC methods, a second column or a different detector is used. The result from the lowest quantitation between the primary and secondary column/detector will be used for reporting purposes. The lowest quantitation will be reported to minimize the reporting of bias high results arising from co-elution of non-target analytes with the analyte of interest.

2.5.5 Standard Materials

Standard materials, including second source materials, used in calibration and to prepare samples will be traceable to National Institute of Standards and Technology (NIST), USEPA, American Association of Laboratory Accreditation (A2LA)

or other equivalent approved source, if available. If an NIST, USEPA, or A2LA standard material is not available, the standard material proposed for use will be included in an addendum to the QAPP and approved before use. The standard materials will be current, and the following expiration policy will be followed: The expiration dates for ampulated solutions will not exceed the manufacturer's expiration date or 1 year from the date of receipt, whichever comes first. Expiration dates for laboratory-prepared stock and diluted standards will be no later than the expiration date of the stock solution or material or the date calculated from the holding time allowed by the applicable analytical method, whichever comes first. Expiration dates for pure chemicals will be established by the laboratory and be based on chemical stability, possibility of contamination, and environmental and storage conditions. Expired standard materials will be either revalidated prior to use or discarded. Revalidation may be performed through assignment of a true value and error window statistically derived from replicate analyses of the material as compared to an unexpired standard. The laboratory will label standard and QC materials with expiration dates.

A second source standard is used to independently confirm initial calibration. A second source standard is a standard purchased from a different vendor than the vendor supplying the material used in the initial calibration standards. The second source material can be used for the continuing calibration standards or for the LCS (but will be used for one of the two). Two different lot numbers from the same vendor do not constitute a second source.

2.6 Field and Laboratory Corrective Action

The procedures that will be followed in identifying problems and performing CAs in the field and in the laboratory are described below.

2.6.1 Field Corrective Action

The PM is responsible for overseeing the CA process, but any team member may initiate it. The CA process consists of identifying a problem, acting to eliminate the problem, monitoring the effectiveness of the CA, verifying that the problem has been eliminated, and documenting the CA.

Examples of CA are correcting COC forms; problems associated with sample collection, packaging, shipping, or field record keeping; or additional training in sampling and analysis. Additional approaches may include re-sampling or evaluating and amending sampling procedures.

2.6.2 Laboratory Corrective Action

The laboratory department supervisors will review the data generated to verify that all QC samples have been run as specified in the procedure. Laboratory personnel are alerted that CAs may be necessary under the following conditions:

- QC data are outside the warning or acceptable windows for precision and accuracy established for laboratory samples.
- Blanks contain contaminants at concentrations above the levels specified in the laboratory QA plan for any target compound.
- Deficiencies are detected by the laboratory QA director during internal or external audits, or from the results of performance evaluation samples.

CAs are implemented immediately when non-conformances in QC sample results are identified by the bench analyst. CA procedures are handled initially at the bench level by the analyst, who reviews the preparation or extraction procedure for possible errors and checks such parameters as instrument calibration, spike and calibration mixes, and instrument sensitivity.

The analyst immediately notifies his or her supervisor of the problem and the investigation being conducted. If the problem persists or cannot be identified, the matter must be referred to the laboratory supervisor and the QA/QC officer for further investigation. At this point, the PC and the PM must be notified about the non-conformance. All laboratory QC problems that will affect the final data must be discussed with the PC as part of the CA process. Once resolved, full documentation of the CA procedure must be filed with the laboratory supervisor, and the

QA/QC officer must be provided with a CA memorandum for inclusion in the project file if data are affected. A copy of the CA memorandum must be included in the laboratory data package deliverable.

CAs may include the following:

- Reanalyzing suspect samples
- Recalibration with new standards
- Eliminating blank contamination
- Resampling and analyzing new samples
- Evaluating and amending sampling and analytical procedures
- Accepting data with an acknowledged level of uncertainty
- Recalibrating analytical instruments
- Qualifying or rejecting the data

After implementation of the required CA measures, data that are deemed unacceptable may not be accepted by the PM, and follow-up CAs may be explored. Details of laboratory CAs are provided in the laboratory QAM.

2.7 Instrument and Equipment Testing, Inspection, and Maintenance Requirements

2.7.1 Field Instruments

All equipment used for field measurements will be maintained in accordance with the manufacturer's instructions. Routine maintenance and all equipment repairs will be documented in the site logbook. Whenever a piece of equipment fails to operate properly, the instrument will either be repaired in-house, if possible, or sent out for repair. Another instrument equivalent to the original will be substituted, if possible. Other than solutions and standards for calibrating the equipment, the field team keeps only a limited amount of supplies on hand. Parts are ordered on an as-needed basis.

2.7.2 Analytical Laboratory Instruments

Preventive maintenance for laboratory instruments is detailed in ***Attachment I, Table 10, Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table***.

It is required that designated laboratory personnel will be trained in routine maintenance procedures for all major instrumentation. Either trained staff or trained service engineers or technicians employed by the instrument manufacturer will make repairs. The laboratory should have multiple instruments that will serve as back-up to minimize potential downtime. All maintenance will be documented and kept in permanent logs. These logs will be available for review by auditing personnel.

Laboratory equipment testing, inspection, and maintenance will be in accordance with the laboratory's QAP. The laboratory QAP should discuss the schedule, procedures, criteria, and documentation for verifying that all analytical equipment is operating in an accurate and precise manner. To minimize instrument downtime, each laboratory should have an internal instrument repair department or have a contract with a local instrument repair company. The laboratory keeps an inventory of certain supplies and consumables, as described in the laboratory's QAP. Additional parts or supplies are ordered on an as-needed basis.

2.8 Instrument Calibration and Frequency

Because instruments used during field investigation activities may be of several models and manufacturers, it is not feasible to present instrument-specific details in this subsection. Instead, instrument-specific calibration will be performed in accordance with the manufacturer's instructions, as provided in the instrument's SOP.

Refer to ***Attachment I, Table 11, Analytical Instrument Calibration Table***.

2.9 Inspection and Acceptance Requirements for Supplies and Consumables

All services, including subcontracted services and supplies received from vendors, must meet the project scope, specified levels of quality, and the submittal schedule. Field and laboratory personnel must evaluate the vendor's ability to provide the services and specify acceptance requirements for supplies and consumables. For example, laboratories rely on suppliers for solvents, gases, consumables, and analytical equipment, including instrument maintenance. The laboratory should have and maintain adequate contracts with its vendors to receive uninterrupted supplies, parts, and services.

2.10 Data Acquisition Requirements

In addition to the electronic data, the laboratory provides hard-copy deliverables of the analytical results. The hard-copy data packages are filed onsite until the project is completed. At that time, the data packages are sent to the PM for inclusion in the project files.

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SECTION 3

Assessment and Oversight

Section 3 describes the assessment and oversight activities that will be followed to determine whether the QC measures identified in the ***Towers Road Disposal Areas Remedial Investigation Work Plan*** and this QAPP are being implemented and documented as required.

Audits and reviews are the tools used to implement this process. For example, during a review, the auditor may check that a monitoring well has been correctly sampled or that the field QC samples were collected at the appropriate frequency. During an audit or review, the auditor may check for:

- Adherence to the Environmental Protection Plan included in ***Section 4.0 of the Towers Road Disposal Areas Remedial Investigation Work Plan***
- Documentation of the process or system
- Proper identification, resolution, and documentation of non-conformance with the process or system
- Correction of identified deficiencies

3.1 Assessments and Response Actions

The need for an audit can be determined independently by the PM. Assessment activities may include surveillance, inspection, peer review, management system review, readiness review, technical systems audit, performance evaluation, and data quality assessment. The PM will be responsible for initiating audits, selecting the audit team, and overseeing audit implementation. For the fieldwork, a monthly audit will be conducted throughout the duration of sampling activities.

The laboratory will be audited in accordance with the laboratory subcontract, as needed. The PC or a designee may perform laboratory audits in compliance with the subcontract. A follow-up meeting would be held to address any deficiencies or issues identified during the audit.

Field audits may be conducted by a review team member, as designated by the PM. One field audit, if requested, will be performed during the first week of sampling.

3.1.1 Laboratory Performance and System Audits

Laboratory systems will be audited in accordance with the project-specific requirements. Contracted laboratories must submit a laboratory Quality Assurance Plan (QAP). The QAP must reference relevant SOPs and the laboratory's internal procurement policies and corrective action program.

The laboratory audit will address at least the following issues:

- Is the laboratory operation being performed as required by the subcontract?
- Are internal laboratory operations being conducted in accordance with the laboratory QAP?
- Are the laboratory analyses being performed in accordance with method requirements?

Any non-conformance noted during an audit will result in a corrective action.

3.1.2 Field Team Performance and System Audits

The PC or other member of the review team, as designated by the PM, may conduct an audit of the field activities in accordance with the program requirements. The audit will address at least the following issues:

- Are sampling operations being performed as stated in the Work Plan?
- Are the sample labels being filled out completely and accurately?
- Are the chain-of-custody records complete and accurate?

- Are the field notebooks being filled out completely and accurately?
- Are the sampling activities being conducted in accordance with the Work Plan and approved SOPs?
- Are the documents generated in association with the field effort being stored as described in the Work Plan?

The generation and documentation of field data may also be audited. Audits will focus on verifying that proper procedures are followed so that subsequent sample data will be valid. Any non-conformance noted during an audit will result in a corrective action.

The results of the assessment and oversight activities will be reported back to the PM, who has ultimate responsibility for ensuring that the corrective action response is completed, verified, and documented.

See ***Table 12 of Attachment I*** for a copy of the Field Performance Audit Checklist.

3.2 Reports to Management

Reports to the PM include project status reports, the results of evaluation and system audits, data quality assessments, and significant QA problems and recommended solutions. The status reports, submitted in accordance with the requirements of the Work Plan, will discuss at least current activities, problems encountered and their resolution, and planned work.

QA reports will be submitted in accordance with the Work Plan. QA reports document implementation of the QAPP and the results of the site-specific QA/QC audits. A final QA report must be submitted as part of each project's final report. The topics to be covered are outlined in the Work Plan, but each will include at least the following information:

- Identification of non-conformances that required corrective action and resolution of the non-conformance
- Data quality assessment in terms of precision and accuracy and how they affect the usability of the analytical results
- Limitations of the qualified results and a discussion of rejected results
- Discussion of the field and laboratory QA/QC sample results
- The results of external laboratory audits

The FTL will provide feedback to the PM discussing all field activities, changes to field procedures, problems encountered, and corrective actions taken.

SECTION 4

Data Review, Validation, and Verification Requirements

This subsection addresses the QA activities that occur after the data collection has been completed. Implementation of these elements, which include data review, validation, and reconciliation to DQOs, will determine the extent to which the data conform to the specified criteria and satisfy the project objectives.

4.1 Data Review, Validation, and Verification Requirements

The data are evaluated for precision, accuracy, and completeness against the analytical protocol requirements. Non-conformances or deficiencies that could affect the usability of data are identified as noted.

All analytical data will be supported by a data package. The data package will contain the supporting QC data for the associated field samples. Before the laboratory will release each data package, the laboratory QAM (or the analytical section supervisor) must carefully review the sample and laboratory performance QC data to verify sample identity, the completeness and accuracy of the sample and QC data, and compliance with method specifications.

4.2 Verification and Validation Methods

4.2.1 Data Verification

Before the analytical results are released by the laboratory, both the sample and QC data will be reviewed carefully to verify sample identity, instrument calibration, detection limits, dilution factors, numerical computations, accuracy of transcriptions, and chemical interpretations. Additionally, the QC data will be reduced and spike recoveries will be included in control charts, and the resulting data will be reviewed to ascertain whether they are within the laboratory-defined limits for accuracy and precision. Any non-conforming data will be discussed in the data package cover letter and case narrative. The laboratory will retain all of the analytical and QC documentation associated with each data package.

As discussed previously, the data are also verified to assess whether the electronic data deliverables (EDDs) and the hard-copy data deliverables are consistent with one another to ensure an accurate database.

4.2.2 Data Validation

The project chemist will ensure that the laboratory analyzed the samples using the correct methods and that all analytes from each analysis group are reported (as per ***tables 6-1 through 6-12 of Attachment I***). The quantitation limits utilized by the laboratory for the project will be compared to the quantitation limits presented in ***tables 6-1 through 6-12 of Attachment I***. If quantitation limits were not met, the reason will be determined and documented. Field QC sample results will be documented and the project chemist will establish that all required QAPP QC samples were run and met the limits specified in ***Tables 6-1 through 6-12 of Attachment I***.

All non-analytical field data will be reviewed by the FTL. Non-analytical field data will be compared against QAPP requirements for completeness and accuracy based on the field calibration records.

4.3 Usability Assessment

It is the responsibility of the PC to ensure that the analytical data meet the method detection limits, reporting limits, and laboratory QC limits listed in this QAPP, the laboratory statement of work, and the various methods. During this assessment, non-conformances are documented, the data are qualified for use in decision making, and for 10 percent of the results the entire analytical process is reconstructed and recalculated from the raw data.

Non-detected site contaminants will be evaluated to ensure that project required quantitation limits (**Attachment I**, ***Tables 6-1 through 6-12)*** were achieved. If project quantitation limits were achieved and the verification and validation steps yielded acceptable data, then the data is considered usable. For statistical comparisons non-detect values will be represented by a concentration equal to one-half the sample reporting limit. For duplicate sample results, the most conservative value will be used for project decisions. Analytical data will be checked to ensure the values and any qualifiers are appropriately transferred to the electronic database. These checks include comparison of hardcopy data and qualifiers to the electronic data deliverable. Once the data has been uploaded into the electronic database, another check will be performed to ensure all results were loaded accurately. Field and laboratory precision will be compared as relative percent difference (RPD) between the two results. Deviations from the QAPP will be reviewed to assess whether corrective action is warranted and to assess impacts to achievement of project objectives.

Describe the evaluative procedures used to assess overall measurement error associated with the project:

To assess whether a sufficient quantity of acceptable data are available for decision making, the data will be reconciled with measurement performance criteria following a review of data quality indicator. If significant biases are detected with laboratory QA/QC samples it will be evaluated to assess impact on decision making. Low biases will be described in greater detail as they represent a possible inability to detect compounds that may be present at the site. If significant deviations are noted between lab and field precision the cause will be further evaluated to assess impact on decision making.

Identify the personnel responsible for performing the usability assessment:

- PC – Bianca Kleist/CH2M HILL
- PM – Janna Staszak /CH2M HILL

Describe the documentation that will be generated during usability assessment and how usability assessment results will be presented so that they identify trends, relationships (correlations), and anomalies:

All the results will be assembled and statistically reported for an overall quality assessment provided in the final project event report. Discussion will cover completeness and representativeness.

Data tables will be produced to reflect detected and non-detected site contaminants and geochemical parameters. Data qualifiers will be reflected in the tables and discussed in the data quality evaluation. Figures will be produced representing concentrations of contamination.

4.3.1 Data Quality Evaluation

The PC or designee will perform the data quality evaluation (DQE). The DQE process is used to assess the effect of the overall analytical process on the usability of the data. The two major categories of data evaluation are laboratory performance and matrix interferences. Evaluation of laboratory performance is a check for compliance with the method requirements. It is a straight-forward examination–either the laboratory did, or did not, analyze the samples within the limits of the analytical method. Evaluation of the matrix interferences is more subtle and involves analysis of several results, including surrogate spike recoveries, matrix spike recoveries, and duplicate sample results.

The entire data set will be evaluated for overall trends in data quality and usability. Information summarized as part of the DQE may include chemical compound frequencies of detection, dilution factors that might affect data usability, and patterns of target compound distribution. The data set also will be evaluated to identify potential data limitations or uncertainties in the laboratory.

4.3.2 Reconciliation with Data Quality Objectives

The final activity of the data evaluation process is to assess whether the data meet the planned DQOs for the project. The final results, as adjusted for the findings of any data evaluation, will be checked against the DQOs, and an assessment will be made as to whether the data are of sufficient quality to support the DQOs. The decision as to data sufficiency may be affected by the overall precision, accuracy, and completeness of the data. The main

project objective should be met assuming the 90 percent completeness goal is obtained after all of the data have undergone sufficient data validation. If the data, after evaluation, are sufficient to achieve project objectives, the data quality manager and project manager will release the data and work may proceed.

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SECTION 5

References

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United States Environmental Protection Agency (USEPA). 1998. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. SW-846.* Third Edition and its updates.

USEPA. 2000. *Guidance for the Data Quality Objectives Process* (QA/G-4).

USEPA. 2001. *EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations.*

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USEPA. 2005. *Uniform Federal Policy for Quality Assurance Plans* (UFP-QAPP).

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Attachment I
Tables

TABLE 1
Communication Pathway and Procedures, Distribution List, and Project Personnel Sign-Off Sheet

Name of Quality Assurance Project Plan (QAPP) Recipient	Title/Role	Organization	Telephone Number (Optional)	E-mail Address or Mailing Address	Communication Drivers	Procedure, Pathway, etc	QAPP Section Reviewed	Date QAPP Read
Dawn Hayes	NAVFAC Remedial Project Manager (RPM)	NAVFAC Mid-Atlantic	(757) 322-4792	dawn.hayes@navy.mil	Communication HPDTA	Oversees project. Primary points of contact (POCs) for NAVFAC; can delegate communication to other internal or external POCs. RPM will notify USEPA and NCDENR via email or telephone call within 24 hours for field changes affecting the scope or implementation of the design. Navy will have 30 days for Work Plan review. All sampling data will be presented and discussed during partnering meetings.		
Brian Murphy	Environmental & Safety Program Manager	HPDTA	(252) 426-4360	hpdta.env.saf@us.army.mil	Communication with HPDTA	Oversees project. POC for HPDTA; can delegate communication to other internal or external POC. Will notify RPM via email or telephone call within 24 hours for field changes effecting the scope or implementation of design. HPDTA will have 30 days for Work Plan review.		
Kim Caulk	NCDENR Environmental Representative	NCDENR IHSB REC Program	(919) 707-8350	Kim.caulk@ncdenr.gov	Communication with NCDENR	Primary POC for NCDENR; can delegate communication to other internal or external POCs.		
Kim Henderson	Registered Site Manager (RSM)	CH2M HILL	(757) 671-6231	kimberley.henderson@ch2m.com	Communication regarding overall project status and implementation and primary POC with Navy RPM and HPDTA	Oversees project and will be informed of project status by the PM. If field changes occur AM will work with the Navy RPM and HPDTA to communicate in field changes to the team via email within 24hrs.		
Chris Bozzini	Senior Technical Consultant (STC)	CH2M HILL	(704) 544-5163	chris.bozzini@ch2m.com	Communication regarding questions/issues encountered in the field, input on data interpretation, as needed.	Responsible for technical content of the deliverables, and will provide technical guidance throughout the project in order to effectively implement quality and technical risk management. All deliverables will be reviewed by the STC prior to submittal for client review. The STC is responsible for oversight of all site related documents.		
Janna Staszak	Project Manager	CH2M HILL	(757) 671-6256	janna.staszak@ch2m.com	Communications regarding project management and implementation/ Field corrective actions (CAs)	Manages project. All information and materials about the project will be forwarded to the Navy, HPDTA, Activity Mangers, and Senior Consultants as soon as possible, as necessary. POC for field sampling team, field and analytical issues requiring CA will be determined by the FTL and/or PM on an as needed basis; the PM will ensure QAPP requirements are met by field staff for duration of project.		
Carl Woods	CH2M HILL H&S Manager	CH2M HILL	(513) 319-5771	carl.woods@ch2m.com	Health and Safety (H&S)	Responsible for generation of the Health and Safety Plan (HSP) and approval of the activity hazard analyses (AHAs) prior to the start of field work. The PM will contact the H&S Manager as needed regarding questions/issues encountered in the field.		
Nate Price	Field Team Leader (FTL)	CH2M HILL	(757) 671-6280	nathaniel.price@ch2m.com	Work Plan changes in field/ QAPP Field Changes/ Field Progress Reports/ Field CAs	Coordinates all field activities and sampling. Documentation of deviations from the Work Plan will be made in the field logbook and the PM will be notified immediately. Deviations will be made only with approval from the PM. Documentation of field activities and work plan deviations (made with the approval of AM and/or QAO) in field logbooks; provide daily progress reports to PM. Field and analytical issues requiring CA will be determined by the FTL and/or PM on an as needed basis; the PM will ensure QAPP requirements are met by field staff for duration of project.		
Nate Price	Site Safety Coordinator (SSC)	CH2M HILL	(757) 671-6280	nathaniel.price@ch2m.com	Overseeing staff health and safety in the field	Responsible for daily safety tailgates, weekly observations, and real-time discussions of observations and changes to be implemented with field staff. Refines and implements the project Accident Prevention Plan (APP) in the field. The SSC is responsible for stopping any investigation-related operation that threatens the health and safety of the field team or surrounding populace.		
Anita Dodson	Senior Chemist	CH2M HILL	(757) 671-6218	anita.dodson@ch2m.com	Release of Analytical Data	No analytical data can be released until validation of the data is completed and has been approved by the Project Chemist. The project chemist will review analytical results within 7 days of receipt for release to the project team. The project chemist will immediately notify the PM, Navy RPM, and Navy QAO of any data quality issues that might cause the project quality objectives to not be obtained. The PM and RPM shall also be notified is there are significant delays by the laboratory that would cause significant project delivery issues.		
Bianca Kleist	Project Chemist (PC)	CH2M HILL	(704) 543-3274	bianca.kleist@ch2m.com	Field and analytical CAs; Data tracking from field collection to database upload	Any CAs for field and analytical issues will be determined by the FTL and/or the Project Chemist and reported to the PM within 4hrs; Data management. On a daily basis, tracks data from sample collection through database upload.		

TABLE 1
Communication Pathway and Procedures, Distribution List, and Project Personnel Sign-Off Sheet

Name of Quality Assurance Project Plan (QAPP) Recipient	Title/Role	Organization	Telephone Number (Optional)	E-mail Address or Mailing Address	Communication Drivers	Procedure, Pathway, etc	QAPP Section Reviewed	Date QAPP Read
Marcia Colon	Laboratory Project Manager	ENCO	(407) 826-5314	mcolon@encolabs.com	Reporting lab data quality issues	Manages sample tracking and maintains communication with PC. All quality assurance/quality control (QA/QC) issues with project field samples will be reported within 2 days to the PC by the laboratory.		
Deb Patton		CAS Rochester	(585) 288-5380	Deb.Patton@ALSGlobal.comger				
Anita Biernacki		Microbial Insights	(865) 573-8188	abiernacki@microbe.com				

TABLE 2
Sample Analysis Summary Table[1]

Sample Location	Sample ID1	VOC	SVOC	Pesticides	PCBs	Metals[2]	Alkalinity	Chloride, Nitrate, Nitrite, Sulfate	Methane, Ethane, Ethene	Sulfide	TOC[3]	DHC[4]
		Analytical Group										
Groundwater												
TR2	TR2-GW01-MMYY	X	X	X	X	X	X	X	X	X	X	X
TR2	TR2-GW02-MMYY	X	X	X	X	X	X	X	X	X	X	
TR5	TR5-GW01-MMYY	X	X	X	X	X	X	X	X	X	X	X
TR5	TR5-GW02-MMYY	X	X	X	X	X	X	X	X	X	X	
Surface Soil												
TR2	TR2-SS01-MMYY	X	X	X	X	X						
TR2	TR2-SS02-MMYY	X	X	X	X	X						
TR2	TR2-SS03-MMYY	X	X	X	X	X						
TR2	TR2-SS04-MMYY	X	X	X	X	X						
TR2	TR2-SS05-MMYY	X	X	X	X	X						
TR2	TR2-SS03D-MMYY	X	X	X	X	X						
TR5	TR5-SS01-MMYY	X	X	X	X	X						
TR5	TR5-SS02--MMYY	X	X	X	X	X						
TR5	TR5-SS03-MMYY	X	X	X	X	X						
TR5	TR5-SS04-MMYY	X	X	X	X	X						
TR5	TR5-SS05-MMYY	X	X	X	X	X						
TR5	TR5-SS05D-MMYY	X	X	X	X	X						
Subsurface Soil												
TR2	TR2-SB01-TB-DB-MMYY	X	X	X	X	X						
TR2	TR2-SB02- TB-DB-MMYY	X	X	X	X	X						
TR2	TR2-SB03- TB-DB-MMYY	X	X	X	X	X						
TR2	TR2-SB04- TB-DB-MMYY	X	X	X	X	X						
TR2	TR2-SB05- TB-DB-MMYY	X	X	X	X	X						
TR2	TR2-SB06-TB-DB-MMYY	X	X	X	X	X						
TR2	TR2-SB07-TB-DB-MMYY	X	X	X	X	X						
TR2	TR2-SB08- TB-DB-MMYY	X	X	X	X	X						
TR2	TR2-SB09- TB-DB-MMYY	X	X	X	X	X						
TR2	TR2-SB010- TB-DB-MMYY	X	X	X	X	X						
TR2	TR2-SB011- TB-DB-MMYY	X	X	X	X	X						
TR2	TR2-SB012- TB-DB-MMYY	X	X	X	X	X						
TR2	TR2-SB013- TB-DB-MMYY	X	X	X	X	X						
TR2	TR2-SB014- TB-DB-MMYY	X	X	X	X	X						
TR2	TR2-SB015- TB-DB-MMYY	X	X	X	X	X						
TR2	TR2-SB016- TB-DB-MMYY	X	X	X	X	X						
TR2	TR2-SB017- TB-DB-MMYY	X	X	X	X	X						
TR2	TR2-SB018- TB-DB-MMYY	X	X	X	X	X						
TR2	TR2-SB04D- TB-DB-MMYY	X	X	X	X	X						
TR2	TR2-SB011D- TB-DB-MMYY	X	X	X	X	X						
TR5	TR5-SB01-TB-DB-MMYY	X	X	X	X	X						

TABLE 2
Sample Analysis Summary Table[1]

Sample Location	Sample ID1	VOC	SVOC	Pesticides	PCBs	Metals[2]	Alkalinity	Chloride, Nitrate, Nitrite, Sulfate	Methane, Ethane, Ethene	Sulfide	TOC[3]	DHC[4]
		Analytical Group										
TR5	TR5-SB02- TB-DB-MMYY	X	X	X	X	X						
TR5	TR5-SB03- TB-DB-MMYY	X	X	X	X	X						
TR5	TR5-SB04- TB-DB-MMYY	X	X	X	X	X						
TR5	TR5-SB05- TB-DB-MMYY	X	X	X	X	X						
TR5	TR5-SB01- TB-DB-MMYY	X	X	X	X	X						
TR5	TR5-SB06- TB-DB-MMYY	X	X	X	X	X						
TR5	TR5-SB07- TB-DB-MMYY	X	X	X	X	X						
TR5	TR5-SB08- TB-DB-MMYY	X	X	X	X	X						
TR5	TR5-SB09- TB-DB-MMYY	X	X	X	X	X						
TR5	TR5-SB010- TB-DB-MMYY	X	X	X	X	X						
TR5	TR5-SB011- TB-DB-MMYY	X	X	X	X	X						
TR5	TR5-SB012- TB-DB-MMYY	X	X	X	X	X						
TR5	TR5-SB013- TB-DB-MMYY	X	X	X	X	X						
TR5	TR5-SB014- TB-DB-MMYY	X	X	X	X	X						
TR5	TR5-SB015- TB-DB-MMYY	X	X	X	X	X						
TR5	TR5-SB016- TB-DB-MMYY	X	X	X	X	X						
TR5	TR5-SB017- TB-DB-MMYY	X	X	X	X	X						
TR5	TR5-SB018- TB-DB-MMYY	X	X	X	X	X						
TR5	TR5-SB19- TB-DB-MMYY	X	X	X	X	X						
TR5	TR5-SB20- TB-DB-MMYY	X	X	X	X	X						
TR5	TR5-SB21- TB-DB-MMYY	X	X	X	X	X						
TR5	TR5-SB09D- TB-DB-MMYY	X	X	X	X	X						
TR5	TR5-SB12D- TB-DB-MMYY	X	X	X	X	X						
Other QA/QC Samples												
N/A	*TR-EB##-MMDDYY*	X	X	X	X	X						
N/A	*TR-TB##-MMDDYY*	X	X	X	X	X						

QA/QC counts are dependent on the total number of samples collected and therefore will be adjusted as the number of sampling locations is adjusted.

MMYY = Month, Year; TB = Top Depth; DB = Bottom Depth

QA/QC sample IDs include additional identifiers; D = Duplicate; EB = Equipment Blank; TB = Trip Blank

[1] General QA/QC approach: duplicates (1 per 10 samples per media), trip blanks (1 per VOA shipment), and equipment blanks (1 per equipment lot, assuming 1 lot of trowels and 1 lot of tubing). [1] Background samples will be collected for this project.

[2] Metals: Mercury and Hexavalent Chromium data will be collected for screening purposes only and QC will not be collected. Full QA/QC will be collected for the rest of the Metals analyte list.

[3] Total Organic Carbon

[4] Dehalococcoides

TABLE 3
Analytical SOP Reference Table

Lab SOP Number	Title, Revision Date, and Number	Date reviewed if not revised	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	Variance to QSM	Modified for Project Work?
LOGINS-03	Receiving Samples (Rev. 11, Effective 07/31/2012)	NA	NA	NA	NA	ENCO	NA	No
ADMIN-14	Waste Disposal and Characterization (Rev. 6, 09/16/2011)	06/29/2012	NA	NA	NA	ENCO	NA	No
MET-03	Mercury in Waters by Digestion/CVAA (Rev. 5, 02/20/2012)	NA	Definitive	Aqueous, Metals	CVAA	ENCO	Y – ENCO does not perform Method of Standard Additions (MSA)	No
MET-05	Metals Analysis by ICP-AES (Rev. 9, 03/09/2012)	NA	Definitive	Aqueous/Solids, Metals	ICP	ENCO	Y - ENCO does not perform MSA	No
Met-15	Metals Analysis by ICP-MS (Rev. 5, 2/14/2011)	2/1/2012	Definitive	Aqueous/Solids, Metals	ICP-MS	ENCO	Y - ENCO does not perform MSA	No
MET-16	Mercury in Soils By Digestion/CVAA (Rev. 5, 03/12/2012)	NA	Definitive	Soils, Metals	CVAA	ENCO	Y - ENCO does not perform MSA	No
EXMT-07	Acid Digestion of Aqueous Samples & Extracts for Analysis by ICP or ICP-MS (Rev.8, 07/10/12)	NA	NA	Aqueous Extraction, Metals	NA	ENCO	None	No
EXMT-09	Acid Digestion of Soil and Waste Samples for Analysis by ICP and (Rev. 6, 08/31/2011) ICP-MS	03/27/2012	NA	Solid Extraction, Metals	NA	ENCO	None	No
VGCMS-05	Analysis of Volatile Organic Compounds by GC/MS (Rev. 17, 08/26/2011)	07/26/2012	Definitive	Aqueous/Solids, Volatile Organics	GCMS	ENCO	None	No
SVGCMS-03	Semivolatile Organic Compounds by GC/MS (Rev. 17, 08/15/2011)	04/19/2012	Definitive	Aqueous/Solids, Semivolatile Organics	GCMS	ENCO	See footnote[1]	No
SVGC-04	Organochlorine Pesticides by GC/ECD (Rev. 10, 09/21/2011	02/02/12	Definitive	Aqueous/Solids, Pesticides	GC	ENCO	See footnote[2]	No
SVCG-07	Polychlorinated Biphenyls by GC/ECD (Rev.5, 03/22/2012)	NA	Definitive	Aqueous/Solids, PCB	GC	ENCO	See footnote[3]	No
EXSV-16	Extraction of Soil/Solid Samples Using Sonication (Rev. 7, 03/16/2012)	NA	NA	Solids Extraction, Semivolatiles	NA	ENCO	None	No
EXSV-27	Extraction of Samples Using Separatory Funnel Techniques (Rev. 5, 09/15/2011)	08/17/2012	NA	Aqueous Extraction, Semivolatiles	NA	ENCO	None	No

TABLE 3
Analytical SOP Reference Table

Lab SOP Number	Title, Revision Date, and Number	Date reviewed if not revised	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	Variance to QSM	Modified for Project Work?
VGC-11	Analysis of Dissolved Gases by Headspace GC/TCD/FID (Rev. 5, 06/24/2011)	08/14/2012	Definitive	Aqueous Dissolved Gases	GC	ENCO	None	No
WETS-004	Alkalinity (Titrametric, pH 4.5); EPA Method 310.1 (Rev. 9, 07/30/2012)	NA	Definitive	Aqueous/Solids, Alkalinity	Buret	ENCO	None	No
WETS-57	Ion Chromotography (Rev. 6, 02/29/2012)	NA	Definitive	Aqueous, Ions	IC	ENCO	None	No
WETS-66	Total and Dissolved Organic Carbon by Combustion-Infrared Method Using the Tekmar Apollo 9000 TOC Combustion Analyzer (Rev. 4, 01/23/2010)	4/30/2012	Definitive	Aqueous, Wet Chemistry	NA	ENCO	None	No
WETS-061	Sulfide (Titrametric; Total Acid Soluble) (Rev.6, 07/20/2012)	NA	Definitive	Aqueous, Wet Chemistry	Buret	ENCO	None	No
GEN-7199	Hexavalent Chromium by Ion Chromatography, Rev. 5, 6/7/12	6/7/12	Definitive	Groundwater, Soil	IC	ALS-Columbia Analytical Services	None	No
GEN-3060	Alkaline Digestion for Hexavalent Chromium in Soil, Rev. 2, 1/6/11	1/5/12	Prep	Soil	Prep	ALS-Columbia Analytical Services	None	No
SOP-qPCR 1.0	MI SOP-qPCR 1.0	6/22/12	Definitive	Aqueous	ABI 7300	Microbial Insights	NA	No
SOP-ABI7300	MI SOP-ABI7300	6/22/12	Definitive	Aqueous	ABI 7300	Microbial Insights	NA	No
SOP COC 1.1	MI SOP COC 1.1	41082	NA	Various	NA	Microbial Insights	NA	No
SOP SamRec 1.1	MI SOP SamRec 1.1	41082	NA	Various	NA	Microbial Insights	NA	No
SOP Waste Disposal 1.0	MI SOP Waste Disposal 1.0	41082	NA	Various	NA	Microbial Insights	NA	No

Notes:

[1] ENCO routinely utilizes SW846 8270D criteria allowing 20% RSD for calibration. ENCO will utilize in-house limits for Benzaldehyde, Caprolactam, 1,1-biphenyl, and Atrazine (these analytes readily breakdown in multi-component spike mixes).

