

**RESOURCE CONSERVATION AND RECOVERY ACT
ANNUAL SAMPLING EVENT WORK PLAN
FOR
SOLID WASTE MANAGEMENT UNITS 3, 9, 10
AND AREA OF CONCERN 1**

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**NAVAL SUPPORT ACTIVITY PANAMA CITY
PANAMA CITY, FLORIDA**

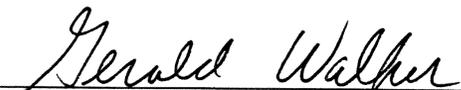
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**Resource Conservation and
Recovery Act
Annual Sampling Event Work Plan
for
Solid Waste Management Units 3, 9,
10 and Area of Concern 1

Naval Support Activity Panama City
Panama City, Florida**



**Southern Division
Naval Facilities Engineering Command
Contract Number N62467-94-D-0888
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LIST OF ACRONYMS AND ABBREVIATIONS

ABB-ES	ABB Environmental Services, Inc.
AOCs	Areas of Concern
BEHP	Bis(2-ethylhexyl)phthalate
°C	Degree Celsius
CAO	Corrective Action Objectives
Cl	Chloride
CLP	Contract Laboratory Procedure
CMS	Corrective Measures Study
CO ₂	Carbon Dioxide
COC	Contaminant of Concern
DPT	Direct-Push Technology
Eh	Oxidation Reduction Potential of Groundwater
FDEP	Florida Department of Environmental Protection
FL-PRO	Florida Petroleum Range Organics
ft	Foot or Feet
H ₂ S	Hydrogen Sulfide
H ₂ SO ₄	Sulfuric Acid
HCL	Hydrochloric Acid
HNO ₃	Nitric Acid
LNAPL	Light Non-Aqueous Phase Liquid
mg/L	Milligram per Liter
mL	Milliliter
MNA	Monitored Natural Attenuation
MS/MSD	Matrix Spike/Matrix Spike Duplicate
mV	Millivolt
µg/L	Microgram per Liter
NAVFAC EFD SOUTH	Southern Division, Naval Facilities Engineering Command
NSA	Naval Support Activity
O ₂	Oxygen
ORP	Oxidation/Reduction Potential
PAH	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
RCRA	Resource Conservation Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation

SIM	Select Ion Monitoring
SOP	Standard Operating Procedure
SVOC	Semivolatile Organic Compound
SWMU	Solid Waste Management Unit
TAL	Target Analyte List
TCL	Target Compound List
TOC	Total Organic Carbon
TPHWG	Total Petroleum Hydrocarbon Working Group
TRPH	Total Recoverable Petroleum Hydrocarbon
TtNUS	Tetra Tech NUS, Inc.
USEPA	United States Environmental Protection Agency
VOA	Volatile Organic Aromatic
VOC	Volatile Organic Compound

1.0 INTRODUCTION

1.1 INTRODUCTION

Tetra Tech NUS, Inc. (TtNUS), has been contracted by the Department of the Navy, Southern Division, Naval Facilities Engineering Command (NAVFAC EFD SOUTH) to complete an Annual Sampling Event Work Plan detailing the sampling and analytical methods used in the proposed sampling event. The purpose of the Annual Sampling Event is to determine the current nature and extent of contamination and compare the current data to previous data for solid waste management units (SWMUs) and areas of concern (AOCs) at Naval Support Activity (NSA) Panama City, in Panama City, Florida. Prior to October 1, 2003, NSA Panama City was designated as Coastal Systems Station Panama City. The Annual Sampling Event is being conducted under contract number N62467-94-D-0888.

A Resource Conservation and Recovery Act (RCRA) facility assessment (RFA) was conducted at NSA Panama City for the United States Environmental Protection Agency (USEPA) Region IV in 1987 (E.C. Jordan Co., 1987). The RFA identified 12 SWMUs and three AOCs. These SWMUs and AOCs were included in the original Hazardous and Solid Waste Amendments permit. Four of these SWMUs and one AOC were determined to require no further action. The remaining eight SWMUs and two AOCs were determined to require further evaluation through completion of an RCRA Facility Investigation (RFI).

The eight SWMUs and two AOCs were investigated during the Phase 1 RFI conducted in 1991 and 1992. A third AOC, Building 455, was added to the Phase 2 RFI field investigation conducted in 1993 and 1994. Descriptions and histories of the SWMUs and AOCs were presented in the RFI [ABB Environmental Services, Inc. (ABB-ES), 1996]. The RFI recommended three SWMUs and one AOC for a Corrective Measures Study (CMS). These SWMUs and AOC are depicted on Figure 1-1 and include the following:

SWMU 3	Landfill C, Burn and Disposal Area
SWMU 9	Firefighting Training Area No. 2
SWMU 10	Site 363, Oil-Water Separator
AOC 1	Firefighting Training Area No. 1

The CMS was completed by ABB-ES in April 1997 and identified corrective action objectives (CAO), media of concern, and corrective action alternatives to address the CAOs. The corrective action alternatives were evaluated based on specific criteria and as a result, one corrective action for each media was recommended for implementation.

Figure1-1

In 2001, TtNUS in conjunction with NAVFAC EFD SOUTH completed an RFI Addendum field event. The RFI Addendum Work Plan (TtNUS, 2001) included for each SWMU and AOC a Hydrogeologic Conceptual Model (vertical cross section) showing estimated groundwater flow paths and contaminant plume definition. Groundwater, sediment, and subsurface soil samples were collected and analyzed for Contaminants of Concern (COCs). In October 2002, NAVFAC EFD SOUTH published the draft RFI Addendum for AOC 1, and SWMUs 3, 9 and 10, NSA Panama City, Panama City, Florida. The draft report summarizes the contaminant concentrations since completion of the corrective actions at the facility, findings for the additional investigation, and made recommendations for each of the AOC and SWMUs.

In April and May 2003, TtNUS completed additional sample collection and field investigation at AOC 1 and SWMUs 3, 9, and 10 at NSA Panama City. The investigation included soil and groundwater sampling and water level measurements at the AOCs and SWMUs. The results of the investigation are summarized in Annual Groundwater Sampling Report.

The purpose of this plan is to outline actions and procedures for sampling events to determine current conditions at the Facility. Previously, corrective actions have been implemented at the sites to address contaminated soils and the presence of free-product. The status of these actions is described briefly in this report. This Annual Sampling Event Work Plan consists of sampling groundwater and subsurface soil to evaluate the nature and extent of contamination at SWMU 3, SWMU 9, SWMU 10, and AOC 1.

This Work Plan consists of five sections, as follows:

- Section 1.0, Introduction.
- Section 2.0, Sampling and Analysis Plans, outlines the sampling and analysis requirements and data evaluation requirements for each of the individual SWMUs and AOCs.
- Section 3.0, Field Operations, describes the field operations to be completed to determine the current condition of groundwater and/or soils.
- Section 4.0, Annual Sampling Event Report, describes the format and items to be included in the documents for the project.
- Appendix A provides a Site-Specific Health and Safety Plan.

2.0 SAMPLING AND ANALYSIS PLANS

2.1 OVERVIEW

The primary objectives of these sampling activities are to determine the current conditions of groundwater and/or soils and compare current conditions to historic concentrations at the four sites at NSA Panama City. Data collected under these sampling programs will be used to supplement the existing data, update the Hydrogeologic Conceptual Model, and evaluate the appropriateness of the Remedial Conceptual Model presented in the RFI Addendum Work Plan (TtNUS, 2001). Since it is expected that Monitored Natural Attenuation (MNA) will play a role in site remediation, the sampling and analysis outlined below includes parameters to address the lines of evidence for MNA.

2.2 SWMU 3

2.2.1 Sampling and Analysis Plan

Groundwater Sampling Plan

Groundwater sampling of the existing monitoring wells at SWMU 3 will allow the detection of COCs and assist in the assessment of current conditions. Groundwater samples will be collected from the four SWMU 3 monitoring wells including PCY-3-2, PCY-3-3S, PCY-3-4S, and PCY-3-5S. In addition, AOC 1 monitoring well PCY-13-18S will be sampled and evaluated as part of the SWMU 3 network due to its proximity to SWMU 3. The monitoring well locations are shown on Figure 2-1.

The groundwater samples will be analyzed for compounds defined by the Contract Laboratory Program (CLP) as the Target Compound List (TCL) volatile organic compounds (VOCs) using SW-846 8260B; TCL semivolatile organic compounds (SVOCs) using SW-846 8270C; polynuclear aromatic hydrocarbons (PAHs) using SW-846 8310, TCL pesticides/polychlorinated biphenyls (PCBs) using SW-846 8081/8082; Target Analyte List (TAL) metals using SW-846 6010B, 9010, and 7471. Groundwater samples will be collected in accordance with Florida Department of Environmental Protection's (FDEP's) Standard Operating Procedures (SOPs) and the groundwater piezometric head will be measured in each monitoring well.

The list of analyses for each groundwater sample is provided in Table 2-1. Measurements of these parameters will assist in evaluating the overall conditions within the aquifer, and the migration of contaminants.

Figure 2-1

TABLE 2-1
SUMMARY OF GROUNDWATER ANALYTICAL REQUIREMENTS
SOLID WASTE MANAGEMENT UNIT 3
RCRA ANNUAL SAMPLING EVENT WORK PLAN
NSA PANAMA CITY, PANAMA CITY, FLORIDA

Analysis	Analytical Method	Sample Volume ⁽¹⁾	Bottleware	Preservation	Holding Time ⁽²⁾
CLP TCL VOCs	SW-846 8260B	3 x 40 mL	Glass, plastic screw cap, Teflon-lined;	Cool to 4°C, HCl to pH<2	14 days from sampling to analysis
CLP TCL SVOCs/PAHs	SW-846 8270C/8310 or 8270 SIM	2 x 1 Liter	Amber glass, Teflon-lined cap;	cool to 4°C	7 days to extraction; 40 days from extraction to analysis
CLP TCL Pesticides/PCBs	SW-846 8081A/8082	2 x 1 Liter	Amber, glass; Teflon-lined cap	Cool to 4°C; dark	7 days to extraction; 40 days from extraction to analysis
CLP TAL Inorganics	SW-846 6010B, 9010, and 7471	1 Liter	Polyethene, plastic cap, plastic liner	Cool to 4°C; dark HNO ₃ to pH<2	Within 180 days

NOTES:

- 1 Sample volume may vary based on laboratory requirements.
- 2 Holding times are measured from the date/time of sample collection.

mL = milliliter
SIM = Select Ion Monitoring
°C = Degree Celsius
HCl = Hydrochloric Acid
HNO₃ = Nitric acid

Sediment Sampling Plan

In addition, sediment samples will be collected at SWMU 3 in support of an Ecological Risk Assessment as scoped during the September 10, 2003, NSA Panama City Partnering Team Meeting. A total of six sediment samples will be collected and analyzed for Aroclor (SW-846 8082), Grain Size (American Society of Testing Materials Method D422), and Total Organic Carbon (TOC) (USEPA 415.1). The list of analyses for each sediment sample is located on Table 2-2. All samples will be collected in accordance with the FDEP's SOPs. In the event that FDEP's SOPs do not address a specific task, TtNUS will defer to the internal TtNUS SOPs.

The sediment sample collection methodology for SWMU 3 will include a composite sample comprised of five aliquots collected over a 3 foot (ft) radius at the location of the former aroclor exceedance. Following the initial sample collection, three additional grab samples will be collected stepped out 5 ft from the outer radius of the previous composite sample. Two additional samples will be collected stepped out an additional 5 ft from the previous step out locations (13 ft radius from center point exceedance location). The sample collection will be biased in the field to target organic and fine sediment areas as opposed to clean well sorted sand materials.

2.3 SWMU 9

2.3.1 Sampling and Analysis Plan

Groundwater Sampling Plan

Groundwater samples will be collected from three existing monitoring wells located at SWMU 9 including PCY-9-3I, PCY-9-4S, and PCY-9-9S. The monitoring well locations are shown on Figure 2-2.

Groundwater samples will be collected from SWMU 9 monitoring wells during two separate monitoring events. The events will be separated by a minimum of three months. Each of the monitoring wells will only be sampled for a single analyte each. Groundwater samples collected from PCY-9-3I will be analyzed for 4-methylphenol using SW-846 8270C, groundwater samples collected from PCY-9-4S will be analyzed for bis(2-ethylhexylphthalate) using SW-846 8270C, and groundwater samples from PCY-9-9S will be analyzed for chloroform using SW-846 8260B. In addition, all groundwater samples will be analyzed for natural attenuation parameters to confirm and/or more accurately measure the rate of natural degradation of contaminants. The list of the analysis for each groundwater sample is provided in Table 2-3. Groundwater samples will be collected in accordance with FDEP's SOPs, and the groundwater piezometric head will be measured in each monitoring well.