[2] ENCO will utilize SW846 Method 8000 internal standard procedures for performing Method 8081B. A 12 hour clock opening with Continuing Calibration Verification (CCV) and Performance Evaluation Mixture shall be utilized.

[2] Toxaphene and Chlordane are not included in LCS/Matrix Spikes/CCVs. All chromatograms are examined for the presence of Toxaphene and Chlordane. In the event Toxaphene or Chlordane are identified, the sample extracts are re-analyzed with Toxaphene/Chlordane-specific calibrations.

[3] ENCO will spike QC samples with Aroclors 1016 & 1260

TABLE 4
Analytical Services Table

Matrix	Analytical Group	Analytical Method	Data Package Turnaround Time	Laboratory / Organization	Backup Laboratory/ Organization
Groundwater, Surface Soil, Subsurface Soil	VOC	SW846 8260B	28 calendar-days	ENCO 10775 Central Port Drive Orlando, FL 32824 (407) 826-5314	TBD
	SVOC	SW846 8270D/8270D-SIM			
	Pests	SW846 8081B			
	PCBs	SW846 8082A			
	Metals (SW846 6020A – groundwater only)	SW846 6020A/7470B/7471A			
Groundwater	Wet Chemistry - Alkalinity	EPA 310.1			
	Wet Chemistry - Chloride, Nitrate, Nitrite, and Sulfate	EPA 300			
	Wet Chemistry - Methane, Ethane, and Ethene	RSK-175			
	Wet Chemistry - Sulfide	EPA 376.1			
Groundwater, Surface Soil, Subsurface Soil	Metals (SW846 6010C)	SW846 6010C		ENCO 4810 Executive Park Court, Suite 111 Jacksonville, FL 32824 (904) 296-3007	
Groundwater	Wet Chemistry - TOC	SW846 9060A			
Groundwater, Surface Soil, Subsurface Soil	Hexavalent Chromium	SW846 7199		Columbia Analytical Services 1565 Jefferson Road, Building 300, Suite 360 Rochester, NY 14623 (585) 288-5380	
Groundwater	Microbial (DHC)	qPCR		Microbial Insights 2340 Stock Creek Blvd. Rockford TN 37853 (865) 573-8188	

TABLE 5
Analytical SOP Requirements Table

Matrix	Analytical Group	Analytical Method / SOP Reference	Containers	Minimum Sample Amount Required for Analysis	Preservation Requirements	Maximum Holding Time
Groundwater	VOC	SW846 8260B/VGCMS-05	3, 40mL Vials, Glass	3 X 40mL (no headspace)	HCl to pH<2, Cool to <6°C	14 days
	SVOC	SW846 8270D and 8270D-SIM/ SVGCMS-03	1, 1 Liter, Amber Glass	500 mL	Cool to <6°C	7 days/40 days
	Pesticides/PCBs	SW846 8081B and SW846 8082A/SVGC-04 and SVGC-07	2, 1 Liter, Amber Glass	1000mL	Cool to <6°C	7 days/40 days
	Metals	SW846 6010C, SW846 6020A, SW846 7470B /MET-05, MET-15, MET-03	1, 250mL Plastic	100mL	HNO3 to pH<2 Cool to <6°C	180 days/ 28 days (Hg)
	Chloride, Nitrate, Nitrite, Sulfate	EPA 300.0 / WETS-57	1 of 250 ml HDPE	50mL	Cool to <6°C	28 days
	Alkalinity	EPA 310.1 / WETS-61		20mL		14 days
	TOC	SW846 9060A / WETS-66	2X40mL VOA Vials	40mL	H2SO4 to pH<2, Cool to 6°C	28 days
	Sulfide	EPA 376.1/WETS-061	250mL Plastic	250	ZnAc+NaOH to pH >12, Cool to 6° C	7 days
	Methane, Ethane, and Ethene	RSK-175 / VGC-11	2X40mL VOA Vials	40ml	Cool to <6°C	7 days
Surface Soil, Subsurface Soil	VOCs	SW846 8260B / VGCMS-05	3X 40mL VOA Vials + stir bar (tared)	5g	Store in 5mL water (2 vials), store in methanol (1 vial),	48 hours to freeze (for water-preserved only) / 14 day to analysis
	SVOCs	SW846 8270D and 8270D-SIM/ SVGCMS-03	4 X 4 oz Glass Jar	40g	Cool to <6°C	14 days/40 days
	Pesticides	SW846 8081B / SVGC-04		40g		14 days/40 days
	PCBs	SW846 8082A / SVGC-07				14 days/40 days
	Metals	SW846 6010C / MET-05		10g		180 days
		SW846 7471A / MET-16		10g		28 days
Groundwater	Hexavalent Chromium	SW846 7199 / GEN-7199	250ml HDPE	10 mL	cool to 0 - 6° C	24 hours
Surface Soil, Subsurface Soil	Hexavalent Chromium	SW846 7199 / GEN-7199	1-4 oz wide mouth	2.5 g	cool to 0 - 6° C	30 days until digestion; 7 days until pH adjustment and analysis
Groundwater	Microbial (DHC)	qPCR	1 liter Poly or BioFlow filter	1 liter	40 C	24-48 hr/ 6 months

TABLE 6-1
Reference Limits and Evaluation Table

Matrix: Groundwater
Analytical Group: VOC

Analyte	CAS #	MCL (UG/L)	NC2LGW (Feb, 2012) (UG/L)	RSLs Tapwater Adjusted (May, 2012) (UG/L)	Project Action Limit[1] (UG/L)	Project Quantitation Limit Goal[2] (UG/L)	Laboratory-Specific (UG/L)			LCS, %R Limits		
							LOQ	LOD	DL	LCL	UCL	RPD
1,1,1-Trichloroethane	71-55-6	200	200	750	200	100.00	2.0	1.0	0.80	65	130	30
1,1,2,2-Tetrachloroethane	79-34-5	NC	0.2	0.066	0.066	0.03	2.0	1.0	0.54	65	130	30
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	NC	200000	5300	5300	2650.00	2.0	1.0	0.73	47	173	30
1,1,2-Trichloroethane	79-00-5	5	NC	0.041	0.041	0.02	2.0	1.0	0.76	75	125	30
1,1-Dichloroethane	75-34-3	7	6	2.4	2.4	1.20	2.0	1.0	0.62	70	135	30
1,1-Dichloroethene	75-35-4	NC	7	26	7	3.50	2.0	1.0	0.94	70	130	30
1,2,3-Trichlorobenzene	87-61-6	NC	0.005	0.52	0.005	0.003	2.0	1.0	0.86	55	140	30
1,2,4-Trichlorobenzene	120-82-1	70	70	0.39	0.39	0.20	2.0	1.0	0.70	65	135	30
1,2-Dibromo-3-chloropropane	96-12-8	0.2	0.04	0.00032	0.00032	0.00032	10	5.0	0.96	50	130	30
1,2-Dibromoethane	106-93-4	0.05	0.02	0.0065	0.0065	0.003	2.0	1.0	0.78	80	120	30
1,2-Dichlorobenzene	95-50-1	600	20	28	20	10.00	2.0	1.0	0.73	70	120	30
1,2-Dichloroethane	107-06-2	5	0.4	0.15	0.15	0.08	2.0	1.0	0.63	70	130	30
1,2-Dichloropropane	78-87-5	5	0.6	0.38	0.38	0.19	2.0	1.0	0.80	75	125	30
1,3-Dichlorobenzene	541-73-1	NC	200	8.7	8.7	4.35	2.0	1.0	0.77	75	125	30
1,4-Dichlorobenzene	106-46-7	75	6	0.42	0.42	0.21	2.0	1.0	0.76	75	125	30
1,4-Dioxane	123-91-1	NC	NC	NC	NC	50	100	50	33	10	200	30
2-Butanone	78-93-3	NC	4000	490	490	245.00	25	12	4.5	30	150	30
2-Hexanone	591-78-6	NC	NC	3.4	3.4	1.70	5.0	2.5	1.4	55	130	30
4-Methyl-2-pentanone	108-10-1	NC	NC	100	100	50.00	5.0	2.5	0.79	60	135	30
Acetone	67-64-1	NC	6000	1200	1200	600.00	25	12	1.8	40	140	30
Benzene	71-43-2	5	1	0.39	0.39	0.20	2.0	1.0	0.71	80	120	30
Bromochloromethane	74-97-5	NC	NC	8.3	8.3	4.15	2.0	1.0	0.94	65	130	30
Bromodichloromethane	75-27-4	80	0.6	0.12	0.12	0.06	2.0	1.0	0.52	75	120	30
Bromoform	75-25-2	80	4	7.9	4	2.00	2.0	1.0	0.75	70	130	30
Bromomethane	74-83-9	NC	NC	0.7	0.7	0.35	2.0	1.0	0.95	30	145	30
Carbon disulfide	75-15-0	NC	700	72	72	36.00	10	5.0	2.6	35	160	30
Carbon tetrachloride	56-23-5	5	0.3	0.39	0.3	0.15	2.0	1.0	0.94	65	140	30
Chlorobenzene	108-90-7	100	50	7.2	7.2	3.60	2.0	1.0	0.72	80	120	30
Chloroethane	75-00-3	NC	3000	2100	2100	1050.00	2.0	1.0	0.98	60	135	30
Chloroform	67-66-3	80	70	0.19	0.19	0.10	2.0	1.0	0.80	65	135	30
Chloromethane	74-87-3	NC	3	19	3	1.50	2.0	1.0	0.82	40	125	30
cis-1,2-Dichloroethene	156-59-2	70	70	2.8	2.8	1.40	2.0	1.0	0.53	70	125	30

TABLE 6-1
Reference Limits and Evaluation Table

Matrix: Groundwater
Analytical Group: VOC

Analyte	CAS #	MCL (UG/L)	NC2LGW (Feb, 2012) (UG/L)	RSLs Tapwater Adjusted (May, 2012) (UG/L)	Project Action Limit[1] (UG/L)	Project Quantitation Limit Goal[2] (UG/L)	Laboratory-Specific (UG/L)			LCS, %R Limits		
							LOQ	LOD	DL	LCL	UCL	RPD
cis-1,3-Dichloropropene	10061-01-5	NC	0.4	0.41	0.4	0.20	2.0	1.0	0.59	70	130	30
Cyclohexane	110-82-7	NC	NC	1300	1300	650.00	2.0	1.0	0.93	45	147	30
Dibromochloromethane	124-48-1	80	0.4	0.15	0.15	0.08	2.0	1.0	0.44	60	135	30
Dichlorodifluoromethane	75-71-8	NC	1000	19	19	9.50	2.0	1.0	0.74	30	155	30
Ethylbenzene	100-41-4	700	600	1.3	1.3	0.65	2.0	1.0	0.69	75	125	30
Isopropylbenzene	98-82-8	NC	70	39	39	19.50	2.0	1.0	0.67	75	125	30
m,p-Xylene	179601-23-1	NC	500	19	19	9.50	4.0	2.0	1.3	75	130	30
Methyl acetate	79-20-9	NC	4000	1600	1600	800.00	2.0	1.0	0.95	24	129	30
Methyl tert-butyl ether	1634-04-4	NC	20	12	12	6.00	2.0	1.0	0.60	55	121	30
Methylcyclohexane	108-87-2	NC	NC	NC	NC	1.0	2.0	1.0	0.64	55	140	30
Methylene chloride	75-09-2	5	5	8.4	5	2.50	10	5.0	0.71	65	125	30
o-Xylene	95-47-6	NC	500	19	19	9.50	2.0	1.0	0.53	80	120	30
Styrene	100-42-5	100	70	110	70	35.00	2.0	1.0	0.61	65	135	30
Tetrachloroethene	127-18-4	5	0.7	3.5	0.7	0.35	2.0	1.0	0.76	45	150	30
Toluene	108-88-3	1000	600	86	86	43.00	2.0	1.0	0.72	75	120	30
trans-1,2-Dichloroethene	156-60-5	100	100	8.6	8.6	4.30	2.0	1.0	0.73	60	140	30
trans-1,3-Dichloropropene	10061-02-6	NC	0.4	0.41	0.4	0.20	2.0	1.0	0.73	55	140	30
Trichloroethene	79-01-6	5	3	0.26	0.26	0.13	2.0	1.0	0.89	70	125	30
Trichlorofluoromethane	75-69-4	NC	2000	110	110	55.00	2.0	1.0	0.94	60	145	30
Vinyl chloride	75-01-4	2	0.03	0.015	0.015	0.01	2.0	1.0	0.71	50	145	30
Xylene, total	1330-20-7	10000	500	19	19	9.50	4.0	2.0	1.3	NA	NA	NA

Notes:

[1] PALs were developed based on screening values to be protective of human health and the environment.

[2] PQL Goals were determined on a case by case basis and in most cases are at least 2 times less than the PAL.

Refer to Refer Section 1.6.4 of the QAPP for a detailed discussion on development of PALs.

NC – No Criteria. Refer Section 1.6.4 of the QAPP for a discussion on how data will be used in the absence of applicable criteria.

MCL values are from the drinking water maximum contaminant levels.

NC2L values are from the North Carolina Groundwater Quality Standards (February 2012).

The RSL Tapwater values were adjusted from the USEPA RSLs Table (May 2012).

Shading represents instances where the PAL is lower than the LOD. Non-detects will not be treated as exceedances though they will be reported at a value greater than the PAL.

TABLE 6-2
Reference Limits and Evaluation Table

Matrix: Groundwater
Analytical Group: SVOC

Analyte	CAS #	MCL (UG/L)	NC2LGW (Feb, 2012) (UG/L)	RSLs Tapwater Adjusted (May, 2012) (UG/L)	Project Action Limit[1] (UG/L)	Project Quantitation Limit Goal[2] (UG/L)	Laboratory-Specific (UG/L)			LCS, %R Limits		
							LOQ	LOD	DL	LCL	UCL	RPD
1,1'-Biphenyl	92-52-4	NC	400	0.083	0.083	0.04	10	9.0	7.0	46	83	30
1,2,4,5-Tetrachlorobenzene	95-94-3	NC	NC	0.12	0.12	0.06	10	6.0	3.2	24	69	30
2,2'-Oxybis(1-choloropropane)	108-60-1	NC	NC	0.31	0.31	0.16	10	6.0	3.1	25	130	30
2,3,4,6-Tetrachlorophenol	58-90-2	NC	200	17	17	8.50	10	6.0	4.7	61	94	30
2,4,5-Trichlorophenol	95-95-4	NC	NC	89	89	44.50	10	6.0	3.6	50	110	30
2,4,6-Trichlorophenol	88-06-2	NC	NC	0.9	0.9	0.45	10	6.0	3.7	50	115	30
2,4-Dichlorophenol	120-83-2	NC	NC	3.5	3.5	1.75	10	6.0	3.3	50	105	30
2,4-Dimethylphenol	105-67-9	NC	100	27	27	13.50	10	6.0	2.7	30	110	30
2,4-Dinitrophenol	51-28-5	NC	NC	3	3	1.50	10	6.0	5.2	15	140	30
2,4-Dinitrotoluene	121-14-2	NC	NC	0.2	0.2	0.10	10	6.0	2.8	50	120	30
2,6-Dinitrotoluene	606-20-2	NC	NC	1.5	1.5	0.75	10	3.0	2.7	50	115	30
2-Chloronaphthalene	91-58-7	NC	NC	55	55	27.50	10	3.0	3.0	50	105	30
2-Chlorophenol	95-57-8	NC	0.4	7.1	0.4	0.20	10	6.0	2.8	35	105	30
2-Methylnaphthalene	91-57-6	NC	30	2.7	2.7	1.35	0.10	0.080	0.046	40	130	30
2-Methylphenol	95-48-7	NC	NC	72	72	36.00	10	3.0	2.3	45	105	30
2-Nitroaniline	88-74-4	NC	NC	15	15	7.50	10	3.0	2.8	40	110	30
2-Nitrophenol	88-75-5	NC	NC	7.1	7.1	3.55	10	6.0	3.1	50	115	30
3,3'-dicholorobenzidine	91-94-1	NC	NC	0.11	0.11	0.06	10	6.0	3.2	40	115	30
3-Nitroaniline	99-09-2	NC	NC	NC	3.0	3.0	10	3.0	2.8	30	110	30
4,6-Dinitro-2-methylphenol	534-52-1	NC	NC	0.12	0.12	0.06	10	6.0	6.0	20	110	30
4-Bromophenyl-phenylether	101-55-3	NC	NC	NC	6.0	6.0	10	6.0	3.3	20	125	30
4-Chloro-3-methylphenol	59-50-7	NC	NC	110	110	55.00	10	6.0	2.6	50	115	30
4-Chloroaniline	106-47-8	NC	NC	0.32	0.32	0.16	10	6.0	2.7	45	110	30
4-Chlorophenyl-phenyl ether	7005-72-3	NC	NC	2.7	2.7	1.35	10	6.0	3.2	15	110	30
4-Methylphenol	106-44-5	NC	40	140	40	20.00	10	6.0	4.5	50	110	30
4-Nitroaniline	100-01-6	NC	NC	3.3	3.3	1.65	10	3.0	2.7	35	120	30
4-Nitrophenol	100-02-7	NC	NC	0.12	0.12	0.06	10	3.0	2.3	0	125	30
Acenaphthene	83-32-9	NC	80	40	40	20.00	0.10	0.080	0.049	45	110	30
Acenaphthylene	208-96-8	NC	200	40	40	20.00	0.10	0.080	0.052	50	105	30
Acetophenone	98-86-2	NC	NC	150	150	75.00	10	3.0	3.0	41	92	30
Anthracene	120-12-7	NC	2000	130	130	65.00	0.10	0.080	0.044	55	110	30

TABLE 6-2
Reference Limits and Evaluation Table

Matrix: Groundwater
Analytical Group: SVOC

Analyte	CAS #	MCL (UG/L)	NC2LGW (Feb, 2012) (UG/L)	RSLs Tapwater Adjusted (May, 2012) (UG/L)	Project Action Limit[1] (UG/L)	Project Quantitation Limit Goal[2] (UG/L)	Laboratory-Specific (UG/L)			LCS, %R Limits		
							LOQ	LOD	DL	LCL	UCL	RPD
Atrazine	1912-24-9	3	3	0.26	0.26	0.13	10	3.0	2.9	47	101	30
Benzaldehyde	100-52-7	NC	NC	150	150	75.00	10	6.0	5.4	43	87	30
Benzo(a) pyrene	50-32-8	0.2	0.005	0.0029	0.0029	0.001	0.10	0.080	0.049	55	110	30
Benzo(a)anthracene	56-55-3	NC	0.05	0.029	0.029	0.015	0.10	0.080	0.058	55	110	30
Benzo(b) fluoranthene	205-99-2	NC	0.05	0.029	0.029	0.01	0.10	0.080	0.051	45	120	30
Benzo(g,h,i) perylene	191-24-2	NC	200	8.7	8.7	4.35	0.10	0.080	0.063	40	125	30
Benzo(k) fluoranthene	207-08-9	NC	0.5	0.29	0.29	0.15	0.10	0.080	0.054	45	125	30
Bis(2-chloroethoxy) methane	111-91-1	NC	NC	4.7	4.7	2.35	10	6.0	2.7	45	105	30
Bis(2-chloroethyl) ether	111-44-4	NC	0.03	0.012	0.012	0.01	10	6.0	3.2	35	110	30
Bis(2-ethylhexyl) phthalate	117-81-7	6	3	0.071	0.071	0.04	10	6.0	3.5	40	125	30
Butylbenzylphthalate	85-68-7	NC	1000	14	14	7.00	10	3.0	2.8	45	115	30
Caprolactam	105-60-2	NC	4000	770	770	385.00	10	3.0	2.7	10	51	30
Carbazole	86-74-8	NC	NC	NC	0	0.00	10	3.0	2.5	50	115	30
Chrysene	218-01-9	NC	5	2.9	2.9	1.45	0.10	0.080	0.040	55	110	30
Dibenzo(a,h) anthracene	53-70-3	NC	0.005	0.0029	0.0029	0.00	0.10	0.080	0.069	40	125	30
Dibenzofuran	132-64-9	NC	NC	0.58	0.58	0.29	10	3.0	2.8	55	105	30
Diethylphthalate	84-66-2	NC	6000	1100	1100	550.00	10	3.0	3.0	40	120	30
Dimethylphthalate	131-11-3	NC	NC	NC	0	0.00	10	3.0	2.9	25	125	30
Di-n-butylphthalate	84-74-2	NC	700	67	67	33.50	10	3.0	2.7	55	115	30
Di-n-octylphthalate	117-84-0	NC	100	0.071	0.071	0.04	10	6.0	3.4	35	135	30
Fluoranthene	206-44-0	NC	300	63	63	31.50	0.10	0.080	0.054	55	115	30
Fluorene	86-73-7	NC	300	22	22	11.00	0.10	0.080	0.049	50	110	30
Hexachlorobenzene	118-74-1	1	0.02	0.042	0.02	0.01	10	3.0	3.0	50	110	30
Hexachlorobutadiene	87-68-3	NC	0.4	0.26	0.26	0.13	10	6.0	3.6	25	105	30
Hexachlorocyclopentadiene	77-47-4	50	NC	2.2	2.2	1.10	10	6.0	3.8	13	120	30
Hexachloroethane	67-72-1	NC	NC	0.51	0.51	0.26	10	3.0	2.9	30	100	30
Indeno(1,2,3,-cd) pyrene	193-39-5	NC	0.05	0.029	0.029	0.01	0.10	0.080	0.067	45	125	30
Isophorone	78-59-1	NC	40	67	40	20.00	10	3.0	2.9	50	110	30
Naphthalene	91-20-3	NC	6	0.14	0.14	0.07	0.10	0.080	0.045	40	100	30
Nitrobenzene	98-95-3	NC	NC	0.12	0.12	0.06	10	6.0	3.1	45	110	30
N-Nitroso-di-n propylamine	621-64-7	NC	NC	0.0093	0.0093	0.005	10	6.0	3.4	35	130	30

TABLE 6-2
Reference Limits and Evaluation Table

Matrix: Groundwater
Analytical Group: SVOC

Analyte	CAS #	MCL (UG/L)	NC2LGW (Feb, 2012) (UG/L)	RSLs Tapwater Adjusted (May, 2012) (UG/L)	Project Action Limit[1] (UG/L)	Project Quantitation Limit Goal[2] (UG/L)	Laboratory-Specific (UG/L)			LCS, %R Limits		
							LOQ	LOD	DL	LCL	UCL	RPD
N-Nitrosodiphenylamine	86-30-6	NC	0.0007	10	0.0007	0.0007	10	6.0	5.4	50	110	30
Pentachlorophenol	87-86-5	1	0.3	0.17	0.17	0.09	10	9.0	6.3	40	115	30
Phenanthrene	85-01-8	NC	200	130	130	65.00	0.10	0.080	0.044	50	115	30
Phenol	108-95-2	NC	30	450	30	15.00	10	3.0	1.4	0	115	30
Pyrene	129-00-0	NC	200	8.7	8.7	4.35	0.10	0.080	0.053	50	130	30

Notes:

[1] PALs were developed based on screening values to be protective of human health and the environment. If the site data indicate concentrations of SVOCs at levels greater than screening values at site sample locations, additional collection of background data for these chemicals may be completed for the purpose of determining any widespread anthropogenic sources which may be unrelated to the areas. The PALs may be adjusted based on the results of the background data collection.

[2] PQL Goals were determined on a case by case basis and in most cases are at least 2 times less than the PAL.

Refer to Refer Section 1.6.4 of the QAPP for a detailed discussion on development of PALs.

NC – No Criteria. Refer Section 1.6.4 of the QAPP for a discussion on how data will be used in the absence of applicable criteria.

MCL values are from the drinking water maximum contaminant levels.

NC2L values are from the North Carolina Groundwater Quality Standards (February 2012).

The RSL Tapwater values were adjusted from the USEPA RSLs Table (May 2012).

Shading represents instances where the PAL is lower than the LOD. Non-detects will not be treated as exceedances though they will be reported at a value greater than the PAL.

TABLE 6-3
Reference Limits and Evaluation Table

Matrix: Groundwater
Analytical Group: Pesticides

Analyte	CAS #	MCL (UG/L)	NC2LGW (Feb, 2012) (UG/L)	RSLs Tapwater Adjusted (May, 2012) (UG/L)	Project Action Limit[1] (UG/L)	Project Quantitation Limit Goal[2] (UG/L)	Laboratory-Specific (UG/L)			LCS, %R Limits		
							LOQ	LOD	DL	LCL	UCL	RPD
4,4'-DDD	72-54-8	NC	0.1	0.28	0.1	0.05	0.10	0.050	0.023	25	150	30
4,4'-DDE	72-55-9	NC	NC	0.2	0.2	0.1	0.10	0.050	0.023	35	140	30
4,4'-DDT	50-29-3	NC	0.1	0.2	0.1	0.05	0.10	0.050	0.024	45	140	30
Aldrin	309-00-2	NC	NC	0.00021	0.00021	0.00021	0.10	0.050	0.033	25	140	30
alpha-BHC	319-84-6	NC	NC	0.0062	0.0062	0.0062	0.10	0.050	0.032	60	130	30
alpha-Chlordane	5103-71-9	NC	0.1	0.027	0.027	0.027	0.10	0.050	0.027	65	125	30
beta-BHC	319-85-7	NC	NC	0.022	0.022	0.022	0.10	0.050	0.040	65	125	30
delta-BHC	319-86-8	NC	NC	0.022	0.022	0.022	0.10	0.050	0.043	45	135	30
Dieldrin	60-57-1	NC	0.002	0.0015	0.0015	0.0015	0.10	0.050	0.031	60	130	30
Endosulfan I	959-98-8	NC	40	7.8	7.8	3.9	0.10	0.050	0.027	50	110	30
Endosulfan II	33213-65-9	NC	40	7.8	7.8	3.9	0.10	0.050	0.027	30	130	30
Endosulfan sulfate	1031-07-8	NC	NC	7.8	7.8	3.9	0.10	0.050	0.030	55	135	30
Endrin	72-20-8	2	2	0.17	0.17	0.085	0.10	0.050	0.026	55	135	30
Endrin aldehyde	7421-93-4	2	2	0.17	0.17	0.085	0.10	0.050	0.039	55	135	30
Endrin ketone	53494-70-5	2	2	0.17	0.17	0.085	0.10	0.050	0.027	75	125	30
gamma-BHC (Lindane)	58-89-9	0.2	0.03	0.036	0.03	0.015	0.10	0.050	0.035	25	135	30
gamma-Chlordane	5103-74-2	NC	0.1	0.027	0.027	0.027	0.10	0.050	0.038	60	125	30
Heptachlor	76-44-8	0.4	0.008	0.0018	0.0018	0.0018	0.10	0.050	0.038	40	130	30
Heptachlor epoxide	1024-57-3	0.2	0.004	0.0033	0.0033	0.0033	0.10	0.050	0.027	60	130	30
Methoxychlor	72-43-5	40	40	2.7	2.7	1.35	0.10	0.050	0.024	55	150	30
Toxaphene	8001-35-2	3	0.03	0.013	0.013	0.013	1.3	0.64	0.32	60	140	30

Notes:

[1] PALs were developed based on screening values to be protective of human health and the environment. If the site data indicate concentrations of pesticides at levels greater than screening values at site sample locations, additional collection of background data for these chemicals may be completed for the purpose of determining any widespread anthropogenic sources which may be unrelated to the areas. The PALs may be adjusted based on the results of the background data collection.

[2] PQL Goals were determined on a case by case basis and in most cases are at least 2 times less than the PAL.

Refer to Refer Section 1.6.4 of the QAPP for a detailed discussion on development of PALs.

NC – No Criteria. Refer Section 1.6.4 of the QAPP for a discussion on how data will be used in the absence of applicable criteria.
MCL values are from the drinking water maximum contaminant levels.

NC2L values are from the North Carolina Groundwater Quality Standards (February 2012).

The RSL Tapwater values were adjusted from the USEPA RSLs Table (May 2012).

Shading represents instances where the PAL is lower than the LOD. Non-detects will not be treated as exceedances though they will be reported at a value greater than the PAL.

TABLE 6-4
Reference Limits and Evaluation Table

Matrix: Groundwater
Analytical Group: PCBs

Analyte	CAS #	MCL (UG/L)	NC2LGW (Feb, 2012) (UG/L)	RSLs Tapwater Adjusted (May, 2012) (UG/L)	Project Action Limit[1] (UG/L)	Project Quantitation Limit Goal[2] (UG/L)	Laboratory-Specific (UG/L)			LCS, %R Limits		
							LOQ	LOD	DL	LCL	UCL	RPD
Aroclor-1016	12674-11-2	0.5	NC	0.11	0.11	0.055	1.0	0.50	0.32	40	140	30
Aroclor-1221	11104-28-2	0.5	NC	0.0043	0.0043	0.00215	1.0	0.50	0.46	29	185	30
Aroclor-1232	11141-16-5	0.5	NC	0.0043	0.0043	0.00215	1.0	0.50	0.45	29	185	30
Aroclor-1242	53469-21-9	0.5	NC	0.034	0.034	0.017	1.0	0.50	0.49	29	185	30
Aroclor-1248	12672-29-6	0.5	NC	0.034	0.034	0.017	1.0	0.50	0.24	29	185	30
Aroclor-1254	11097-69-1	0.5	NC	0.031	0.031	0.0155	1.0	0.50	0.46	29	185	30
Aroclor-1260	11096-82-5	0.5	NC	0.034	0.034	0.017	1.0	0.50	0.48	60	130	30
Aroclor-1262	37324-23-5	NC	NC	NC	0.50	0.50	1.0	0.50	0.36	29	185	30
Aroclor-1268	11100-14-4	NC	NC	NC	0.50	0.50	1.0	0.50	0.31	29	185	30

Notes:

[1] PALs were developed based on screening values to be protective of human health and the environment.

[2] PQL Goals were determined on a case by case basis and in most cases are at least 2 times less than the PAL.

Refer to Refer Section 1.6.4 of the QAPP for a detailed discussion on development of PALs.

NC – No Criteria. Refer Section 1.6.4 of the QAPP for a discussion on how data will be used in the absence of applicable criteria.

MCL values are from the drinking water maximum contaminant levels.

NC2L values are from the North Carolina Groundwater Quality Standards (February 2012).