Figure 2-2

TABLE 2-2
SUMMARY OF SEDIMENT ANALYTICAL REQUIREMENTS
SOLID WASTE MANAGEMENT UNIT 3
RCRA ANNUAL SAMPLING EVENT WORK PLAN
NSA PANAMA CITY, PANAMA CITY, FLORIDA

Analysis	Analytical Method	Sample Volume⁽¹⁾	Bottleware	Preservation	Holding Time⁽²⁾
Aroclor	SW-846 8082	8oz Jar	Glass, plastic screw cap, Teflon-lined cap;	Cool to 4°C	7 days to extraction; 40 days from extraction to analysis
Total Organic Carbon	USEPA 415.1	8oz Jar	Glass, plastic screw cap, Teflon-lined cap;	H ₂ SO ₄ to pH < 2.0; Cool to 4°C	28 days to analysis
Grain Size	ASTM D422	8oz Jar	Glass, plastic screw cap, Teflon-lined cap;	Cool to 4°C;	Analyze as soon as possible

NOTES:

- 1 Sample volume may vary based on laboratory requirements.
- 2 Holding times are measured from the date/time of sample collection.

oz = ounce
H₂SO₄ = sulfuric acid
°C = degrees Celsius

TABLE 2-3
SUMMARY OF ANALYTICAL REQUIREMENTS
SOLID WASTE MANAGEMENT UNIT 9
RCRA ANNUAL SAMPLING EVENT WORK PLAN
NSA PANAMA CITY, PANAMA CITY, FLORIDA
PAGE 1 of 3

Parameter	Method ¹ / Reference	Data Use	Sample Volume, Container, & Preservation	Field or Fixed-Base Laboratory
Chloroform	SW-846 8260B	Evaluate changes in COC concentrations and plume migration.	Glass, plastic screw cap, Teflon-lined; Cool to 4°C, HCl to pH<2.	Fixed
4-Methylphenol; BEHP	SW-846 8270C	Evaluate changes in COC concentrations and plume migration.	Amber glass, Teflon-lined cap; cool to 4°C.	Fixed
Temperature	Direct-reading thermometer	Biological processes are temperature dependent.	500 mL in glass or plastic container. Analyze immediately.	Field
Dissolved Oxygen	Chemetrics K-7501 or K-7512	Concentrations of less than 1 milligram per liter (mg/L) indicate anaerobic conditions.	Follow test kit instructions. Analyze to nearest 0.2 mg/L.	Field
pH	Direct-reading meter	Biological processes are pH sensitive.	500 mL in glass or plastic container. Analyze immediately.	Field
Specific Conductance	Direct-reading meter	General water quality parameter used to verify that site samples are obtained from the same groundwater system.	500 mL in glass or plastic container. Analyze immediately.	Field
Alkalinity/Dissolved Inorganic Carbon ²	Chemetrics K-9810, K-9815, K-9820	General water quality parameter used to verify that site samples are obtained from the same groundwater system and to measure the buffering capacity of the groundwater by measuring carbonate, bicarbonate, and hydroxide ions.	Follow test kit instructions.	Field
Ferrous Iron (Fe ⁺²)	HACH DR-890 Colorimeter (Method 8146)	Presence of ferrous iron may indicate presence of an anaerobic degradation process due to depletion of oxygen, nitrate, and manganese.	Follow test kit instructions. Analyze to nearest 0.1 mg/L.	Field
Nitrate (NO ₃ ⁻), Nitrite (NO ₂ ⁻)	USEPA 300.0	Substrates for microbial respiration if oxygen is depleted.	500 mL in plastic container. Analyze within 48 hours of collection.	Fixed

TABLE 2-3 Continued

**SUMMARY OF ANALYTICAL REQUIREMENTS
SOLID WASTE MANAGEMENT UNIT 9
RCRA ANNUAL SAMPLING EVENT WORK PLAN
NSA PANAMA CITY, PANAMA CITY, FLORIDA
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Parameter	Method¹/ Reference	Data Use	Sample Volume, Container, & Preservation	Field or Fixed-Base Laboratory
Oxidation/Reduction Potential (ORP)/Eh	Direct Reading Meter	ORP provides information on environmental conditions and to interpret the nature and state of chemical compounds and biological conditions. ORP typically ranges from +200mV in normal aerobic, oxidizing conditions to -400mV in strongly anaerobic, reductive conditions.	500 mL in glass container filling from the bottom. Analyze immediately.	Field
Hydrogen Sulfide (H ₂ S)	HACH test kit HS-C	If groundwater lacks ferrous iron but contains concentrations of sulfate greater than 1 mg/L and hydrogen sulfide greater than 0.05 mg/L, sulfate reduction is the predominant process.	Follow test kit instructions. Analyze to nearest 0.01 mg/L.	Field
Methane (CH ₄), Ethane (C ₂ H ₆), Ethene(C ₂ H ₄)	RSK SOP-147 & 175	Presence of methane indicates biological degradation via an anaerobic pathway utilizing CO ₂ as an electron acceptor. An ORP of less than -200mV could be indicative of methanogenesis. Ethane and ethene are also analyzed to indicate biological degradation of chlorinated VOCs.	40 mL in VOA vial with Teflon lined cap. Cool to 4°C.	Fixed
Carbon Dioxide (CO ₂)	Chemetrics K-1910, K-1920, K-1925	CO ₂ concentrations can be compared with background values, which could indicate an aerobic process for bacterial degradation of petroleum hydrocarbons.	Follow test kit instructions. Analyze immediately.	Field
Chloride (Cl)	USEPA 300.0	By-product of reductive dechlorination of chlorinated VOCs.	250 mL in plastic container. Cool to 4°C.	Fixed
Turbidity	Direct Reading Meter	Confirms low-flow sampling.	Follow instrument instructions. Analyze immediately.	Field
Inorganic Analytes including arsenic, sodium, magnesium, calcium, potassium, and manganese	USEPA SW-846 6010B	Dissolved arsenic and manganese indicate anaerobic microbiological activity in aquifer matrix material. Other analytes are used for charge balancing during major ion analysis.	1 Liter in plastic container. Cool to 4°C; HNO ₃ to pH<2.	Fixed

TABLE 2-3 Continued

**SUMMARY OF ANALYTICAL REQUIREMENTS
SOLID WASTE MANAGEMENT UNIT 9
RCRA ANNUAL SAMPLING EVENT WORK PLAN
NSA PANAMA CITY, PANAMA CITY, FLORIDA
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Parameter	Method ¹ / Reference	Data Use	Sample Volume, Container, & Preservation	Field or Fixed-Base Laboratory
Total Organic Carbon (TOC)	USEPA 415.1	TOC concentrations are used to classify the plume and to determine if reductive de-chlorination is possible in the absence of anthropogenic carbon.	125 mL in glass container. Cool to 4°C; H ₂ SO ₄ to Ph < 2.	Fixed
Sulfate (SO ₄ ⁻²)	USEPA 300.0	Sulfide may be produced by sulfate reduction by sulfate-reducing bacteria.	250 mL in plastic container. Cool to 4°C.	Fixed

NOTES:

¹Laboratory analytical method
VOA = volatile organic aromatic
BEHP = Bis(2-ethylhexyl)phthalate
°C = degrees Celsius
mL = milliliter

²This is a field method
Eh = Oxidation Reduction Potential of Groundwater
mV = millivolt
mg/L = milligrams per liter
HCl = hydrochloric acid

2.4 SWMU 10

2.4.1 Sampling and Analysis Plan

Soil Sampling Plan

Because of concern that soil used in the reconstruction activities following the UST removal at the SWMU 10 may contain elevated concentrations of inorganic materials, TtNUS will sample and analyze representative samples of the backfill material. To complete the work, TtNUS will initially hand auger soil borings within the backfill area and observe lithologic changes in soil composition. The visible observations will be used to delineate the backfilled material area. Once the limits of the backfill material are defined, four subsurface soil samples, representative of the material, will be collected. The samples will be collected in accordance with the FDEP's SOPs and will be analyzed for TAL Metals only. In the event that FDEP's SOPs do not address a specific task, TtNUS will defer to the internal TtNUS SOPs.

Groundwater Sampling Plan

Groundwater sampling of the SWMU 10 monitoring wells will allow the detection of COCs and assist in the assessment of the movement and potential degradation of organic compounds within the aquifer. The data collection and evaluation will help determine whether natural attenuation can be effective in reducing contaminant concentrations to levels below regulatory criteria. Groundwater sampling will be completed as a single event with samples collected from monitoring wells PCY-363-MW-01R, PCY-363-MW-2, PCY-363-MW-3, PCY-363-MW-4R, PCY-363-MW-5DR, PCY-363-MW-6, PCY-363-MW-7, PCY-363-MW-8, and PCY-363-MW-9 (Figure 2-3).

The groundwater samples will be analyzed for CLP TCL VOCs (SW-846 8260B), SVOCs (SW-846 8270C), PAHs (SW-846 8310), total arsenic, cadmium, chromium, and lead (SW-846 6010B). In addition, groundwater samples will be analyzed for natural attenuation parameters to confirm and/or more accurately measure the rate of natural degradation of contaminants. The list of the analysis for each groundwater sample is provided in Table 2-4. Groundwater samples will be collected in accordance with FDEP's SOPs and the groundwater piezometric head will be measured in each monitoring well.

2.5 AOC 1

2.5.1 Sampling and Analysis Plan

Groundwater Sampling Plan

Groundwater sampling of the existing permanent monitoring wells at AOC 1 will assist in the assessment of the movement and potential degradation of organic compounds within the aquifer. The data will help

determine whether natural attenuation can be effective in reducing contaminant concentrations to acceptable levels. Groundwater samples will be collected from existing monitoring wells (Figure 2-4) including PCY-13-2S, PCY-13-2, PCY-13-2D, PCY-13-3, PCY-13-3S, PCY-13-3D, PCY-13-4S, PCY-13-4I, PCY-13-5S, PCY-13-5I, PCY-13-6S, PCY-13-6I, PCY-13-7I, PCY-13-8S, PCY-13-8I, PCY-13-9S, and

Figure 2-3

Figure 2-4

TABLE 2-4

**SUMMARY OF GROUNDWATER ANALYTICAL REQUIREMENTS
SOLID WASTE MANAGEMENT UNIT 10
RCRA ANNUAL SAMPLING EVENT WORK PLAN
NSA PANAMA CITY, PANAMA CITY, FLORIDA
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Parameter	Method¹/ Reference	Data Use	Sample Volume, Container, and Preservation	Field or Fixed-Base Laboratory
TCL VOCs	SW-846 8260B	Evaluate changes in COCs concentrations and plume migration.	Glass, plastic screw cap, Teflon-lined; Cool to 4°C, HCl to pH<2.	Fixed
TCL SVOCs	SW-846 8270C and 8310	Evaluate changes in COCs concentrations and plume migration.	Amber glass, Teflon-lined cap; cool to 4°C.	Fixed
Temperature	Direct-reading thermometer	Biological processes are temperature dependent.	500 mL in glass or plastic container. Analyze immediately.	Field
Dissolved Oxygen	Chemetrics K-7501 or K-7512	Concentrations of less than 1 mg/L indicate anaerobic conditions.	Follow test kit instructions. Analyze to nearest 0.2 mg/L.	Field
Dissolved methane	SW-846 3810	The presence of methane indicates biodegradation by methanogenesis.	50 mL glass container.	Fixed
pH	Direct-reading meter	Biological processes are pH sensitive.	500 mL in glass or plastic container. Analyze immediately.	Field
Specific Conductance	Direct-reading meter	General water quality parameter used to verify that site samples are obtained from the same groundwater system.	500 mL in glass or plastic container. Analyze immediately.	Field
Alkalinity/Dissolved inorganic carbon ²	Chemetrics K-9810, K-9815, K-9820	General water quality parameter used to verify that site samples are obtained from the same groundwater system and to measure the buffering capacity of the groundwater by measuring carbonate, bicarbonate, and hydroxide ions.	Follow test kit instructions.	Field
Ferrous Iron (Fe ⁺²)	HACH DR-890 Colorimeter	Presence of ferrous iron may indicate presence of an anaerobic degradation process due to depletion of oxygen, nitrate, and manganese.	Follow test kit instructions. Analyze to nearest 0.1 mg/L.	Field
Nitrate (NO ₃ ⁻), Nitrite (NO ₂ ⁻)	USEPA 300.0	Substrates for microbial respiration if oxygen is depleted.	500 mL in plastic container. Analyze within 48 hours of collection.	Fixed

TABLE 2-4 Continued

**SUMMARY OF GROUNDWATER ANALYTICAL REQUIREMENTS
SOLID WASTE MANAGEMENT UNIT 10
RCRA ANNUAL SAMPLING EVENT WORK PLAN
NSA PANAMA CITY, PANAMA CITY, FLORIDA
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Parameter	Method ¹ / Reference	Data Use	Sample Volume, Container, and Preservation	Field or Fixed-Base Laboratory
ORP/Eh	Direct Reading Meter	ORP typically ranges from +200mV in normal aerobic, oxidizing conditions to -400mV in strongly anaerobic, reductive conditions.	500 mL in glass container filling from the bottom. Analyze immediately.	Field
Hydrogen Sulfide (H ₂ S)	HACH test kit HS-C	If groundwater lacks ferrous iron but contains concentrations of sulfate greater than 1 mg/L and hydrogen sulfide greater than 0.05 mg/L, sulfate reduction is the predominant process.	Follow test kit instructions. Analyze to nearest 0.01 mg/L.	Field
Methane (CH ₄), Ethane (C ₂ H ₆), Ethene(C ₂ H ₄)	RSK SOP-147 and 175	Presence of methane indicates biological degradation via an anaerobic pathway utilizing CO ₂ as an electron acceptor. An ORP of less than -200mV could be indicative of methanogenesis. Ethane and ethene are also analyzed to indicate biological degradation of chlorinated VOCs.	40 mL in VOA vial with Teflon lined cap. Cool to 4°C.	Fixed
CO ₂	Chemetrics K-1910, K-1920, K-1925	CO ₂ concentrations can be compared with background values to determine whether or not they are elevated, which could indicate an aerobic process for bacterial degradation of petroleum hydrocarbons.	Follow test kit instructions. Analyze immediately.	Field
Cl	USEPA 300.0	Byproduct of reductive dechlorination of chlorinated VOCs.	250 mL in plastic container. Cool to 4°C.	Fixed
Turbidity	Direct Reading Meter	Confirms low-flow sampling.	Follow instrument instructions. Analyze immediately.	Field
Inorganic Analytes including arsenic, sodium, magnesium, calcium, potassium, and manganese	SW-846 6010B	Dissolved arsenic and manganese indicate anaerobic microbiological activity in aquifer matrix material. Other analytes are used for charge balancing during major ion analysis.	1 Liter in plastic container. Cool to 4°C; HNO ₃ to pH < 2.	Fixed

TABLE 2-4 Continued

**SUMMARY OF GROUNDWATER ANALYTICAL REQUIREMENTS
SOLID WASTE MANAGEMENT UNIT 10
RCRA ANNUAL SAMPLING EVENT WORK PLAN
NSA PANAMA CITY, PANAMA CITY, FLORIDA
PAGE 3 of 3**

Parameter	Method ¹ / Reference	Data Use	Sample Volume, Container, and Preservation	Field or Fixed-Base Laboratory
TOC	USEPA 415.1	TOC concentrations are used to classify the plume and to determine if reductive dechlorination is possible in the absence of anthropogenic carbon.	125 mL in glass container. Cool to 4°C; H ₂ SO ₄ to pH < 2.	Fixed
Sulfate (SO ₄ ⁻²)	USEPA 300.0	Sulfide may be produced by sulfate reduction by sulfate-reducing bacteria.	250 mL in plastic container. Cool to 4°C.	Fixed

NOTES:

¹ Laboratory analytical method	² This is a field method
VOA = volatile organic aromatic	TOC = Total Organic Carbon
Eh = Oxidation Reduction Potential of Groundwater	
BEHP = Bis(2-ethylhexyl)phthalate	mV = millivolt
°C = degrees Celsius	mg/L = milligrams per liter
mL = milliliter	HCl = hydrochloric acid

PCY-13-9I, PCY-13-11S, PCY-13-11I, PCY-13-12I, PCY-13-13S, PCY-13-13I, PCY-13-14I, PCY-13-15S, PCY-13-15I, PCY-13-16S, PCY-13-16I, PCY-13-16D, PCY-13-17S, PCY-13-17I, PCY-13-17D, PCY-13-18S, PCY-13-18I, and PCY-13-18D.

The groundwater samples from the permanent monitoring wells will be analyzed for CLP TCL VOCs and SVOCs (SW-846 8260B and 8270C/ 8310 analysis, respectively). In addition, samples will be analyzed for biological parameters to confirm and/or more accurately measure the rate of natural degradation of contaminants. The list of the analysis for each groundwater sample is provided in Table 2-6. Groundwater samples will be collected in accordance with FDEP's SOPs, and the groundwater piezometric head will be measured in each monitoring well.

Soil Sampling Plan

AOC 1 is a former firefighting training area utilized from the mid 1950s until the late 1970s when the new facility on Gull Circle (SWMU 9) was constructed. The AOC was graded and paved in 1978 and is currently a fenced and paved open storage area. A bioslurping system was installed to recover free product and removed over 3,800 gallons of product by July 30, 1998. The system was initially shut down in October, 1999 because recovery had essentially ceased following removal of 5,374 gallons of free product. Drought conditions over time lowered the water table, releasing non-aqueous phase liquid that had been trapped below the water table and free-product recovery using hand bailing had dramatically increased. In November 2000, the bioslurping system was turned back on and remained operational until shortly before the RFI Addendum field work began, at which time the system was dismantled. AOC 1 groundwater has been sampled annually since the RFI addendum; however, no subsurface soil samples have been collected since the remedial system shut-down. Subsurface soil sampling at AOC 1 is proposed to determine the current nature and extent of soil contamination using a direct-push technology (DPT) soil-sampling device (e.g., Geoprobe[®] system).

The DPT sampler will be used to collect samples from discrete intervals above the zone of groundwater saturation. The sampling grid will initially be set-up on 25 ft centers and will be centered on monitoring well PCY-13-MW-3S, which currently has a measurable amount of free-product. The proposed DPT subsurface soil investigation area is shown on Figure 2-5. Based on mobile laboratory results, grid spacing and the number of samples collected and analyzed may change in order to delineate the extent of contamination. It is estimated that five days of fieldwork and up to 33 individual DPT soil borings will be completed. Subsurface soil samples will be field screened for benzene, toluene, ethylbenzene and total xylene and chlorinated solvents using a mobile laboratory. Based on the soil screening results, ten (10) subsurface soil samples covering a range of soil screening responses will be selected for fixed-base laboratory analysis.

Figure 2-5

Soil samples sent to the fixed-base laboratory will be analyzed for FDEP's used oil analytical group (Table C Chapter 62-770, Florida Administrative Code) including Priority Pollutant Volatile Organics (SW-846 8260B analysis) and Extractable Organics (SW-846 8270C and 8310 analysis); Non-priority Pollutant Organics (Tentatively Identified Compounds with gas chromatograph peaks greater than 10 micrograms per liter); and total arsenic, cadmium, chromium, and lead (SW-846 6010B analysis). In addition, soil samples will be collected for analysis of long chain petroleum hydrocarbons using the Total Petroleum Hydrocarbon Working Group (TPHWG) method. Additional soil sample volume will be collected during the field event and extracted at the laboratory. If the FL-PRO analysis indicates exceedances of the default TRPH soil cleanup target level (340 milligrams per kilogram), the TPHWG Method will be run on the additional sample extract.

Three soil samples will also be collected from the soil locations with the highest mobile laboratory analytical results and analyzed for synthetic precipitant leaching procedure. The three samples will initially be extracted at the laboratory, then held until the analytical results for the total analysis are known. Based on the results of the total analysis, the extract will only be analyzed for those compounds that exceed FDEP's leachability screening criteria. The soil samples for laboratory analysis will be collected in accordance with FDEP SOPs. The laboratory analytical methods are specified in Table 2-5.

TABLE 2-5
SUMMARY OF SOIL ANALYTICAL REQUIREMENTS
AREA OF CONCERN 1
RCRA ANNUAL SAMPLING EVENT WORK PLAN
NSA PANAMA CITY, PANAMA CITY, FLORIDA
PAGE 1 of 1

Analysis	Analytical Method	Bottleware	Preservation ⁽²⁾	Holding Time ⁽³⁾
<u>SOILS; FIXED-BASE LABORATORY</u>				
Priority Pollutant Volatile Organics (plus Tentatively Identified Compounds)	SW846 8260B	3 encores and 4 oz. jar	Cool to 4°C; dark	48 hours to extraction; 14 days from extraction to analysis
Priority Pollutant Extractable Organics (plus Tentatively Identified Compounds)	SW846 8270C and 8310	8 oz. jar	Cool to 4°C; dark	7 days to extraction; 40 days from extraction to analysis
TRPH	FL-PRO	8 oz. jar	Cool to 4°C; dark	7 days to extraction; 40 days from extraction to analysis
Inorganic Analytes	SW-846 6010B	8 oz. jar	Cool to 4°C; dark	Within 180 days
Long Chain Petroleum Hydrocarbons	Total Petroleum Criteria Working Group Method (TPCWG)	8 oz. jar	Cool to 4°C; dark	7 days to extraction; 40 days from extraction to analysis

NOTES:

- 1 Sample volume may vary based on laboratory requirements.
- 2 Holding times are measured from the date/time of sample collection.
oz = ounce
°C = degrees Celsius

TABLE 2-6
SUMMARY OF GROUNDWATER ANALYTICAL REQUIREMENTS
AREA OF CONCERN 1
RCRA ANNUAL SAMPLING EVENT WORK PLAN
NSA PANAMA CITY, PANAMA CITY, FLORIDA
PAGE 1 of 3

Parameter	Method ¹ / Reference	Data Use	Sample Volume, Container, and Preservation	Field or Fixed-Base Laboratory
TCL VOCs	SW846 8260B	Evaluate changes in COC concentrations and plume migration.	Glass, plastic screw cap, Teflon-lined; Cool to 6°C, HCl to pH<2.	Fixed
TCL SVOCs	SW846 8270C and 8310	Evaluate changes in COC concentrations and plume migration.	Amber glass, Teflon-lined cap; cool to 6°C.	Fixed
Temperature	Direct-reading thermometer	Biological processes are temperature dependent.	500 mL in glass or plastic container. Analyze immediately.	Field
Dissolved Oxygen	Chemetrics K-7501 or K-7512	Concentration of less than 1 mg/L indicate anaerobic conditions.	Follow test kit instructions. Analyze to nearest 0.2 mg/L.	Field
pH	Direct-reading meter	Biological processes are pH sensitive.	500 mL in glass or plastic container. Analyze immediately.	Field
Specific Conductance	Direct-reading meter	General water quality parameter used to verify that site samples are obtained from the same groundwater system.	500 mL in glass or plastic container. Analyze immediately.	Field
Alkalinity/Dissolved inorganic carbon ²	HACH AL-DT (Method 8203)	General water quality parameter used to verify that site samples are obtained from the same groundwater system and to measure the buffering capacity of the groundwater by measuring carbonate, bicarbonate, and hydroxide ions.	Follow test kit instructions.	Field
Ferrous Iron (Fe ⁺²)	HACH DR-850 Colorimeter (Method 8146)	Presence of ferrous iron may indicate presence of an anaerobic degradation process due to depletion of oxygen, nitrate, and manganese.	Follow test kit instructions. Analyze to nearest 0.1 mg/L.	Field
Nitrate (NO ₃ ⁻), Nitrite (NO ₂ ⁻)	USEPA 300.0	Substrates for microbial respiration if oxygen is depleted.	500 mL in plastic container. Cool to 6°C.	Fixed

TABLE 2-6 Continued

**SUMMARY OF GROUNDWATER ANALYTICAL REQUIREMENTS
AREA OF CONCERN 1
RCRA ANNUAL SAMPLING EVENT WORK PLAN
NSA PANAMA CITY, PANAMA CITY, FLORIDA
PAGE 2 of 3**

Parameter	Method ¹ / Reference	Data Use	Sample Volume, Container, and Preservation	Field or Fixed-Base Laboratory
Oxidation/Reduction Potential (ORP)/Eh	Direct Reading Meter	ORP typically ranges from +200mV in normal aerobic, oxidizing conditions to -400mV in strongly anaerobic, reductive conditions.	500 mL in glass container filling from the bottom. Analyze immediately.	Field
Hydrogen Sulfide (H ₂ S)	HACH test kit HS-C	If groundwater lacks ferrous iron but contains concentrations of sulfate greater than 1 mg/L and hydrogen sulfide greater than 0.05 mg/L, sulfate reduction is the predominant process.	Follow test kit instructions. Analyze to nearest 0.01 mg/L.	Field
Methane (CH ₄), Ethane (C ₂ H ₆), Ethene(C ₂ H ₄)	RSK SOP-147 and 175	Presence of methane indicates biological degradation via an anaerobic pathway utilizing CO ₂ as an electron acceptor. An ORP of less than -200mV could be indicative of methanogenesis. Ethane and ethene are also analyzed to indicate biological degradation of chlorinated VOCs.	40 mL in VOA vial with Teflon lined cap. Cool to 6°C.	Fixed
CO ₂	HACH test kit CA-DT (Method 8205)	CO ₂ concentrations can be compared with background values to determine whether or not they are elevated, which could indicate an aerobic process for bacterial degradation of petroleum hydrocarbons.	Follow test kit instructions. Analyze immediately.	Field
Cl	USEPA 300	Byproduct of reductive dechlorination of chlorinated VOCs.	250 mL in plastic container. Cool to 6°C.	Fixed
Turbidity	Direct Meter Reading	Confirms low-flow sampling.	Follow instrument instructions. Analyze immediately.	Field
Inorganic Analytes including arsenic, sodium, magnesium, calcium, potassium, and manganese	SW-846 6010B	Dissolved arsenic and manganese indicate anaerobic microbiological activity in aquifer matrix material. Other analytes are used for charge balancing during major ion analysis.	1 Liter in plastic container. Cool to 6°C; HNO ₃ to pH < 2.	Fixed

TABLE 2-6 Continued

**SUMMARY OF GROUNDWATER ANALYTICAL REQUIREMENTS
AREA OF CONCERN 1
RCRA ANNUAL SAMPLING EVENT WORK PLAN
NSA PANAMA CITY, PANAMA CITY, FLORIDA
PAGE 3 of 3**

Parameter	Method ¹ / Reference	Data Use	Sample Volume, Container, and Preservation	Field or Fixed-Base Laboratory
TOC	USEPA 415.1	TOC concentrations are used to classify the plume and to determine if reductive dechlorination is possible in the absence of anthropogenic carbon.	125 mL in plastic container. Cool to 6°C; H ₂ SO ₄ to pH < 2.	Fixed
Sulfate (SO ₄ ⁻²)	USEPA 300.0	Sulfide may be produced by sulfate reduction by sulfate-reducing bacteria.	250 mL in plastic container. Cool to 6°C.	Fixed

NOTES:

¹ Laboratory analytical method	² This is a field method
VOA = volatile organic aromatic	TOC = Total Organic Carbon
Eh = Oxidation Reduction Potential of Groundwater	
BEHP = Bis(2-ethylhexyl)phthalate	mV = millivolt
°C = degrees Celsius	mg/L = milligrams per liter
mL = milliliter	HCl = hydrochloric acid

3.0 FIELD OPERATIONS

This section describes the procedures for conducting the project-specific field investigation activities to be performed at sites SWMU 3, SWMU 9, SWMU 10, and AOC 1 for the Annual Sampling Event. Field operation activities to be performed include decontamination of equipment, waste handling, DPT soil sampling, groundwater sampling, and water level measurements. The individual activities are described below.

3.1 DECONTAMINATION

Decontamination of major equipment and sampling equipment will be in general accordance with FDEP SOP protocol (DEP-SOP-001/01) (FDEP, 2001) prior to and between the collection of each sample.

3.2 WASTE HANDLING

Limited solid wastes in the form of soil or sediment are expected to be generated during this field program. All solid and liquid wastes generated will be collected in 55-gallon drums and will be handled in accordance with applicable state and federal regulations.

3.3 DIRECT-PUSH SOIL SAMPLING

A DPT soil sampling device (e.g., Geoprobe[®] system) will be used to obtain subsurface soil samples at AOC 1, NSA Panama City. Unlike conventional drilling techniques, DPT probing tools do not create an open borehole into which soil sampling devices are inserted. DPT allows investigators to push a closed sampler to depth, open the sampler, and obtain a discrete soil sample that is relatively undisturbed.