The RSL Tapwater values were adjusted from the USEPA RSLs Table (May 2012).

Shading represents instances where the PAL is lower than the LOD. Non-detects will not be treated as exceedances though they will be reported at a value greater than the PAL.

TABLE 6-5
Reference Limits and Evaluation Table

Matrix: Groundwater
Analytical Group: Metals (including Mercury and Hexavalent Chromium)

METALS	CAS #	MCL (UG/L)	NC2LGW (Feb, 2012) (UG/L)	RSLs Tapwater Adjusted (May, 2012) (UG/L)	Project Action Limit[1] (UG/L)	Project Quantitation Limit Goal[2] (UG/L)	Laboratory-Specific (UG/L)			LCS, %R Limits		
							LOQ	LOD	DL	LCL	UCL	RPD
Aluminum	7429-90-5	NC	NC	1600	1600	800.00	400	200	41.0	80	120	20
Antimony	7440-36-0	6	NC	0.6	0.6	0.30	2.00	0.440	0.110	80	120	20
Arsenic	7440-38-2	10	10	0.045	0.045	0.02	20.0	10.0	0.610	80	120	20
Barium	7440-39-3	2000	700	290	290	145.00	10.0	8.00	2.00	80	120	20
Beryllium	7440-41-7	4	NC	1.6	1.6	0.80	0.740	0.370	0.0940	80	120	20
Cadmium	7440-43-9	5	2	0.69	0.69	0.35	8.00	4.00	0.110	80	120	20
Calcium	7440-70-2	NC	NC	NC	0	0.00	500	125	33.0	80	120	20
Chromium	7440-47-3	100	10	0.031	0.031	0.02	6.00	3.00	0.450	80	120	20
Chromium VI (Hexavalent)	18540-29-9	NC	10	0.031	0.031	0.02	10	10	2.9	70	130	20
Cobalt	7440-48-4	NC	NC	0.47	0.47	0.24	1.00	0.840	0.210	80	120	20
Copper	7440-50-8	1300	1000	62	62	31.00	10.0	5.00	1.30	80	120	20
Iron	7439-89-6	NC	300	1100	300	150.00	50.0	25.0	21.0	80	120	20
Lead	7439-92-1	15	15	15	15	7.50	1.20	0.600	0.160	80	120	20
Magnesium	7439-95-4	NC	NC	NC	125	125	500	125	53.0	80	120	20
Manganese	7439-96-5	NC	50	32	32	16.00	20.0	10.0	0.370	80	120	20
Mercury	7439-97-6	2	1	0.43	0.43	0.22	0.200	0.0690	0.0230	80	120	20
Nickel	7440-02-0	NC	100	30	30	15.00	2.40	1.20	0.320	80	120	20
Potassium	7440-09-7	NC	NC	7.8	7.8	3.90	500	250	100	80	120	20
Selenium	7782-49-2	50	20	NC	20	10.00	5.20	2.60	0.650	80	120	20
Silver	7440-22-4	NC	20	7.1	7.1	3.55	0.240	0.120	0.0290	80	120	20
Sodium	7440-23-5	NC	NC	NC	250	250	500	250	47.0	80	120	20
Thallium	7440-28-0	2	NC	0.016	0.016	0.01	0.460	0.230	0.0580	80	120	20
Vanadium	7440-62-2	NC	NC	7.8	7.8	3.90	1.00	0.800	0.200	80	120	20
Zinc	7440-66-6	NC	1000	470	470	235.00	20.0	10.0	3.10	80	120	20

Notes:

[1] PALs were developed based on screening values to be protective of human health and the environment. This investigation includes the collection of background data. The PALs will be adjusted if background data indicate metals concentrations are naturally present at concentrations exceeding the screening values.

[2] PQL Goals were determined on a case by case basis and in most cases are at least 2 times less than the PAL.

Refer to Refer Section 1.6.4 of the QAPP for a detailed discussion on development of PALs.

NC – No Criteria. Refer Section 1.6.4 of the QAPP for a discussion on how data will be used in the absence of applicable criteria.
MCL values are from the drinking water maximum contaminant levels.

NC2L values are from the North Carolina Groundwater Quality Standards (February 2012).

The RSL Tapwater values were adjusted from the USEPA RSLs Table (May 2012).

Shading represents instances where the PAL is lower than the LOD. Non-detects will not be treated as exceedances though they will be reported at a value greater than the PAL.

TABLE 6-6
Reference Limits and Evaluation Table

Matrix: Groundwater
Analytical Group: Wet Chemistry

Analyte	CAS #	Laboratory-Specific (MG/L)			LCS, %R Limits		
		LOQ	LOD	DL	LCL	UCL	RPD
Alkalinity	471-34-1	2.0	2.0	2.0	90	110	10
Chloride	16887-00-6	5.0	1.2	0.29	90	110	10
Methane	74-82-8	0.00100	0.000964	0.000430	74	120	18
Nitrate	14797-55-8	1.0	0.21	0.052	90	110	10
Nitrite	14797-65-0	0.10	0.044	0.035	90	110	10
Sulfate	14808-79-8	5.0	0.26	0.07	61	138	22
Sulfide	18496-25-8	1.0	1.0	0.45	86	105	20
Total organic carbon (TOC)	TOC	1.0	0.66	0.22	85	115	21

Notes:
[1] Contractor-generated CAS number.
Refer Section 1.6.4 of the QAPP for a discussion on how data will be used in the absence of applicable criteria.

TABLE 6-7
Reference Limits and Evaluation Table

Matrix: Groundwater
Analytical Group: Microbial (DHC)

Analyte	CAS #	Laboratory-Specific (CELLS/ML)		
		LOQ	LOD	DL
Dehalococcoides	DHC[1]	500	100	100

Notes:
[1] Contractor-generated CAS number.
Refer Section 1.6.4 of the QAPP for a discussion on how data will be used in the absence of applicable criteria.

TABLE 6-8
Reference Limits and Evaluation Table

Matrix: Surface Soil, Subsurface Soil
Analytical Group: VOC

Analyte	CAS #	Preliminary Residential Health - Based Soil Remediation Goal (PSRG) (UG/KG)	Protection of Ground water (PSRG) (UG/KG)	RSLs Residential Soil Adjusted (May 2012) (UG/KG)	Project Action Limit[1] (UG/KG)	Project Quantitation Limit Goal[2] (UG/KG)	Laboratory-Specific (UG/KG)			LCS, %R Limits		
							LOQ	LOD	DL	LCL	UCL	RPD
1,1,1-Trichloroethane	71-55-6	640000	1200	640000	1200	600.00	2.0	1.0	0.4	70	135	30
1,1,2,2-Tetrachloroethane	79-34-5	560	1.2	560	1.2	0.60	2.0	1.0	0.3	55	130	30
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	910000	9000000	910000	910000	455000.00	2.0	1.0	0.6	70	130	30
1,1,2-Trichloroethane	79-00-5	320	3.2	160	3.2	1.60	2.0	1.0	0.6	60	125	30
1,1-Dichloroethane	75-34-3	3300	30	3300	30	15.00	2.0	1.0	0.6	75	125	30
1,1-Dichloroethene	75-35-4	48000	45	24000	45	22.50	2.0	1.0	0.6	65	135	30
1,2,3-Trichlorobenzene	87-61-6	9800	NC	4900	4900	2450.00	2.0	1.0	0.9	60	135	30
1,2,4-Trichlorobenzene	120-82-1	12000	2200	6200	2200	1100.00	2.0	1.0	0.8	65	130	30
1,2-Dibromo-3-chloropropane	96-12-8	5.4	0.25	5.4	0.25	0.13	2.0	1.0	0.6	40	135	30
1,2-Dibromoethane	106-93-4	34	0.097	34	0.097	0.05	2.0	1.0	0.3	70	125	30
1,2-Dichlorobenzene	95-50-1	380000	240	190000	240	120.00	2.0	1.0	0.4	75	120	30
1,2-Dichloroethane	107-06-2	430	2	430	2	1.00	2.0	1.0	0.3	70	135	30
1,2-Dichloropropane	78-87-5	940	3.2	940	3.2	1.60	2.0	1.0	0.6	70	120	30
1,3-Dichlorobenzene	541-73-1	NC	2400	NC	2400	1200.00	2.0	1.0	0.5	70	125	30
1,4-Dichlorobenzene	106-46-7	2400	70	2400	70	35.00	2.0	1.0	0.4	70	125	30
1,4-Dioxane	123-91-1	4900	12	NC	12	6.00	100	50	5.5	44	134	30
2-Butanone	78-93-3	5600000	16000	2800000	16000	8000.00	5.0	2.5	1.8	30	160	30
2-Hexanone	591-78-6	42000	170	21000	170	85.00	5.0	2.5	0.9	45	145	30
4-Methyl-2-pentanone	108-10-1	1100000	430	530000	430	215.00	5.0	2.5	1.4	45	145	30
Acetone	67-64-1	12000000	24000	6100000	24000	12000.00	25	12	1.7	20	160	30
Benzene	71-43-2	1100	7.3	1100	7.3	3.65	2.0	1.0	0.4	75	125	30
Bromochloromethane	74-97-5	32000	NC	16000	16000	8000.00	2.0	1.0	0.4	70	125	30
Bromodichloromethane	75-27-4	270	2.9	270	2.9	1.45	2.0	1.0	0.4	70	130	30
Bromoform	75-25-2	62000	19	62000	19	9.50	2.0	1.0	0.3	55	135	30
Bromomethane	74-83-9	1500	48	730	48	24.00	2.0	1.0	0.9	30	160	30
Carbon disulfide	75-15-0	160000	3800	82000	3800	1900.00	10	5.0	2.1	45	160	30
Carbon tetrachloride	56-23-5	610	2.1	610	2.1	1.05	2.0	1.0	0.6	65	135	30
Chlorobenzene	108-90-7	58000	430	29000	430	215.00	2.0	1.0	0.5	75	125	30
Chloroethane	75-00-3	290	340	1500000	290	145.00	2.0	1.0	0.5	40	155	30
Chloroform	67-66-3	120000	NC	290	290	145.00	2.0	1.0	0.4	70	125	30
Chloromethane	74-87-3	24000	15	12000	15	7.50	2.0	1.0	0.6	50	130	30
cis-1,2-Dichloroethene	156-59-2	32000	360	16000	360	180.00	2.0	1.0	0.5	65	125	30
cis-1,3-Dichloropropene	10061-01-5	NC	NC	1700	1700	850.00	2.0	1.0	0.3	70	125	30
Cyclohexane	110-82-7	NC	NC	120000	120000	60000.00	2.0	1.0	0.5	70	130	30

Analyte	CAS #	Preliminary Residential Health - Based Soil Remediation Goal (PSRG) (UG/KG)	Protection of Ground water (PSRG) (UG/KG)	RSLs Residential Soil Adjusted (May 2012) (UG/KG)	Project Action Limit[1] (UG/KG)	Project Quantitation Limit Goal[2] (UG/KG)	Laboratory-Specific (UG/KG)			LCS, %R Limits		
							LOQ	LOD	DL	LCL	UCL	RPD
Dibromochloromethane	124-48-1	680	1.9	680	1.9	0.95	2.0	1.0	0.3	65	130	30
Dichlorodifluoromethane	75-71-8	19000	29000	9400	9400	4700.00	2.0	1.0	0.6	35	135	30
Ethylbenzene	100-41-4	5400	8100	5400	5400	2700.00	2.0	1.0	0.6	75	125	30
Isopropylbenzene	98-82-8	270000	1300	210000	1300	650.00	2.0	1.0	0.5	75	130	30
m,p-Xylene	179601-23-1	120000	NC	59000	59000	29500.00	4.0	2.0	1.0	80	125	30
Methyl acetate	79-20-9	16000000	NC	7800000	7800000	3900000.00	10	5.0	1.6	70	130	30
Methyl tert-butyl ether	1634-04-4	43000	85	43000	85	42.50	2.0	1.0	0.3	70	130	30
Methylcyclohexane	108-87-2	NC	NC	NC	1.0	1.0	2.0	1.0	0.5	55	140	30
Methylene chloride	75-09-2	56000	23	36000	23	11.50	10	5.0	0.7	58	123	30
o-Xylene	95-47-6	140000	NC	69000	69000	34500.00	2.0	1.0	0.5	75	125	30
Styrene	100-42-5	870000	920	630000	920	460.00	2.0	1.0	0.4	75	125	30
Tetrachloroethene	127-18-4	17000	5	8600	5	2.50	2.0	1.0	0.5	65	140	30
Toluene	108-88-3	820000	5500	500000	5500	2750.00	2.0	1.0	0.5	70	125	30
trans-1,2-Dichloroethene	156-60-5	30000	510	15000	510	255.00	2.0	1.0	0.7	65	135	30
trans-1,3-Dichloropropene	10061-02-6	NC	NC	1700	1700	850.00	2.0	1.0	0.3	65	125	30
Trichloroethene	79-01-6	880	18	440	18	9.00	2.0	1.0	0.5	75	125	30
Trichlorofluoromethane	75-69-4	160000	24000	79000	24000	12000.00	2.0	1.0	0.5	25	185	30
Vinyl chloride	75-01-4	60	0.19	60	0.19	0.10	2.0	1.0	0.4	60	125	30
Xylene, total	1330-20-7	130000	5800	63000	5800	2900.00	4.0	2.0	1.0	NA	NA	NA

Notes:

[1] PALs were developed based on screening values to be protective of human health and the environment.

[2] PQL Goals were determined on a case by case basis and in most cases are at least 2 times less than the PAL.

Refer to Refer Section 1.6.4 of the QAPP for a detailed discussion on development of PALs.

NC – No Criteria. Refer Section 1.6.4 of the QAPP for a discussion on how data will be used in the absence of applicable criteria.

PSRG values were taken from the NC DENR inactive hazardous site Preliminary Soil Remediation Goals (July 2012).

The RSL Residential Soil values were adjusted from the USEPA RSLs Table (May 2012).

Shading represents instances where the PAL is lower than the LOD. Non-detects will not be treated as exceedances though they will be reported at a value greater than the PAL.

TABLE 6-9
Reference Limits and Evaluation Table

Matrix: Surface Soil, Subsurface Soil
Analytical Group: SVOC

Analyte	CAS #	Preliminary Residential Health - Based Soil Remediation Goal (PSRG) (UG/KG)	Protection of Ground water (PSRG) (UG/KG)	RSLs Residential Soil Adjusted (May 2012) (UG/KG)	Project Action Limit[1] (UG/KG)	Project Quantitation Limit Goal[2] (UG/KG)	Laboratory-Specific (UG/KG)			LCS, %R Limits		
							LOQ	LOD	DL	LCL	UCL	RPD
1,1'-Biphenyl	92-52-4	10000	43000	5100	5100	2550.00	330	100	95	52	100	30
1,2,4,5-Tetrachlorobenzene	95-94-3	3600	97	1800	97	48.50	330	100	69	59	81	30
2,2'-Oxybis(1-choloropropane)	108-60-1	4600	NC	4600	4600	2300.00	330	100	82	20	115	30
2,3,4,6-Tetrachlorophenol	58-90-2	360000	13000	180000	13000	6500.00	330	200	74	18	98	30
2,4,5-Trichlorophenol	95-95-4	1200000	2500	610000	2500	1250.00	330	100	58	50	110	30
2,4,6-Trichlorophenol	88-06-2	12000	160	6100	160	80.00	330	100	60	45	110	30
2,4-Dichlorophenol	120-83-2	36000	14	18000	14	7.00	330	100	71	45	110	30
2,4-Dimethylphenol	105-67-9	240000	1400	120000	1400	700.00	330	100	74	30	105	30
2,4-Dinitrophenol	51-28-5	24000	NC	12000	12000	6000.00	330	300	120	15	130	30
2,4-Dinitrotoluene	121-14-2	1600	1.6	1600	1.6	0.80	330	100	72	50	115	30
2,6-Dinitrotoluene	606-20-2	12000	NC	6100	6100	3050.00	330	100	69	50	110	30
2-Chloronaphthalene	91-58-7	180000	NC	180000	180000	90000.00	330	100	65	45	105	30
2-Chlorophenol	95-57-8	78000	4.1	39000	4.1	2.05	330	100	82	45	105	30
2-Methylnaphthalene	91-57-6	46000	1600	23000	1600	800.00	33	25	21	45	105	30
2-Methylphenol	95-48-7	620000	4100	310000	4100	2050.00	330	100	70	40	105	30
2-Nitroaniline	88-74-4	120000	NC	61000	61000	30500.00	330	100	67	45	120	30
2-Nitrophenol	88-75-5	NC	NC	39000	39000	19500.00	330	100	78	40	110	30
3,3'-dicholorobenzidine	91-94-1	1100	NC	1100	1100	550.00	330	100	91	10	130	30
3-Nitroaniline	99-09-2	NC	NC	NC	100	100	330	100	74	25	110	30
4,6-Dinitro-2-methylphenol	534-52-1	980	NC	490	490	245.00	330	300	130	30	135	30
4-Bromophenyl-phenylether	101-55-3	NC	NC	NC	100	100	330	100	73	45	115	30
4-Chloro-3-methylphenol	59-50-7	NC	NC	610000	610000	305000.00	330	100	67	45	115	30
4-Chloroaniline	106-47-8	2400	NC	2400	2400	1200.00	330	100	92	10	100	30
4-Chlorophenyl-phenyl ether	7005-72-3	NC	NC	31000	31000	15500.00	330	100	67	45	110	30
4-Methylphenol	106-44-5	NC	NC	610000	610000	305000.00	330	300	160	40	105	30
4-Nitroaniline	100-01-6	24000	NC	24000	24000	12000.00	330	100	82	35	115	30
4-Nitrophenol	100-02-7	NC	NC	4800	4800	2400.00	330	100	82	15	140	30
Acenaphthene	83-32-9	680000	8400	340000	8400	4200.00	33	25	22	45	110	30
Acenaphthylene	208-96-8	NC	21000	340000	21000	10500.00	33	25	19	45	105	30
Acetophenone	98-86-2	1600000	3500	780000	3500	1750.00	330	100	83	52	86	30
Anthracene	120-12-7	NC	NC	1700000	1700000	850000.00	33	25	14	55	105	30
Atrazine	1912-24-9	2100	25	2100	25	12.50	330	100	74	45	120	30
Benzaldehyde	100-52-7	1200000	3000	780000	3000	1500.00	330	100	99	45	99	30
Benzo(a) pyrene	50-32-8	NC	NC	15	15	7.50	33	25	7.4	50	110	30
Benzo(a)anthracene	56-55-3	NC	NC	150	150	75.00	33	25	9.3	50	110	30
Benzo(b) fluoranthene	205-99-2	NC	NC	150	150	75.00	33	25	13	45	115	30
Benzo(g,h,i) perylene	191-24-2	NC	7800000	170000	170000	85000.00	33	25	12	40	125	30
Benzo(k) fluoranthene	207-08-9	NC	NC	1500	1500	750.00	33	25	12	45	125	30

Analyte	CAS #	Preliminary Residential Health - Based Soil Remediation Goal (PSRG) (UG/KG)	Protection of Ground water (PSRG) (UG/KG)	RSLs Residential Soil Adjusted (May 2012) (UG/KG)	Project Action Limit[1] (UG/KG)	Project Quantitation Limit Goal[2] (UG/KG)	Laboratory-Specific (UG/KG)			LCS, %R Limits		
							LOQ	LOD	DL	LCL	UCL	RPD
Bis(2-chloroethoxy) methane	111-91-1	36000	NC	18000	18000	9000.00	330	100	64	45	110	30
Bis(2-chloroethyl) ether	111-44-4	210	0.14	210	0.14	0.07	330	100	92	40	105	30
Bis(2-ethylhexyl) phthalate	117-81-7	35000	7200	35000	7200	3600.00	330	100	85	45	125	30
Butylbenzylphthalate	85-68-7	260000	150000	260000	150000	75000.00	330	100	93	50	125	30
Caprolactam	105-60-2	6200000	18000	3100000	18000	9000.00	330	200	100	14	125	30
Carbazole	86-74-8	NC	370	NC	370	185.00	330	100	68	45	115	30
Chrysene	218-01-9	NC	NC	15000	15000	7500.00	33	25	12	55	110	30
Dibenzo(a,h) anthracene	53-70-3	NC	NC	15	15	7.50	33	25	13	40	125	30
Dibenzofuran	132-64-9	NC	NC	7800	7800	3900.00	330	100	66	50	105	30
Diethylphthalate	84-66-2	9800000	37000	4900000	37000	18500.00	330	100	75	50	115	30
Dimethylphthalate	131-11-3	NC	NC	NC	0	0.00	330	100	62	50	110	30
Di-n-butylphthalate	84-74-2	1200000	19000	610000	19000	9500.00	330	100	79	55	114	30
Di-n-octylphthalate	117-84-0	NC	38000	35000	35000	17500.00	330	100	67	40	130	30
Fluoranthene	206-44-0	NC	NC	230000	230000	115000.00	33	25	13	55	115	30
Fluorene	86-73-7	NC	NC	230000	230000	115000.00	33	25	21	50	110	30
Hexachlorobenzene	118-74-1	300	2.6	300	2.6	1.30	330	100	81	45	120	30
Hexachlorobutadiene	87-68-3	6200	8.7	6100	8.7	4.35	330	100	80	40	115	30
Hexachlorocyclopentadiene	77-47-4	74000	NC	37000	37000	18500.00	330	100	93	24	120	30
Hexachloroethane	67-72-1	8600	NC	4300	4300	2150.00	330	100	74	35	110	30
Indeno(1,2,3,-cd) pyrene	193-39-5	NC	NC	150	150	75.00	33	25	12	40	125	30
Isophorone	78-59-1	510000	210	510000	210	105.00	330	100	72	45	110	30
Naphthalene	91-20-3	NC	NC	3600	3600	1800.00	3	25	23	40	105	30
Nitrobenzene	98-95-3	4800	NC	4800	4800	2400.00	330	100	79	40	115	30
N-Nitroso-di-n propylamine	621-64-7	69	NC	69	69	34.50	330	100	90	40	155	30
N-Nitrosodiphenylamine	86-30-6	99000	NC	99000	99000	49500.00	330	200	140	50	115	30
Pentachlorophenol	87-86-5	890	31	890	31	15.50	330	300	140	25	120	30
Phenanthrene	85-01-8	NC	68000	1700000	68000	34000.00	33	25	18	50	110	30
Phenol	108-95-2	3600000	230	1800000	230	115.00	330	100	76	40	100	30
Pyrene	129-00-0	340000	220000	170000	170000	85000.00	33	25	12	45	125	30

Notes:

[1] PALs were developed based on screening values to be protective of human health and the environment. If the site data indicate concentrations of SVOCs at levels greater than screening values at site sample locations, additional collection of background data for these chemicals may be completed for the purpose of determining any widespread anthropogenic sources which may be unrelated to the areas. The PALs may be adjusted based on the results of the background data collection.

[2] PQL Goals were determined on a case by case basis and in most cases are at least 2 times less than the PAL.

Refer to Refer Section 1.6.4 of the QAPP for a detailed discussion on development of PALs.

NC – No Criteria. Refer Section 1.6.4 of the QAPP for a discussion on how data will be used in the absence of applicable criteria.

PSRG values were taken from the NC DENR inactive hazardous site Preliminary Soil Remediation Goals (July 2012).

The RSL Residential Soil values were adjusted from the USEPA RSLs Table (May 2012).

Shading represents instances where the PAL is lower than the LOD. Non-detects will not be treated as exceedances though they will be reported at a value greater than the PAL.

TABLE 6-10
Reference Limits and Evaluation Table

Matrix: Surface Soil, Subsurface Soil
Analytical Group: Pesticides

Analyte	CAS #	Preliminary Residential Health - Based Soil Remediation Goal (PSRG) (UG/KG)	Protection of Ground water (PSRG) (UG/KG)	RSLs Residential Soil Adjusted (May 2012) (UG/KG)	Project Action Limit[1] (UG/KG)	Project Quantitation Limit Goal[2] (UG/KG)	Laboratory-Specific (UG/KG)			LCS, %R Limits		
							LOQ	LOD	DL	LCL	UCL	RPD
4,4'-DDD	72-54-8	2000	240	2000	240	120	1.7	1.0	0.48	30	135	30
4,4'-DDE	72-55-9	1400	240	1400	240	120	1.7	1.0	0.52	70	125	30
4,4'-DDT	50-29-3	NC	NC	1700	1700	850	1.7	1.0	0.66	45	140	30
Aldrin	309-00-2	29	3.3	29	3.3	3.3	1.7	1.0	0.49	45	140	30
alpha-BHC	319-84-6	77	0.36	77	0.36	0.36	1.7	1.0	0.49	60	125	30
alpha-Chlordane	5103-71-9	NC	NC	1600	1600	1600	1.7	1.0	0.45	65	120	30
beta-BHC	319-85-7	270	1.2	270	1.2	1.2	1.7	1.0	1.0	60	125	30
delta-BHC	319-86-8	NC	NC	270	270	270	1.7	1.0	0.48	55	130	30
Dieldrin	60-57-1	NC	NC	30	30	30	1.7	1.0	0.45	65	125	30
Endosulfan I	959-98-8	NC	NC	37000	37000	18500	1.7	1.0	0.39	15	135	30
Endosulfan II	33213-65-9	NC	NC	37000	37000	18500	1.7	1.0	0.48	35	140	30
Endosulfan sulfate	1031-07-8	NC	8000	37000	8000	4000	1.7	1.0	0.49	60	135	30
Endrin	72-20-8	3600	810	1800	810	405	1.7	1.0	0.74	60	135	30
Endrin aldehyde	7421-93-4	NC	NC	1800	1800	900	1.7	1.0	0.50	35	145	30
Endrin ketone	53494-70-5	NC	NC	1800	1800	900	1.7	1.0	0.45	65	135	30
gamma-BHC (Lindane)	58-89-9	520	1.8	520	1.8	0.9	1.7	1.0	0.45	60	125	30
gamma-Chlordane	5103-74-2	NC	NC	1600	1600	1600	1.7	1.0	0.45	65	125	30
Heptachlor	76-44-8	110	6.6	110	6.6	6.6	1.7	1.0	0.53	50	140	30
Heptachlor epoxide	1024-57-3	53	0.82	53	0.82	0.82	1.7	1.0	0.48	65	130	30
Methoxychlor	72-43-5	62000	22000	31000	22000	11000	1.7	1.0	0.86	55	145	30
Toxaphene	8001-35-2	440	46	440	46	46	33	20	8.0	60	140	30

Notes:

[1] PALs were developed based on screening values to be protective of human health and the environment. If the site data indicate concentrations of pesticides at levels greater than screening values at site sample locations, additional collection of background data for these chemicals may be completed for the purpose of determining any widespread anthropogenic sources which may be unrelated to the areas. The PALs may be adjusted based on the results of the background data collection.

[2] PQL Goals were determined on a case by case basis and in most cases are at least 2 times less than the PAL.

Refer to Refer Section 1.6.4 of the QAPP for a detailed discussion on development of PALs.

NC – No Criteria. Refer Section 1.6.4 of the QAPP for a discussion on how data will be used in the absence of applicable criteria.

PSRG values were taken from the NC DENR inactive hazardous site Preliminary Soil Remediation Goals (July 2012).

The RSL Residential Soil values were adjusted from the USEPA RSLs Table (May 2012).

Shading represents instances where the PAL is lower than the LOD. Non-detects will not be treated as exceedances though they will be reported at a value greater than the PAL.

TABLE 6-11
Reference Limits and Evaluation Table

Matrix: Surface Soil, Subsurface Soil
Analytical Group: PCBs

Analyte	CAS #	Preliminary Residential Health - Based Soil Remediation Goal (PSRG) (UG/KG)	Protection of Ground water (PSRG) (UG/KG)	RSLs Residential Soil Adjusted (May 2012) (UG/KG)	Project Action Limit[1] (UG/KG)	Project Quantitation Limit Goal[2] (UG/KG)	Laboratory-Specific (UG/KG)			LCS, %R Limits		
							LOQ	LOD	DL	LCL	UCL	RPD
Aroclor-1016	12674-11-2	NC	NC	390	390	195	40	20	14	40	140	30
Aroclor-1221	11104-28-2	NC	NC	140	140	70	40	20	13	29	185	30
Aroclor-1232	11141-16-5	NC	NC	140	140	70	40	20	13	29	185	30
Aroclor-1242	53469-21-9	NC	NC	220	220	110	40	20	10	29	185	30
Aroclor-1248	12672-29-6	NC	NC	220	220	110	40	20	5.7	29	185	30
Aroclor-1254	11097-69-1	NC	NC	110	110	55	40	20	15	29	185	30
Aroclor-1260	11096-82-5	NC	NC	220	220	110	40	20	11	60	130	30
Aroclor-1262	37324-23-5	NC	NC	NC	20	20	40	20	12	29	185	30
Aroclor-1268	11100-14-4	NC	NC	NC	20	20	40	20	7.6	29	185	30

Notes:
[1] PALs were developed based on screening values to be protective of human health and the environment.
[2] PQL Goals were determined on a case by case basis and in most cases are at least 2 times less than the PAL.
Refer to Refer Section 1.6.4 of the QAPP for a detailed discussion on development of PALs.
NC – No Criteria. Refer Section 1.6.4 of the QAPP for a discussion on how data will be used in the absence of applicable criteria.
PSRG values were taken from the NC DENR inactive hazardous site Preliminary Soil Remediation Goals (July 2012).
The RSL Residential Soil values were adjusted from the USEPA RSLs Table (May 2012).
Shading represents instances where the PAL is lower than the LOD. Non-detects will not be treated as exceedances though they will be reported at a value greater than the PAL.

TABLE 6-12
Reference Limits and Evaluation Table

Matrix: Surface Soil, Subsurface Soil
Analytical Group: Metals (including Mercury and Hexavalent Chromium)

Analyte	CAS #	Preliminary Residential Health - Based Soil Remediation Goal (PSRG) (MG/KG)	Protection of Ground water (PSRG) (MG/KG)	RSLs Residential Soil Adjusted (May 2012) (MG/KG)	Project Action Limit[1] (MG/KG)	Project Quantitation Limit Goal[2] (MG/KG)	Laboratory-Specific (MG/KG)			LCS, %R Limits		
							LOQ	LOD	DL	LCL	UCL	RPD
Aluminum	7429-90-5	15000	NC	7700	7700	3850.00	20.0	10.0	1.90	80	120	20
Antimony	7440-36-0	6.2	0.9	3.1	0.9	0.45	2.00	1.00	0.190	80	120	20
Arsenic	7440-38-2	0.39	5.8	0.39	0.39	0.20	2.00	1.00	0.260	80	120	20
Barium	7440-39-3	3000	580	1500	580	290.00	0.500	0.250	0.0110	80	120	20
Beryllium	7440-41-7	32	63	16	16	8.00	0.0500	0.0250	0.00610	80	120	20
Cadmium	7440-43-9	14	3	7	3	1.50	0.100	0.0500	0.0140	80	120	20
Calcium	7440-70-2	NC	NC	NC	6.25	6.25	25.0	6.25	1.90	80	120	20
Chromium	7440-47-3	NC	NC	0.29	0.29	0.15	0.500	0.250	0.0290	80	120	20
Chromium VI (Hexavalent)	18540-29-9	0.29	3.8	0.29	0.29	0.15	0.4	0.2	0.1	LCS -82; MS -75	LCS - 120; MS -125	30
Cobalt	7440-48-4	4.6	0.9	2.3	0.9	0.45	0.500	0.250	0.0230	80	120	20
Copper	7440-50-8	620	700	310	310	155.00	0.500	0.250	0.0760	80	120	20
Iron	7439-89-6	11000	150	5500	150	75.00	10.0	5.00	1.50	80	120	20
Lead	7439-92-1	NC	NC	400	400	200.00	2.00	1.00	0.100	80	120	20
Magnesium	7439-95-4	NC	NC	NC	6.25	6.25	25.0	6.25	1.80	80	120	20
Manganese	7439-96-5	360	65	180	65	32.50	1.00	0.500	0.0260	80	120	20
Mercury	7439-97-6	NC	NC	2.3	2.3	1.15	0.0480	0.0240	0.00540	80	120	20
Nickel	7440-02-0	300	130	150	130	65.00	0.500	0.250	0.0200	80	120	20
Potassium	7440-09-7	NC	NC	NC	25.0	25.0	50.0	25.0	4.10	80	120	20
Selenium	7782-49-2	78	2.1	39	2.1	1.05	2.00	1.00	0.310	80	120	20
Silver	7440-22-4	78	3.4	39	3.4	1.70	0.500	0.250	0.0590	80	120	20
Sodium	7440-23-5	NC	NC	NC	12.5	12.5	25.0	12.5	2.70	80	120	20
Thallium	7440-28-0	0.16	0.28	0.078	0.078	0.04	2.00	1.00	0.140	80	120	20
Vanadium	7440-62-2	78	6	39	6	3.00	0.500	0.250	0.0460	80	120	20
Zinc	7440-66-6	4600	1200	2300	1200	600.00	1.00	0.500	0.190	80	120	20

Notes:

[1] PALs were developed based on screening values to be protective of human health and the environment. This investigation includes the collection of background data. The PALs will be adjusted if background data indicate metals concentrations are naturally present at concentrations exceeding the screening values.
[2] PQL Goals were determined on a case by case basis and in most cases are at least 2 times less than the PAL.

Refer to Refer Section 1.6.4 of the QAPP for a detailed discussion on development of PALs.

NC – No Criteria. Refer Section 1.6.4 of the QAPP for a discussion on how data will be used in the absence of applicable criteria.

PSRG values were taken from the NC DENR inactive hazardous site Preliminary Soil Remediation Goals (July 2012).

The RSL Residential Soil values were adjusted from the USEPA RSLs Table (May 2012).

Shading represents instances where the PAL is lower than the LOD. Non-detects will not be treated as exceedances though they will be reported at a value greater than the PAL.

TABLE 7
Data Package Deliverables

All Analytical Fractions			
Case Narrative – A detailed case narrative per analytical fraction is required and will include explanation of any non-compliance and/or exceptions and CA. Exceptions will be noted for receipt, holding times, methods, preparation, calibration, blanks, spikes, surrogates (if applicable), and sample exceptions.			•
Sample Identification (ID) Cross Reference Sheet (Lab IDs and Client IDs)			•
Completed COC and any sample receipt information			•
Sample preparation (extraction/digestion) logs			•
Copies of non-conformance memos and CAs			•
Form *	**GC/HPLC Organic Fractions**	**Level II**	**Level IV**
1	Sample results	•	• + raw
2	Surrogate Recovery Summary (with applicable control limits)	•	•
3	Precision Summary **	•	• + raw
3	LCS Accuracy Summary	•	• + raw
4	Method Blank Summary	•	• + raw
6	Initial Calibration Summary (including concentration levels of standards) ***		• + raw
7	Continuing Calibration Summary ***		• + raw
7	Degradation Summary (Organochlorine Pesticides only) ***		• + raw
8	Analytical Sequence (including internal standard area performance where applicable) ***		•
10	Compound Identification Summary (where confirmation required) ***		•
Form *	**Inorganic Fractions**	**Level II**	**Level IV**
1	Sample Results	•	• + raw
2A	Initial and Continuing Calibration Summary		• + raw
3	Initial and Continuing Calibration Blanks and Method Blanks Summary	•	• + raw
4	Interference Check Standard Summary		• + raw
5A	Pre-digestion Matrix Spike Recoveries Summary	•	• + raw
5B	Post-digestion Spike Recoveries Summary		• + raw
6	Native Duplicate	•	• + raw
7	LCS Recovery Summary	•	• + raw
8	Method of Standard Addition (if necessary)		• + raw
9	Serial Dilution		• + raw
10	Instrument or Method Detection Limit Summary		•
11	ICP Interelement Correction Factors		•
12	Linear Range Summary		•
13	Preparation Log Summary		• + raw
14	Analytical Run Sequence and GFAA Post-spike Recovery Summary		• + raw
Form *	**General Chemistry Fractions: (Includes potentiometric, gravimetric, colorimetric, and titrimetric analytical techniques.**	**Level II**	**Level IV**
1	Sample Results	•	• + raw
2A	Initial and Continuing Calibration Summary		• + raw
3	Initial and Continuing Calibration Blanks and Method Blanks Summary	•	• + raw
5A	Pre-digestion Matrix Spike Recoveries Summary	•	• + raw
6	Native Duplicate	•	• + raw
7	LCS Recovery Summary	•	• + raw
10	Instrument or Method Detection Limit Summary		•

TABLE 8-1
Laboratory QC Samples Table

Matrix: Groundwater
Analytical Group: VOC
Analytical Method/SOP Reference: SW846 8260B / VGCMS-05

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	CA	Person(s) Responsible for CA	DQI	MPC
Method blank	One per preparatory batch	No analytes detected > ½ reporting limit (RL) and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise affect sample results. For common laboratory contaminants, no analytes detected > RL (see Box D-1 of DoD QSM).	Correct problem, then see criteria in Box D-1of the DoD QSM. If required, reprep and reanalyze method blank and all samples processed with the contaminated blank.	Analyst	Bias/Contamination	No analytes detected > ½ reporting limit (RL) and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise affect sample results. For common laboratory contaminants, no analytes detected > RL (see Box D-1 of DoD QSM).
LCS		See Table 6-1	Correct problem, then reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available.		Precision and Accuracy/Bias	See Table 6-1
IS	Spiked in every sample	Retention time within 30 seconds from retention time of the midpoint standard in the ICAL; areas within -50% to +100% of ICAL midpoint standard.	Inspect GC/MS for malfunctions; mandatory reanalysis of samples analyzed while system was malfunctioning.		Precision and Accuracy	Retention time within 30 seconds from retention time of the midpoint standard in the ICAL; areas within -50% to +100% of ICAL midpoint standard.
Surrogates		Dibromofluoromethane 85-115%, Toluene-d8 85-120%, 1,2-Dichloroethane-d4 70-120%, 4-Bromofluorobenzene 75-120%	Re-prep and reanalyze sample unless objective evidence of suspected or confirmed sample matrix effects are available. If insufficient sample exists for reanalysis, client will be contacted for instructions. In the absence of client instruction, data will be qualified.		Precision and Accuracy/Bias	Dibromofluoromethane 85-115%, Toluene-d8 85-120%, 1,2-Dichloroethane-d4 70-120%, 4-Bromofluorobenzene 75-120%

DoD-QSM v 4.2 is the basis for this table.

TABLE 8-2
Laboratory QC Samples Table

Matrix: Groundwater
Analytical Group: SVOC
Analytical Method/SOP Reference: SW846 8270D & 8270D-SIM/SVGCMS-03

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	CA	Person(s) Responsible for CA	DQI	MPC
Method Blank	One per preparatory batch.	No analytes detected > ½ RL and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise affect sample results. For common laboratory contaminants, no analytes detected > RL (see Box D-1 of DoD QSM).	Correct problem, then see criteria in Box D-1of the DoD QSM. If required, reprep and reanalyze method blank and all samples processed with the contaminated blank.	Analyst	Bias/Contamination	No analytes detected > ½ RL and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise affect sample results. For common laboratory contaminants, no analytes detected > RL (see Box D-1 of DoD QSM).
Laboratory Control Sample (LCS)		See Table 6-2	Correct problem, then reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available.		Precision and Accuracy/Bias	See Table 6-2
Surrogate Spike	Spiked in every sample.	2-Fluorobiphenyl 50-110%, Terphenyl-d_{14} 50-135%, Nitrobenzene-d_5, 40-110%.	Re-prep and reanalyze sample unless objective evidence of suspected or confirmed sample matrix effects are available. If insufficient sample exists for reanalysis, client will be contacted for instructions. In the absence of client instruction, data will be qualified.		Precision and Accuracy/Bias	2-Fluorobiphenyl 50-110%, Terphenyl-d_{14} 50-135%, Nitrobenzene-d_5, 40-110%.
Internal Standard (IS)	Spiked in every sample.	Retention time within 30 seconds from retention time of the midpoint standard in the ICAL; areas within -50% to +100% of ICAL midpoint standard.	Inspect GC/MS for malfunctions; mandatory re-analysis of samples analyzed while system was malfunctioning.		Precision and Accuracy	Retention time within 30 seconds from retention time of the midpoint standard in the ICAL; areas within -50% to +100% of ICAL midpoint standard.

DoD-QSM v 4.2 is the basis for this table.

TABLE 8-3
Laboratory QC Samples Table

Matrix: Groundwater
Analytical Group: Pesticides
Analytical Method/SOP Reference: SW846 8081B/ SVGC-04

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparatory batch.	No analytes detected > 1/2 LOQ, > 1/10 amount measured in any sample, or regulatory limit (whichever is greater).	Correct problem. If required, re-prep and re-analyze method blank and all samples processed with the contaminated blank.	Analyst	Bias/ Contamination	No analytes detected > 1/2 LOQ, > 1/10 amount measured in any sample, or regulatory limit (whichever is greater).
LCS		See Table 6-3	Correct problem, then re-prep and re-analyze the LCS and all samples in the associated preparatory batch for failed analytes.		Precision and Accuracy/Bias	See Table 6-3
Surrogates	Spiked in every sample.	Decachlorobiphenyl 30-135%	For QC and field samples, correct problem then re-prep and re-analyze all failed samples for failed surrogates in the associated preparatory batch.		Precision and Accuracy/Bias	Decachlorobiphenyl 30-135%

DoD-QSM v 4.2 is the basis for this table.

TABLE 8-4
Laboratory QC Samples Table

Matrix: Groundwater
Analytical Group: PCBs
Analytical Method/SOP Reference: SW846 8082A/ SVCG-07

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparatory batch.	No analytes detected > 1/2 LOQ, > 1/10 amount measured in any sample, or regulatory limit (whichever is greater).	Correct problem. If required, re-prep and re-analyze method blank and all samples processed with the contaminated blank.	Analyst	Bias/ Contamination	No analytes detected > 1/2 LOQ, > 1/10 amount measured in any sample, or regulatory limit (whichever is greater).
LCS		See Table 6-4	Correct problem, then re-prep and re-analyze the LCS and all samples in the associated preparatory batch for failed analytes.		Precision and Accuracy/Bias	See Table 6-4
Surrogates	Spiked in every sample.	Decachlorobiphenyl 40-135%, 2,4,5,6-TCMX 38-142%.	For QC and field samples, correct problem then re-prep and re-analyze all failed samples for failed surrogates in the associated preparatory batch.		Precision and Accuracy/Bias	Decachlorobiphenyl 40-135%, 2,4,5,6-TCMX 38-142%.[1]

DoD-QSM v 4.2 is the basis for this table.

TABLE 8-5
Laboratory QC Samples Table

Matrix: Groundwater
Analytical Group: Metals (excluding Mercury)
Analytical Method/SOP Reference: SW846 6010C / MET-05

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparatory batch.	No analytes detected > 1/2 LOQ. Blank result must not otherwise affect sample results.	Correct problem; then repeat. If the method blank still fails; redigest and analyze all affected samples.	Analyst	Bias/ Contamination	No analytes detected > 1/2 LOQ. Blank result must not otherwise affect sample results.
LCS		See Table 6-5	Correct problem, then reprep and reanalyze the LCS and all samples in the associated preparatory batch.		Precision and Accuracy/Bias	See Table 6-5
Dilution Test		Recovery within ±10% of true value.	Perform Post Spike		Precision and Accuracy/Bias	Recovery within ±10% of true value.
Post Spike	One is performed when dilution test fails or analyte concentration for all samples < 50x LOD.	Recovery within ± 25% of true value.	If dilution test recoveries are outside of QC acceptance limits but post spike meets QC acceptance criteria, and matrix effects are not confirmed, reprep and reanalyze sample.		Precision and Accuracy/Bias	Recovery within ± 25% of true value.

DoD-QSM v 4.2 is the basis for this table.

TABLE 8-6
Laboratory QC Samples Table

Matrix: Groundwater
Analytical Group: Metals (excluding Mercury)
Analytical Method/SOP Reference: SW846 6020A / MET-15

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparatory batch.	No analytes detected > 1/2 LOQ. Blank result must not otherwise affect sample results.	Correct problem; then repeat. If the method blank still fails; redigest and analyze all affected samples.	Analyst	Bias/Contamination	No analytes detected > 1/2 LOQ. Blank result must not otherwise affect sample results.
LCS		See Table 6-5	LCS is re-analyzed. If still fails, samples, along with QC, are re-prepped and re-analyzed. Client will be contacted for guidance about whether to re-prep samples. In the absence of client specific requirements, flag the data.		Precision and Accuracy/Bias	See Table 6-5
Dilution Test		Recovery within ±10% of true value.	Perform post spike.		Precision and Accuracy/Bias	Recovery within ±10% of true value.
Post Spike	When dilution test fails or analyte concentration for all samples < 50x LOD.	Recovery within ±25% of true value.	If dilution test recovers outside of QC acceptance limits but post spike meets QC acceptance criteria, matrix effects are not confirmed, reprep and reanalyze sample.		Precision and Accuracy/Bias	Recovery within ±25% of true value.
Internal Standard (IS)	Spiked in every sample.	IS intensity within 30-120% of intensity of IS in ICAL.	Re-analyze sample at 5x dilution with the addition of appropriate amounts of IS.		Precision and Accuracy	IS intensity within 30-120% of intensity of IS in ICAL.

DoD-QSM v 4.2 is the basis for this table.

TABLE 8-7
Laboratory QC Samples Table

Matrix: Groundwater
Analytical Group: Mercury
Analytical Method/SOP Reference: SW846 7470B / MET-03

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparatory batch.	No analytes detected > 1/2 LOQ. Blank result must not otherwise affect sample results.	Correct problem; then repeat. If the method blank still fails; re-prep and re-analyze all samples processed with contaminated blank.	Analyst	Bias/Contamination	No analytes detected > 1/2 LOQ. Blank result must not otherwise affect sample results.
LCS		Refer to Table 6-5	Correct problem, then reprep and reanalyze the LCS and all samples in the associated preparatory batch.		Precision and Accuracy/Bias	Refer to Table 6-5

DoD-QSM v 4.2 is the basis for this table.

TABLE 8-8
Laboratory QC Samples Table

Matrix: Groundwater
Analytical Group: Hexavalent Chromium
Analytical Method/SOP Reference: SW846 7199 / GEN-7199

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	1 per batch of 20 or fewer samples	No target compounds should be >1/2 QL	Reclean, reanalyze and/or qualify the data	Analyst/Supervisor	Bias/Contamination	No target compounds should be >1/2 QL
LCS	1 per batch of 20 or fewer samples	70-130% of True Value	Evaluate, reanalyze batch if possible. If the LCS recoveries are high and the sample results are <QL narrate.	Analyst/Supervisor	Accuracy/Bias	70-130% of True Value
DUP	1 per batch of 20 or fewer samples	RPD<20%; +/- RL if <4xLOQ	Repeat sample and duplicate unless obvious or historical interferences or lack of volume.	Analyst/Supervisor	Precision	RPD<20%; +/- RL if <4xLOQ

DoD-QSM v 4.2 is the basis for this table.

TABLE 8-9
Laboratory QC Samples Table

Matrix: Groundwater
Analytical Group: Wet Chemistry - Alkalinity
Analytical Method/SOP Reference: EPA 310.1 / WETS-004

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparatory blank	No target analytes > 1/2 LOQ	Correct problem; then repeat. If the method blank still fails; repeat initial calibration.	Analyst	Bias/ contamination	No target analytes > 1/2 LOQ
LCS		90-110%	LCS is reanalyzed. If still fails, samples, along with QC, are re-prepped and reanalyzed.Client will be contact for guidance about whether to re-prep samples. In the absence of client specific requirements, flag the data.		Precision and Accuracy/Bias	90-110%

DoD-QSM v 4.2 is the basis for this table.

TABLE 8-10
Laboratory QC Samples Table

Matrix: Groundwater
Analytical Group: Wet Chemistry - Chloride, Nitrate, Nitrite, Sulfate
Analytical Method/SOP Reference: EPA 300/WETS-57

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparatory blank	No target analytes > 1/2 LOQ	Correct problem; then repeat. If the method blank still fails; repeat initial calibration.	Analyst	Bias/ contamination	No target analytes > 1/2 LOQ
LCS		90-110%	LCS is reanalyzed. If still fails, samples, along with QC, are re-prepped and reanalyzed.Client will be contact for guidance about whether to re-prep samples. In the absence of client specific requirements, flag the data.		Precision and Accuracy/Bias	90-110%

DoD-QSM v 4.2 is the basis for this table.

TABLE 8-11
Laboratory QC Samples Table

Matrix: Groundwater
Analytical Group: Wet Chemistry - Methane, Ethane, and Ethene
Analytical Method/SOP Reference: RSK-175 / VGC-11

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparatory batch	No target analytes > 1/2 LOQ; no common laboratory contaminants > LOQ	Correct problem. If required, re-prep and re-analyze method blank and all samples processed with the contaminated blank.	Analyst	Bias/ contamination	No target analytes > 1/2 LOQ
LCS		See Table 6-6	LCS is reanalyzed. If still fails, samples along with QC, are re-prepped and re-analyzed. In the absence of client specific requirements, flag the data.		Precision and Accuracy/Bias	See Table 6-6

DoD-QSM v 4.2 is the basis for this table.

TABLE 8-12
Laboratory QC Samples Table

Matrix: Groundwater
Analytical Group: Wet Chemistry - Sulfide
Analytical Method/SOP Reference: EPA 376.1/WETS-61

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparatory blank	No target analytes > 1/2 LOQ	Correct problem; then repeat. If the method blank still fails; repeat initial calibration.	Analyst	Bias/ contamination	No target analytes > 1/2 LOQ
LCS		86-105%	LCS is reanalyzed. If still fails, samples, along with QC, are re-prepped and reanalyzed.Client will be contact for guidance about whether to re-prep samples. In the absence of client specific requirements, flag the data.		Precision and Accuracy/Bias	86-105%

DoD-QSM v 4.2 is the basis for this table.

TABLE 8-13
Laboratory QC Samples Table

Matrix: Groundwater
Analytical Group: Wet Chemistry - TOC
Analytical Method/SOP Reference: SW846 9060A / WETS-066

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparatory batch	No target analytes > 1/2 LOQ	Correct problem; then repeat. If the method blank still fails; repeat initial calibration.	Analyst	Bias/ contamination	No target analytes > 1/2 LOQ
LCS		90-110%	LCS is reanalyzed. If still fails, samples, along with QC, are re-prepped and reanalyzed. In the absence of client specific requirements, flag the data.		Precision and Accuracy/Bias	90-110%

DoD-QSM v 4.2 is the basis for this table.

TABLE 8-14
Laboratory QC Samples Table

Matrix: Groundwater
Analytical Group: Microbial (DHC)
Analytical Method/SOP Reference: qPCR / MI SOP-qPCR 1.0

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory (sample) Duplicate	All field samples	NA	Rerun assay; if still not within 2 Ct units, flag J (estimate)	Lab Manager	NA	CT value within 2 units of other duplicate
Field duplicate	At client's request & with sample submission		Rerun assay; if still not within 4 Ct units, flag J (estimate)			CT value within 4 units of other sample (duplicate)
Assay Negative Control (Blank)	1 per analytical assay plate		Rerun assay; may have to reoptimize assay			values for positive samples are set above any fluorescence for the negative control
DNA extraction negative control	1 per analytical batch		Rerun assay or reextract samples if problem persists			CT < or = Assay Negative Control
Positive Control	1 per analytical assay plate		Rerun assay / check reagents			calcluated concentration within +/-20% of same concentration on standard curve

TABLE 8-15
Laboratory QC Samples Table

Matrix: Surface Soil, Subsurface Soil
Analytical Group: VOC
Analytical Method/SOP Reference: SW846 8260B / VGCMS-05

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method blank	One per preparatory batch	No target analytes > 1/2 LOQ; no common laboratory contaminants > LOQ.	Correct problem. If required, re-prep and re-analyze method blank and all samples processed with the contaminated blank.	Analyst	Bias/Contamination	No target analytes > 1/2 LOQ; no common laboratory contaminants > LOQ.
Laboratory Control Sample (LCS)		Refer to Table 6-8	LCS is reanalyzed. If still fails, samples along with QC, are re-prepped and re-analyzed. Client will be contacted for guidance about whether to re-prep samples. In the absence of client specific requirements, flag the data.		Precision and Accuracy/Bias	Refer to Table 6-8
Internal Standards (IS)	Spiked in Every Sample	Retention time within 30 seconds from retention time of the midpoint standard in the ICAL; areas within -50% to +100% of ICAL midpoint standard.	Inspect mass spectrometer and GC for malfunctions; mandatory reanalysis of samples analyzed while system was malfunctioning.		Precision and Accuracy	Retention time within 30 seconds from retention time of the midpoint standard in the ICAL; areas within -50% to +100% of ICAL midpoint standard.
Surrogates		Dibromofluoromethane 74-133%, Toluene-d_8 85-115%, 1,2-Dichloroethane-d4 59-133%, 4-Bromofluorobenzene 85-120%	Re-prep and re-analyze sample unless objective evidence of suspected or confirmed sample matrix effects are available. If insufficient sample exists for reanalysis, client will be contacted for instructions. In the absence of client instruction, data will be qualified.		Precision and Accuracy/Bias	Dibromofluoromethane 74-133%, Toluene-d_8 85-115%, 1,2-Dichloroethane-d4 59-133%, 4-Bromofluorobenzene 85-120%

DoD-QSM v 4.2 is the basis for this table.

TABLE 8-16
Laboratory QC Samples Table

Matrix: Surface Soil, Subsurface Soil
Analytical Group: SVOC
Analytical Method/SOP Reference: SW846 8270D & 8270D-SIM / SVGCMS-03

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparatory batch.	No analytes detected > ½ RL and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise affect sample results. For common laboratory contaminants, no analytes detected > RL (see Box D-1 of DOD QSM).	Correct problem, then see criteria in Box D-1of the DOD QSM. If required, reprep and reanalyze method blank and all samples processedwith the contaminated blank.	Analyst	Bias/Contamination	Same as QC Acceptance Limits.
Laboratory Control Sample (LCS)		Refer to Table 6-9	Correct problem, then reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available.		Precision and Accuracy/Bias	Refer to Table 6-9
Surrogate Spike	Spiked in every sample.	2-Fluorobiphenyl 45-105%, Terphenyl-d14 30-125%, Nitrobenzene-d5 35-100%, 2-Fluorophenol 35-105%, Phenol-d5 40-100%, 2,4,6-Tribromophenol 35-125%	Re-prep and re-analyze sample unless objective evidence of suspected or confirmed sample matrix effects are available. If insufficient sample exists for reanalysis, client will be contacted for instructions. In the absence of client instruction, data will be qualified.		Precision and Accuracy/Bias	Same as QC Acceptance Limits.
Internal Standards	Spiked in every sample.	Retention time within 30 seconds from retention time of the midpoint standard in the ICAL; areas within -50% to +100% of ICAL midpoint standard.	Inspect mass spectrometer and GC for malfunctions; mandatory re-analysis of samples analyzed while system was malfunctioning.		Precision and Accuracy	Same as QC Acceptance Limits.

DoD-QSM v 4.2 is the basis for this table.

TABLE 8-17
Laboratory QC Samples Table

Matrix: Surface Soil, Subsurface Soil
Analytical Group: Pesticides
Analytical Method/SOP Reference: SW846 8081B / SVGC-04

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparatory batch.	No analytes detected > 1/2 LOQ, > 1/10 amount measured in any sample, or regulatory limit (whichever is greater).	Correct problem. If required, re-prep and re-analyze method blank and all samples processed with the contaminated blank.	Analyst	Bias/ Contamination	No analytes detected > 1/2 LOQ, > 1/10 amount measured in any sample, or regulatory limit (whichever is greater).
LCS		Refer to Table 6-10.	Correct problem, then re-prep and re-analyze the LCS and all samples in the associated preparatory batch for failed analytes.		Precision and Accuracy/Bias	Refer to Table 6-10.
Surrogates	Spiked in every sample.	Decachlorobiphenyl 30-135%	For QC and field samples, correct problem then re-prep and re-analyze all failed samples for failed surrogates in the associated preparatory batch.		Precision and Accuracy/Bias	Decachlorobiphenyl 30-135%

DoD-QSM v 4.2 is the basis for this table.

TABLE 8-18
Laboratory QC Samples Table

Matrix: Surface Soil, Subsurface Soil
Analytical Group: PCBs
Analytical Method/SOP Reference: SW846 8082A / SVGC-07

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparatory batch.	No analytes detected > 1/2 LOQ, > 1/10 amount measured in any sample, or regulatory limit (whichever is greater).	Correct problem. If required, re-prep and re-analyze method blank and all samples processed with the contaminated blank.	Analyst	Bias/ Contamination	No analytes detected > 1/2 LOQ, > 1/10 amount measured in any sample, or regulatory limit (whichever is greater).
LCS		Refer to Table 6-11.	Correct problem, then re-prep and re-analyze the LCS and all samples in the associated preparatory batch for failed analytes.		Precision and Accuracy/Bias	Refer to Table 6-11.
Surrogates	Spiked in every sample.	Decachlorobiphenyl 60-125%, *2,4,5,6-TCMX 20-137%.*	For QC and field samples, correct problem then re-prep and re-analyze all failed samples for failed surrogates in the associated preparatory batch.		Precision and Accuracy/Bias	Decachlorobiphenyl 40-135%, *2,4,5,6-TCMX 38-142%.*[1]

DoD-QSM v 4.2 is the basis for this table.

TABLE 8-19
Laboratory QC Samples Table

Matrix: Surface Soil, Subsurface Soil
Analytical Group: Metals (excluding Mercury)
Analytical Method/SOP Reference: SW846 6010C / MET-05

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparatory batch.	No analytes detected > 1/2 LOQ. Blank result must not otherwise affect sample results.	Correct problem; then repeat. If the method blank still fails; redigest and analyze all affected samples.	Analyst	Bias/ Contamination	No analytes detected > 1/2 LOQ. Blank result must not otherwise affect sample results.
LCS		Refer to Table 6-12.	Correct problem, then reprep and reanalyze the LCS and all samples in the associated preparatory batch.		Precision and Accuracy/Bias	Refer to Table 6-12.
Dilution Test		Recovery within ±10% of true value.	Perform Post Spike		Precision and Accuracy/Bias	Recovery within ±10% of true value.
Post Spike	One is performed when dilution test fails or analyte concentration for all samples < 50x LOD.	Recovery within ± 25% of true value.	If dilution test recoveries are outside of QC acceptance limits but post spike meets QC acceptance criteria, and matrix effects are not confirmed, reprep and reanalyze sample.		Precision and Accuracy/Bias	Recovery within ± 25% of true value.

DoD-QSM v 4.2 is the basis for this table.

TABLE 8-20
Laboratory QC Samples Table

Matrix: Surface Soil, Subsurface Soil
Analytical Group: Mercury
Analytical Method/SOP Reference: SW846 7471A / MET-16

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per preparatory batch.	No analytes detected > 1/2 LOQ. Blank result must not otherwise affect sample results.	Correct problem; then repeat. If the method blank still fails; re-prep and re-analyze all samples processed with contaminated blank.	Analyst	Bias/Contamination	No analytes detected > 1/2 LOQ. Blank result must not otherwise affect sample results.
LCS		Refer to Table 6-12.	Correct problem, then reprep and reanalyze the LCS and all samples in the associated preparatory batch.		Precision and Accuracy/Bias	Refer to Table 6-12.

DoD-QSM v 4.2 is the basis for this table.

TABLE 9-1
Field QC Samples

Matrix: Groundwater
Analytical Group: VOC

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	VOC	One per 10 field samples	Precision	%Relative Percent Difference (RPD) ≤30%	S & A
Equipment Rinsate Blank		One per equipment lot	Bias/Contamination	No target analytes > ½ limit of quantitation (LOQ); no common laboratory contaminants > LOQ.	S
Trip Blank		One per cooler containing samples for VOC samples	Bias/Contamination	No target analytes > ½ LOQ; no common laboratory contaminants > LOQ.	S & A
Temperature Blank		One per cooler	Accuracy/Representativeness	2 to 6 degrees Celsius (°C)	S

TABLE 9-2
Field QC Samples

Matrix: Groundwater
Analytical Group: SVOC

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	SVOC	One per 10 field samples	Precision	%RPD ≤20%	S & A
Equipment Rinsate Blank		One per equipment lot	Bias/Contamination	No target analytes > ½ LOQ	S
Temperature Blank		One per cooler	Accuracy/Representativeness	2 to 6°C	S

TABLE 9-3
Field QC Samples

Matrix: Groundwater
Analytical Group: Pesticides

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	Pesticides	One per 10 field samples	Precision	%RPD ≤20%	S & A
Equipment Rinsate Blank		One per equipment lot	Bias/Contamination	No target analytes > ½ LOQ	S
Temperature Blank		One per cooler	Accuracy/Representativeness	2 to 6°C	S

TABLE 9-4
Field QC Samples

Matrix: Groundwater
Analytical Group: PCBs

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	PCBs	One per 10 field samples	Precision	%RPD ≤20%	S & A
Equipment Rinsate Blank		One per equipment lot	Bias/Contamination	No target analytes > ½ LOQ	S
Temperature Blank		One per cooler	Accuracy/Representativeness	2 to 6°C	S

TABLE 9-5
Field QC Samples

Matrix: Groundwater
Analytical Group: Metals (including Mercury and Hexavalent Chromium)

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate[1]	Metals (including Mercury and Hexavalent Chromium)	One per 10 field samples	Precision	%RPD ≤20%	S & A
Equipment Rinsate Blank[1]		One per equipment lot	Bias/Contamination	No target analytes > ½ LOQ.	S
Temperature Blank		One per cooler	Accuracy/Representativeness	2 to 6°C	S

1

[1] Not applicable to Mercury and Hexavalent Chromium.

TABLE 9-6
Field QC Samples

Matrix: Groundwater
Analytical Group: Wet Chemistry - Alkalinity, Chloride, Nitrate, Nitrite, Sulfate, Sulfide, Methane, Ethane, Ethene, TOC

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Temperature Blank	Wet Chemistry - Alkalinity, Chloride, Nitrate, Nitrite, Sulfate, Sulfide, Methane, Ethane, Ethene, TOC	One per cooler	Accuracy/Representativeness	2 to 6 degrees Celsius (°C)	S

TABLE 9-7
Field QC Samples

Matrix: Groundwater
Analytical Group: Microbial (DHC)

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Temperature Blank	Microbial (DHC)	One per cooler	Accuracy/Representativeness	2 to 6 degrees Celsius (°C)	S

TABLE 9-8
Field QC Samples

Matrix: Surface Soil, Subsurface Soil
Analytical Group: VOC

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	VOC	One per 10 samples per matrix	Precision	Relative Percent Difference (RPD) ≤20%	S & A
Equipment Rinsate Blank		One per equipment lot	Accuracy / Bias (contamination)	No analyte detected > ½ LOQ	S
Trip Blank		One per cooler containing VOCs	Accuracy / Bias (contamination)	No target analytes > ½ LOQ	S & A
Temperature Blank		One per cooler to the laboratory	Accuracy / Representativeness	2 to 6°C	S

TABLE 9-9
Field QC Samples

Matrix: Surface Soil, Subsurface Soil
Analytical Group: SVOC

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	SVOC	One per 10 samples per matrix	Precision	Relative Percent Difference (RPD) ≤30%	S & A
Equipment Rinsate Blank		One per equipment lot	Accuracy / Bias (contamination)	No analyte detected > ½ LOQ	S
Temperature Blank		One per cooler to the laboratory	Accuracy / Representativeness	2 to 6°C	S

TABLE 9-10
Field QC Samples

Matrix: Surface Soil, Subsurface Soil
Analytical Group: Pesticides

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	Pesticides	One per 10 samples per matrix	Precision	Relative Percent Difference (RPD) ≤30%	S & A
Equipment Rinsate Blank		One per equipment lot	Accuracy / Bias (contamination)	No analyte detected > ½ LOQ	S
Temperature Blank		One per cooler to the laboratory	Accuracy / Representativeness	2 to 6°C	S

TABLE 9-11
Field QC Samples

Matrix: Surface Soil, Subsurface Soil
Analytical Group: PCBs

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate	PCBs	One per 10 samples per matrix	Precision	Relative Percent Difference (RPD) ≤30%	S & A
Equipment Rinsate Blank		One per equipment lot	Accuracy / Bias (contamination)	No analyte detected > ½ LOQ	S
Temperature Blank		One per cooler to the laboratory	Accuracy / Representativeness	2 to 6°C	S

TABLE 9-12
Field QC Samples

Matrix: Surface Soil, Subsurface Soil
Analytical Group: Metals (including Mercury and Hexavalent Chromium)

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
Field Duplicate[1]	Metals (including Mercury and Hexavalent Chromium)	One per 10 samples per matrix	Precision	Relative Percent Difference (RPD) ≤30%	S & A
Equipment Rinsate Blank[1]		One per equipment lot	Accuracy / Bias (contamination)	No analyte detected > ½ LOQ	S
Temperature Blank		One per cooler to the laboratory	Accuracy / Representativeness	2 to 6°C	S

[1] Not applicable to Mercury and Hexavalent Chromium.