The DPT sampler will be used to collect samples from discrete intervals above the zone of groundwater saturation. The DPT sampler typically has an inner diameter of 1 to 2 inches and recovers a soil core measuring up to 4 ft in length. Liners made of material compatible with the contaminants of interest will be used inside the soil sampler to keep the sample intact after it is extruded. This procedure will reduce the likelihood of cross-contamination or false-positive laboratory results.

The DPT sampler is attached to the leading end of the pushing rods and driven in a closed and sealed position into the subsurface soil using a hydraulic and/or percussion driver. At the top of the desired sampling interval, the pushing is temporarily stopped and an internal release mechanism in the sampler is triggered. After the release is activated, the sampler is again driven downward, collecting soil in the

sample tube as a piston retracts. The probe assembly is then retrieved and the soil sample is removed for examination and collection.

After removal from the sampler barrel, the sample is extracted and placed on a fresh, clean surface. The liner cut open horizontally and the exposed soil is screened with a flame ionization detector (FID). Samples for OVA headspace are then collected and analyzed. Samples selected for mobile laboratory analyses will be immediately placed into laboratory-supplied containers. The samples will be labeled, preserved on ice, and transported to the laboratory. All portions of the probe assembly that are inserted into the ground will be decontaminated before each use using standard decontamination procedures. Equipment rinsate blanks will be collected from the decontaminated sampler at the prescribed frequency.

3.4 GROUNDWATER SAMPLING

Groundwater samples will be collected using low-flow purging (typically a rate of less than 1 liter per minute) and sampling with a peristaltic pump and Teflon[™] tubing dedicated to each well. (DEP-SOP-001/01). All groundwater samples will be collected using the procedures as specified in FDEP SOPs (DEP-SOP-001/01). If light non-aqueous phase liquid (LNAPL) is detected in any monitoring well prior to sampling, a groundwater sample will not be collected at that location.

Prior to groundwater sample collection, the monitoring wells will be purged to remove stagnant water in the well casing. Both purging and sampling operations will be conducted at a flow rate that results in a groundwater turbidity measurement of 20 nephelometric turbidity units or less if possible.

Groundwater samples for analysis other than VOCs will be collected using a vacuum trap apparatus to prevent sample contact with the peristaltic pump and placed in precleaned containers supplied by the contract laboratory. The sample aliquot for VOC analysis will be collected last by slowly pulling the Teflon[™] tubing out of the well to minimize agitation of the water in the monitoring well and the transferring the contents of the tubing to a VOC vial. The samples will then be placed in a cooler, chilled with ice, and shipped under chain-of-custody protocol to the off-site laboratory for analysis.

3.5 WATER LEVEL MEASUREMENTS

One round of water-level measurements will be conducted at each site during each sampling event to provide information regarding groundwater flow patterns and gradients. Water levels will be measured from all accessible monitoring wells at each site. Water-level measurements will be completed within the shortest time possible on the same day and, no sooner than 24 hours after a significant precipitation event, to minimize the precipitation effects on the data sets. The water levels at SWMU 3 and AOC 1 will

be recorded concurrently because of the proximity and interrelationship of the groundwater at the two sites.

Because groundwater table fluctuations occur during tidal cycles and seasonal changes, which may affect the presence or absence of LNAPL in monitoring wells near the edge of a LNAPL plume, these factors will be considered when recording measurements. In conjunction with the groundwater elevation measurements, concurrent tidal information will be obtained.

In monitoring wells with suspected LNAPL, water-level measurements will be made by obtaining a direct reading from an electronic oil-water interface probe. The probe will be used to investigate each well for the presence of LNAPL prior to recording the depth to groundwater measurement. Measurement will be recorded to the nearest 0.01 ft and referenced to the top of casing notch or north side of the well casing. The measurement tape will be properly decontaminated prior to conducting the measurement event and between each monitoring well.

3.6 SAMPLE HANDLING

3.6.1 Sample Containers, Preservation, Holding Times, and Analyses

The sample containers, preservatives holding times, and specific analysis are provided in Tables 2-1, 2-2, 2-3, 2-4, and 2-5.

3.6.2 Sample Documentation, Packaging, and Shipping

Matrix-specific sample logsheets will be maintained for each sample collected. In addition, sample collection information will be recorded in bound field notebooks and the site logbook. Samples will be packaged and shipped according to FDEP SOP protocol (DEP-SOP-001/01).

The bottleware, preservation, and holding time requirements for the analyses proposed for this investigation are provided in Tables 2-1, 2-2, 2-3, 2-4, and 2-5. Pre-preserved, certified-clean bottleware will be supplied by the laboratory subcontractor.

3.7 DATA QUALITY REQUIREMENTS

3.7.1 Laboratory Analyses and Quality Assurance/Quality Control Samples

The analytical methods to be used are presented in Tables 2-1, 2-2, 2-3, 2-4, and 2-5. The analytical data packages should be Naval Energy and Environmental Support Activity Level E (USEPA Level III). The analytical data will receive a full validation.

Rinsate blanks are collected to determine whether the source water or the decontamination process have introduced contaminants to the environmental samples collected. Trip blanks are used to determine if contaminants are introduced in the samples during the sample shipping process. Field duplicates are a single sample split into two portions for a determination of the precision of the sampling and analysis method employed. Table 3-1 describes the frequency of field quality control samples.

TABLE 3-1

**FREQUENCY OF FIELD QUALITY CONTROL SAMPLES
RCRA ANNUAL SAMPLING EVENT WORK PLAN
NSA PANAMA CITY, PANAMA CITY, FLORIDA**

Type Of Samples	Frequency
Rinsate Blank	1 per media per sample event
Trip Blank (VOCs only)	1 per sample shipment
Field Duplicate	1 per 20 samples/matrix
Matrix spike/Matrix spike duplicate (MS/MSD)	1 per 20 samples/matrix

The field sampling team will provide the appropriate additional sample volume as prescribed by the laboratory requirements for laboratory duplicate and matrix spike samples. The additional sample aliquots required for analysis of MS/MSD will be collected with a frequency of 1 per 20 samples per matrix.

3.7.2 Bottleware Requirements

The bottleware, preservation, and holding time requirements for the analyses proposed for this investigation are provided in Table 2-1, 2-2, 2-3, 2-4, and 2-5. Pre-preserved, certified-clean bottleware will be supplied by the laboratory subcontractor.

3.7.3 Data Reduction, Validation, and Reporting

Formal off-site data validation has been included in this work. The data will be evaluated using precision, accuracy, representativeness, completeness, and comparability parameters using the National Validation

Functional Guidelines for Organic Data review, the National Validation Functional Guidelines of Inorganic Analysis, and the TtNUS SOPs.

4.0 RCRA FACILITY INVESTIGATION REPORT

Following the sampling event, an Annual Sampling Event Report will be prepared. This report will describe sampling activities, present sampling analytical results, and evaluate the natural attenuation process. Analytical summary tables and figures including, but not limited to, sample location maps, groundwater flow maps, contaminant concentration maps will be presented as required. The report will summarize the data and provide conclusions and recommendations for future actions, as may be required.

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APPENDIX A

SITE-SPECIFIC HEALTH AND SAFETY PLANS

HEALTH AND SAFETY PLAN
FOR
SITE INVESTIGATION AND SAMPLING AT SOLID WASTE MANAGEMENT UNITS
3, 10 AND AREA OF CONCERN 1

NAVAL SUPPORT ACTIVITY
PANAMA CITY, FLORIDA

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

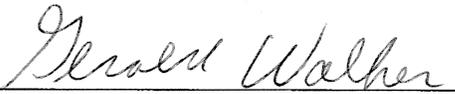
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CONTRACT NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0337

February 2004

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**Health and Safety Plan
for
Site Investigation and Sampling at Solid Waste
Management Units 3, 10, and Area of Concern 1**

**Naval Support Activity
Panama City, Florida**



**Engineering Field Activity Chesapeake
Naval Facilities Engineering Command
Contract Number N62467-94-D-0888
Contract Task Order 0337**

February 2004

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ATTACHMENTS

NUMBER

I	ILLNESS/INJURY PROCEDURE AND REPORT FORM
II	MEDICAL DATA SHEET
III	SAFE WORK PERMITS
IV	UTILITY LOCATING AND EXCAVATION CLEARANCE
V	EQUIPMENT INSPECTION CHECKLIST

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1.0 INTRODUCTION

Authorization: This Health and Safety Plan (HASP) and the work described within are completed under the authorization of:

Contract: Comprehensive long-term Environmental Action Navy (CLEAN III)

Contract Number: N62467-94-D-0888

Contract Task Order: 0337

Statement of Work: Installation of a monitoring well at SWMU 10, groundwater sampling at SWMU 3, 10, and Area of Concern 1, sediment sampling at SWMU 3 wetland at Naval Support Activity Panama City Panama City, Florida.

Proposed Dates of Work: Spring 2004

Application: This Health and Safety Plan (HASP) has been written to encompass site activities that are to be conducted at the Naval Support Activity Panama City Panama City, Florida. Activities to be conducted as per this HASP are defined in detail in Section 4.0.

Compliance: The elements of this HASP are intended to be in compliance with the requirements established by:

- OSHA 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response (HAZWOPER)"
- Applicable sections of 29 CFR 1926 "Safety and Health Regulations for Construction."
- Tetra Tech NUS Health and Safety Program

This Health and Safety Plan (HASP) has been developed to provide health and safety practices and procedures for Tetra Tech NUS (Tetra Tech NUS) and subcontractor personnel to follow while engaged in investigatory activities at the Naval Support Activity in Panama City, Florida. This HASP must be used in conjunction with the Tetra Tech NUS Health and Safety Guidance Manual. Both of these documents must be present at the site during the performance of all site activities. The Guidance Manual provides detailed information pertaining to the HASP as well as applicable Tetra Tech NUS Standard Operating Procedures (Sops). This HASP and the contents of the Guidance Manual were developed to comply with the requirements stipulated in 29 CFR 1910.120 (OSHA's Hazardous Waste Operations and Emergency Response Standard).

This HASP has been developed using the latest available information regarding known or suspected chemical contaminants and potential physical hazards associated with the proposed work at the site. The HASP will be modified if new information becomes available. All changes to the HASP will be made with

the approval of the Tetra Tech NUS Site Safety Officer (SSO) and the Tetra Tech NUS Clean Health and Safety Manager (HSM). Requests for modifications to the HASP will be directed to the SSO who will determine whether to make the changes. The SSO will notify the Task Order Manager (TOM), who will notify all affected personnel of changes.

1.1 KEY PROJECT PERSONNEL AND ORGANIZATION

This section defines responsibility for site safety and health for Tetra Tech NUS and subcontractor employees engaged in onsite activities. Personnel assigned to these positions will exercise the primary responsibility for all onsite health and safety. These persons will be the primary points of contact for any questions regarding the safety and health procedures and the selected control measures that are to be implemented for onsite activities.

- The Tetra Tech NUS TOM is responsible for the overall direction of health and safety for this project.
- The Project Health and Safety Officer (PHSO) is responsible for developing this HASP in accordance with applicable OSHA regulations. Specific responsibilities include:
 - Providing information on site contaminants and physical hazards associated with the site
 - Establishing air monitoring and decontamination procedures
 - Assigning personal protective equipment
 - Determining emergency response procedures and emergency contacts
 - Stipulating training requirements and reviewing appropriate training and medical surveillance certificates
 - Providing standard work practices to minimize potential injuries and exposures associated with hazardous waste work.
- The Tetra Tech NUS Field Operations Leader (FOL) is responsible for implementation of the HASP with the assistance of an appointed SSO. The FOL manages field activities, executes the work plan, and enforces safety procedures as applicable to the work plan.
- The SSO supports site activities by advising the FOL on all aspects of health and safety on-site. These duties may include:
 - Coordinates all health and safety activities with the FOL

- Selects, applies, inspects, and maintains personal protective equipment
 - Establishes work zones and control points
 - Implements air monitoring program for onsite activities
 - Verifies training and medical clearance of onsite personnel status in relation to site activities
 - Implements Hazard Communication and Respiratory Protection Programs
 - Coordinates emergency services.
 - Provides site specific training for all on-site personnel
 - Investigates all accidents and injuries (Attachment I Illness/Injury Forms and Instructions)
-
- Compliance with the requirements stipulated in this HASP is monitored by the SSO and coordinated through the Tetra Tech NUS CLEAN HSM.

 - In some cases one person may be designated responsibilities for more than one position. For example, at NSA Panama City, the FOL will also be responsible for SSO duties.

1.2 SITE INFORMATION AND PERSONNEL ASSIGNMENTS

Site Name: Naval Support Activity **Client Contact:** Arturo McDonald
Panama City, Florida **Phone Number:** (850) 234-4743

Project Team:

Tetra Tech NUS Personnel:

Gerald Walker
TBD
TBD
Matthew M. Soltis, CIH, CSP
Donald J. Westerhoff, CSP

Discipline/Tasks Assigned:

Task Order Manager (TOM)
Field Operations Leader (FOL)
Site Safety Officer (SSO)
CLEAN Health and Safety Manager
Project Health and Safety Officer (PHSO)

Other Potential Tetra Tech NUS Project Personnel:

TBD Field Geologist

Non-Tetra Tech NUS Personnel

TBD
TBD

Affiliation/Discipline/Tasks Assigned

DPT subcontractor(s)
Mobile Laboratory

Other TtNUS personnel:

Tom Patton

Affiliation/Discipline/Tasks Assigned:

Equipment Manager

Hazard Assessments (for purposes of 29 CFR 1910.132) and HASP preparation conducted by:

Donald J. Westerhoff, CSP

2.0 EMERGENCY ACTION PLAN

2.1 INTRODUCTION

This section has been developed as part of a planning effort to direct and guide field personnel in the event of an emergency. All site activities will be coordinated with Base Fire Protection and Emergency Services prior to commencement. In the event of an emergency, which cannot be mitigated using onsite resources, personnel will evacuate to a safe place of refuge and the appropriate emergency response agencies will be notified. It has been determined that the majority of potential emergency situations would be better supported by outside emergency responders. Based on this determination, TtNUS and subcontractor personnel will not provide emergency response support beyond the capabilities and training of onsite personnel. Workers who are ill or who have suffered a non-serious injury may be transported by site personnel to nearby medical facilities, provided that such transport does not aggravate or further endanger the welfare of the injured/ill person. The emergency response agencies listed in this plan are capable of providing the most effective response, and as such, will be designated as the primary responders. These agencies are located within a reasonable distance from the area of site operations, which ensures adequate emergency response time. NSA Panama City security will be notified anytime outside response agencies are contacted. This Emergency Action Plan conforms to the requirements of 29 CFR 1910.38(a), as allowed in 29 CFR 1910.120(l)(1)(ii).