TABLE 10
Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
GC/MS (VOC)	Clean sources, maintain vacuum pumps.	Tuning	Instrument performance and sensitivity.	Service vacuum pumps twice per year, other maintenance as needed.	Tune and CCV pass criteria.	Recalibrate instrument.	Analyst	VGCMS-05
	Change septum, clean injection port, change or clip column, install new liner, change trap.	Sensitivity check	Instrument performance and sensitivity.	Daily or as needed.	Tune and CCV pass criteria.	Re-inspect injector port, cut additional column, re-analyze CCV, and re-calibrate instrument.		
GC/MS (SVOC)	Clean sources, maintain vacuum pumps.	Tuning	Instrument performance and sensitivity.	Service vacuum pumps twice per year, other maintenance as needed.	Tune and CCV pass criteria.	Recalibrate instrument.	Analyst	SVGCMS-03
	Change septum, clean injection port, change or clip column, install new liner, change trap.	Sensitivity check	Instrument performance and sensitivity.	Daily or as needed.	Tune and CCV pass criteria.	Re-inspect injector port, cut additional column, re-analyze CCV, and re-calibrate instrument.		
GC-ECD (Pesticides)	Injection port maintenance.	Degredation check run every 12 hrs	DDT and Endrin breakdown <15%.	Beginning of each 12 hour 8081B sequence.	DDT and Endrin breakdown <15%.	Clip the guard column, replace the injection port liner, replace the gold seal, clean the injection port and repeat degredation check.	Analyst	SVGC-04
GC-ECD (PCBs)	Injection port maintenance.	NA.	Evaluate baseline and peak shapes.	As needed.	Analyst judgement of excessive tailing or baseline fluctuation.	Clip the guard column, replace the injection port liner, replace the gold seal, clean the injection port		SVGC-07
GC (Methane, Ethane, and Ethene)	Injection port maintenance	NA	Evaluate baseline and peak shapes	As needed	Analyst judgement of excessive tailing or baseline fluctuation	Clip the guard column, replace the injection port liner, replace the gold seal, clean the injection port, and replace the injection port septum.	Analyst	VGC-11
IC (Chloride, Nitrate, Nitrite, Sulfate)	Fill eluent bottles and Fill reservoir water bottle.	NA	Visual	Weekly or as needed	NA	Fill bottle as needed	Analyst	WETS-057
	Check back pressure is below 2300 PSI.	NA	Visual	Weekly or as needed	NA	clean or replace guard column and frit		
	Check IC for leaks.	NA	visual check for liquid or pressure fluctuation	Weekly or as needed	NA	fix leak		
TOC ANALYZER (TOC)	Inspect/Clean TOC syringe.	NA	Visual	Monthly	NA	Clean as needed	Analyst	WETS-066
	Inspect Permeation Dryer.	NA	Visual	Monthly	NA	Replace if humidity observed		
	Test fittings on 8 port valve	NA	Visual check for leaks	Monthly	NA	Replace or tight fittings as needed		
	Replace Injection Line.	NA	Peak shape and unifirmity between injection replicas	As needed	CCV pass criteria	Replace line		
	Replace Corrosive Scrubber (Tin and Copper).	NA	Color discoloration	As needed	CCV pass criteria	Replace Tin and Copper		
	Replace/wash and condition Catalys and Combustion Tube	NA	CCV passing	As needed	CCV pass criteria	Replace and condition.		
ICP-AES (Metals)	Change tubing	None	None	Every other run	None	None	Analyst	MET-05
	Clean air filter	Inspect air filters	Visual	Monthy	Air Filters are clean	Clean, replace air filters		
	Clean lenses	Inspect lenses for cleanliness		As needed	Lenses are clean	None		
	Clean injector	Inspect injector for cleanliness			verify injector is clean			

TABLE 10
Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
ICP-MS (Metals)	Clean, inspect, change cones	Monitor ISTD counts for variation	Instrument performance and sensitivity	As needed	Monitor ISTD counts for variation	Re-calibrate	Analyst	MET-15
	Clean, inspect, change spray chamber,injector,torch							
	Replace pump windings					Replace windings, re-calibrate and re-analyze		
CVAA (Mercury)	Replace disposables, flush lines	Sensitivity check	Instrument performance and sensitivity	Daily or as needed	CCV pass criteria	Recalibrate	Analyst	MET -03 and MET-16
	Clean lens				Method Blank pass criteria			
	Replace pump tubing	Flow Rate Check		As needed	Monitor flow rate for variation	Replace windings, recalibrate and re-analyze		
IC/UVVIS (Hexavalent Chromium)	Change column bed supports	Hexavalent Chromium	Change column bed supports	monthly or as needed	must meet initial and/or continuing calibration criteria	Repeat maintenance activity or remove from service	Analyst/Supervisor	GEN-7199
	Clean column	Hexavalent Chromium	Clean column	monthly or as needed	must meet initial and/or continuing calibration criteria	Repeat maintenance activity or remove from service		
	Change column	Hexavalent Chromium	Change column	Every 6 months or as needed	must meet initial and/or continuing calibration criteria	Repeat maintenance activity or remove from service		
	Change tubing	Hexavalent Chromium	Change tubing	Annually or as needed	must meet initial and/or continuing calibration criteria	Repeat maintenance activity or remove from service		
ABI 7300 (qPCR)	Background check;	Initial calibration verification and background check	Monitor instrument performance via initial calibration verification and blank	Background check monthly	Standard curve R2 value >0.95: CT value within 4 units of same point on standard curve	Clean wells, rerun background assay	Lab Manager	MI SOP- ABI7300
	Dye calibration annually			Dye calibration annually				

TABLE 11
Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
GC-MS (VOC)	Tuning	Prior to ICAL and at the beginning of each 12-hour period.	Refer to method for specific ion criteria.	Retune instrument and verify. Rerun affected samples.	Analyst	VGCMS-05
	Minimum five-point initial calibration (ICAL) for all analytes	ICAL prior to sample analysis.	1. Average response factor (RF) for SPCCs: VOCs ≥0.30 for chlorobenzene and 1,1,2,2-tetrachlorolethane; VOCs ≥0.1 for chloromethane, bromoform, and 1,1-dichloroethane. 2. RSD for RFs for CCCs: VOCs ≤ 30% and one option below: Option 1: RSD for each analyte ≤ 15%; Option 2: linear least squares regression r ≥ 0.995 Option 3: non-linear regression.coefficient of determination (COD) r2 ≥ 0.990 (6 points shall be used for second order; 7 points shall be used for third order).	Correct problem then repeat ICAL.		
	Second source calibration verification (ICV)	Once after each ICAL.	All project analytes within ± 20% of true value.	Correct problem and verify second source standard. Rerun second source verification. If that fails, correct problem and repeat ICAL.		
	Retention time window position establishment for each analyte and surrogate.	Once per ICAL.	Position shall be set using the midpoint standard of the ICAL curve when ICAL is performed. On days when ICAL is not performed, the initial CCV is used.	NA.		
	Evaluation of relative retention times (RRT)	With each sample.	RRT of each target analyte within ± 0.06 RRT units.	Correct problem, then rerun ICAL.		
	Continuing calibration verification (CCV)	Daily before sample analysis and every 12 hours of analysis time.	1. Average RF for SPCCs: VOCs≥ 0.30 for chlorobenzene and 1,1,2,2-tetrachlorolethane; ≥ 0.1 for chloromethane, bromoform, and 1,1-dichloroethane. 2. %Difference/Drift for all target compounds and surrogates: VOCs ≤ 20%D (Note: D = difference when using RFs or drift when using least squares regression or non-linear calibration).	DoD project level approval must be obtained for each of the failed analytes or corrective action must be taken. Correct problem, then rerun calibration verification. If that fails, then repeat ICAL. Reanalyze all samples since last acceptable CCV.		
GC-MS (SVOC)	Tuning	Prior to ICAL and at the beginning of each 12-hour period.	Refer to method for specific ion criteria.	Retune instrument and verify. Rerun affected samples.	Analyst	SVGCMS-03
	Minimum five-point initial calibration (ICAL) for all analytes	ICAL prior to sample analysis.	1. Average response factor (RF) for SPCCs: SVOCs≥ 0.050. 2. RSD for RFs for CCCs: SVOCs ≤ 30% and one option below: Option 1: RSD for each analyte ≤ 15%; Option 2: linear least squares regression r ≥ 0.995; Option 3: non-linear regression.coefficient of determination (COD) r2 ≥ 0.990 (6 points shall be used for second order, 7 points shall be used for third order).	Correct problem then repeat ICAL.		
	Second source calibration verification (ICV)	Once after each ICAL.	All project analytes within ± 20% of true value.	Correct problem and verify second source standard. Rerun second source verification. If that fails, correct problem and repeat ICAL.		
	Retention time window position establishment for each analyte and surrogate.	Once per ICAL.	Position shall be set using the midpoint standard of the ICAL curve when ICAL is performed. On days when ICAL is not performed, the initial CCV	NA.		

TABLE 11
Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
			is used.			
	Evaluation of relative retention times (RRT)	With each sample.	RRT of each target analyte within ± 0.06 RRT units.	Correct problem, then rerun ICAL.		
	Continuing calibration verification (CCV)	Daily before sample analysis and every 12 hours of analysis time.	1. Average RF for SPCCs: SVOCs ≥ 0.050. 2. %Difference/Drift for all target compounds and surrogates: SVOCs ≤ 20%D (Note: D = difference when using RFs or drift when using least squares regression or non-linear calibration).	DoD project level approval must be obtained for each of the failed analytes or corrective action must be taken. Correct problem, then rerun calibration verification. If that fails, then repeat ICAL. Reanalyze all samples since last acceptable CCV.		
GC/ECD (Pesticides)	Breakdown Check	At the beginning of each 12 hour sequence, prior to analysis of samples.	Degradation ≤15% for both DDT and Endrin.	Correct the problem, repeat breakdown check.	Analyst	SVGC-04
	Minimum five-point initial calibration (ICAL) for all analytes	ICAL prior to sample analysis.	One of the following options: Option 1: RSD for each analyte ≤20% Option 2: Linear regression fit, r≥0.995.	Correct the problem, repeat ICAL.		
	Retention time window position establishment	Once per ICAL and at the beginning of the analytical shift.	Position shall be set using the midpoint standard of the ICAL curve when ICAL is performed. On days when ICAL is not performed, the initial CCV is used.	NA.		
	Second Source Calibration Verification (SCV)	Immediately following the ICAL.	Within 80-120% of true value.	Correct the problem: rerun SCV. If that fails, repeat ICAL.		
	Continuing Calibration Verification (CCV)	At the beginning of every 12-hour sequence, after the pesticide breakdown check.	Within 80-120% of true value.	Correct the problem, then rerun CCV. If that fails, repeat ICAL. Re-analyze all samples since the last successful calibration verification.		
GC/ECD (PCBs)	Minimum five-point initial calibration (ICAL) for all analytes	ICAL prior to sample analysis.	One of the following options: Option 1: RSD for each analyte ≤20% Option 2: Linear regression fit, r≥0.995.	Correct the problem, repeat ICAL.	Analyst	SVGC-07
	Retention time window position establishment	Once per ICAL and at the beginning of the analytical shift.	Position shall be set using the midpoint standard of the ICAL curve when ICAL is performed. On days when ICAL is not performed, the initial CCV is used.	NA.		
	Second Source Calibration Verification (SCV)	Immediately following the ICAL.	Within 80-120% of true value.	Correct the problem, rerun SCV. If that fails, repeat ICAL.		
	Continuing Calibration Verification (CCV)	Prior to any samples in sequences that do not include ICAL, after every 10th sample, and at the end of the sequence.	Within 80-120% of true value.	Correct the problem, then rerun CCV. If that fails, repeat ICAL. Re-analyze all samples since the last successful calibration verification.		
GC (Methane, Ethane, and Ethene)	Initial calibration (ICAL) for all analytes	Daily ICAL prior to sample analysis.	Calculate reponse factor (RF) for each standard, compute average response factor and percent RSD. RSD <20%. Optionally, a linear regression curve may be fit if the correlation coefficient > 0.990.	Correct problem then repeat ICAL.	Analyst	VGC-11
	Second source calibration verification	Once after each ICAL.	All project analytes within ± 25% of true value.	Verify second source standard. Rerun second source verification. If that fails, correct problem and repeat ICAL.		
	Continuing calibration verification (CCV)	Before any samples in sequences that don't include initial calibrations, after every 24 hours, and at the end of the sequence.	All project analytes within ± 20% of true value.	Correct problem, rerun calibration verification. If that fails, then repeat ICAL. Reanalyze all samples since the last successful calibration verification.		

TABLE 11
Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
IC (Chloride, Nitrate, Nitrite, Sulfate)	Initial calibration (ICAL), minimum of three standards and a calibration blank	Every 6 months, ICAL prior to sample analysis.	Coefficient of determination at least 0.995	Correct problem then repeat ICAL.	Analyst	WETS-57
	Second source calibration verification	Once after each ICAL.	All analytes within ± 10% of true value and retention times within appropriate windows	Verify second source standard. Rerun second source verification. If that fails, correct problem and repeat ICAL.		
	Continuing calibration verification (CCV)	After every 10 field samples and at the end of the analysis sequence.	All project analytes within established retention time windows. Within ± 10% of true value.	Correct problem, then rerun calibration verification. If that fails, then repeat ICAL. Reanalyze all samples since the last successful calibration verification.		
	Retention Time Windows	One per multipoint calibration	Position shall be set using the midpoint standard of the ICAL curve when ICAL is performed. On days when ICAL is not performed, the initial CCV is used.	NA		
TOC Analyzer (TOC)	Initial calibration (ICAL), minimum of five standards and a calibration blank	Annually, ICAL prior to sample analysis.	Coefficient of determination at least 0.995	Correct problem then repeat ICAL.	Analyst	WETS-066
	Second source calibration verification	Once after each ICAL.	All analytes within ± 15% of true value and retention times within appropriate windows	Verify second source standard. Rerun second source verification. If that fails, correct problem and repeat ICAL.		
	Continuing calibration verification (CCV)	After every 10 field samples and at the end of the analysis sequence.	All analytes within ± 15% of true value.	Correct problem, rerun calibration verification. If that fails, then repeat ICAL. Reanalyze all samples since the last successful calibration verification.		
ICP-AES (Metals)	Initial calibration (ICAL) - minimum one high standard and a calibration blank for all analytes	Daily ICAL prior to sample analysis.	More than one calibration standard is used, R≥ 0.995.	Correct problem, then repeat ICAL.	Analyst	MET-05
	Low-level calibration check standard	Daily, after one-point ICAL.	Within ± 20% of true value.	Correct problem, then reanalyze.		
	Second source calibration verification	Once after each ICAL, prior to beginning a sample run.	Value of second source for all analytes within ± 10% of true value.	Verify second source standard. Rerun second source verification. If that fails, correct problem and repeat ICAL.		
	Continuing calibration verification (CCV)	After every 10 field samples and at the end of the analysis sequence.	All analytes within ± 10% of true value.	Correct problem, rerun calibration verification. If that fails, then repeat ICAL. Reanalyze all samples since the last successful calibration verification.		
	Calibration blank	Before beginning a sample run, after every 10 samples, and at end of the analysis sequence.	No analytes detected > LOD.	Correct problem. Re-prep and reanalyze calibration blank. All samples following the last acceptable calibration blank must be reanalyzed.		
	Interference check solutions (ICS-A and ICS-AB)	At the beginning of an analytical run and every 12 hours.	ICS-A: Absolute value of concentration for all non-spiked analytes < LOD (unless they are a verified trace impurity from one of the spiked analytes); ICS-AB: Within ± 20% of true value.	Terminate analysis, locate and correct problem, reanalyze ICS, reanalyze all samples.		
ICP-MS (Metals)	Tuning	Prior to ICAL.	Mass calibration ≤ 0.1 amu from the true value; resolution < 0.9 amu full width at 10% peak height; For stability, RSD≤ 5% for at least four replicate analyses.	Retune instrument then reanalyze tuning solutions.	Analyst	MET-15

TABLE 11
Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
	ICAL for all analytes (minimum 2 point calibration)	Daily ICAL prior to sample analysis.	More than one calibration standard is used, R≥ 0.995.	Correct problem, then repeat ICAL.		
	Second source calibration verification	Once after each ICAL, prior to beginning a sample run.	Value of second source for all analytes within ± 10% of true value.	Verify second source standard. Rerun second source verification. If that fails, correct problem and repeat ICAL.		
	CCV	After every 10 field samples and at the end of the analysis sequence.	All analytes within ± 10% of true value.	Correct problem, rerun calibration verification. If that fails, then repeat ICAL. Reanalyze all samples since the last successful calibration verification.		
	Calibration blank	Before beginning a sample run, after every 10 samples, and at end of the analysis sequence.	No analytes detected > LOD.	Correct problem. Re-prep and reanalyze calibration blank. All samples following the last acceptable calibration blank must be reanalyzed.		
	Interference check solutions (ICS-A and ICS-AB)	At the beginning of an analytical run and every 12 hours.	ICS-A: Absolute value of concentration for all non-spiked analytes < LOD (unless they are a verified trace impurity from one of the spiked analytes); ICS-AB: Within ± 20% of true value.	Terminate analysis, locate and correct problem, reanalyze ICS, reanalyze all samples.		
CVAA (Mercury)	ICAL - minimum 5 standards and a calibration blank	Initial calibration daily prior to sample analysis.	Correlation coefficient >0.995; accepted if the second-source calibration verification passes.	Correct problem, then repeat initial calibration.	Analyst	MET-03 and MET-16
	Second-source Calibration Verification	Once per initial calibration, prior to beginning a sample run.	Less than 10% difference from expected concentration for all target analytes.	Correct problem, then repeat. If still fails, repeat initial calibration.		
	CCV	Following SCV, after every 10 samples and the end of the sequence.	Within +/- 20% of true value.	Correct problem, then repeat. If still fails, repeat initial calibration. Re-analyze all samples since the last successful calibration verification.		
	Calibration blank	Daily after initial calibration and every ten samples.	No analytes detected > LOD.	Correct problem, re-prep and reanalyze calibration blank. Re-analyze all samples following the last acceptable calibration blank.		
IC/UVVIS (Hexavalent Chromium)	ICAL	Prior to sample analysis	CC > 0.999	Correct problem then repeat ICAL	Analyst/Supervisor	GEN-7199
	ICV	After each ICAL	90-110% Recovery	Correct problem and verify second source standard. Rerun ICV. If that fails, correct problem and repeat ICAL.		
	CCV	At the beginning of the analytical sequence; after each 10 field samples; at the end of the analytical sequence	90-110% Recovery	Correct problem, rerun CCV. If that fails, then repeat ICAL. Reanalyze all samples since the last acceptable CCV.		
ABI 7300 (qPCR)	Initial Assay Calibration (standard curve)	Once per assay	Standard curve R2>0.95	Rerun and/or optimize assay	Lab Manager	MI SOP-qPCR 1.0
	Continuing Calibration Verification	Primary-annual	Standard curve R2>0.95	Rerun and/or optimize assay		
	Continuing Calibration Verification	Secondary-every plate (Assay)	CT value within 4 units of same point on standard curve	Rerun		

TABLE 12
Field Performance Audit Checklist

Project Responsibilities

Project No.: _____ Date: _____

Project Location: HPDTA _____ Signature: _____

Team Members: _____

_____

Yes No 1) Is the approved work plan being followed?

Comments _____

_____

Yes No 2) Was a briefing held for project participants?

Comments _____

_____

Yes No 3) Were additional instructions given to project participants?

Comments _____

_____

Sample Collection

Yes No 1) Is there a written list of sampling locations and descriptions?

Comments _____

_____

Yes No 2) Are samples collected as stated in the Master SOPs?

Comments _____

_____

Yes No 3) Are samples collected in the type of containers specified in the work plan?

Comments _____

_____

Yes No 4) Are samples preserved as specified in the work plan?

Comments _____

_____

Yes No 5) Are the number, frequency, and type of samples collected as specified in the work plan?

Comments _____

_____

Yes No 6) Are quality assurance checks performed as specified in the work plan?

Comments _____

_____

Yes No 7) Are photographs taken and documented?

Comments _____

_____

Document Control

Yes No 1) Have any accountable documents been lost?

Comments _____

_____

Yes No 2) Have any accountable documents been voided?

Comments _____

_____

Yes No 3) Have any accountable documents been disposed of?

Comments _____

_____

Yes No 4) Are the samples identified with sample tags?

Comments _____

_____

Yes No 5) Are blank and duplicate samples properly identified?

Comments _____

_____

Yes No 6) Are samples listed on a chain-of-custody record?

Comments _____

_____

Yes No 7) Is chain-of-custody documented and maintained?

Comments _____

_____

TABLE 13
Project Documents and Records

Document	Where Maintained
Field Notebooks	Electronic .pdf copies in the project file. Hardcopy (bound notebook) in the project file.
Chain-of-Custody Records	Electronic .pdf copies in the project file. Hardcopy in the project file.
Air Bills	Hardcopy in the project file.
Telephone Logs	Hardcopy in the project file.
Corrective Action Forms	Electronic .pdf copies in the project file. Hardcopy in the project file.
PID/FID readings	Recorded in Field Notebook.
Water quality parameters collected during sediment sampling	Recorded in Field Notebook.
OVM/OVA readings	Recorded in Field Notebook.
Various field measurements	Recorded in Field Notebook.
All equipment calibration information	Recorded in Field Notebook.
Pertinent telephone conversations	Recorded in Field Notebook.
Equipment maintenance records	Inspected by Field Team Leader. Not maintained.
Sample Receipt, Custody, and Tracking Records	Electronic .pdf copies in the project file. Hardcopy in the full data package.
Standard Traceability Logs	Hardcopy in the full data package.
Equipment Calibration Logs	Hardcopy in the full data package.
Sample Prep Logs	Hardcopy in the full data package.
Run Logs	Hardcopy in the full data package.
Equipment Maintenance, Testing, and Inspection Logs	Hardcopy in the full data package.
Reported Field Sample Results	Electronic .pdf copies in the project file. Hardcopy in the data package.
Reported Results for Standards, QC Checks, and QC Samples	Hardcopy in the full data package.
Instrument Printouts (raw data) for Field Samples, Standards, QC Checks, and QC Samples	Hardcopy in the full data package.
Data Package Completeness Checklists	Hardcopy in the data validation report.
Sample Disposal Records	Maintained by the laboratory.
Extraction/Clean-up Records	Maintained by the laboratory.
Raw Data	Hardcopy in the full data package.
Field Sampling Audit Checklists	Hardcopy in the project file.
Fixed Laboratory Audit Checklists	If completed, hardcopy in the project file

Note:

All project documents and records, original and copies, shall be surrendered to the hpdta environmental manager upon completion of the project

Attachment II
DoD ELAP Accreditation Letters – Analytical Laboratory

PERRY JOHNSON LABORATORY ACCREDITATION, INC.

Certificate of Accreditation

Perry Johnson Laboratory Accreditation, Inc., has assessed the Laboratory of:

Columbia Analytical Services, Inc.
1 Mustard Street, Suite #250
Rochester, NY 14609

(Hereinafter called the Organization) and hereby declares that Organization has met the requirements of the DoD Quality Systems Manual for Environmental Laboratories Version 4.1 (4/22/2009) and is accredited in accordance with the**:**

United States Department of Defense Environmental Laboratory Accreditation Program (DoD-ELAP)

This accreditation demonstrates technical competence for the defined scope:

Environmental Testing
(As detailed in the supplement)

Such testing shall only be offered at or from the address given above. This Accreditation is granted subject to the system rules governing the Accreditation referred to above, and the Organization hereby covenants with the Accreditation Body's duty to observe and comply with the said rules.

For PJLA:

The validity of this certificate is mandated through ongoing surveillance.

Tracy Szerszen
President/Operations Manager
Perry Johnson Laboratory
Accreditation, Inc. (PJLA)
26555 Evergreen, Suite 1325
Southfield, Michigan 48076

Initial Accreditation Date:	Issue Date:	Revision Date:	Expiration Date:
January 22, 2010	January 22, 2010	February 01, 2010	January 21, 2012

Accreditation No:	Certificate No:	Page No:
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Certificate of Accreditation: Supplement

Columbia Analytical Services, Inc.
1 Mustard Street, Suite #250
Rochester, NY 14609

Accreditation is granted to this facility to perform the following testing:

Matrix	Standard / Method	Technology	Analyte
Aqueous	EPA 1631	CVAFS	Mercury
Aqueous	EPA 1664A	Gravimetric	Oil and grease
Aqueous	EPA 1664A	Gravimetric	Total petroleum hydrocarbons
Aqueous	EPA 245.1	CVAA	Mercury
Aqueous	EPA 300.0	IC	Chloride
Aqueous	EPA 300.0	IC	Fluoride
Aqueous	EPA 300.0	IC	Nitrate
Aqueous	EPA 300.0	IC	Sulfate
Aqueous	EPA 351.2	UV-VIS	Nitrogen, total Kjeldahl
Aqueous	EPA 353.2	UV-VIS	Nitrite as N
Aqueous	EPA 410.4	UV-VIS	Chemical oxygen demand
Aqueous	(CAS SOP) GEN-TICW	UV-VIS	Total inorganic carbon
Aqueous	EPA 7470A	CVAA	Mercury
Aqueous	EPA 8260B	GC-MS-SIM	1,1-Dichloroethene
Aqueous	EPA 8260B	GC-MS-SIM	1,2-Dichlorobenzene
Aqueous	EPA 8260B	GC-MS-SIM	1,2-Dichloroethane
Aqueous	EPA 8260B	GC-MS-SIM	1,4-Dioxane
Aqueous	EPA 8260B	GC-MS-SIM	Carbon tetrachloride
Aqueous	EPA 8260B	GC-MS-SIM	Dichloromethane
Aqueous	EPA 8260B	GC-MS-SIM	Ethylbenzene
Aqueous	EPA 8260B	GC-MS-SIM	m- + p-Xylene
Aqueous	EPA 8260B	GC-MS-SIM	o-Xylene
Aqueous	EPA 8260B	GC-MS-SIM	Tetrachloroethene
Aqueous	EPA 8260B	GC-MS-SIM	Trichloroethene
Aqueous	EPA 8260B	GC-MS-SIM	Vinyl chloride
Aqueous	EPA 8260B	GC-MS-SIM	Xylenes, total
Aqueous	EPA 8310	HPLC-UV/FLUOR	Acenaphthene
Aqueous	EPA 8310	HPLC-UV/FLUOR	Acenaphthylene
Aqueous	EPA 8310	HPLC-UV/FLUOR	Anthracene
Aqueous	EPA 8310	HPLC-UV/FLUOR	Benzo(a)antracene
Aqueous	EPA 8310	HPLC-UV/FLUOR	Benzo(a)pyrene
Aqueous	EPA 8310	HPLC-UV/FLUOR	Benzo(b)fluoranthene

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Matrix	Standard / Method	Technology	Analyte
Aqueous	EPA 8310	HPLC-UV/FLUOR	Benzo(g,h,i)perylene
Aqueous	EPA 8310	HPLC-UV/FLUOR	Benzo(k)fluoranthene
Aqueous	EPA 8310	HPLC-UV/FLUOR	Chrysene
Aqueous	EPA 8310	HPLC-UV/FLUOR	Dibenzo(a,h)anthracene
Aqueous	EPA 8310	HPLC-UV/FLUOR	Fluoranthene
Aqueous	EPA 8310	HPLC-UV/FLUOR	Fluorene
Aqueous	EPA 8310	HPLC-UV/FLUOR	Indeno(1,2,3-cd)pyrene
Aqueous	EPA 8310	HPLC-UV/FLUOR	Naphthalene
Aqueous	EPA 8310	HPLC-UV/FLUOR	Phenanthrene
Aqueous	EPA 8310	HPLC-UV/FLUOR	Pyrene
Aqueous	EPA 9060	UV-VIS	Total organic carbon
Aqueous	EPA 9066	UV-VIS	Phenolics, total
Aqueous	RSK-175	GC-FID	Ethane
Aqueous	RSK-175	GC-FID	Ethylene
Aqueous	RSK-175	GC-FID	Methane
Aqueous	RSK-175	GC-FID	Propane
Aqueous	RSK-175	GC-FID	Acetylene
Aqueous	SM 2320B	Titration	Alkalinity, total, carbonate, and bicarbonate
Aqueous	SM 2340C	Titration	Hardness, total
Solids	EPA 8330	HPLC-UV	1,3,5-Trinitrobenzene
Solids	EPA 8330	HPLC-UV	1,3-Dinitrobenzene
Solids	EPA 8330	HPLC-UV	2,4,6-Trinitrotoluene
Solids	EPA 8330	HPLC-UV	2,4-Dinitrotoluene
Solids	EPA 8330	HPLC-UV	2,6-Dinitrotoluene
Solids	EPA 8330	HPLC-UV	2-Amino-4,6-dinitrotoluene
Solids	EPA 8330	HPLC-UV	2-Nitrotoluene
Solids	EPA 8330	HPLC-UV	3-Nitrotoluene
Solids	EPA 8330	HPLC-UV	4-Amino-2,6-dinitrotoluene
Solids	EPA 8330	HPLC-UV	4-Nitrotoluene
Solids	EPA 8330	HPLC-UV	HMX
Solids	EPA 8330	HPLC-UV	Nitrobenzene
Solids	EPA 8330	HPLC-UV	RDX
Solids	EPA 8330	HPLC-UV	Tetryl

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Matrix	Standard / Method	Technology	Analyte
Solids	(CAS SOP) GEN-351.2	UV-VIS	Nitrogen, total Kjeldahl
Solids	EPA 7471	CVAA	Mercury
Solids	EPA 300.0	IC	Chloride
Solids	EPA 300.0	IC	Fluoride
Solids	EPA 300.0	IC	Nitrate
Solids	EPA 300.0	IC	Sulfate
Solids	EPA Lloyd Kahn	UV-VIS	Total organic carbon
Solids	SM 5220B	Titration	Chemical oxygen demand
Solids	(CAS SOP) GEN-420.4/9066	UV-VIS	Phenolics, total
Aqueous/Solids	EPA 353.2	UV-VIS	Nitrate/nitrite as N
Aqueous/Solids	EPA 6010B	ICP-AES	Aluminum
Aqueous/Solids	EPA 6010B	ICP-AES	Antimony
Aqueous/Solids	EPA 6010B	ICP-AES	Arsenic
Aqueous/Solids	EPA 6010B	ICP-AES	Barium
Aqueous/Solids	EPA 6010B	ICP-AES	Beryllium
Aqueous/Solids	EPA 6010B	ICP-AES	Boron
Aqueous/Solids	EPA 6010B	ICP-AES	Cadmium
Aqueous/Solids	EPA 6010B	ICP-AES	Calcium
Aqueous/Solids	EPA 6010B	ICP-AES	Chromium
Aqueous/Solids	EPA 6010B	ICP-AES	Cobalt
Aqueous/Solids	EPA 6010B	ICP-AES	Copper
Aqueous/Solids	EPA 6010B	ICP-AES	Iron
Aqueous/Solids	EPA 6010B	ICP-AES	Lead
Aqueous/Solids	EPA 6010B	ICP-AES	Magnesium
Aqueous/Solids	EPA 6010B	ICP-AES	Manganese
Aqueous/Solids	EPA 6010B	ICP-AES	Nickel
Aqueous/Solids	EPA 6010B	ICP-AES	Potassium
Aqueous/Solids	EPA 6010B	ICP-AES	Selenium
Aqueous/Solids	EPA 6010B	ICP-AES	Silver
Aqueous/Solids	EPA 6010B	ICP-AES	Sodium
Aqueous/Solids	EPA 6010B	ICP-AES	Thallium
Aqueous/Solids	EPA 6010B	ICP-AES	Tin
Aqueous/Solids	EPA 6010B	ICP-AES	Vanadium