TtNUS will provide the following response measures:

- Incipient stage fire fighting support and prevention
- Incipient spill control and containment measures and prevention
- Removal of personnel from emergency situations
- Initial medical support for injuries or illnesses requiring basic first-aid
- Site control and security measures as necessary

2.2 EMERGENCY PLANNING

Through the initial hazard/risk assessment effort, emergencies resulting from chemical, physical, biological and fire hazards are the types of emergencies that could be encountered during site activities.

To minimize and eliminate the potential for these emergency situations, pre-emergency planning activities will include the following (which are the responsibility of the SSO and/or the FOL):

- Coordinating with local Emergency Response personnel to ensure that TtNUS emergency action activities are compatible with existing emergency response procedures.
- Establishing and maintaining information at the project staging area (support zone) for easy access in the event of an emergency. This information will include the following:
 - Chemical Inventory (used on-site), with Material Safety Data Sheets.
 - On-site personnel medical records (Medical Data Sheets).
 - A logbook identifying personnel on site each day.
 - Hospital route maps with directions (these should also be placed in each site vehicle)

The TtNUS FOL will be responsible for the following tasks:

- Identifying a chain of command for emergency action.
- Educating site workers to the hazards and control measures associated with planned activities at the site, and to provide early recognition and prevention where possible.

2.3 EMERGENCY RECOGNITION AND PREVENTION

2.3.1 Recognition

Foreseeable emergency situations will generally be recognized by visual observation. Visual observation is primarily relevant for physical hazards that may be associated with the proposed scope of work. Visual observation will also play a role in detecting some chemical hazards. To adequately recognize chemical exposures, site personnel must have a clear knowledge of signs and symptoms of exposure associated with site contaminants. This information is provided in Table 6-1 of this HASP. Tasks to be performed at the site, potential hazards associated with those tasks, and the recommended control methods are discussed in detail in Section 5.0 and 6.0. Additionally, early recognition of hazards will be supported by daily site surveys to eliminate any situation predisposed to an emergency. The FOL and the SSO will be responsible for performing surveys. Site surveys will be conducted at all work locations prior to the commitment of resources and personnel. This will be done for the purpose of removing or barricading identified physical hazards. Additionally, site surveys will be conducted at least once a week at all resource/staging areas. All site surveys conducted during this effort will be documented in the Field Operations Logbook.

2.3.2 Prevention

TtNUS and subcontractor personnel will minimize the potential for emergencies by following the Health and Safety Guidance Manual and ensuring compliance with the HASP and applicable OSHA regulations. Daily site surveys will also assist in prevention of illness/injuries when hazards are recognized early and control measures initiated.

2.4 SAFE DISTANCES AND PLACES OF REFUGE

In the event that the site must be evacuated, all personnel will immediately stop activities and report to the designated safe place of refuge. Safe places of refuge will be identified prior to the commencement of site activities and will be conveyed to personnel as part of issuing a Safe Work Permit (SWP) to conduct exclusion zone activities within an identified area. As part of this issuance, a safety meeting will be conducted to discuss hazards and control measures identified on the SWP and through the site survey for that particular area. Whenever possible, the safe place of refuge will also serve as the telephone communications point for that area. During an evacuation, personnel will remain at the refuge location until directed otherwise by the TtNUS FOL or the on-site Incident Commander of the Emergency Response Team. The FOL or the SSO will take a head count at this location to account for and to confirm the location of all site personnel. Emergency response personnel will be immediately notified of any unaccounted personnel.

2.5 EVACUATION ROUTES AND PROCEDURES

An evacuation to the identified refuge location will be initiated whenever the health, safety or welfare of site workers is compromised. Specific examples of conditions that may initiate an evacuation include (but are not limited to) the following: severe weather conditions; a fire or explosion; readings on monitoring instruments indicating levels of contamination that are greater than prescribed action levels; and personnel showing signs or symptoms of overexposure to potential site contaminants. In the event of an evacuation, personnel will proceed immediately to the designated place of refuge unless doing so would further jeopardize the welfare of workers. In such an event, personnel will proceed to a designated alternate location and remain until further notification from the TtNUS FOL.

Evacuation procedures will be discussed prior to the initiation of any work at the site. Evacuation routes from the site and safe places of refuge are dependent upon the location at which work is being performed and the circumstances under which an evacuation is required. Additionally, site location and meteorological conditions (i.e., wind speed and direction) may dictate evacuation routes. As a result,

assembly points will be selected and communicated to the workers relative to the site location where work is being performed.

2.6 DECONTAMINATION PROCEDURES/EMERGENCY MEDICAL TREATMENT

During an evacuation, decontamination procedures will be performed only, if doing so does not further jeopardize the welfare of site workers. However, it is unlikely that an evacuation would occur at this site which would require workers to evacuate the site without first performing decontamination procedures. TtNUS will provide medical treatment to the level of first aid. Personnel requiring treatment greater than first aid will constitute an emergency situation for which the appropriate agency must be notified. First-aid kits will be maintained on-site and shall be accessible to all field personnel during operations as described within this document

2.7 EMERGENCY ALERTING AND RESPONSE PROCEDURES

TtNUS personnel will be working in close proximity to each other at NSA Panama City. As a result, hand signals, voice commands, and line of site communication will be sufficient to alert site personnel of an emergency. When project tasks are performed simultaneously on different sites, vehicle horns will be used to communicate emergency situations.

If an emergency warranting evacuation occurs, the following procedures are to be initiated:

- Initiate the evacuation via hand signals, voice commands, line of site communication, or vehicle horns.
- Report to the designated refuge point.
- Describe to the FOL (FOL will serve as the Incident Commander) pertinent incident details. Once all personnel are evacuated, appropriate response procedures will be enacted to control the situation.

In the event that site personnel cannot mitigate the hazardous situation, the FOL and SSO will enact emergency notification procedures to secure additional assistance in the following manner:

- Dial 911 or call other emergency contacts (Table 2-1) and report the incident. Give the emergency operator the location of the emergency, the type of emergency, the number of injured, and a brief description of the incident. Stay on the phone and follow the instructions given by the operator. The operator will then notify and dispatch the proper emergency response agencies.

2.8 PPE AND EMERGENCY EQUIPMENT

A first aid kit, eye wash units (or bottles of disposable eyewash solution) and fire extinguishers (strategically placed) will be maintained on-site and shall be immediately available for use in the event of an emergency. This equipment will be located in the field office as well as in each site vehicle. First aid will only be administered by personnel holding current certification. At least one first aid kit supplied with equipment to protect against bloodborne pathogens should be available onsite if personnel will administer first aid.

2.9 EMERGENCY CONTACTS

Prior to initiating field activities, all personnel will be thoroughly briefed on the emergency procedures to be followed in the event of an accident. Table 2-1 provides a list of emergency contacts and their associated telephone numbers. This table must be posted where it is readily available to all site personnel. Facility maps should also be posted showing potential evacuation routes and designated meeting areas.

**TABLE 2-1
EMERGENCY CONTACTS
NSA PANAMA CITY, FLORIDA**

CONTACT	PHONE NUMBER
EMERGENCY (Police, Fire, and Ambulance Services)	911
Bay Medical Center (Primary Hospital)	(850) 769-1511
Seawind Medical Center (Alternate Hospital)	(850) 872-9701
Navy Onsite Representative Arturo McDonald	(850) 234-4773
Florida Poison Control Center	(800) 222-1222
Navy EIC Philip McGinnis	(843) 820-5501
Chemtrec National Response Center	(800) 424-9300 (800) 424-8802
TtNUS Office on Base FOL TDB	TBD
TtNUS, Tallahassee Office	(850) 385-9899
TtNUS, Pittsburgh Office	(412) 921-7090
Task Order Manager Gerald Walker	(850) 385-9899
Health and Safety Manager Matthew M. Soltis, CIH, CSP	(412) 921-8912
Project Health and Safety Officer Donald J. Westerhoff, CSP	(412) 921-7281
Utilities Arturo McDonald	(850) 234-4774

2.10 EMERGENCY ROUTE TO HOSPITAL

Directions to Bay Medical Center (Primary)

615 North Bonita Avenue
Panama City, FL 32401
(850) 769-1511

Take right out of NSA Panama City. Go over bridge on US 98. Follow US 98 to Cove Blvd (SR 77). Turn right on Cove and go south to 7th Street. Turn left on 7th. Hospital will be on right.

Directions to Seawind Medical Clinic (Alternate)

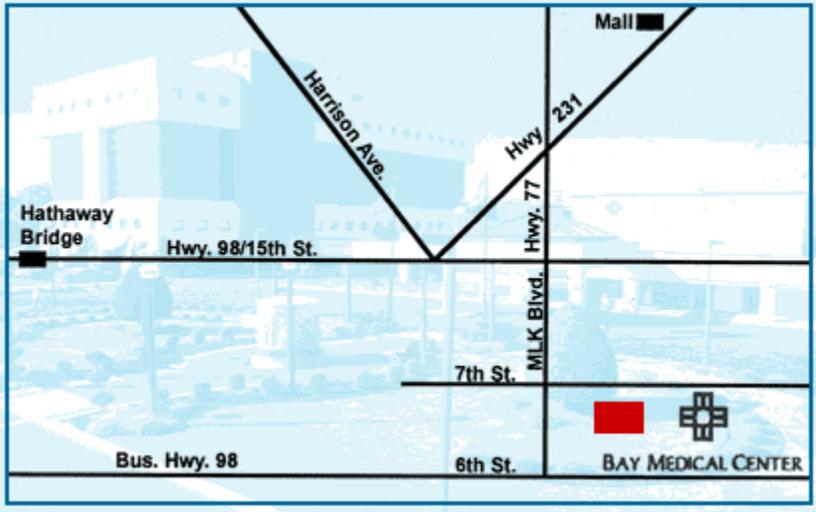
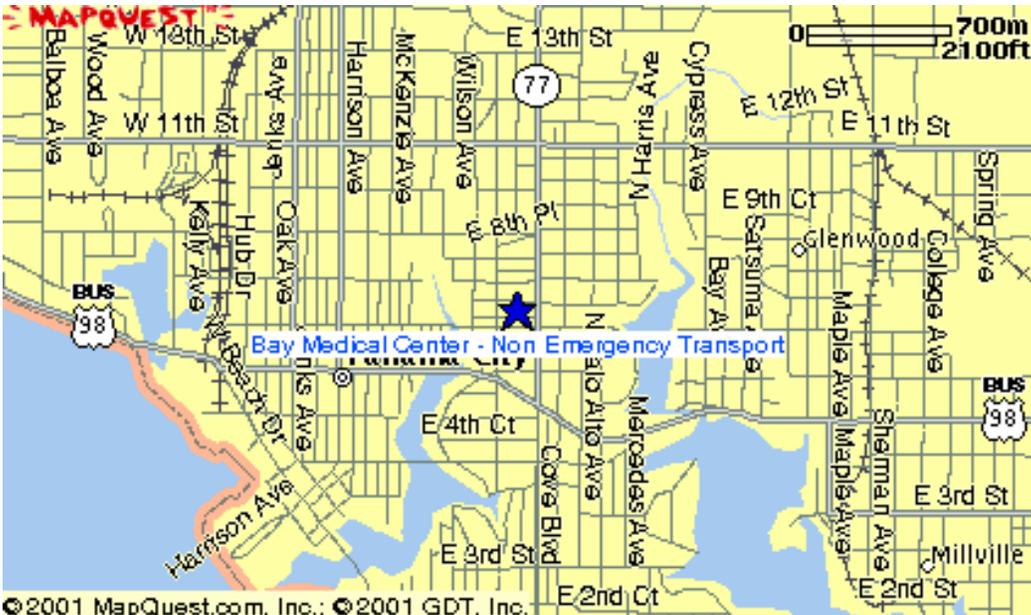
4121 W. Highway 98
Panama City, FL
(850) 872-9701

The alternate source of medical assistance is Seawind Medical Clinic. Directions to this hospital are:

Take right out of NSA Panama City. Go over bridge on US 98. Follow US 98. Clinic will be on right side after crossing bridge.

A map indicating the travel route from the site to the Bay Medical Center is inserted as Figure 2-1 of this HASP. This information will also be posted with maps in the field office and copies placed in a conspicuous location within each site vehicle for quick retrieval.

FIGURE 2-1
HOSPITAL ROUTE MAP
NAVAL SUPPORT ACTIVITY
PANAMA CITY, FLORIDA



2.11 INJURY/ILLNESS REPORTING

If any TtNUS personnel are injured or develop an illness as a result of working on site, the TtNUS "Injury/Illness Procedure" (Attachment I) must be followed. Following this procedure is necessary for documenting all of the information obtained at the time of the incident.