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Matrix	Standard / Method	Technology	Analyte
Aqueous/Solids	EPA 6010B	ICP-AES	Zinc
Aqueous/Solids	EPA 6020	ICP-MS	Arsenic
Aqueous/Solids	EPA 6020	ICP-MS	Antimony
Aqueous/Solids	EPA 6020	ICP-MS	Barium
Aqueous/Solids	EPA 6020	ICP-MS	Beryllium
Aqueous/Solids	EPA 6020	ICP-MS	Cadmium
Aqueous/Solids	EPA 6020	ICP-MS	Chromium
Aqueous/Solids	EPA 6020	ICP-MS	Cobalt
Aqueous/Solids	EPA 6020	ICP-MS	Copper
Aqueous/Solids	EPA 6020	ICP-MS	Lead
Aqueous/Solids	EPA 6020	ICP-MS	Manganese
Aqueous/Solids	EPA 6020	ICP-MS	Nickel
Aqueous/Solids	EPA 6020	ICP-MS	Selenium
Aqueous/Solids	EPA 6020	ICP-MS	Silver
Aqueous/Solids	EPA 6020	ICP-MS	Thallium
Aqueous/Solids	EPA 6020	ICP-MS	Vanadium
Aqueous/Solids	EPA 6020	ICP-MS	Zinc
Aqueous/Solids	EPA 6850	HPLC-MS	Perchlorate
Aqueous/Solids	EPA 7196A	UV-VIS	Chromium, hexavalent
Aqueous/Solids	EPA 7199	IC-UV	Chromium, hexavalent
Aqueous/Solids	EPA 8015B	GC-FID	Gasoline range organics
Aqueous/Solids	EPA 8015B	GC-FID	Diesel range organics
Aqueous/Solids	EPA 8081A	GC-ECD	4,4'-DDD
Aqueous/Solids	EPA 8081A	GC-ECD	4,4'-DDE
Aqueous/Solids	EPA 8081A	GC-ECD	4,4'-DDT
Aqueous/Solids	EPA 8081A	GC-ECD	Aldrin
Aqueous/Solids	EPA 8081A	GC-ECD	α-BHC
Aqueous/Solids	EPA 8081A	GC-ECD	Alpha-chlordane
Aqueous/Solids	EPA 8081A	GC-ECD	β-BHC
Aqueous/Solids	EPA 8081A	GC-ECD	Chlordane, technical
Aqueous/Solids	EPA 8081A	GC-ECD	δ-BHC
Aqueous/Solids	EPA 8081A	GC-ECD	Dieldrin

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Matrix	Standard / Method	Technology	Analyte
Aqueous/Solids	EPA 8081A	GC-ECD	Endosulfan I
Aqueous/Solids	EPA 8081A	GC-ECD	Endosulfan II
Aqueous/Solids	EPA 8081A	GC-ECD	Endosulfan sulfate
Aqueous/Solids	EPA 8081A	GC-ECD	Endrin
Aqueous/Solids	EPA 8081A	GC-ECD	Endrin aldehyde
Aqueous/Solids	EPA 8081A	GC-ECD	Endrin ketone
Aqueous/Solids	EPA 8081A	GC-ECD	γ-BHC (Lindane)
Aqueous/Solids	EPA 8081A	GC-ECD	γ-Chlordane
Aqueous/Solids	EPA 8081A	GC-ECD	Heptachlor
Aqueous/Solids	EPA 8081A	GC-ECD	Heptachlor epoxide
Aqueous/Solids	EPA 8081A	GC-ECD	Hexachlorobenzene
Aqueous/Solids	EPA 8081A	GC-ECD	Methoxychlor
Aqueous/Solids	EPA 8081A	GC-ECD	Toxaphene
Aqueous/Solids	EPA 8082	GC-ECD	PCB 1016
Aqueous/Solids	EPA 8082	GC-ECD	PCB 1221
Aqueous/Solids	EPA 8082	GC-ECD	PCB 1232
Aqueous/Solids	EPA 8082	GC-ECD	PCB 1242
Aqueous/Solids	EPA 8082	GC-ECD	PCB 1248
Aqueous/Solids	EPA 8082	GC-ECD	PCB 1254
Aqueous/Solids	EPA 8082	GC-ECD	PCB 1260
Aqueous/Solids	EPA 8260B	GC-MS	1,1,1,2-Tetrachloroethane
Aqueous/Solids	EPA 8260B	GC-MS	1,1,1-Trichloroethane
Aqueous/Solids	EPA 8260B	GC-MS	1,1,2,2-Tetrachloroethane
Aqueous/Solids	EPA 8260B	GC-MS	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)
Aqueous/Solids	EPA 8260B	GC-MS	1,1,2-Trichloroethane
Aqueous/Solids	EPA 8260B	GC-MS	1,1-Dichloroethane
Aqueous/Solids	EPA 8260B	GC-MS	1,1-Dichloroethene
Aqueous/Solids	EPA 8260B	GC-MS	1,1-Dichloropropene
Aqueous/Solids	EPA 8260B	GC-MS	1,2,3-Trichlorobenzene
Aqueous/Solids	EPA 8260B	GC-MS	1,2,3-Trichloropropane
Aqueous/Solids	EPA 8260B	GC-MS	1,2,4-Trichlorobenzene
Aqueous/Solids	EPA 8260B	GC-MS	1,2,4-Trimethylbenzene

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Matrix	Standard / Method	Technology	Analyte
Aqueous/Solids	EPA 8260B	GC-MS	1,2-Dibromo-3-chloropropane
Aqueous/Solids	EPA 8260B	GC-MS	1,2-Dibromoethane
Aqueous/Solids	EPA 8260B	GC-MS	1,2-Dichloro-1,1,2,2-tetrafluoroethane (Freon-114)
Aqueous/Solids	EPA 8260B	GC-MS	1,2-Dichloro-1,1,2-trifluoroethane (Freon 123a)
Aqueous/Solids	EPA 8260B	GC-MS	1,2-Dichlorobenzene
Aqueous/Solids	EPA 8260B	GC-MS	1,2-Dichloroethane
Aqueous/Solids	EPA 8260B	GC-MS	1,2-Dichloroethene, total
Aqueous/Solids	EPA 8260B	GC-MS	1,2-Dichloropropane
Aqueous/Solids	EPA 8260B	GC-MS	1,3,5-Trimethylbenzene
Aqueous/Solids	EPA 8260B	GC-MS	1,3-Dichlorobenzene
Aqueous/Solids	EPA 8260B	GC-MS	1,3-Dichloropropane
Aqueous/Solids	EPA 8260B	GC-MS	1,4-Dichlorobenzene
Aqueous/Solids	EPA 8260B	GC-MS	1,4-Dioxane
Aqueous/Solids	EPA 8260B	GC-MS	2,2-Dichloro-1,1,1-trifluoroethane (Freon 123)
Aqueous/Solids	EPA 8260B	GC-MS	2,2-Dichloropropane
Aqueous/Solids	EPA 8260B	GC-MS	2-Butanone (MEK)
Aqueous/Solids	EPA 8260B	GC-MS	2-Chloro-1,3-butadiene
Aqueous/Solids	EPA 8260B	GC-MS	2-Chloroethylvinyl ether
Aqueous/Solids	EPA 8260B	GC-MS	2-Chlorotoluene
Aqueous/Solids	EPA 8260B	GC-MS	2-Hexanone
Aqueous/Solids	EPA 8260B	GC-MS	2-Methyl-1-propanol (Isobutlyl alcohol)
Aqueous/Solids	EPA 8260B	GC-MS	2-Methyl-2-propanol (Tertbutyl alcohol)
Aqueous/Solids	EPA 8260B	GC-MS	2-Nitropropane
Aqueous/Solids	EPA 8260B	GC-MS	2-Propanol
Aqueous/Solids	EPA 8260B	GC-MS	3-Chloro-1-propene (Allyl chloride)
Aqueous/Solids	EPA 8260B	GC-MS	4-Chlorotoluene
Aqueous/Solids	EPA 8260B	GC-MS	4-Ethyltoluene
Aqueous/Solids	EPA 8260B	GC-MS	4-Isopropyltoluene
Aqueous/Solids	EPA 8260B	GC-MS	4-Methyl-2-pentanone (MIBK)
Aqueous/Solids	EPA 8260B	GC-MS	Acetone
Aqueous/Solids	EPA 8260B	GC-MS	Acetonitrile
Aqueous/Solids	EPA 8260B	GC-MS	Acrolein

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Matrix	Standard / Method	Technology	Analyte
Aqueous/Solids	EPA 8260B	GC-MS	Acrylonitrile
Aqueous/Solids	EPA 8260B	GC-MS	Benzene
Aqueous/Solids	EPA 8260B	GC-MS	Benzyl chloride
Aqueous/Solids	EPA 8260B	GC-MS	Bromobenzene
Aqueous/Solids	EPA 8260B	GC-MS	Bromochloromethane
Aqueous/Solids	EPA 8260B	GC-MS	Bromodichloromethane
Aqueous/Solids	EPA 8260B	GC-MS	Bromoform
Aqueous/Solids	EPA 8260B	GC-MS	Bromomethane
Aqueous/Solids	EPA 8260B	GC-MS	Carbon disulfide
Aqueous/Solids	EPA 8260B	GC-MS	Carbon tetrachloride
Aqueous/Solids	EPA 8260B	GC-MS	Chlorobenzene
Aqueous/Solids	EPA 8260B	GC-MS	Chloroethane
Aqueous/Solids	EPA 8260B	GC-MS	Chloroform
Aqueous/Solids	EPA 8260B	GC-MS	Chloromethane
Aqueous/Solids	EPA 8260B	GC-MS	cis-1,2-Dichloroethene
Aqueous/Solids	EPA 8260B	GC-MS	cis-1,3-Dichloropropene
Aqueous/Solids	EPA 8260B	GC-MS	Cyclohexane
Aqueous/Solids	EPA 8260B	GC-MS	Cyclohexanone
Aqueous/Solids	EPA 8260B	GC-MS	Dibromochloromethane
Aqueous/Solids	EPA 8260B	GC-MS	Dibromomethane
Aqueous/Solids	EPA 8260B	GC-MS	Dichlorodifluoromethane (Freon 12)
Aqueous/Solids	EPA 8260B	GC-MS	Dichlorofluoromethane (Freon 21)
Aqueous/Solids	EPA 8260B	GC-MS	Dichloromethane
Aqueous/Solids	EPA 8260B	GC-MS	Diethyl ether
Aqueous/Solids	EPA 8260B	GC-MS	Diisopropyl ether
Aqueous/Solids	EPA 8260B	GC-MS	Ethyl methacrylate
Aqueous/Solids	EPA 8260B	GC-MS	Ethyl tert-butyl ether
Aqueous/Solids	EPA 8260B	GC-MS	Ethylbenzene
Aqueous/Solids	EPA 8260B	GC-MS	Hexachlorobutadiene
Aqueous/Solids	EPA 8260B	GC-MS	Iodomethane
Aqueous/Solids	EPA 8260B	GC-MS	Isopropylbenzene
Aqueous/Solids	EPA 8260B	GC-MS	m- + p-Xylene

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Matrix	Standard / Method	Technology	Analyte
Aqueous/Solids	EPA 8260B	GC-MS	Methacrylonitrile
Aqueous/Solids	EPA 8260B	GC-MS	Methyl acetate
Aqueous/Solids	EPA 8260B	GC-MS	Methyl methacrylate
Aqueous/Solids	EPA 8260B	GC-MS	Methylcyclohexane
Aqueous/Solids	EPA 8260B	GC-MS	Methyl-tert-butyl ether (MTBE)
Aqueous/Solids	EPA 8260B	GC-MS	Napthalene
Aqueous/Solids	EPA 8260B	GC-MS	N-butylacetate
Aqueous/Solids	EPA 8260B	GC-MS	N-butylbenzene
Aqueous/Solids	EPA 8260B	GC-MS	N-heptane
Aqueous/Solids	EPA 8260B	GC-MS	N-propylbenzene
Aqueous/Solids	EPA 8260B	GC-MS	o-Xylene
Aqueous/Solids	EPA 8260B	GC-MS	Propionitrile
Aqueous/Solids	EPA 8260B	GC-MS	sec-butylbenzene
Aqueous/Solids	EPA 8260B	GC-MS	Styrene
Aqueous/Solids	EPA 8260B	GC-MS	tert-amyl methyl ether
Aqueous/Solids	EPA 8260B	GC-MS	tert-butylbenzene
Aqueous/Solids	EPA 8260B	GC-MS	Tetra hydrofuran
Aqueous/Solids	EPA 8260B	GC-MS	Tetrachloroethene
Aqueous/Solids	EPA 8260B	GC-MS	Toluene
Aqueous/Solids	EPA 8260B	GC-MS	trans-1,2-Dichloroethene
Aqueous/Solids	EPA 8260B	GC-MS	trans-1,3-Dichloropropene
Aqueous/Solids	EPA 8260B	GC-MS	trans-1,4-Dichloro-2-butene
Aqueous/Solids	EPA 8260B	GC-MS	Trichloroethene
Aqueous/Solids	EPA 8260B	GC-MS	Trichlorofluoromethane (Freon 11)
Aqueous/Solids	EPA 8260B	GC-MS	Vinyl acetate
Aqueous/Solids	EPA 8260B	GC-MS	Vinyl chloride
Aqueous/Solids	EPA 8260B	GC-MS	Xylenes, total
Aqueous/Solids	EPA 8270C	GC-MS	1,2,4,5-Tetrachlorobenzene
Aqueous/Solids	EPA 8270C	GC-MS	1,2,4-Trichlorobenzene
Aqueous/Solids	EPA 8270C	GC-MS	1,2-Dichlorobenzene
Aqueous/Solids	EPA 8270C	GC-MS	1,2-Diphenylhydrazine
Aqueous/Solids	EPA 8270C	GC-MS	1,3,5-Trinitrobenzene

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Matrix	Standard / Method	Technology	Analyte
Aqueous/Solids	EPA 8270C	GC-MS	1,3-Dichlorobenzene
Aqueous/Solids	EPA 8270C	GC-MS	1,3-Dinitrobenzene
Aqueous/Solids	EPA 8270C	GC-MS	1,4-Dichlorobenzene
Aqueous/Solids	EPA 8270C	GC-MS	1,4-Dioxane
Aqueous/Solids	EPA 8270C	GC-MS	1,4-Naphthoquinone
Aqueous/Solids	EPA 8270C	GC-MS	1-Methyl-2-pyrrolidinone
Aqueous/Solids	EPA 8270C	GC-MS	1-Methylnaphthalene
Aqueous/Solids	EPA 8270C	GC-MS	1-Naphthylamine
Aqueous/Solids	EPA 8270C	GC-MS	2,3,4,6-Tetrachlorophenol
Aqueous/Solids	EPA 8270C	GC-MS	2,4,5-Trichlorophenol
Aqueous/Solids	EPA 8270C	GC-MS	2,4,6-Trichlorophenol
Aqueous/Solids	EPA 8270C	GC-MS	2,4-Dichlorophenol
Aqueous/Solids	EPA 8270C	GC-MS	2,4-Dimethylphenol
Aqueous/Solids	EPA 8270C	GC-MS	2,4-Dinitrophenol
Aqueous/Solids	EPA 8270C	GC-MS	2,4-Dinitrotoluene
Aqueous/Solids	EPA 8270C	GC-MS	2,6-Dichlorophenol
Aqueous/Solids	EPA 8270C	GC-MS	2,6-Dinitrotoluene
Aqueous/Solids	EPA 8270C	GC-MS	2-Acetylaminofluorene
Aqueous/Solids	EPA 8270C	GC-MS	2-Chloronaphthalene
Aqueous/Solids	EPA 8270C	GC-MS	2-Chlorophenol
Aqueous/Solids	EPA 8270C	GC-MS	2-Methyl-5-nitroaniline (5-Nitro-o-toluidine)
Aqueous/Solids	EPA 8270C	GC-MS	2-Methylnaphthalene
Aqueous/Solids	EPA 8270C	GC-MS	2-Methylphenol
Aqueous/Solids	EPA 8270C	GC-MS	2-Naphthylamine
Aqueous/Solids	EPA 8270C	GC-MS	2-Nitroaniline
Aqueous/Solids	EPA 8270C	GC-MS	2-Nitrophenol
Aqueous/Solids	EPA 8270C	GC-MS	2-Picoline
Aqueous/Solids	EPA 8270C	GC-MS	3,3'-Dichlorobenzidine
Aqueous/Solids	EPA 8270C	GC-MS	3,3'-Dimethylbenzidine
Aqueous/Solids	EPA 8270C	GC-MS	3+4-Methylphenol
Aqueous/Solids	EPA 8270C	GC-MS	3-Methylcholanthrene
Aqueous/Solids	EPA 8270C	GC-MS	3-Nitroaniline

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Matrix	Standard / Method	Technology	Analyte
Aqueous/Solids	EPA 8270C	GC-MS	4,6-Dinitro-2-methylphenol
Aqueous/Solids	EPA 8270C	GC-MS	4-Aminobiphenyl
Aqueous/Solids	EPA 8270C	GC-MS	4-Bromophenyl-phenylether
Aqueous/Solids	EPA 8270C	GC-MS	4-Chloro-3-methylphenol
Aqueous/Solids	EPA 8270C	GC-MS	4-Chloroaniline
Aqueous/Solids	EPA 8270C	GC-MS	4-Chlorophenyl-phenylether
Aqueous/Solids	EPA 8270C	GC-MS	4-Nitroaniline
Aqueous/Solids	EPA 8270C	GC-MS	4-Nitrophenol
Aqueous/Solids	EPA 8270C	GC-MS	4-Nitroquinoline-1-oxide
Aqueous/Solids	EPA 8270C	GC-MS	7,12-Dimethylbenz(a)anthracene
Aqueous/Solids	EPA 8270C	GC-MS	α,α-Dimethylphenethylamine
Aqueous/Solids	EPA 8270C	GC-MS	Acenaphthene
Aqueous/Solids	EPA 8270C	GC-MS	Acenaphthylene
Aqueous/Solids	EPA 8270C	GC-MS	Acetophenone
Aqueous/Solids	EPA 8270C	GC-MS	Aniline
Aqueous/Solids	EPA 8270C	GC-MS	Anthracene
Aqueous/Solids	EPA 8270C	GC-MS	Aramite
Aqueous/Solids	EPA 8270C	GC-MS	Atrazine
Aqueous/Solids	EPA 8270C	GC-MS	Benzaldehyde
Aqueous/Solids	EPA 8270C	GC-MS	Benzidine
Aqueous/Solids	EPA 8270C	GC-MS	Benzo(a)anthracene
Aqueous/Solids	EPA 8270C	GC-MS	Benzo(a)pyrene
Aqueous/Solids	EPA 8270C	GC-MS	Benzo(b)fluoranthene
Aqueous/Solids	EPA 8270C	GC-MS	Benzo(g,h,i)perylene
Aqueous/Solids	EPA 8270C	GC-MS	Benzo(k)fluoranthene
Aqueous/Solids	EPA 8270C	GC-MS	Benzoic acid
Aqueous/Solids	EPA 8270C	GC-MS	Benzyl alcohol
Aqueous/Solids	EPA 8270C	GC-MS	Biphenyl
Aqueous/Solids	EPA 8270C	GC-MS	Bis(1-chloroisopropyl)ether
Aqueous/Solids	EPA 8270C	GC-MS	Bis(-2-chloroethoxy)methane
Aqueous/Solids	EPA 8270C	GC-MS	Bis(2-chloroethyl)ether
Aqueous/Solids	EPA 8270C	GC-MS	Bis(2-ethylhexyl)phthalate

Certificate of Accreditation: Supplement

Columbia Analytical Services, Inc.
1 Mustard Street, Suite #250
Rochester, NY 14609

Accreditation is granted to this facility to perform the following testing:

Matrix	Standard / Method	Technology	Analyte
Aqueous/Solids	EPA 8270C	GC-MS	Butyl benzyl phthalate
Aqueous/Solids	EPA 8270C	GC-MS	Caprolactam
Aqueous/Solids	EPA 8270C	GC-MS	Carbazole
Aqueous/Solids	EPA 8270C	GC-MS	Chlorobenzilate
Aqueous/Solids	EPA 8270C	GC-MS	Chrysene
Aqueous/Solids	EPA 8270C	GC-MS	Cyclohexane, isothiocyanato-
Aqueous/Solids	EPA 8270C	GC-MS	Diallate
Aqueous/Solids	EPA 8270C	GC-MS	Dibenzo(a,h)anthracene
Aqueous/Solids	EPA 8270C	GC-MS	Dibenzofuran
Aqueous/Solids	EPA 8270C	GC-MS	Diethylphthalate
Aqueous/Solids	EPA 8270C	GC-MS	Dimethoate
Aqueous/Solids	EPA 8270C	GC-MS	Dimethyl phthalate
Aqueous/Solids	EPA 8270C	GC-MS	Di-n-butylphthalate
Aqueous/Solids	EPA 8270C	GC-MS	Di-n-octyl phthalate
Aqueous/Solids	EPA 8270C	GC-MS	Dinoseb
Aqueous/Solids	EPA 8270C	GC-MS	Diphenylamine
Aqueous/Solids	EPA 8270C	GC-MS	Disulfoton
Aqueous/Solids	EPA 8270C	GC-MS	Ethyl methanesulfonate
Aqueous/Solids	EPA 8270C	GC-MS	Fluoranthene
Aqueous/Solids	EPA 8270C	GC-MS	Fluorene
Aqueous/Solids	EPA 8270C	GC-MS	Hexachlorobenzene
Aqueous/Solids	EPA 8270C	GC-MS	Hexachlorobutadiene
Aqueous/Solids	EPA 8270C	GC-MS	Hexachlorocyclopentadiene
Aqueous/Solids	EPA 8270C	GC-MS	Hexachloroethane
Aqueous/Solids	EPA 8270C	GC-MS	Hexachlorophene
Aqueous/Solids	EPA 8270C	GC-MS	Hexachloropropene
Aqueous/Solids	EPA 8270C	GC-MS	Indeno(1,2,3-cd)pyrene
Aqueous/Solids	EPA 8270C	GC-MS	Isodrin
Aqueous/Solids	EPA 8270C	GC-MS	Isophorone
Aqueous/Solids	EPA 8270C	GC-MS	Isosafrole
Aqueous/Solids	EPA 8270C	GC-MS	Methapyrilene
Aqueous/Solids	EPA 8270C	GC-MS	Methyl methanesulfonate

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Matrix	Standard / Method	Technology	Analyte
Aqueous/Solids	EPA 8270C	GC-MS	Methyl parathion
Aqueous/Solids	EPA 8270C	GC-MS	Naphthalene
Aqueous/Solids	EPA 8270C	GC-MS	Nitrobenzene
Aqueous/Solids	EPA 8270C	GC-MS	N-nitrosodiethylamine
Aqueous/Solids	EPA 8270C	GC-MS	N-nitrosodimethylamine
Aqueous/Solids	EPA 8270C	GC-MS	N-nitrosodi-n-butylamine
Aqueous/Solids	EPA 8270C	GC-MS	N-nitroso-di-n-propylamine
Aqueous/Solids	EPA 8270C	GC-MS	N-nitrosodiphenylamine
Aqueous/Solids	EPA 8270C	GC-MS	N-nitrosomethylethylamine
Aqueous/Solids	EPA 8270C	GC-MS	N-nitrosomorpholine
Aqueous/Solids	EPA 8270C	GC-MS	N-nitrosopiperidine
Aqueous/Solids	EPA 8270C	GC-MS	N-nitrosopyrolidine
Aqueous/Solids	EPA 8270C	GC-MS	Octachlorostyrene
Aqueous/Solids	EPA 8270C	GC-MS	o,o,o-triethyl phosphorothioate
Aqueous/Solids	EPA 8270C	GC-MS	o-toluidine
Aqueous/Solids	EPA 8270C	GC-MS	Parathion (ethyl)
Aqueous/Solids	EPA 8270C	GC-MS	p-dimethylaminoazobenzene
Aqueous/Solids	EPA 8270C	GC-MS	Pentachlorobenzene
Aqueous/Solids	EPA 8270C	GC-MS	Pentachloroethane
Aqueous/Solids	EPA 8270C	GC-MS	Pentachloronitrobenzene
Aqueous/Solids	EPA 8270C	GC-MS	Pentachlorophenol
Aqueous/Solids	EPA 8270C	GC-MS	Phenacetin
Aqueous/Solids	EPA 8270C	GC-MS	Phenanthrene
Aqueous/Solids	EPA 8270C	GC-MS	Phenol
Aqueous/Solids	EPA 8270C	GC-MS	Phorate
Aqueous/Solids	EPA 8270C	GC-MS	Phthalimide
Aqueous/Solids	EPA 8270C	GC-MS	Pyrene
Aqueous/Solids	EPA 8270C	GC-MS	Pyridine
Aqueous/Solids	EPA 8270C	GC-MS	Safrole
Aqueous/Solids	EPA 8270C	GC-MS	Sulfotepp
Aqueous/Solids	EPA 8270C	GC-MS	Thionazin
Aqueous/Solids	EPA 8270C	GC-MS-LVI	1,4-Dioxane

Certificate of Accreditation: Supplement

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Rochester, NY 14609

Accreditation is granted to this facility to perform the following testing:

Matrix	Standard / Method	Technology	Analyte
Aqueous/Solids	EPA 8270C	GC-MS-LVI	1-Methylnaphthalene
Aqueous/Solids	EPA 8270C	GC-MS-LVI	2-Methylnaphthalene
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Acenaphthene
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Acenaphthylene
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Anthracene
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Benzo(a)anthracene
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Benzo(a)pyrene
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Benzo(b)fluoranthene
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Benzo(g,h,i)perylene
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Benzo(k)fluoranthene
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Bis(2-ethylhexyl)phthalate
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Butyl benzyl phthalate
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Carbazole
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Chrysene
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Dibenzo(a,h)anthracene
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Dibenzofuran
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Diethyl phthalate
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Dimethyl phthalate
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Di-n-butyl phthalate
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Di-n-octyl phthalate
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Fluoranthene
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Fluorene
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Hexachlorobenzene
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Indeno(1,2,3-cd)pyrene
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Naphthalene
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Nitrobenzene
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Octachlorostyrene
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Phenanthrene
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Pyrene
Aqueous/Solids	EPA 8270C	GC-MS-LVI	Pyridine
Aqueous/Solids	EPA 9012A	UV-VIS	Cyanide, total
Aqueous/Solids	EPA 9034	Titration	Sulfide, acid soluble

Certificate of Accreditation: Supplement

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Rochester, NY 14609

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Matrix	Standard / Method	Technology	Analyte
Aqueous/Solids	ILM05.3	UV-VIS	Cyanide, total
Aqueous/Solids	ILM05.3	ICP-AES	Aluminum
Aqueous/Solids	ILM05.3	ICP-AES	Antimony
Aqueous/Solids	ILM05.3	ICP-AES	Arsenic
Aqueous/Solids	ILM05.3	ICP-AES	Barium
Aqueous/Solids	ILM05.3	ICP-AES	Beryllium
Aqueous/Solids	ILM05.3	ICP-AES	Cadmium
Aqueous/Solids	ILM05.3	ICP-AES	Calcium
Aqueous/Solids	ILM05.3	ICP-AES	Chromium
Aqueous/Solids	ILM05.3	ICP-AES	Cobalt
Aqueous/Solids	ILM05.3	ICP-AES	Copper
Aqueous/Solids	ILM05.3	ICP-AES	Iron
Aqueous/Solids	ILM05.3	ICP-AES	Lead
Aqueous/Solids	ILM05.3	ICP-AES	Magnesium
Aqueous/Solids	ILM05.3	ICP-AES	Manganese
Aqueous/Solids	ILM05.3	ICP-AES	Nickel
Aqueous/Solids	ILM05.3	ICP-AES	Potassium
Aqueous/Solids	ILM05.3	ICP-AES	Selenium
Aqueous/Solids	ILM05.3	ICP-AES	Silver
Aqueous/Solids	ILM05.3	ICP-AES	Sodium
Aqueous/Solids	ILM05.3	ICP-AES	Thallium
Aqueous/Solids	ILM05.3	ICP-AES	Vanadium
Aqueous/Solids	ILM05.3	ICP-AES	Zinc
Aqueous/Solids	OLC03.2	GC-MS	1,1,1-Trichloroethane
Aqueous/Solids	OLC03.2	GC-MS	1,1,2,2-Tetrachloroethane
Aqueous/Solids	OLC03.2	GC-MS	1,1,2-Trichloroethane
Aqueous/Solids	OLC03.2	GC-MS	1,1-Dichloroethane
Aqueous/Solids	OLC03.2	GC-MS	1,1-Dichloroethene
Aqueous/Solids	OLC03.2	GC-MS	1,2,3-Trichlorobenzene
Aqueous/Solids	OLC03.2	GC-MS	1,2,4-Trichlorobenzene
Aqueous/Solids	OLC03.2	GC-MS	1,2-Dibromo-3-chloropropane

Certificate of Accreditation: Supplement

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1 Mustard Street, Suite #250
Rochester, NY 14609

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Matrix	Standard / Method	Technology	Analyte
Aqueous/Solids	OLC03.2	GC-MS	1,2-Dibromoethane
Aqueous/Solids	OLC03.2	GC-MS	1,2-Dichlorobenzene
Aqueous/Solids	OLC03.2	GC-MS	1,2-Dichloroethane
Aqueous/Solids	OLC03.2	GC-MS	1,2-Dichloropropane
Aqueous/Solids	OLC03.2	GC-MS	1,3-Dichlorobenzene
Aqueous/Solids	OLC03.2	GC-MS	1,4-Dichlorobenzene
Aqueous/Solids	OLC03.2	GC-MS	2-Butanone
Aqueous/Solids	OLC03.2	GC-MS	2-Hexanone
Aqueous/Solids	OLC03.2	GC-MS	4-Methyl-2-pentanone
Aqueous/Solids	OLC03.2	GC-MS	Acetone
Aqueous/Solids	OLC03.2	GC-MS	Benzene
Aqueous/Solids	OLC03.2	GC-MS	Bromochloromethane
Aqueous/Solids	OLC03.2	GC-MS	Bromodichloromethane
Aqueous/Solids	OLC03.2	GC-MS	Bromoform
Aqueous/Solids	OLC03.2	GC-MS	Bromomethane
Aqueous/Solids	OLC03.2	GC-MS	Carbon disulfide
Aqueous/Solids	OLC03.2	GC-MS	Carbon tetrachloride
Aqueous/Solids	OLC03.2	GC-MS	Chlorobenzene
Aqueous/Solids	OLC03.2	GC-MS	Chloroethane
Aqueous/Solids	OLC03.2	GC-MS	Chloroform
Aqueous/Solids	OLC03.2	GC-MS	Chloromethane
Aqueous/Solids	OLC03.2	GC-MS	cis-1,2-Dichloroethene
Aqueous/Solids	OLC03.2	GC-MS	cis-1,3-Dichloropropene
Aqueous/Solids	OLC03.2	GC-MS	Cyclohexane
Aqueous/Solids	OLC03.2	GC-MS	Dibromochloromethane
Aqueous/Solids	OLC03.2	GC-MS	Dichlorodifluoromethane
Aqueous/Solids	OLC03.2	GC-MS	Ethylbenzene
Aqueous/Solids	OLC03.2	GC-MS	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)
Aqueous/Solids	OLC03.2	GC-MS	Isopropylbenzene
Aqueous/Solids	OLC03.2	GC-MS	Methyl acetate
Aqueous/Solids	OLC03.2	GC-MS	Methylcyclohexane

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Rochester, NY 14609

Accreditation is granted to this facility to perform the following testing:

Matrix	Standard / Method	Technology	Analyte
Aqueous/Solids	OLC03.2	GC-MS	Methylene chloride
Aqueous/Solids	OLC03.2	GC-MS	Methyl-t-butyl ether
Aqueous/Solids	OLC03.2	GC-MS	m- + p-Xylene
Aqueous/Solids	OLC03.2	GC-MS	o-Xylene
Aqueous/Solids	OLC03.2	GC-MS	Styrene
Aqueous/Solids	OLC03.2	GC-MS	Tetrachloroethene
Aqueous/Solids	OLC03.2	GC-MS	Toluene
Aqueous/Solids	OLC03.2	GC-MS	trans-1,2-Dichloroethene
Aqueous/Solids	OLC03.2	GC-MS	trans-1,3-Dichloropropene
Aqueous/Solids	OLC03.2	GC-MS	Trichloroethene
Aqueous/Solids	OLC03.2	GC-MS	Trichlorofluoromethane
Aqueous/Solids	OLC03.2	GC-MS	Vinyl chloride
Aqueous/Solids	OLM04.3	GC-MS	1,1,1-Trichloroethane
Aqueous/Solids	OLM04.3	GC-MS	1,1,2,2-Tetrachloroethane
Aqueous/Solids	OLM04.3	GC-MS	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)
Aqueous/Solids	OLM04.3	GC-MS	1,1,2-Trichloroethane
Aqueous/Solids	OLM04.3	GC-MS	1,1-Dichloroethane
Aqueous/Solids	OLM04.3	GC-MS	1,1-Dichloroethene
Aqueous/Solids	OLM04.3	GC-MS	1,2,4-Trichlorobenzene
Aqueous/Solids	OLM04.3	GC-MS	1,2-Dibromo-3-chloropropane
Aqueous/Solids	OLM04.3	GC-MS	1,2-Dibromoethane
Aqueous/Solids	OLM04.3	GC-MS	1,2-Dichlorobenzene
Aqueous/Solids	OLM04.3	GC-MS	1,2-Dichloroethane
Aqueous/Solids	OLM04.3	GC-MS	1,2-Dichloropropane
Aqueous/Solids	OLM04.3	GC-MS	1,3-Dichlorobenzene
Aqueous/Solids	OLM04.3	GC-MS	1,4-Dichlorobenzene
Aqueous/Solids	OLM04.3	GC-MS	2-Butanone
Aqueous/Solids	OLM04.3	GC-MS	2-Hexanone
Aqueous/Solids	OLM04.3	GC-MS	4-Methyl-2-pentanone
Aqueous/Solids	OLM04.3	GC-MS	Acetone
Aqueous/Solids	OLM04.3	GC-MS	Benzene
Aqueous/Solids	OLM04.3	GC-MS	Bromodichloromethane

Certificate of Accreditation: Supplement

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Rochester, NY 14609

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Matrix	Standard / Method	Technology	Analyte
Aqueous/Solids	OLM04.3	GC-MS	Bromoform
Aqueous/Solids	OLM04.3	GC-MS	Bromomethane
Aqueous/Solids	OLM04.3	GC-MS	Carbon disulfide
Aqueous/Solids	OLM04.3	GC-MS	Carbon tetrachloride
Aqueous/Solids	OLM04.3	GC-MS	Chlorobenzene
Aqueous/Solids	OLM04.3	GC-MS	Chlorodifluoromethane
Aqueous/Solids	OLM04.3	GC-MS	Chloroethane
Aqueous/Solids	OLM04.3	GC-MS	Chloroform
Aqueous/Solids	OLM04.3	GC-MS	Chloromethane
Aqueous/Solids	OLM04.3	GC-MS	cis-1,2-Dichloroethene
Aqueous/Solids	OLM04.3	GC-MS	cis-1,3-Dichloropropene
Aqueous/Solids	OLM04.3	GC-MS	Cyclohexane
Aqueous/Solids	OLM04.3	GC-MS	Dibromochloromethane
Aqueous/Solids	OLM04.3	GC-MS	Dichlorodifluoromethane
Aqueous/Solids	OLM04.3	GC-MS	Ethylbenzene
Aqueous/Solids	OLM04.3	GC-MS	Isopropylbenzene
Aqueous/Solids	OLM04.3	GC-MS	m- + p-Xylene
Aqueous/Solids	OLM04.3	GC-MS	Methyl acetate
Aqueous/Solids	OLM04.3	GC-MS	Methyl tert-butyl ether
Aqueous/Solids	OLM04.3	GC-MS	Methylcyclohexane
Aqueous/Solids	OLM04.3	GC-MS	Methylene chloride
Aqueous/Solids	OLM04.3	GC-MS	o-Xylene
Aqueous/Solids	OLM04.3	GC-MS	Styrene
Aqueous/Solids	OLM04.3	GC-MS	Tetrachloroethene
Aqueous/Solids	OLM04.3	GC-MS	Toluene
Aqueous/Solids	OLM04.3	GC-MS	trans-1,2-Dichloroethene
Aqueous/Solids	OLM04.3	GC-MS	trans-1,3-Dichloropropene
Aqueous/Solids	OLM04.3	GC-MS	Trichloroethene
Aqueous/Solids	OLM04.3	GC-MS	Trichlorofluoromethane
Aqueous/Solids	OLM04.3	GC-MS	Vinyl chloride

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Matrix	Standard / Method	Technology	Analyte
Aqueous	EPA 3010A	Acid Digestion	Metals prep
Solids	EPA 3050B	Acid Digestion	Metals prep
Solids	EPA 3060A	Digestion	Hexavalent chromium digestion
Aqueous	EPA 3510C	SF Extraction	Semivolatiles, pesticides, PCBs, DRO
Solids	EPA 3541	SOX Extraction	Semivolatiles, pesticides, PCBs, DRO
Aqueous/Solids	EPA 3620B	Florisil Cleanup	Semivolatiles, pesticides, PCBs
Aqueous/Solids	EPA 3660B	Sulfur Cleanup	Semivolatiles, pesticides, PCBs
Aqueous/Solids	EPA 3665A	Sulfuric Acid Cleanup	PCBs
Aqueous	EPA 5030B	P&T	Volatiles
Solids	EPA 5035	P&T closed	Volatiles
Aqueous/Solids	EPA 9030B	Distillation	Sulfide, acid soluble

SCOPE OF ACCREDITATION TO ISO/IEC 17025-2005

ENVIRONMENTAL CONSERVATION LABORATORIES – JACKSONVILLE
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Jacksonville, FL 32216
Denise K. Stern Phone: 904 296 3007
Email address: dstern@encolabs.com

ENVIRONMENTAL

Valid To: April 30, 2014 Certificate Number: 3000.02

In recognition of the successful completion of the A2LA evaluation process, (including an assessment of the laboratory's compliance with ISO IEC 17025:2005, the 2003 NELAC Chapter 5 Standard, and the requirements of the DoD Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in the current DoD Quality Systems Manual for Environmental Laboratories) accreditation is granted to this laboratory to perform recognized EPA methods using the following testing technologies and in the analyte categories identified below:

Parameter/Analyte	Non-Potable Water	Solid Hazardous Waste	Air
Isopropyl alcohol (2-Propanol)	EPA 8015C	NA	ENCO VGCMS-07
4-Ethyltoluene	NA	NA	ENCO VGCMS-07
Cyclohexane	EPA 8260B	EPA 8260B	ENCO VGCMS-07
1,1,1-Trichloroethane	EPA 624, 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
1,1,2,2-Tetrachloroethane	EPA 624, 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
1,1,2-Trichloro-1,2,2-trifluoroethane	EPA 8260B	EPA 8260B	EPA TO-14A
1,1,2-Trichloroethane	EPA 624, 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
1,1-Dichloroethane	EPA 624, 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
1,1-Dichloroethylene	EPA 624, 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
1,2-Dichloro-1,1,2,2-tetrafluoroethane	NA	NA	EPA TO-14A
1,3-Butadiene	NA	NA	EPA TO-15
1,4-Dioxane	EPA 8260B	EPA 8260B	EPA TO-15
2,2,4-Trimethylpentane	NA	NA	EPA TO-15
Benzyl chloride	NA	NA	EPA TO-15
n-Hexane	NA	NA	EPA TO-15
2-Hydroxy isobutyric acid	ENCO VGC-13	NA	NA
Acetic acid	ENCO VGC-13	NA	NA
Butyric acid (Butanoic acid)	ENCO VGC-13	NA	NA
Hexanoic acid	ENCO VGC-13	NA	NA
Isohexanoic acid (4-methyl-pentanoic acid)	ENCO VGC-13	NA	NA
Isopentanoic acid (3-methyl-butanoic acid)	ENCO VGC-13	NA	NA
Lactic acid	ENCO VGC-13	NA	NA
Pentanoic acid	ENCO VGC-13	NA	NA

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Parameter/Analyte	Non-Potable Water	Solid Hazardous Waste	Air
Propionic acid (Propanoic acid)	ENCO VGC-13	NA	NA
Pyruvic acid	ENCO VGC-13	NA	NA
Propylene glycol	ENCO VGC-18	NA	NA
Ethyl acetate	EPA 8015C	NA	ENCO VGCMS-07
Ethylene glycol	EPA 8015C	NA	NA
Diesel range organics (DRO)	EPA 8015C	EPA 8015C	NA
Gasoline range organics (GRO)	EPA 8015C	EPA 8015C	NA
Isobutyl alcohol (2-Methyl-1-propanol)	EPA 8015C, 8260B	EPA 8260B	NA
Methanol	EPA 8015C	EPA 8015C	NA
n-Butyl alcohol	EPA 8015C	NA	NA
n-Propanol	EPA 8015C	NA	NA
1,2-Dibromo-3-chloropropane (DBCP)	EPA 504, 504.1, 8011, 8260B	EPA 8260B	NA
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 504, 504.1, 8011, 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
1,2-Dichlorobenzene	EPA 624, 8260B, 8270D	EPA 8260B, 8270D	EPA TO-14A, EPA TO-15
1,2-Dichloroethane	EPA 624, 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
1,2-Dichloropropane	EPA 624, 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
1,3-Dichlorobenzene	EPA 624, 8260B, 8270D	EPA 8260B, 8270D	EPA TO-14A, EPA TO-15
1,4-Dichlorobenzene	EPA 624, 8260B, 8270D	EPA 8260B, 8270D	EPA TO-14A, EPA TO-15
2-Chloroethyl vinyl ether	EPA 624, 8260B	EPA 8260B	NA
Acrolein (Propenal)	EPA 624, 8260B	EPA 8260B	NA
Acrylonitrile	EPA 624, 8260B	EPA 8260B	NA
Benzene	EPA 624, 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
Bromodichloromethane	EPA 624, 8260B	EPA 8260B	ENCO VGCMS-07
Bromoform	EPA 624, 8260B	EPA 8260B	EPA TO-15
Carbon tetrachloride	EPA 624, 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
Chlorobenzene	EPA 624, 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
Chloroethane	EPA 624, 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
Chloroform	EPA 624, 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
cis-1,3-Dichloropropene	EPA 624, 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
Dibromochloromethane	EPA 624, 8260B	EPA 8260B	ENCO VGCMS-07
Ethylbenzene	EPA 624, 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
Methyl bromide (Bromomethane)	EPA 624, 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
Methyl chloride (Chloromethane)	EPA 624, 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
Methylene chloride	EPA 624, 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
Tetrachloroethylene	EPA 624, 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
Toluene	EPA 624, 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
trans-1,2-Dichloroethylene	EPA 624, 8260B	EPA 8260B	EPA TO-15
trans-1,3-Dichloropropylene	EPA 624, 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
Trichloroethene	EPA 624, 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
Trichlorofluoromethane	EPA 624, 8260B	EPA 8260B	EPA-TO-14A
Vinyl chloride	EPA 624, 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
Xylene (total)	EPA 624, 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
1,1,1,2-Tetrachloroethane	EPA 8260B	EPA 8260B	NA
1,1-Dichloropropene	EPA 8260B	EPA 8260B	NA
1,2,3-Trichlorobenzene	EPA 8260B	EPA 8260B	NA

Parameter/Analyte	Non-Potable Water	Solid Hazardous Waste	Air
1,2,3-Trichloropropane	EPA 8260B	EPA 8260B	NA
1,2,4-Trichlorobenzene	EPA 8260B, 625, 8270D	EPA 8260B, 8270D	EPA TO-14A, EPA TO-15
1,2,4-Trimethylbenzene	EPA 8260B	EPA 8260B	EPA TO-14A
1,3,5-Trimethylbenzene	EPA 8260B	EPA 8260B	EPA TO-14A
1,3-Dichloropropane	EPA 8260B	EPA 8260B	NA
2,2-Dichloropropane	EPA 8260B	EPA 8260B	NA
2-Butanone (Methyl ethyl ketone, MEK)	EPA 8260B, 8015C	EPA 8260B	EPA TO-15
2-Chlorotoluene	EPA 8260B	EPA 8260B	NA
2-Hexanone	EPA 8260B	EPA 8260B	ENCO VGCMS-07
4-Chlorotoluene	EPA 8260B	EPA 8260B	NA
4-Methyl-2-pentanone (MIBK)	EPA 8260B, 8015C	EPA 8260B	EPA TO-15
Acetone	EPA 8260B	EPA 8260B	ENCO VGCMS-07
Acetonitrile	EPA 8260B	EPA 8260B	NA
Allyl chloride (3-Chloropropene)	EPA 8260B	EPA 8260B	EPA TO-15
Bromobenzene	EPA 8260B	EPA 8260B	NA
Bromochloromethane	EPA 8260B	EPA 8260B	NA
Carbon disulfide	EPA 8260B	EPA 8260B	EPA TO-15
Chloroprene	EPA 8260B	EPA 8260B	NA
cis-1,2-Dichloroethylene	EPA 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
Dibromomethane	EPA 8260B	EPA 8260B	NA
Dichlorodifluoromethane	EPA 8260B	EPA 8260B	EPA TO-14A
Diethyl ether	EPA 8260B	EPA 8260B	NA
Ethanol	EPA 8260B, 8015C	EPA 8260B	NA
Ethyl methacrylate	EPA 8260B	EPA 8260B	NA
Hexachlorobutadiene	EPA 8260B, 625, 8270D	EPA 8260B, 8270D	EPA TO-14A, EPA TO-15
Iodomethane (Methyl iodine)	EPA 8260B	EPA 8260B	NA
Isopropylbenzene	EPA 8260B	EPA 8260B	NA
Isopropyl ether	EPA 8260B	EPA 8260B	NA
Methacrylonitrile	EPA 8260B	EPA 8260B	NA
Methyl Acetate	EPA 8260B	EPA 8260B	NA
Methyl Cyclohexane	EPA 8260B	EPA 8260B	NA
Methyl methacrylate	EPA 8260B	EPA 8260B	NA
Methyl tert-butyl ether (MTBE)	EPA 8260B	EPA 8260B	EPA TO-15
m.p-Xylene	EPA 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
Naphthalene	EPA 8260B, 625 Scan-Sim, 8270D Scan-Sim	EPA 8260B, 8270D Scan-Sim	NA
n-Butyl benzene	EPA 8260B	EPA 8260B	NA
n-Propyl benzene	EPA 8260B	EPA 8260B	NA
o-Xylene	EPA 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
p-Isopropyltoluene	EPA 8260B	EPA 8260B	NA
Propionitrile (Ethyl cyanide)	EPA 8260B	EPA 8260B	NA
sec-Butylbenzene	EPA 8260B	EPA 8260B	NA
Styrene	EPA 8260B	EPA 8260B	EPA TO-14A, EPA TO-15
tert-Butylbenzene	EPA 8260B	EPA 8260B	NA
trans-1,4-Dichloro-2-butene	EPA 8260B	EPA 8260B	NA
Vinyl acetate	EPA 8260B	EPA 8260B	EPA TO-15
4,4'-DDD	EPA 608, 8081B	EPA 8081B	NA
4,4'-DDE	EPA 608, 8081B	EPA 8081B	NA

Parameter/Analyte	Non-Potable Water	Solid Hazardous Waste	Air
4,4'-DDT	EPA 608, 8081B	EPA 8081B	NA
Aldrin	EPA 608, 8081B	EPA 8081B	NA
alpha-BHC (alpha-Hexachlorocyclohexane)	EPA 608, 8081B	EPA 8081B	NA
Aroclor-1016(PCB-1016)	EPA 608, 8082A	EPA 8082A	NA
Aroclor-1221(PCB-1221)	EPA 608, 8082A	EPA 8082A	NA
Aroclor-1232(PCB-1232)	EPA 608, 8082A	EPA 8082A	NA
Aroclor-1242(PCB-1242)	EPA 608, 8082A	EPA 8082A	NA
Aroclor-1248(PCB-1248)	EPA 608, 8082A	EPA 8082A	NA
Aroclor-1254(PCB-1254)	EPA 608, 8082A	EPA 8082A	NA
Aroclor-1260(PCB-1260)	EPA 608, 8082A	EPA 8082A	NA
beta-BHC (beta-Hexachlorocyclohexane)	EPA 608, 8081B	EPA 8081B	NA
Chlordane(tech.)	EPA 608, 8081B	EPA 8081B	NA
delta-BHC	EPA 608, 8081B	EPA 8081B	NA
Dieldrin	EPA 608, 8081B	EPA 8081B	NA
Endosulfan I	EPA 608, 8081B	EPA 8081B	NA
Endosulfan II	EPA 608, 8081B	EPA 8081B	NA
Endosulfan sulfate	EPA 608, 8081B	EPA 8081B	NA
Endrin	EPA 608, 8081B	EPA 8081B	NA
Endrin aldehyde	EPA 608, 8081B	EPA 8081B	NA
gamma-BHC (Lindane,gamma-Hexachlorocyclohexane)	EPA 608, 8081B	EPA 8081B	NA
Heptachlor	EPA 608, 8081B	EPA 8081B	NA
Heptachlor epoxide	EPA 608, 8081B	EPA 8081B	NA
Toxaphene (Chlorinated camphene)	EPA 608, 8081B	EPA 8081B	NA
alpha-Chlordane	EPA 8081B	EPA 8081B	NA
Endrin ketone	EPA 8081B	EPA 8081B	NA
gamma-Chlordane	EPA 8081B	EPA 8081B	NA
Isodrin	EPA 8081B, 8270D	EPA 8081B, 8270D	NA
Methoxychlor	EPA 8081B	EPA 8081B	NA
Mirex	EPA 8081B	EPA 8081B	NA
Kepone	EPA 8270D	EPA 8270D	NA
o,o,o-Triethylphosphorothioate	EPA 8270D	EPA 8270D	NA
Parathion,ethyl	EPA 8270D	EPA 8270D	NA
Phorate	EPA 8270D	EPA 8270D	NA
Sulfotepp	EPA 8270D	EPA 8270D	NA
Thionazin (Zinophos)	EPA 8270D	EPA 8270D	NA
Dalapon	EPA 615, 8151A	EPA 8151A	NA
3,5-DCBA	EPA 615, 8151A	EPA 8151A	NA
4-Nitrophenol	EPA 615, 8151A, 625, 8270D	EPA 8270D, 8151A	NA
Dicamba	EPA 615, 8151A	EPA 8151A	NA
MCPP	EPA 615, 8151A	EPA 8151A	NA
MCPA	EPA 615, 8151A	EPA 8151A	NA
Dichlorprop	EPA 615, 8151A	EPA 8151A	NA
2,4-D	EPA 615, 8151A	EPA 8151A	NA
Pentachlorophenol	EPA 615, 8151A, 625, 8270D	EPA 8151A, 8270D	NA

Parameter/Analyte	Non-Potable Water	Solid Hazardous Waste	Air
2,4,5-TP (Silvex)	EPA 615, 8151A	EPA 8151A	NA
Chloramben	EPA 615, 8151A	EPA 8151A	NA
2,4,5-T	EPA 615, 8151A	EPA 8151A	NA
2,4-DB	EPA 615, 8151A	EPA 8151A	NA
Bentazon	EPA 615, 8151A	EPA 8151A	NA
Picloram	EPA 615, 8151A	EPA 8151A	NA
Dinoseb	EPA 615, 8151A, 625, 8270D	EPA 8151A, 8270D	NA
Dacthal	EPA 615, EPA 8151A	EPA 8151A	NA
Acifluorfen	EPA 615, EPA 8151A	EPA 8151A	NA
2,4-DCAA	EPA 615, EPA 8151A	EPA 8151A	NA
Total coliforms	SM9222B	NA	NA
Fecal coliforms	SM9222D	NA	NA
Aluminum	EPA 200.7, 6010C	EPA 6010C	NA
Antimony	EPA 200.7, 6010C	EPA 6010C	NA
Arsenic	EPA 200.7, 6010C	EPA 6010C	NA
Barium	EPA 200.7, 6010C	EPA 6010C	NA
Beryllium	EPA 200.7, 6010C	EPA 6010C	NA
Boron	EPA 200.7, 6010C	EPA 6010C	NA
Cadmium	EPA 200.7, 6010C	EPA 6010C	NA
Calcium	EPA 200.7, 6010C	EPA 6010C	NA
Chromium	EPA 200.7, 6010C	EPA 6010C	NA
Cobalt	EPA 200.7, 6010C	EPA 6010C	NA
Copper	EPA 200.7, 6010C	EPA 6010C	NA
Hardness (calc.)	SM2340B	NA	NA
Iron	EPA 200.7, 6010C, SM18 3500-Fe D	EPA 6010C	NA
Lead	EPA 200.7, 6010C	EPA 6010C	NA
Lithium	EPA 200.7, 6010C	EPA 6010C	NA
Magnesium	EPA 200.7, 6010C	EPA 6010C	NA
Manganese	EPA 200.7, 6010C	EPA 6010C	NA
Molybdenum	EPA 200.7, 6010C	EPA 6010C	NA
Nickel	EPA 200.7, 6010C	EPA 6010C	NA
Potassium	EPA 200.7, 6010C	EPA 6010C	NA
Selenium	EPA 200.7, 6010C	EPA 6010C	NA
Silver	EPA 200.7, 6010C	EPA 6010C	NA
Sodium	EPA 200.7, 6010C	EPA 6010C	NA
Strontium	EPA 200.7, 6010C	EPA 6010C	NA
Thallium	EPA 200.7, 6010C	EPA 6010C	NA
Tin	EPA 200.7, 6010C	EPA 6010C	NA
Titanium	EPA 200.7, 6010C	EPA 6010C	NA
Vanadium	EPA 200.7, 6010C	EPA 6010C	NA
Zinc	EPA 200.7, 6010C	EPA 6010C	NA
Mercury	EPA 245.1, 7470A	EPA 7471B	NA
Sulfate	ASTM D516-90	NA	NA
Ignitability	EPA 1010A	EPA 1010A, EPA 1030	NA
Conductivity	EPA 120.1, SM18 2510B	NA	NA
Turbidity	EPA 180.1, SM18 2130B	NA	NA
Orthophosphate as P	EPA 365.3	NA	NA
Color	SM2120B	NA	NA
Alkalinity as CaC03	SM2320B	NA	NA

Parameter/Analyte	Non-Potable Water	Solid Hazardous Waste	Air
Hardness	SM2340C	NA	NA
Residue-nonfilterable (TSS)	SM2540D	NA	NA
Residue-total	SM2540B	NA	NA
Residue-filterable (TDS)	SM2540C	NA	NA
Chromium VI	SM3500-CrD(18th/19th Ed.)/UV-VIS	NA	NA
Chloride	SM4500-Cl-C	NA	NA
Total residual chlorine	SM4500-Cl-G	NA	NA
pH	SM18 4500-H+-B, EPA 9040C	EPA 9040C, 9045D	NA
Corrosivity (pH)	NA	EPA 9040C	NA
Paint Filter Liquids Test	NA	EPA 9095B	NA
Nitrite	SM4500-NO2 B	NA	NA
Biochemical oxygen demand	SM5210B	NA	NA
Carbonaceous BOD(CBOD)	SM5210B	NA	NA
Chemical oxygen demand	SM5220D, EPA 410.4	NA	NA
Total Organic Carbon	SM18 5310B, EPA 9060A	NA	NA
Total Petroleum Hydrocarbons (TPH)	FL-PRO	FL-PRO	NA
Oil & Grease (HEM)	EPA 1664A	EPA 9071B	NA
Total Petroleum Hydrocarbons (TPH) (HEM-SGT)	EPA 1664A	NA	NA
Carbon dioxide	RSK-175	NA	NA
Ethane	RSK-175	NA	NA
Ethylene	RSK-175	NA	NA
Methane	RSK-175	NA	NA
2,4,6-Trichlorophenol	EPA 625, 8270D	EPA 8270D	NA
2,4-Dichlorophenol	EPA 625, 8270D	EPA 8270D	NA
2,4-Dimethylphenol	EPA 625, 8270D	EPA 8270D	NA
2,4-Dinitrophenol	EPA 625, 8270D	EPA 8270D	NA
2,4-Dinitrotoluene (2,4-DNT)	EPA 625, 8270D	EPA 8270D	NA
2,6-Dinitrotoluene (2,6-DNT)	EPA 625, 8270D	EPA 8270D	NA
2-Chloronaphthalene	EPA 625, 8270D	EPA 8270D	NA
2-Chlorophenol	EPA 625, 8270D	EPA 8270D	NA
2-Methyl-4,6-dinitrophenol	EPA 625, 8270D	EPA 8270D	NA
2-Nitrophenol	EPA 625, 8270D	EPA 8270D	NA
3,3'-Dichlorobenzidine	EPA 625, 8270D	EPA 8270D	NA
4-Bromophenyl phenylether	EPA 625, 8270D	EPA 8270D	NA
4-Chloro-3-methylphenol	EPA 625, 8270D	EPA 8270D	NA
4-Chlorophenyl phenylether	EPA 625, 8270D	EPA 8270D	NA
Acenaphthene	EPA 625 Scan-Sim , 8270D Scan-Sim	EPA 8270D Scan-Sim	NA
Acenaphthylene	EPA 625 Scan-Sim , 8270D Scan-Sim	EPA 8270D Scan-Sim	NA
Aniline	EPA 625, 8270D	EPA 8270D	NA
Anthracene	EPA 625 Scan-Sim, 8270D Scan-Sim	EPA 8270D Scan-Sim	NA
Benzidine	EPA 625, 8270D	EPA 8270D	NA

Parameter/Analyte	Non-Potable Water	Solid Hazardous Waste	Air
Benzo(a)anthracene	EPA 625 Scan-Sim , 8270D Scan-Sim	EPA 8270D Scan-Sim	NA
Benzo(a)pyrene	EPA 625 Scan-Sim , 8270D Scan-Sim	EPA 8270D Scan-Sim	NA
Benzo(b)fluoranthene	EPA 625 Scan-Sim , 8270D Scan-Sim	EPA 8270D Scan-Sim	NA
Benzo(g,h,i)perylene	EPA 625 Scan-Sim , 8270D Scan-Sim	EPA 8270D Scan-Sim	NA
Benzo(k)fluoranthene	EPA 625 Scan-Sim , 8270D Scan-Sim	EPA 8270D Scan-Sim	NA
bis(2-Chloroethoxy)methane	EPA 625, 8270D	EPA 8270D	NA
bis(2-Chloroethyl) ether	EPA 625, 8270D	EPA 8270D	NA
bis(2-Chloroisopropyl) ether (2,2'-Oxybis(1-chloropropane)	EPA 625, 8270D	EPA 8270D	NA
bis(2-Ethylhexyl) phthalate(DEHP)	EPA 625, 8270D	EPA 8270D	NA
Butylbenzylphthalate	EPA 625, 8270D	EPA 8270D	NA
Chrysene	EPA 625 Scan-Sim , 8270D Scan-Sim	EPA 8270D Scan-Sim	NA
Dibenzo(a,h)anthracene	EPA 625 Scan-Sim, 8270D Scan-Sim	EPA 8270D Scan-Sim	NA
Diethyl phthalate	EPA 625, 8270D	EPA 8270D	NA
Dimethyl phthalate	EPA 625, 8270D	EPA 8270D	NA
Di-n-butyl phthalate	EPA 625, 8270D	EPA 8270D	NA
Di-n-octyl phthalate	EPA 625, 8270D	EPA 8270D	NA
Fluoranthene	EPA 625 Scan-Sim , 8270D Scan-Sim	EPA 8270D Scan-Sim	NA
Fluorene	EPA 625 Scan-Sim, 8270D Scan-Sim	EPA 8270D Scan-Sim	NA
Hexachlorobenzene	EPA 625, 8270D	EPA 8270D	NA
Hexachlorocyclopentadiene	EPA 625, 8270D	EPA 8270D	NA
Hexachloroethane	EPA 625, 8270D	EPA 8270D	NA
Indeno(1,2,3-cd)pyrene	EPA 625 Scan-Sim, 8270D Scan-Sim	EPA 8270D Scan-Sim	NA
Isophorone	EPA 625, 8270D	EPA 8270D	NA
Nitrobenzene	EPA 625, 8270D	EPA 8270D	NA
n-Nitrosodimethylamine	EPA 625, 8270D	EPA 8270D	NA
n-Nitrosodi-n-propylamine	EPA 625, 8270D	EPA 8270D	NA
n-Nitrosodiphenylamine	EPA 625, 8270D	EPA 8270D	NA
Phenanthrene	EPA 625 Scan-Sim , 8270D Scan-Sim	EPA 8270D Scan-Sim	NA
Phenol	EPA 625, 8270D	EPA 8270D	NA
Pyrene	EPA 625 Scan-Sim, 8270D Scan-Sim	EPA 8270D Scan-Sim	NA
Pyridine	EPA 625, 8270D	EPA 8270D	NA
1,1-Biphenyl	EPA 8270D	EPA 8270D	
1,2,4,5-Tetrachlorobenzene	EPA 8270D	EPA 8270D	NA
1,2-Diphenylhydrazine	EPA 8270D	EPA 8270D	NA
1,3,5-Trinitrobenzene (1,3,5-TNB)	EPA 8270D	EPA 8270D	NA

Parameter/Analyte	Non-Potable Water	Solid Hazardous Waste	Air
1,3-Dinitrobenzene (1,3-DNB)	EPA 8270D	EPA 8270D	NA
1,4-Naphthoquinone	EPA 8270D	EPA 8270D	NA
1,4-Phenylenediamine	EPA 8270D	EPA 8270D	NA
1-Methylnaphthalene	EPA 625 Scan-Sim, 8270D Scan-Sim	EPA 8270D Scan-Sim	NA
1-Naphthylamine	EPA 8270D	EPA 8270D	NA
2,3,4,6-Tetrachlorophenol	EPA 8270D	EPA 8270D	NA
2,4,5-Trichlorophenol	EPA 8270D	EPA 8270D	NA
2,6-Dichlorophenol	EPA 8270D	EPA 8270D	NA
2-Acetylaminofluorene	EPA 8270D	EPA 8270D	NA
2-Methylnaphthalene	EPA 625 Scan-Sim, 8270D Scan-Sim	EPA 8270D Scan-Sim	NA
2-Methylphenol (o-Cresol)	EPA 8270D	EPA 8270D	NA
2-Naphthylamine	EPA 8270D	EPA 8270D	NA
2-Nitroaniline	EPA 8270D	EPA 8270D	NA
2-Picoline (2-Methylpyridine)	EPA 8270D	EPA 8270D	NA
3,3'-Dimethylbenzidine	EPA 8270D	EPA 8270D	NA
3-Methylcholanthrene	EPA 8270D	EPA 8270D	NA
3-Methylphenol (m-Cresol)	EPA 8270D	EPA 8270D	NA
3-Nitroaniline	EPA 8270D	EPA 8270D	NA
4-Aminobiphenyl	EPA 8270D	EPA 8270D	NA
4-Chloroaniline	EPA 8270D	EPA 8270D	NA
4-Dimethyl aminoazobenzene	EPA 8270D	EPA 8270D	NA
4-Methylphenol (p-Cresol)	EPA 8270D	EPA 8270D	NA
4-Nitroaniline	EPA 8270D	EPA 8270D	NA
4-Nitroquinoline-n-oxide	EPA 8270D	EPA 8270D	NA
5-Nitro-o-toluidine	EPA 8270D	EPA 8270D	NA
7,12-Dimethylbenz(a)anthracene	EPA 8270D	EPA 8270D	NA
a-a-Dimethylphenethylamine	EPA 8270D	EPA 8270D	NA
Acetophenone	EPA 8270D	EPA 8270D	NA
Aramite	EPA 8270D	EPA 8270D	NA
Atrazine	EPA 8270D	EPA 8270D	NA
Benzaldehyde	EPA 8270D	EPA 8270D	NA
Benzoic acid	EPA 8270D	EPA 8270D	NA
Benzyl alcohol	EPA 8270D	EPA 8270D	NA
Caprolactam	EPA 8270D	EPA 8270D	NA
Carbazole	EPA 8270D	EPA 8270D	NA
Chlorobenzilate	EPA 8270D	EPA 8270D	NA
Cresol, Total	EPA 8270D	EPA 8270D	NA
Diallate	EPA 8270D	EPA 8270D	NA
Dibenzo(a,h)pyrene	EPA 8270D	EPA 8270D	NA
Dibenzofuran	EPA 8270D	EPA 8270D	NA
Dimethoate	EPA 8270D	EPA 8270D	NA
Diphenylamine	EPA 8270D	EPA 8270D	NA
Disulfoton	EPA 8270D	EPA 8270D	NA
DPH (as Azobenzene)	EPA 8270D	EPA 8270D	NA
Ethyl methanesulfonate	EPA 8270D	EPA 8270D	NA
Famphur	EPA 8270D	EPA 8270D	NA

Parameter/Analyte	Non-Potable Water	Solid Hazardous Waste	Air
Hexachlorophene	EPA 8270D	EPA 8270D	NA
Hexachloropropene	EPA 8270D	EPA 8270D	NA
Isosafrole	EPA 8270D	EPA 8270D	NA
Methapyrilene	EPA 8270D	EPA 8270D	NA
Methyl methane sulfonate	EPA 8270D	EPA 8270D	NA
Methyl parathion (Parathion,methyl)	EPA 8270D	EPA 8270D	NA
Nitroquinoline-1-oxide	EPA 8270D	EPA 8270D	NA
n-Nitrosodiethylamine	EPA 8270D	EPA 8270D	NA
n-Nitroso-di-n-butylamine	EPA 8270D	EPA 8270D	NA
n-Nitrosomethylethylamine	EPA 8270D	EPA 8270D	NA
n-Nitrosomorpholine	EPA 8270D	EPA 8270D	NA
n-Nitrosopiperidine	EPA 8270D	EPA 8270D	NA
n-Nitrosopyrrolidine	EPA 8270D	EPA 8270D	NA
o-Toluidine	EPA 8270D	EPA 8270D	NA
Pentachlorobenzene	EPA 8270D	EPA 8270D	NA
Pentachloroethane	EPA 8270D	EPA 8270D	NA
Pentachloronitrobenzene	EPA 8270D	EPA 8270D	NA
Phenacetin	EPA 8270D	EPA 8270D	NA
Pronamide (Kerb)	EPA 8270D	EPA 8270D	NA
Safrole	EPA 8270D	EPA 8270D	NA
C9-C18 Aliphatic Hydrocarbons	MAEPH	MAEPH	NA
C19-C36 Aliphatic Hydrocarbons	MAEPH	MAEPH	NA
C11-C22 Aromatic Hydrocarbons	MAEPH	MAEPH	NA
C5-C8 Aliphatic Hydrocarbons	MAVPH	MAVPH	NA
C9-C12 Aliphatic Hydrocarbons	MAVPH	MAVPH	NA
C9-C10 Aromatic Hydrocarbons	MAVPH	MAVPH	NA
Toxicity Characteristic Leaching Procedure (TCLP)	EPA 1311	EPA 1311	NA
Synthetic Precipitation Leaching Procedure (SPLP)	EPA 1312	EPA 1312	NA

Analytical method	Prep Method			
	Soil	Water	Air	Waste
EPA 8260B	EPA 5035	EPA 5030B	NA	EPA 5035
EPA 624	NA	EPA 5030B	NA	NA
EPA 625	NA	EPA 3510C	NA	NA
EPA 8270D	EPA 3545A	EPA 3510C	NA	EPA 3580A
EPA 200.7	NA	EPA 200.7	NA	NA
EPA 6010C	EPA 3050B	EPA 3005A	NA	EPA 3050B
EPA 608	NA	EPA 3510C	NA	NA
EPA 8081B	EPA 3545A	EPA 3510C	NA	EPA 3580A
EPA 8082A	EPA 3545A, EPA 3540C	EPA 3510C	NA	EPA 3580A
EPA 615	NA	EPA 615	NA	NA

Analytical method	Prep Method			
EPA 8151A	EPA 8151A	EPA 8151A	NA	EPA 8151A
MA VPH, May 2004 Revision 1.1	EPA 5035	EPA 5030B	NA	NA
MA EPH, May 2004 Revision 1.1	EPA 3545A	EPA 3510C	NA	NA
FLPRO	EPA 3545A	EPA 3510C	NA	NA
8015C – GRO	EPA 5035	EPA 5030B	NA	NA
8015C – DRO	EPA 3545A	EPA 3510C	NA	NA
TO14A	NA	NA	TO14A	NA
TO15	NA	NA	TO15	NA
SPLP	EPA 1312	EPA 1312	NA	EPA 1312
TCLP	EPA 1311	EPA 1311	NA	EPA 1311

The American Association for Laboratory Accreditation

World Class Accreditation

Accredited DoD ELAP Laboratory

A2LA has accredited

ENVIRONMENTAL CONSERVATION LABORATORIES - JACKSONVILLE

Jacksonville, FL

for technical competence in the field of

Environmental Testing

In recognition of the successful completion of the A2LA evaluation process that includes an assessment of the laboratory's compliance with ISO/IEC 17025:2005, the 2003 NELAC Chapter 5 Standard, and the requirements of the Department of Defense Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in the DoD Quality Systems Manual for Environmental Laboratories (QSM v4.1); accreditation is granted to this laboratory to perform recognized EPA methods as defined on the associated A2LA Environmental Scope of Accreditation. This accreditation demonstrates technical competence for this defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION
CORPORATE SEAL 1978
DISTRICT OF COLUMBIA
A2LA

Presented this 1st day of May 2012.

President & CEO
For the Accreditation Council
Certificate Number 3000.02
Valid to April 30, 2014

For the tests or types of tests to which this accreditation applies, please refer to the laboratory's Environmental Scope of Accreditation.

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

ENVIRONMENTAL CONSERVATION LABORATORIES – ORLANDO
10775 Central Port Drive
Orlando, FL 32824
Russell Macomber Phone: 407 826 5314
rmacomber@encolabs.com

ENVIRONMENTAL

Valid To: March 31, 2014 Certificate Number: 3000.01

In recognition of the successful completion of the A2LA evaluation process, (including an assessment of the laboratory's compliance with ISO IEC 17025:2005, the 2003 NELAC Chapter 5 Standard, and the requirements of the DoD Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in version 4.2 of the DoD Quality Systems Manual for Environmental Laboratories) accreditation is granted to this laboratory to perform recognized EPA methods using the following testing technologies and in the analyte categories identified below:

Testing Technologies

Analyte / Parameter	Non-Potable Water	Solid Hazardous Waste
Metals	EPA 6020A/200.8	EPA 6020A
Aluminum	EPA 6020A/200.8	EPA 6020A
Antimony	EPA 6020A/200.8	EPA 6020A
Arsenic	EPA 6020A/200.8	EPA 6020A
Barium	EPA 6020A/200.8	EPA 6020A
Beryllium	EPA 6020A/200.8	EPA 6020A
Cadmium	EPA 6020A/200.8	EPA 6020A
Calcium	EPA 6020A/200.8	EPA 6020A
Chromium	EPA 6020A/200.8	EPA 6020A
Cobalt	EPA 6020A/200.8	EPA 6020A
Copper	EPA 6020A/200.8	EPA 6020A
Hardness	SM 2340 B	----------
Iron	EPA 6020A/200.8	EPA 6020A
Lead	EPA 6020A/200.8	EPA 6020A
Magnesium	EPA 6020A/200.8	EPA 6020A
Manganese	EPA 6020A/200.8	EPA 6020A
Mercury	EPA 245.1/7470A	EPA 7471B
Molybdenum	EPA 6020A/200.8	EPA 6020A
Nickel	EPA 6020A/200.8	EPA 6020A
Potassium	EPA 6020A/200.8	EPA 6020A
Selenium	EPA 6020A/200.8	EPA 6020A
Silver	EPA 6020A/200.8	EPA 6020A
Sodium	EPA 6020A/200.8	EPA 6020A
Thallium	EPA 6020A/200.8	EPA 6020A
Tin	EPA 6020A/200.8	EPA 6020A
Titanium	EPA 6020A/200.8	EPA 6020A
Vanadium	EPA 6020A/200.8	EPA 6020A

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Analyte / Parameter	Non-Potable Water	Solid Hazardous Waste
Metals	EPA 6020A/200.8	EPA 6020A
Zinc	EPA 6020A/200.8	EPA 6020A
Microbiology		
Total Coliforms	SM 9222B	----------
Fecal Coliforms	SM 9222D	----------
General Chemistry		
Acidity, as $CaC0_3$	EPA 305.1/SM 2310 B (4A)	----------
Alkalinity as $CaC0_3$	EPA 310.1/SM 2320 B	EPA 310.1/SM 2320 B
Alkalinity as $CaC0_3$	EPA 310.2	EPA 310.2
Biochemical oxygen demand	EPA 405.1/SM 5210 B	----------
Bromide	EPA 300.0/9056A	EPA 9056A
Carbonaceous BOD (CBOD)	SM 5210 B	----------
Chemical oxygen demand	EPA 410.4	----------
Chloride	EPA 300.0/9056A	EPA 9056A
Chromium VI	EPA 7196/ SM 3500-Cr D	EPA 7196
Conductivity	EPA 120.1	----------
Cyanide	EPA 335.2/SM 4500-CN E	EPA 9014
Cyanide, Reactive	----------	SW-846 7.3.3
Ferric iron (calculated)	SM 3500-Fe D	----------
Ferrous iron	SM 3500-Fe D	----------
Fluoride	EPA 300.0/9056A	EPA 9056A
Hardness	EPA 130.2/SM 2340 C	----------
Kjeldahl nitrogen -total	EPA 351.2	EPA351.2
Nitrate as N	EPA 300.0/353.1/9056A	EPA 353.1/9056A
Nitrate-nitrite	EPA 300.0/353.1/9056A	EPA 353.1/9056A
Nitrite as N	EPA 300.0/354.1/9056A/SM 4500-NO_2 B	EPA 9056A/ SM 4500-NO_2 B
Organic nitrogen	EPA 351.2/350.1	EPA 351.2/350.1
Orthophosphate as P	EPA 365.1	----------
Orthophosphate as P	EPA 365.3	----------
pH	EPA 150.1/9040C/SM 4500-H^+-B	EPA 9045D
Phosphorus, total	EPA 365.4	EPA 365.4
Residue-filterable (TDS)	SM 2540 C	----------
Residue-nonfilterable (TSS)	SM 2540 D	----------
Residue-total	SM 2540 B/SM 2540 G/EPA 160.3	SM 2540G/EPA 160.3
Residue-volatile	EPA 160.4	EPA 160.4
Sulfate	EPA 300.0/9056A	EPA 9056A
Sulfide	EPA 376.1/SM 4500-S E	EPA 9030B/9034
Sulfide, Reactive	----------	SW-846 7.3.4
Surfactants -MBAS	SM 5540 C	----------
Total nitrate-nitrite	EPA 9056 A/SM 4500-$N0_3$ H	EPA 9056 A/SM 4500-$N0_3$ H
Total cyanide	EPA 9014	EPA 9014
Total nitrogen	TKN + Total nitrate-nitrite	TKN + Total nitrate-nitrite
Total Organic Carbon	EPA 9060A/SM 5310B	TOC Walkley Black
Total phenolics	EPA 420.1	EPA 420.1
Total, fixed, and volatile residue	SM 2540 G	SM 2540 G
Turbidity	EPA 180.1	----------
Un-ionized ammonia	DEP SOP 10/03/83	DEP SOP 10/03/83
Extractable Organics		
1,2,4-Trichlorobenzene	EPA 8270D/625	EPA 8270D

Analyte / Parameter	Non-Potable Water	Solid Hazardous Waste
Extractable Organics		
1,2,4,5-Tetrachlorobenzene	EPA 8270D/625	EPA 8270D
1,2-Dichlorobenzene	EPA 8270D/625	EPA 8270D
1,2-Diphenylhydrazine	EPA 8270D/625	EPA 8270D
1,3-Dichlorobenzene	EPA 8270D/625	EPA 8270D
1,4-Dichlorobenzene	EPA 8270D/625	EPA 8270D
1- Methylnaphthalene	EPA 8270D/625/ Scan-Sim	EPA 8270D/ Scan-Sim
2,3,4,6-Tetrachlorophenol	EPA 8270D/625	EPA 8270D
2,4,5-Trichlorophenol	EPA 8270D/625	EPA 8270D
2,4,6-Trichlorophenol	EPA 8270D/625	EPA 8270D
2,4-Dichlorophenol	EPA 8270D/625	EPA 8270D
2,4-Dimethylphenol	EPA 8270D/625	EPA 8270D
2,4-Dinitrophenol	EPA 8270D/625	EPA 8270D
2,4-Dinitrotoluene (2,4-DNT)	EPA 8270D/625/ Scan-Sim	EPA 8270D
2,6-Dichlorophenon	EPA 8270D/625	EPA 8270D
2,6-Dinitrotoluene (2,6-DNT)	EPA 8270D/625	EPA 8270D
2-Chloronaphthalene	EPA 8270D/625	EPA 8270D
2-Chlorophenol	EPA 8270D/625	EPA 8270D
2·Methyl-4,6-dinitrophenol	EPA 8270D/625	EPA 8270D
2-Methylnaphthalene	EPA 8270D/625 Scan-Sim	EPA 8270D Scan-Sim
2-Methylphenol (o-Cresol)	EPA 8270D/625	EPA 8270D
2-Nitroaniline	EPA 8270D/625	EPA 8270D
2-Nitrophenol	EPA 8270D/625	EPA 8270D
3,3'-Dichlorobenzidine	EPA 8270D/625	EPA 8270D
3/4-Methylphenols (m/p-Cresols)	EPA 8270D/625	EPA 8270D
3-Nitroaniline	EPA 8270D/625	EPA 8270D
4-Bromophenyl phenyl ether	EPA 8270D/625	EPA 8270D
4-Chloro-3-methylphenol	EPA 8270D/625	EPA 8270D
4-Chloroaniline	EPA 8270D/625	EPA 8270D
4-Chlorophenyl phenyl ether	EPA 8270D/625	EPA 8270D
4-Nitrophenol	EPA 8270D/625	EPA 8270D
Acenaphthene	EPA 8270D/625 Scan-Sim	EPA 8270D Scan-Sim
Acenaphthylene	EPA 8270D/625 Scan-Sim	EPA 8270D Scan-Sim
4-Melhylphenol (p-Cresol)	EPA 8270D/625	EPA 8270D
4-Nitroaniline	EPA 8270D/625	EPA 8270D
Acetophenone	EPA 8270D/625	EPA 8270D
Anthracene	EPA 8270D/625/ Scan-Sim	EPA 8270D
Atrazine	EPA 8270D/625	EPA 8270D
Benzaldehyde	EPA 8270D/625	EPA 8270D
Benzidine	EPA 8270D/625/ Scan-Sim	EPA 8270D
Benzo(a)anthracene	EPA 8270D/625/ Scan-Sim	EPA 8270D Scan-Sim
Benzo(a)pyrene	EPA 8270D/625/ Scan-Sim	EPA 8270D Scan-Sim
Benzo(b)fluoranthene	EPA 8270D/625/ Scan-Sim	EPA 8270D Scan-Sim
Benzo(g,h,i)perylene	EPA 8270D/625/ Scan-Sim	EPA 8270D Scan-Sim
Benzo(k)fluoranthene	EPA 8270D/625/ Scan-Sim	EPA 8270D Scan-Sim
Benzyl alcohol	EPA 8270D/625	EPA 8270D
1,1-Biphenyl	EPA 8270D/625	EPA 8270D
bis(2-Chloroethoxy) methane	EPA 8270D/625	EPA 8270D
bis(2-Chloroethyl) ether	EPA 8270D/625	EPA 8270D
bis(2-Chloroisopropyl) ether (2,2'-Oxybis(1-chloropropane))	EPA 8270D/625	EPA 8270D
bis(2-Ethylhexyl) phthalate (DEHP)	EPA 8270D/625	EPA 8270D

Analyte / Parameter	Non-Potable Water	Solid Hazardous Waste
Extractable Organics		
Butyl benzyl phthalate	EPA 8270D/625	EPA 8270D
Caprolactam	EPA 8270D/625	EPA 8270D
Carbazole	EPA 8270D/625	EPA 8270D
Chrysene	EPA 8270D/625/ Scan-Sim	EPA 8270D Scan-Sim
Dibenz(a,h)anthracene	EPA 8270D/625/ Scan-Sim	EPA 8270D Scan-Sim
Dibenzofuran	EPA 8270D/625	EPA 8270D
Diethyl phthalate	EPA 8270D/625	EPA 8270D
Dimethyl phthalate	EPA 8270D/625/ Scan-Sim	EPA 8270D
Di-n-butyl phthalate	EPA 8270D/625	EPA 8270D
Di-n-octyl phthalate	EPA 8270D/625	EPA 8270D
Fluoranthene	EPA 8270D/625/ Scan-Sim	EPA 8270D Scan-Sim
Fluorene	EPA 8270D/625 Scan-Sim	EPA 8270D Scan-Sim
Hexachlorobenzene	EPA 8270D/625/ Scan-Sim	EPA 8270D
Hexachlorobutadiene	EPA 8270D/625/ Scan-Sim	EPA 8270D
Hexachlorocyclopentadiene	EPA 8270D/625	EPA 8270D
Hexachloroethane	EPA 8270D/625	EPA 8270D
Indeno(1,2,3-cd)pyrene	EPA 8270D/625/ Scan-Sim	EPA 8270D Scan-Sim
Isodrin	EPA 8270D/625	EPA 8270D
Isophorone	EPA 8270D/625	EPA 8270D
Naphthalene	EPA 8270D/625 Scan-Sim	EPA 8270D Scan-Sim
Nitrobenzene	EPA 8270D/625	EPA 8270D
n-Nitrosodimethylamine	EPA 8270D/625	EPA 8270D
n-Nitrosodi-n-propylamine	EPA 8270D/625	EPA 8270D
n-Nitrosodiphenylamine	EPA 8270D/625	EPA 8270D
n-Nitrosopyrrolidine	EPA 8270D/625	EPA 8270D
Pentachlorophenol	EPA 8270D/625/ Scan-Sim	EPA 8270D
Phenanthrene	EPA 8270D/625 Scan-Sim	EPA 8270D Scan-Sim
Phenol	EPA 8270D/625	EPA 8270D
Pyrene	EPA 8270D/625 Scan-Sim	EPA 8270D Scan-Sim
Pyridine	EPA 8270D/625	EPA 8270D
Total Petroleum Hydrocarbons (TPH)	FL·PRO	FL·PRO
Volatile Organics		
1,1,1,2-Tetrachloroethane	EPA 8260B/624	EPA 8260B
1,1,1-Trichloroethane	EPA 8260B/624	EPA 8260B
1,1,2,2-Tetrachloroethane	EPA 8260B/624	EPA 8260B
1,1,2-Trichloro-1,2,2-trifluoroethane	EPA 8260B/624	EPA 8260B
1,1,2-Trichloroethane	EPA 8260B/624	EPA 8260B
1,1-Dichloroethane	EPA 8260B/624	EPA 8260B
1,1-Dichloroethene	EPA 8260B/624	EPA 8260B
1,1-Dichloropropene	EPA 8260B/624	EPA 8260B
1,2,3-Trichlorobenzene	8260B/624	EPA 8260B
1,2,3-Trichloropropane	EPA 8260B/624	EPA 8260B
1,2,4-Trichlorobenzene	EPA 8260B/624	EPA 8260B
1,2,4-Trimethylbenzene	EPA 8260B/624	EPA 8260B
1,2-Dibromo-3-chloropropane (DBCP)	EPA 504/8011/8260B	EPA 8260B
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 504/8011/8260B	EPA 8260B
1,2-Dichlorobenzene	EPA 8260B/624	EPA 8260B
1,2-Dichloroethane	EPA 8260B/624	EPA 8260B

Analyte / Parameter	Non-Potable Water	Solid Hazardous Waste
Volatile Organics		
1,2-Dichloropropane	EPA 8260B/624	EPA 8260B
1,3,5-Trimethylbenzene	EPA 8260B/624	EPA 8260B
1,3-Dichlorobenzene	EPA 8260B/624	EPA 8260B
1,3-Dichloropropane	EPA 8260B/624	EPA 8260B
1,4-Dichlorobenzene	EPA 8260B/624	EPA 8260B
1,4-Dioxane (1,4-Diethylencoxide)	EPA 8260B/8260C SIM/624	EPA 8260B/8260C SIM
2,2-Dichloropropane	EPA 8260B/624	EPA 8260B
2-Butanone (Methyl ethyl ketone, MEK)	EPA 8260B/624	EPA 8260B
2-Chloroethyl vinyl ether	EPA 8260B/624	EPA 8260B
2-Chlorotoluene	EPA 8260B/624	EPA 8260B
2-Hexanone	EPA 8260B/624	EPA 8260B
4-Chlorotoluene	EPA 8260B/624	EPA 8260B
4-Methyl-2-pentanone (MIBK)	EPA 8260B/624	EPA 8260B
Acetone	EPA 8260B/624	EPA 8260B
Acetonitrile	EPA 8260B/624	EPA 8260B
Acrolein (Propenal)	EPA 8260B/624	EPA 8260B
Acrylonitrile	EPA 8260B/624	EPA 8260B
Allyl chloride (3-Chloropropene)	EPA 8260B/624	EPA 8260B
Benzene	EPA 8260B/624	EPA 8260B
Bromobenzene	EPA 8260B/624	EPA 8260B
Bromochloromethane	EPA 8260B/624	EPA 8260B
Bromodichloromethane	EPA 8260B/624	EPA 8260B
Bromoform	EPA 8260B/624	EPA 8260B
Carbon tetrachloride	EPA 8260B/624	EPA 8260B
Carbon disulfide	EPA 8260B/624	EPA 8260B
Chlorobenzene	EPA 8260B/624	EPA 8260B
Chloroethane	EPA 8260B/624	EPA 8260B
Chloroform	EPA 8260B/624	EPA 8260B
Chloroprene	EPA 8260B/624	EPA 8260B
cis-1,2-Dichloroethene	EPA 8260B/624	EPA 8260B
cis-1,3-Dichloropropene	EPA 8260B/624	EPA 8260B
Cyclohexane	EPA 8260B/624	EPA 8260B
Dibromochloromethane	EPA 8260B/624	EPA 8260B
Dibromomethane	EPA 8260B/624	EPA 8260B
Dichlorodifluoromethane	EPA 8260B/624	EPA 8260B
Ethyl methacrylate	EPA 8260B/624	EPA 8260B
Hexachlorobutadiene	EPA 8260B/624	EPA 8260B
Ethylbenzene	EPA 8260B/624	EPA 8260B
Iodomethane (Methyl iodide)	EPA 8260B/624	EPA 8260B
Isobutyl alcohol (2-Methyl-l-propanol)	EPA 8260B/624	EPA 8260B
Isopropylbenzene	EPA 8260B/624	EPA 8260B
m+p-Xylenes	EPA 8260B/624	EPA 8260B
Methacrylonitrile	EPA 8260B/624	EPA 8260B
Methyl acetate	EPA 8260B/624	EPA 8260B
Methyl bromide (Bromomethane)	EPA 8260B/624	EPA 8260B
Methyl chloride (Chloromethane)	EPA 8260B/624	EPA 8260B
Methyl methacrylate	EPA 8260B/624	EPA 8260B
Methyl tert-butyl ether (MTBE)	EPA 8260B/624	EPA 8260B
Methylcyclohexane	EPA 8260B/624	EPA 8260B

Analyte / Parameter	Non-Potable Water	Solid Hazardous Waste
Volatile Organics		
Methylene chloride	EPA 8260B/624	EPA 8260B
Naphthalene	EPA 8260B/624	EPA 8260B
n-Butylbenzene	EPA 8260B/624	EPA 8260B
n-Propylbenzene	EPA 8260B/624	EPA 8260B
o-Xylene	EPA 8260B/624	EPA 8260B
Pentachloroethane	EPA 8260B/624	EPA 8260B
p-Isopropyltoluene	EPA 8260B/624	EPA 8260B
Propionitrile (Ethyl cyanide)	EPA 8260B/624	EPA 8260B
sec-Butylbenzene	EPA 8260B/624	EPA 8260B
Styrene	EPA 8260B/624	EPA 8260B
tert-Butylbenzene	EPA 8260B/624	EPA 8260B
Tetrachloroethene (Perchloroethylene)	EPA 8260B/624	EPA 8260B
Toluene	EPA 8260B/624	EPA 8260B
trans-1,2-Dichloroethene	EPA 8260B/624	EPA 8260B
trans-1,3-Dichloropropene	EPA 8260B/624	EPA 8260B
trans-1,4-Dichloro-2-butene	EPA 8260B/624	EPA 8260B
Trichloroethene (Trichloroethylene)	EPA 8260B/624	EPA 8260B
Trichlorofluoromethane	EPA 8260B/624	EPA 8260B
Vinyl acetate	EPA 8260B/624	EPA 8260B
Vinyl chloride	EPA 8260B/624	EPA 8260B
Xylene (total)	EPA 8260B/624	EPA 8260B
Pesticides-Herbicides-PCBs		
2,4,5-T	EPA 8151A /615	EPA 8151A
2,4-D	EPA 8151A /615	EPA 8151A
2,4-DB	EPA 8151A /615	EPA 8151A
3,5-Dichlorobenzoic acid	EPA 8151A /615	EPA 8151A
4.4'-DDD	EPA 8081B/608	EPA 8081B
4.4'-DDE	EPA 8081B/608	EPA 8081B
4,4'·DDT	EPA 8081B/608	EPA 8081B
4-Nitrophenol	EPA 8151A/615	EPA 8151A
Acifluorfen	EPA 8151A/615	EPA 8151A
Aldrin	EPA 8081B/608	EPA 8081B
alpha-BHC (alpha-Hexachlorocyclohexane)	EPA 8081B/608	EPA 8081B
alpha-Chlordane	EPA 8081B/608	EPA 8081B
Aroclor-1016(PCB-1016)	EPA 8082A/608	EPA 8082A
Aroclor-1221 (PCB-1221)	EPA 8082A/608	EPA 8082A
Aroclor-1232 (PCB-1232)	EPA 8082A/608	EPA 8082A
Aroclor-1242 (PCB-1242)	EPA 8082A/608	EPA 8082A
Aroclor-1248 (PCB-1248)	EPA 8082A/608	EPA 8082A
Aroclor-1254 (PCB-1254)	EPA 8082A/608	EPA 8082A
Aroclor-1260 (PCB-1260)	EPA 8082A/608	EPA 8082A
Aroclor-1262 (PCB-1262)	EPA 8082A/608	EPA 8082A
Aroclor-1268 (PCB-1268)	EPA 8082A/608	EPA 8082A
Azinphos-methyl (Guthion)	EPA 8141B	EPA 8141B
Bentazon	EPA 8151A/615	EPA 8151A
beta-BHC (beta-Hexachlorocyclohexane)	EPA 8081B/608	EPA 8081B
Bolstar (Sulprofos)	EPA 8141B	EPA 8141B
Chloramben	EPA 8151A/615	EPA 8151A

Analyte / Parameter	Non-Potable Water	Solid Hazardous Waste
Pesticides-Herbicides-PCBs		
Chlordane (tech.)	EPA 8081B/608	EPA 8081B
Chlorpynfos	EPA 8141B	EPA 8141B
Coumaphos	EPA 8141B	EPA 8141B
Dacthal (DCPA)	EPA 8151A/615	EPA 8151A
Dalapon	EPA 8151A/615	EPA 8151A
delta-BHC	EPA 8081B/608	EPA 8081B
Demeton, Total	EPA 8141B	EPA 8141B
Diazinon	EPA 8141B	EPA 8141B
Dicamba	EPA 8151A/615	EPA 8151A
Dichlorofenthion	EPA 8141B	EPA 8141B
Dichloroprop (Dichlorprop)	EPA 8151A/615	EPA 8151A
Dlchlorovos (DDVP, Dichtorvos)	EPA 8141B	EPA 8141B
Dieldrin	EPA 8081B/608	EPA 8081B
Dimethoate	EPA 8141B	EPA 8141B
Dinoseb (2-sec-buty1-4 ,6-dinilrophenol, DNB P)	EPA 8151A/615	EPA 8151A
Disulfoton	EPA 8141B	EPA 8141B
Endosulfan I	EPA 8081B/608	EPA 8081B
Endosulfan II	EPA 8081B/608	EPA 8081B
Endosulfan sulfate	EPA 8081B/608	EPA 8081B
Endrin	EPA 8081B/608	EPA 8081B
Endrin aldehyde	EPA 8081B/608	EPA 8081B
Endrin ketone	EPA 8081B/608	EPA 8081B
EPN	EPA 8141B	EPA 8141B
Ethion	EPA 8141B	EPA 8141B
Ethoprop	EPA 8141B	EPA 8141B
fensulfothion	EPA 8141B	EPA 8141B
fenthion	EPA 8141B	EPA 8141B
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	EPA 8081B/608	EPA 8081B
gamma-Chlordane	EPA 8081B/608	EPA 8081B
Heptachlor	EPA 8081B/608	EPA 8081B
Heptachlor epoxide	EPA 8081B/608	EPA 8081B
Isodrin	EPA 8081B/608	EPA 8081B
Malathion	EPA 8141B	EPA 8141B
MCPA	EPA 8151A/615	EPA 8151A
MCPP	EPA 8151A/615	EPA 8151A
Merphos	EPA 8141B	EPA 8141B
Methoxychlor	EPA 8081B/608	EPA 8081B
Methyl parathion (Parathion. methyl)	EPA 8141B	EPA 8141B
Mevinphos	EPA 8141B	EPA 8141B
Mirex	EPA 8081B/608	EPA 8081B
Monocrotophos	EPA 8141B	EPA 8141B
Naled	EPA 8141B	EPA 8141B
Parathion, ethyl	EPA 8141B	EPA 8141B
Pentachlorophenol	EPA 8151A/615	EPA 8151A
Phorate	EPA 8141B	EPA 8141B
Picloram	EPA 8151A/615	EPA 8151A
Ronnel	EPA 8141B	EPA 8141B
Silvex (2A.5-TP)	EPA 8151B/615	EPA 8151B
Stirofos	EPA 8141B	EPA 8141B

Analyte / Parameter	Non-Potable Water	Solid Hazardous Waste
Pesticides-Herbicides-PCBs		
Sulfotepp	EPA 8141B	EPA 8141B
Tetraethyl pyrophosphate (TEPP)	EPA 8141B	EPA 8141B
Tokuthion (Prothiophos)	EPA 8141B	EPA 8141B
Toxaphene (Chlorinated camphene)	EPA 8081B/608	EPA 8081B
Trichloronate	EPA 8141B	EPA 8141B

Preparation Methods

Fraction	Analytical Method	Preparation Method
Cyanide	EPA 9014 EPA 335.2 /SM 4500-CN E	EPA 9010C
TX	EPA 9056A	EPA 5050
Metal water prep	EPA 6020A/200.8	EPA 3005A
Metals soil prep	EPA 6020A	EPA 3050B
Metals TCLP prep	EPA 6020A/200.8	EPA 3010A
Extractable organics and Pesticides water prep	EPA 8270D/625/8081B/8082A/ 608/ 8141B	EPA 3510C
Extractable organics and Pesticides waste prep	EPA 8270D/625/8081B/8082A/ 608/ 8141B	EPA 3580A
Extractable organics and Pesticides soil prep	EPA 8270D/625/8081B/8082A/ 608/ 8141B	EPA 3550C
Organics water and mid-level soil prep	EPA 8260B/624	EPA 5030B
Organics low-level soil prep	EPA 8260B/624	EPA 5035
Soil/water leachate	Wets	ENCO WETS-88
SPLP	Wets, Organics, and Metals	EPA 1312
TCLP	Wets, Organics, and Metals	EPA 1311

The American Association for Laboratory Accreditation

World Class Accreditation

Accredited DoD ELAP Laboratory

A2LA has accredited

ENVIRONMENTAL CONSERVATION LABORATORIES - ORLANDO

Orlando, FL

for technical competence in the field of

Environmental Testing

In recognition of the successful completion of the A2LA evaluation process that includes an assessment of the laboratory's compliance with ISO/IEC 17025:2005, the 2003 NELAC Chapter 5 Standard, and the requirements of the Department of Defense Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in version 4.2 of the DoD Quality System Manual for Environmental Laboratories (QSM); accreditation is granted to this laboratory to perform recognized EPA methods as defined on the associated A2LA Environmental Scope of Accreditation. This accreditation demonstrates technical competence for this defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION
CORPORATE SEAL 1978
DISTRICT OF COLUMBIA
A2LA

Presented this 29th day of May 2012.

President & CEO
For the Accreditation Council
Certificate Number 3000.01
Valid to March 31, 2014

For the tests or types of tests to which this accreditation applies, please refer to the laboratory's Environmental Scope of Accreditation.