Any pertinent information regarding allergies to medications or other special conditions will be provided to medical service personnel. This information is listed on Medical Data Sheets (Attachment II) filed onsite. If an exposure to hazardous materials has occurred, provide information on the chemical, physical, and toxicological properties of the subject chemical(s) to medical service personnel.

FIGURE 2-2 EMERGENCY RESPONSE PROTOCOL

The purpose of this protocol is to provide guidance for the medical management of injury situations. In the event of a personnel injury or accident:

- Rescue, when necessary, employing proper equipment and methods.
- Give attention to emergency health problems -- breathing, cardiac function, bleeding, and shock.
- Transfer the victim to the medical facility designated in this HASP by suitable and appropriate conveyance (i.e. ambulance for serious events)
- Obtain as much exposure history as possible (a Potential Exposure report is attached).
- If the injured person is a Tetra Tech NUS employee, call the medical facility and advise them that the patient(s) is/are being sent and that they can anticipate a call from the WorkCare physician. WorkCare will contact the medical facility and request specific testing which may be appropriate. WorkCare physicians will monitor the care of the victim. Site officers and personnel should not attempt to get this information, as this activity leads to confusion and misunderstanding.
- Call WorkCare at 1-800-455-6155 and enter Extension 109, or follow the voice prompt for after hours and weekend notification, and being prepared to provide:
 - Any known information about the nature of the injury.
 - As much of the exposure history as was feasible to determine in the time allowed.
 - Name and phone number of the medical facility to which the victim(s) has/have been taken.
 - Name(s) of the involved Tetra Tech NUS, Inc. employee(s).
 - Name and phone number of an informed site officer who will be responsible for further investigations.
 - Fax appropriate information to WorkCare at (714) 456-2154.
- Contact Corporate Health and Safety Department (Matt Soltis) and Human Resources Manager Marilyn Duffy at 1-800-245-2730.

As data is gathered and the scenario becomes more clearly defined, this information should be forwarded to WorkCare.

WorkCare will compile the results of all data and provide a summary report of the incident. A copy of this report will be placed in each victim's medical file in addition to being distributed to appropriately designated company officials.

Each involved worker will receive a letter describing the incident but deleting any personal or individual comments. A personalized letter describing the individual findings/results will accompany this generalized summary. A copy of the personal letter will be filed in the continuing medical file maintained by WorkCare.

FIGURE 2-2 (continued)
WORKCARE
POTENTIAL EXPOSURE REPORT

Name: _____ Date of Exposure: _____
Social Security No.: _____ Age: _____ Sex: _____
Client Contact: _____ Phone No.: _____
Company Name: _____

I. Exposing Agent

Name of Product or Chemicals (if known): _____

Characteristics (if the name is not known)

Solid Liquid Gas Fume Mist Vapor

II. Dose Determinants

What was individual doing? _____

How long did individual work in area before signs/symptoms developed? _____

Was protective gear being used? If yes, what was the PPE? _____

Was their skin contact? _____

Was the exposing agent inhaled? _____

Were other persons exposed? If yes, did they experience symptoms? _____

III. Signs and Symptoms (check off appropriate symptoms)

Immediately With Exposure:

Burning of eyes, nose, or throat
Tearing
Headache
Cough
Shortness of Breath

Chest Tightness / Pressure
Nausea / Vomiting
Dizziness
Weakness

Delayed Symptoms:

Weakness
Nausea / Vomiting
Shortness of Breath
Cough

Loss of Appetite
Abdominal Pain
Headache
Numbness / Tingling

IV. Present Status of Symptoms (check off appropriate symptoms)

Burning of eyes, nose, or throat
Tearing
Headache
Cough
Shortness of Breath
Chest Tightness / Pressure
Cyanosis

Nausea / Vomiting
Dizziness
Weakness
Loss of Appetite
Abdominal Pain
Numbness / Tingling

Have symptoms: (please check off appropriate response and give duration of symptoms)

Improved: _____ Worsened: _____ Remained Unchanged: _____

V. Treatment of Symptoms (check off appropriate response)

None: _____ Self-Medicating: _____ Physician Treated: _____

3.0 SITE BACKGROUND

3.1 SITE INFORMATION

Naval Support Activity (NSA) Panama City is located in Panama City, Bay County, Florida. Bay County is located on the Gulf of Mexico in Florida's panhandle, approximately 100 miles southwest of Tallahassee. NSA Panama City was placed on the United States Environmental Protection Agency's (EPA's) Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List as a result of pollution resulting from past waste disposal practices that predate CERCLA. NSA Panama City was first established in 1942 as a harbor for World War II convoy ships and as a liaison with a nearby shipyard. The United States Department of the Navy has entered into a Federal Facilities Agreement with EPA to define the overall extent of contamination. Additional information concerning the historical background, current site conditions, and other contamination assessments may be found in accompanying project work plans.

3.2 SITE HISTORY AND CURRENT OPERATIONS

The NSA Panama City is a government-owned and contractor-operated (GOCO) facility. NSA Panama City consists of two operational areas, which together comprise approximately 657 acres. The laboratory consists of approximately 360 acres and the ordnance area which covers approximately 300 acres and is primarily for ordnance storage and for limited research. (Note: None of the planned activities involve areas where ordnance concerns exist).

3.3 INVESTIGATION AREAS

3.3.1 Solid Waste Management Unit (SWMU) 3

SWMU 3, Landfill C, Burn and Disposal Area, is located northeast of the Amphibious Assault Landing Craft Area (Building 319) on the beach of St. Andrew Bay. The site is bordered on the east by St. Andrew Bay, on the north by a small tidal inlet and pond leading to the St. Andrew Bay, and on the west by Building 292. SWMU 3 is reported to be 150 feet long by 50 feet wide by 12 feet deep. It is unclear from previous reports exactly where the landfill was located. The landfill extended from the fence-line on the north side of the Amphibious Assault Landing Craft Area for 150 feet to the south, along the waterline of St. Andrew bay. The entire area adjacent to the Amphibious Assault Landing Craft Area is covered with concrete riprap. A grassy area lies beyond the riprap and fence line to the north, around the tidal inlet. SWMU 3 was used for waste disposal from 1953 to 1959. Disposed wastes included general household garbage, scrap lumber and metal, tree limbs, paint, paint thinner and solvent cans (mostly empty or with residue), bilge water, and waste oil (possibly transformer oil containing PCBs). Between 24

and 48 cubic yards of waste were brought to the site each day, and burning took place once per month. Bulldozers were used to push piles to a height of approximately 25 feet. The piles were then doused with gasoline and ignited. The resulting ash piles were covered with sand. Aerial photographs dated 1956 and 1959 show a bulldozed area along the beach with apparent debris and waste extending in width from the bay to a point approximately halfway to Solomon Drive, which parallels the shore. The area extends in length along the beach from a line parallel to the back of the supply warehouses (Buildings 99 and 100) at the north end, to Vernon Street on the south.

3.3.2 SWMU 10

SWMU 10 is an oil-water separator (OWS) system near Building 363 located along the eastern boundary of NSA Panama City. It is located approximately 120 feet south of the JP-5 subsurface storage facility (Building 325) and approximately 120 feet from St. Andrew Bay. The OWS system has been in operation since 1968 and consists of a 6,000-gallon underground waste oil tank; a 10,000-gallon fiberglass reinforced plastic (FRP) oily waste holding tank; and the OWS pumps, controls, and associated piping. The OWS is used to treat bilge water that is removed from naval vessels. A retention pond is located adjacent to the OWS system in a southeast direction. However, there is no evidence of a release of contaminants. Two releases of oil and bilge water from the OWS were reported by NSA Panama City personnel in 1992. Furthermore, information obtained by the Florida Department of Environmental Protection (FDEP) during a hazardous waste compliance inspection suggested that waste chlorinated solvents (and possibly polychlorinated biphenyl [PCBs]) had been disposed of in the OWS. Sampling performed in 1992 confirmed the presence of chlorinated solvents in soil and groundwater. The first release of oil and bilge water from the OWS occurred in February 1992. It was noted that a petroleum-like discharge was rising to the ground surface above the 10,000-gallon FRP tank. NSA Panama City personnel removed approximately two 55-gallon drums of soil from the area of the release. A second release of oil and bilge water occurred in March 1992 when valves were inadvertently left in incorrect positions and stormwater was diverted into the 10,000-gallon holding tank.

3.3.3 Area Of Concern (AOC) 1

AOC 1 is a former firefighting training pit located immediately to the west of Buildings 290 and 399 in a fenced and paved area used for open storage. The location of the firefighting training area is approximately 140 feet west of Building 100. However, other sources map it as an 80-foot square, located 10 feet west of the south wall of Building 399 and abutting the present fenceline. Aerial photographs and previous sampling suggests that the source area is actually located farther north, to the west of the northern wall of Building 399 but still within the fenced area. AOC 1 is currently a fenced and paved open storage area. It is bordered by parking to the west and south, by NSA Panama City's shipping and receiving facilities to the east and by woodland and SWMU 9 to the north. St. Andrew Bay

is visible across Solomon Drive approximately 700 feet away. Fire fighting training occurred at AOC 1 approximately once per month in an unlined pit. The firefighter training area was operational from the mid 1950s until the late 1970s, when the new facility on Gull Circle (SWMU 9) was constructed. The AOC was graded and paved in 1978. Materials reported to be used for the firefighting exercises included waste oils (possibly containing PCBs), fuels (diesel, gasoline, and JP-5), paint, paint thinners, and bilge water. These materials were spilled onto the ground and ignited. It is reported that approximately 45 to 50 drums, an estimated 2,000 to 6,000 gallons were spilled onto the ground and ignited each year.

4.0 SCOPE OF WORK

This section describes the project tasks that will be performed at NSA Panama City. Additionally, each task has been evaluated and the associated hazards and recommended control measures are listed in Table 5-1 of this HASP. The planned activities involved in this effort are presented in detail in the Work Plan developed for the project. If new tasks are to be performed at the site, Table 5-1 and this section will be modified accordingly. General field investigations to be performed by TtNUS include, but are not necessarily limited to, the following:

- Mobilization/Demobilization Activities
- Installation of a monitoring well at SWMU 10 to monitor possible migration of manganese
- Subsurface soil sampling using Direct Push Technology (DPT) at AOC1
- Sediment sampling at SWMU 3 wetland
- Groundwater sampling of monitoring wells at SWMU 3, 10, and AOC 1
- Decontamination of Sampling Equipment
- Collection and Handling of Investigative Derived Wastes (IDW)

5.0 TASKS/HAZARDS/ASSOCIATED CONTROL MEASURES

Table 5-1 of this section serves as the primary portion of the site specific HASP. This table is intended to assist project personnel in the recognition of hazards and recommended procedures necessary to minimize potential exposure or injuries related to those hazards. The table also assists field team members in determining which PPE and decontamination procedures to use based on appropriate air monitoring techniques and site-specific conditions. The evaluation of each task provided detailed information including anticipated hazards, recommended control measures, air monitoring recommendations, required Personal Protective Equipment (PPE), and decontamination measures. This table must be updated if the scope of work, contaminants of concern or pertinent conditions change.

While Table 5-1 and the HASP are designed to be used together they must be accompanied by the TtNUS Health and Safety Guidance Manual. This manual is designed to further explain supporting elements for any site-specific operations as required by 29 CFR 1910.120. The Guidance Manual should be referenced for additional information regarding air monitoring instrumentation, decontamination activities, emergency response, hazard assessments, hazard communication and hearing conservation programs, medical surveillance, PPE, respiratory protection, site control measures, standard work practices, and training requirements. Many of TtNUS's SOPs are also provided in the Guidance Manual.

Safe Work Permits (SWP) issued for all major activities (see Attachment III) will use elements defined in Table 5-1 as the primary reference. The FOL or the SSO completing the SWP will add additional site-specific information. In situations where the SWP is more conservative than the direction provided in Table 5-1 due to the incorporation of site-specific elements, the Safe Work Permit will be followed.

5.1 GENERAL SAFE WORK PRACTICES

In addition to the task-specific work practices identified on Table 5-1, the follow these safe work practices when conducting work involving known and unknown site hazards. These safe work practices establish a pattern of general precautions and measures for reducing risks associated with hazardous site operations.

- Refrain from eating, drinking, chewing gum or tobacco, taking medication, or smoking in contaminated or potentially contaminated areas or where the possibility for the transfer of contamination exists.

- Wash hands and face thoroughly upon leaving a contaminated or suspected contaminated area. A thorough shower and washing must be conducted as soon as possible if excessive skin contamination occurs.
- Avoid contact with potentially contaminated substances by walking around puddles, pools, mud, or other such areas. Avoid, whenever possible, kneeling on the ground or leaning or sitting on equipment. Do not place monitoring equipment on potentially contaminated surfaces.
- Be aware of the location of the nearest telephone and all emergency telephone numbers. See Section 2.0, Table 2-1.
- Attend briefings on anticipated hazards, equipment requirements, Safe Work Permits, emergency procedures, and communication methods before going on site.
- Plan and mark entrance, exit, and emergency escape routes. See Section 2.0.
- Rehearse unfamiliar operations prior to implementation.
- Use the “buddy system” whenever respiratory protection equipment is in use. Establish hand signals or other means of emergency communication in case two-way radio failure.
- Maintain visual contact with each other and with other on-site team members by remaining in close proximity in order to assist each other in case of emergency.
- Establish appropriate Safety Zones including Support, Contamination Reduction, and Exclusion Zones.
- Minimize the number of personnel and equipment in contaminated areas (such as the Exclusion Zone). Non-essential vehicles and equipment should remain within the Support Zone.
- Establish appropriate decontamination procedures for leaving the site.
- Immediately report all injuries, illnesses, and unsafe conditions, practices, and equipment to the Site Safety Officer (SSO).
- Observe coworkers for signs of toxic exposure and heat or cold stress.
- Inform co-workers of potential symptoms of illness, such as headaches, dizziness, nausea, or blurred vision.

5.2 DPT OPERATIONS - SAFE WORK PRACTICES

The following Safe Work Practices are to be followed when working in or around Direct Push Operations.

5.2.1 Before DPT Operations

- Identify underground utilities and buried structures before drilling. Use the Utility Locating and Excavation Clearance Standard Operating Procedure provided in Attachment IV.
- DPT rigs will be inspected by the SSO or designee, prior to the acceptance of the equipment at the site and prior to the use of the equipment. Repairs or deficiencies identified during the inspection will be corrected prior to use. The inspection will be accomplished using the Equipment Inspection Checklist provided in Attachment V. Inspection frequencies will be once every 10 day shift or following repairs.
- The work area around the point of operation will be graded to the extent possible to remove any trip hazards near or surrounding operating equipment.
- The DPT helper will establish an equipment staging and lay-down plan. The purpose of this is to keep the work area clear of clutter and slips, trips, and fall hazards. Mechanisms to secure heavy objects such as drill flights will be provided to avoid the collapse stacked equipment.
- Potentially contaminated tools will be wrapped in polyethylene sheeting for storage and transport to the centrally located decontamination unit.

5.2.2 During DPT Operations

- Minimize contact to the extent possible with contaminated tooling and environmental media.
- Support functions (sampling and screening stations) will be maintained a safe distance from the DPT rig to remove these activities from within physical hazard boundaries.
- Only qualified operators and knowledgeable ground crew personnel will participate in the operation of the DPT rig.
- In order to minimize contact with potentially contaminated tooling and media and to minimize lifting hazards, multiple personnel should move heavy tooling, where necessary.

- Only personnel absolutely essential to the work activity will be allowed in the exclusion zone. Site visitors will be escorted.

5.2.3 After DPT Operations

- Equipment used within the exclusion zone will undergo a complete decontamination and evaluation by the SSO to determined cleanliness prior to moving to the next location, exiting the site, or prior to down time for maintenance.
- Motorized equipment will be fueled prior to the commencement of the day's activities. During fueling operations all equipment will be shutdown and bonded to the fuel provider.
- When not in use the direct push rig will be shutdown, emergency brakes set, and wheels chocked.
- Areas subjected to subsurface investigative methods will be restored to equal or better condition than original to remove any contamination brought to the surface and to remove any physical hazards. In situations where these hazards cannot be removed these areas will be barricaded to minimize the impact on field crews working in the area.

**TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES
SWMU 3, 10 and AOC 1 - NSA PANAMA CITY, FLORIDA**

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring/Type and Action Levels	Personal Protective Equipment <i>Items in italics are deemed optional as conditions or the FOL or SSO require.</i>	Decontamination Procedures
<p>Mobilization/demobilization, surveying and other site activities that are not directly related to hazardous waste site operations (no potential for exposure to site contaminants).</p>	<p><i>Chemical hazards:</i> Exposure to potential site contaminants is not anticipated during this activity. However, chemicals brought on site in support of field activities are to be identified, logged, accompanied by an appropriate MSDS, properly stored, and evaluated for purposes of hazard communication.</p> <p><i>Physical hazards:</i> Potential physical hazards associated with this task may include:</p> <p>1) Lifting (muscle strains and pulls) 2) Pinches and compressions 3) Slip, trips, and falls 4) Moving machinery 5) Vehicular and foot traffic</p> <p><i>Natural hazards:</i> 6) Insect, animal bites and stings, poisonous plants, etc.</p>	<p>To eliminate potential chemical hazards associated with this task ensure the following:</p> <ul style="list-style-type: none"> - A chemical inventory list is generated for chemicals brought on site (Complete Section 5.0 of the Health and Safety Guidance Manual). - MSDS must be available for chemicals brought on site. - Materials are stored in accordance with recommended practices and according to compatibility (See MSDS for storage and compatibility recommendations). <p>1) Employ machinery or multiple personnel for heavy lifts. - Use proper lifting techniques.</p> <p>2) Keep any machine guarding in place. Avoid moving parts. Secure loose clothing, jewelry, or long hair that could become entangled.</p> <p>3) Preview and prepare work locations where unstable/uneven terrain exists. Barricade all excavations and embankments deeper than 2 feet.</p> <p>4) Equipment to be employed will be</p> <ul style="list-style-type: none"> - Inspected in accordance with OSHA and manufacturers design. The inspection will include the completion of the Equipment Record Sheet documenting the review and acceptance/failure of safety devices, guards, emergency stops. The Equipment Inspection Checklist is provided in Attachment IV of this HASP. - Operated by knowledgeable operators, and knowledgeable ground crew, as applicable. - Establish safe zones of approach. - Secure all loose articles to avoid possible entanglement. <p>5) Identify access/egress routes and locations to within established areas of operation.</p> <ul style="list-style-type: none"> - Equipment capable of self propelled movement will be equipped with movement alarms as applicable. - Traffic regulations for NSA Panama City are to be followed as posted. <p>6) Avoid potential nesting areas of biting/stinging insects and animals. Use commercially available insect repellents. Avoid contact with poisonous vegetation. Wear appropriate clothing. Tape ankle and wrists areas to prevent ticks, chiggers, etc. from attaching themselves to you skin. Wear light colored clothing so that ticks and other biting insects can be easily visible and be removed. Follow directions as specified in Section 6.3 concerning natural hazards.</p>	<p>Not required</p>	<p>Mobilization/demobilization activities are intended to initiate and proceed in Level D protection:</p> <p>Level D - (Minimum Requirements)</p> <ul style="list-style-type: none"> - Standard field attire (Sleeved shirt; long pants; or coveralls) - Steel toe safety shoes or boots - Safety glasses, when potential eye hazards may exist. - Hardhat (when overhead hazards exists, or identified as an operation requirement) - Reflective vest for high traffic areas - Hearing protection for high noise areas, or as directed on an operation by operation scenario. As a general rule of thumb, if you need to raise your voice to be heard while engaged in conversation with someone who is within 2 feet of your position you may be exposed to excessive noise levels and should employ hearing protection until the SSO can quantify the potential hazard through sound level measurements or noise dosimetry. <p>Note: The Safe Work Permit(s) for this task (see Attachment III) will be issued at the beginning of each day to address the tasks planned for that day. As part of this task, additional PPE may be assigned to reflect site-specific conditions or special considerations or conditions associated with any identified task.</p>	<p>As potential site contaminants are not anticipated to be encountered as part of this task, personal decontamination is not required.</p> <p>Equipment arriving/leaving the site will be inspected prior to permitting this equipment to enter or exit the site. The SSO will inspect the equipment and give the clearance to allow the equipment to pass. Failure to pass inspection will prohibit entering or exiting the site as applicable. Equipment which fails the inspection will have to be decontaminated again to a level acceptable to the SSO prior to passage on or off site. Equipment permitted to pass on/off site will be documented using an Equipment Inspection Checklist. This form may be found in Attachment V of this HASP.</p>

**TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES
SWMU 3, 10 and AOC 1 - NSA PANAMA CITY, FLORIDA**

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring/Type and Action Levels	Personal Protective Equipment <i>Items in italics are deemed optional as conditions or the FOL or SSO require.</i>	Decontamination Procedures
<p>Multi-media sampling including surface and subsurface soils, groundwater, and sediments.</p> <p>AOC 1 – soil sampling will be performed using DPT rig.</p> <p>Groundwater sampling will be performed at SWMU 3, 10, and AOC 1 using peristaltic pump.</p> <p>Sediment samples will be collected at SWMU 3.</p>	<p><i>Chemical hazards:</i></p> <p>1) Similar contaminants may exist within soils and groundwater at each of the sites to be investigated. Potential contaminants of concern include various metals, SVOCs/PAHs, VOCs, PCBs and pesticides. None of the contaminants of concern were previously detected at concentrations that are likely to pose an acute exposure hazard to site personnel. However, contaminant concentrations may vary from one sampling location to another. As a result, continuous air monitoring will be performed to evaluate airborne concentrations of VOCs at source areas and in worker breathing zones. Additionally safe work practices and use of PPE will be used to further prevent potential exposure/contact with site contaminants.</p> <p>Table 6-1 lists some of the chemicals and contaminants that may exist at SWMU 3, 10 and AOC 1.</p> <p>2) Transfer of contamination into clean areas</p> <p><i>Physical hazards:</i></p> <p>3) Noise 4) Lifting (muscle strains and pulls) 5) Pinches and compressions 6) Slip, trips, and falls 7) Inclement Weather 8) Cuts injuries from cutting tools</p> <p><i>Natural hazards:</i></p> <p>9) Insect, animal bites, poisonous plants, etc.</p>	<p>1) Safe work practices (avoiding contact with potentially contaminated media, washing hands and face before performing hand to mouth activities, avoid creating dusts, locate support activities upwind and away from other site hazards, etc.) and use of PPE to prevent potential exposure to lead will also prevent exposures to other potential site contaminants. Real-time air monitoring instrumentats will be used to detect potential VOCs at source areas for comparision to established action levels.</p> <p>2) Decontaminate all equipment and supplies between sampling locations and prior to leaving the site.</p> <p>3) When sampling near the DPT rig, employ hearing protection. When working within 25 feet of operating equipment use hearing protection to protect against excessive noise. As a general rule of thumb, if you have to raise your voice to talk to someone who is within 2 feet of your location, noise levels may be excessive, and hearing protection must be worn.</p> <p>4) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques.</p> <p>5) Use pinch bars or other equipment to keep hands out of the point of operation.</p> <p>6) Preview work locations for unstable/uneven terrain.</p> <p>7) Operations will be temporarily suspended during electrical storms.</p> <p>8) Use manufacturer approved holders and cutting devices to secure and cut acetate liners. Serious injuries have been noted when site workers use box cutters or support acetate lines using body parts when attempting to remove soil cores. Keep hands and other body parts clear of cutting surfaces. Replace blades often and disposed of acetate lines once soil is removed.</p> <p>9) Avoid nesting areas, use commercially available insect repellents. Report potential hazards to the SSO. If necessary use Tyvek coveralls to minimize contact. Tape pant legs and wear light colored clothing so that ticks and other biting insects can be easily visible and be removed. See Section 6.3.1 and Section 4.0 of the Health and Safety Guidance Manual for protection against mosquito and tick hazards.</p>	<p>Although detectable concentrations of VOCs are not anticipated to be present, direct reading instruments such as a Photoionization Detector (PID) with at least an 10.6 eV source (or higher) or Flame Ionization Detector (FID) will be used as a general screening instrument.</p> <p>Monitor source areas (sample locations, cores, etc.) using a PID or FID at each sampling interval. Positive sustained results at a source or downwind location(s) which may impact operations crew will require the following actions:</p> <p>Monitor the breathing zone of at-risk and downwind employees. Any sustained reading (greater than 1 minute in duration) above 10 ppm in worker breathing zones requires site activities to be suspended and site personnel to report to an unaffected area.</p> <p>Work may resume when airborne readings in worker breathing zone return to background levels.</p>	<p>Sampling activities are anticipated to proceed in a modified Level D protection as specified below:</p> <p>Level D - (Minimum Requirements) For sampling activities:</p> <ul style="list-style-type: none"> - Standard field attire (Sleeved shirt; long pants) - Steel toe Safety shoes or boots - Safety glasses - Nitrile gloves (Clean pair for each sample location, layered if necessary) - <i>Hard-hat (when overhead hazards exists, or identified as an operation requirement)</i> - <i>Reflective vest for high traffic areas</i> - <i>Hearing protection for high noise areas, or as directed on an operation by operation scenario.</i> - <i>Rubber boot for accessing wetlands (SWMU 3) or areas where excessive moisture or mud are present.</i> - <i>Hip waders and US Coast Guard-approved life vests if collection of sediments involves entering bodies of water.</i> <p>Note: The Safe Work Permit(s) for this task (see Attachment III) will be issued at the beginning of each day to address the tasks planned for that day. As part of this task, additional PPE may be assigned to reflect site-specific conditions or special considerations or conditions associated with any identified task.</p>	<p>Decontaminate sample containers in accordance with the Field Sampling Plan.</p> <p>Personnel decontamination:</p> <ul style="list-style-type: none"> - Equipment drop-off - Wash and rinse reusable outer protective garments - Remove and dispose of disposable PPE - Wash hands and face, leave contamination reduction zone. <p>Equipment decontamination:</p> <p>See Task - Decontamination of Sampling and Heavy Equipment</p>

**TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES
SWMU 3, 10 and AOC 1 - NSA PANAMA CITY, FLORIDA**

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring/Type and Action Levels	Personal Protective Equipment <i>Items in italics are deemed optional as conditions or the FOL or SSO require.</i>	Decontamination Procedures
<p>Soil borings using Direct Push Technology (DPT) at AOC 1.</p> <p>Installation of a micro monitoring well at SWMU 10.</p>	<p><i>Chemical hazards:</i></p> <p>1a) AOC 1 - Site contaminants at AOC 1 include various metals, SVOCs/PAHs, and VOCs including toluene, xylenes, and ethylbenzene. Based on the most recent analytical data from a previous investigation, none of the contaminants of concern are likely to present an exposure concern to site personnel.</p> <p>1b) SWMU 10 – Site contaminants at SWMU 10 include various metals, SVOCs/PAHs (specifically naphthalene). The monitoring well is being installed specifically to determine if manganese is migrating from the site. Existing data indicates that none of the contaminants of concern (including manganese and naphthalene) are likely to present an exposure concern to site personnel.</p> <p>2) Transfer of contamination into clean areas or onto persons</p> <p><i>Physical hazards:</i></p> <p>3) Pinch/compression points</p> <p>4) Noise</p> <p>5) Energized systems</p> <p>6) Lifting</p> <p>7) Inclement weather</p> <p><i>Natural hazards:</i></p> <p>8) Insect, animal bites, poisonous plants, etc.</p>	<p>1) Safe work practices (avoiding contact with potentially contaminated media, washing hands and face before performing hand to mouth activities, avoid creating dusts, locate support activities upwind and away from other site hazards, etc.) and use of PPE will prevent exposures to potential site contaminants. Real-time air monitoring instruments will be used to detect potential VOCs at source areas for comparison to established action levels.</p> <p>2) Decontaminate all equipment and supplies between boreholes and prior to leaving the site.</p> <p>3) Equipment to be used will be</p> <ul style="list-style-type: none"> - Inspected in accordance with Federal safety and transportation guidelines, OSHA (1926.600,.601,.602), and manufacturers design and documented as such using the Equipment Inspection Sheet (See Attachment V of this HASP or Section 10.0 of the TtNUS Health and Safety Guidance Manual). - Operated by qualified operators, and knowledgeable ground crew. - Used within establish safe zones and routes of approach - Only manufacturer approved equipment may be used in conjunction with equipment repair procedures. <p>In addition, to equipment considerations the following safe operating procedures will be incorporated:</p> <ul style="list-style-type: none"> - Personnel not directly supporting this operation will remain at least 25 feet from the point of operation. - Hydraulic masts or other projecting devices shall be at least 20 feet from overhead power sources and a minimum of 3 feet from underground utilities unless the exact location of the underground utility is known. - Hand signals will be established prior to the commencement of the operation. - Only manufacturer approved equipment may be used in conjunction with equipment repair procedures (i.e., flight connectors etc.). - Work areas will be kept clear of clutter. - Secure all loose articles to avoid possible entanglement. - Equipment shall be equipped with movement warning systems. - Personnel working in high equipment traffic areas are required to wear reflective vests for high visibility, and to establish unimpeded work areas around the operation. This activity may require areas of the building to be coordinated off during this operation. - Personnel will be instructed in the location and operations of the emergency shut off device(s). This device will be tested initially (and then periodically) to insure its operational status. - Areas will be inspected prior to the movement of DPT vehicle and support vehicles to eliminate any physical hazards. This will be the responsibility of the FOL and/or SSO. <p>4) Hearing protection will be used during all subsurface activities.</p> <p>5) Utility clearances shall be obtained prior to subsurface activities. Prior to any subsurface investigations, the locations of all underground utilities will be identified and marked by NSA Panama personnel. Obtain written permit clearance prior to all subsurface investigations. See Attachment IV Utility Locating And Excavation Clearance of this HASP.</p> <p>6) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques.</p> <p>7) Suspend or terminate operations until directed otherwise by SSO</p> <p>8) Avoid potential nesting areas of biting/stinging insects and animals. Use commercially available insect repellents. Avoid contact with poisonous vegetation. Wear appropriate clothing. Tape ankle and wrists areas to prevent ticks, chiggers, etc. from attaching themselves to you skin. Wear light colored clothing so that ticks and other biting insects can be easily visible and be removed. Follow directions as specified in Section 6.3 concerning natural hazards.</p>	<p>Although detectable concentrations of VOCs are not anticipated to be present, direct reading instruments such as a Photoionization Detector (PID) with at least an 10.6 eV source (or higher) or Flame Ionization Detector (FID) will be used as a general screening instrument.</p> <p>Monitor source areas (sample locations, cores, etc.) using a PID or FID at each sampling interval. Positive sustained results at a source or downwind location(s) which may impact operations crew will require the following actions:</p> <p>Monitor the breathing zone of at-risk and downwind employees. Any sustained reading (greater than 1 minute in duration) above 10 ppm in worker breathing zones requires site activities to be suspended and site personnel to report to an unaffected area.</p> <p>Work may resume when airborne readings in worker breathing zone return to background levels.</p> <p>Where the utility clearance cannot be obtained in a reasonable period, or not located, intrusive activities shall proceed with extreme caution using a magnetometer for periodic downhole surveys every 2 feet to a depth of at least 6 feet. See Attachment IV Utility Locating And Excavation Clearance of this HASP.</p>	<p>Subsurface operations are to be initiated in Level D protection. Level D protection constitutes the following minimum protection</p> <ul style="list-style-type: none"> - Standard field attire (Sleeved shirt; long pants) - Tyvek coveralls and disposable boot covers if surface contamination is present or if the potential exists for soiling work attire. - Nitrile gloves with surgical style inner gloves - Steel toe safety shoes or boots - Safety glasses - Hardhat - Hearing protection for high noise areas, as directed by the SSO. - <i>Reflective vest for high traffic areas</i> <p>Note: The Safe Work Permit(s) for this task (see Attachment III) will be issued at the beginning of each day to address the tasks planned for that day. As part of this task, additional PPE may be assigned to reflect site-specific conditions or special considerations or conditions associated with any identified task.</p>	<p>Personnel Decontamination will consist of a soap/water wash and rinse for outer protective equipment (boots, gloves, PVC splash suits, etc.). This function will take place at an area adjacent to the site activities. This procedure will consist of:</p> <ul style="list-style-type: none"> - Equipment drop - Soap/water wash and rinse of outer boots and gloves - Soap/water wash and rinse of the outer splash suit, as applicable - Outer suit, boot covers, outer glove removal - Wash hands and face, leave contamination reduction zone - Shower at the end of each shift or after exposure to contaminants. <p>Equipment Decontamination - Heavy equipment decontamination will take place at a centralized decontamination pad utilizing steam or pressure washers. Heavy equipment such as Drill Rig, will have the wheels and tires cleaned along with any loose debris removed, prior to transporting to the central decontamination area. Site vehicles will be restricted access to exclusion zones, or also have their wheels/tires sprayed off as not to track mud onto the roadways servicing this installation. Roadways shall be cleared of any debris resulting from the onsite activity.</p> <p>Equipment used in the exclusion zone will require a complete decontamination between locations and prior to removal from the site. The FOL or the SSO will be responsible for evaluating equipment arriving onsite and that which is to leave the site. No equipment will be authorized access or exit without this authorization.</p> <p>Evaluation will consist of</p> <ul style="list-style-type: none"> - Visual inspection - Scanning equipment with monitoring instruments

**TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES
SWMU 3, 10 and AOC 1 - NSA PANAMA CITY, FLORIDA**

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring/Type and Action Levels	Personal Protective Equipment <i>Items in italics are deemed optional as conditions or the FOL or SSO require.</i>	Decontamination Procedures
Decontamination of sampling equipment	<p>Chemical hazards:</p> <p>1) Similar contaminants may exist within soils and groundwater at each of the sites to be investigated. Potential contaminants of concern include various metals, SVOCs/PAHs, VOCs, PCBs and pesticides. None of the contaminants of concern were previously detected at concentrations that are likely to pose an acute exposure hazard to site personnel. However, contaminant concentrations may vary from one sampling location to another. As a result, continuous air monitoring will be performed to evaluate airborne concentrations of VOCs at source areas and in worker breathing zones. Additionally safe work practices and use of PPE will be used to further prevent potential exposure/contact with site contaminants.</p> <p>Table 6-1 lists some of the chemicals and contaminants that may exist at SWMU 3, 10 and AOC 1.</p> <p>- Decontamination fluids - Liquinox (detergent), isopropanol, methanol, etc.</p> <p>Physical hazards:</p> <p>2) Lifting (muscle strains and pulls)</p> <p>3) Pinches and compressions</p> <p>4) Noise</p> <p>5) Flying Projectiles</p>	<p>1) Employ protective equipment to minimize contact with site contaminants and hazardous decontamination fluids.</p> <ul style="list-style-type: none"> - Have a means by which the eyes and/or skin may be flushed (i.e., portable camp shower, emergency eyewash, etc.) readily accessible. - Obtain manufacturer's MSDS for any decontamination solvents used on-site. Users of solvents must review the MSDS and have ready access to it on-site. Maintain a Chemical Inventory and a file of MSDSs for all hazardous chemicals brought to the site. Users must observe MSDS requirements with regard to chemical use, storage, spill response, PPE, and other aspects. <p>Use of solvents will be restricted to outdoor locations (i.e., this activity is restricted from inside a trailer or other small or poorly-ventilated space).</p> <p>2) Use multiple persons where necessary for lifting and handling heavy pieces of equipment for decontamination purposes.</p> <p>3) Place or stack equipment securely during decontamination and air drying to prevent unstable items from falling.</p> <p>4) Steam/pressure washer operators will wear hearing protection. Other personnel will be restricted from the area (i.e., no closer than 20 feet) to minimize their potentials to exposure to noise, overspray, and flying projectiles.</p> <p>5) Wear appropriate protection (splash shield to protect pressure washer operator). Place shields around the area when this potential exists to protect others within the area.</p>	<p>1) Use visual observation and real-time monitoring instrumentation to ensure all equipment and/or areas which have been cleaned and dried are properly cleaned of potentially contaminated medias (e.g., air, water, soils).</p> <p>Elevated airborne concentrations impacting field crews or downwind receptors are not anticipated for this task.</p>	<p><i>For sampling equipment including trowels, macro samplers, bailers, etc.:</i></p> <p>Observe MSDS requirements, but not less than Level D Minimum requirements -</p> <ul style="list-style-type: none"> - Standard field attire (sleeved shirt; long pants) - Steel toe safety shoes or boots - Nitrile outer gloves - Safety glasses <p>In the event of overspray of chemical decontamination fluids employ PVC rain suits or PE or PVC coated Tyvek and face shield or goggles.</p> <p>Respiratory protection is not anticipated for these activities.</p> <p>Note: The Safe Work Permit(s) for this task (see Attachment III) will be issued at the beginning of each day to address the tasks planned for that day. As part of this task, additional PPE may be assigned to reflect site-specific conditions or special considerations or conditions associated with any identified task.</p>	<p>This decontamination procedure for Level D protection will consist of</p> <ul style="list-style-type: none"> - Remove and dispose of any disposable PPE (Tyvek coveralls, outer gloves, etc.) - Soap/water wash and rinse of reusable PPE items (e.g., splash suit, boots). - Wash hands and face; leave contamination reduction zone <p>Equipment Decontamination - All equipment used in the exclusion zone will require a complete decontamination between locations and prior to removal from the site.</p> <p>The FOL or the SSO will be responsible for evaluating equipment arriving at and leaving the site. No equipment will be authorized access or exit without this authorization.</p> <p>Evaluation will consist of</p> <ul style="list-style-type: none"> - Visual inspection - Scanning equipment with monitoring instruments

**TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES
SWMU 3, 10 and AOC 1 - NSA PANAMA CITY, FLORIDA**

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring/Type and Action Levels	Personal Protective Equipment <i>Items in italics are deemed optional as conditions or the FOL or SSO require.</i>	Decontamination Procedures
IDW management and moving IDW drums to storage areas	<p><i>Chemical hazards:</i></p> <p>1) Similar contaminants may exist within soils and groundwater at each of the sites to be investigated. Potential contaminants of concern include various metals, SVOCs/PAHs, VOCs, PCBs and pesticides. None of the contaminants of concern were previously detected at concentrations that are likely to pose an acute exposure hazard to site personnel. However, contaminant concentrations may vary from one sampling location to another. As a result, continuous air monitoring will be performed to evaluate airborne concentrations of VOCs at source areas and in worker breathing zones. Additionally safe work practices and use of PPE will be used to further prevent potential exposure/contact with site contaminants.</p> <p>Table 6-1 lists some of the chemicals and contaminants that may exist at SWMU 3, 10 and AOC 1.</p> <p>See Table 6-1 for more information on the chemicals of concern.</p> <p>2) Transfer of contamination into clean areas</p> <p><i>Physical hazards:</i></p> <p>3) Noise in excess of 85 dBA 4) Lifting (muscle strains/pulls) 5) Pinches and compressions 6) Slip, trips, and falls 7) Vehicular and foot traffic 8) Ambient temperature extremes (heat/cold stress) 9) Eye and foot hazards</p> <p><i>Natural hazards:</i></p> <p>10) Insect/animal bites and stings, poisonous plants, etc. 11) Inclement weather</p>	<p>1) Use real-time monitoring instrumentation, action levels, and identify PPE to control exposures to potentially contaminated media (e.g. air, water, soils).</p> <p>2) Decontaminate equipment and supplies, if they become contaminated, between locations and prior to leaving the site.</p> <p>3) When working near heavy equipment, use hearing protection. Refer to Section 6 of the Guidance Manual for further information.</p> <p>4) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques.</p> <p>5) Keep any machine guarding in place. Avoid moving parts. Use tools or equipment where necessary to avoid contacting pinch points.</p> <p>6) Preview work locations for unstable/uneven terrain.</p> <p>7) Traffic and equipment considerations are to include the following: - Secure loose articles to avoid possible entanglement. - Activities are to be conducted consistent with the Base requirements.</p> <p>8) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding cold/heat stress concerns is provided in Section 4 of the TiNUS Health and Safety Guidance Manual.</p> <p>9) Avoid recognized eye and foot hazards. Wear appropriate PPE.</p> <p>10) Avoid nesting areas, use commercially available insect repellents. Report potential hazards to the SSO.</p> <p>11) Suspend or terminate operations until directed otherwise by SSO.</p>	<p>A direct reading Photoionization Detector w/10.6 eV lamp will be used to screen samples and to detect the presence of any potential volatile organics. Positive sustained results at a source or downwind location(s) which may impact operations crew will require the following actions:</p> <ul style="list-style-type: none"> - Monitor the breathing zone of at-risk and downwind employees. Any sustained readings (greater than 1 minute in duration) above 15 ppm in the breathing zone of the at-risk employees requires site activities to be suspended and site personnel to report to an unaffected area. - Work may only resume if airborne readings in worker breathing zone return to background levels. If elevated readings in worker breathing zone persist, the PHSO and HSM will be contacted to determine necessary actions and levels of protection. 	<p>Level D protection will be utilized for the initiation of sampling activities.</p> <p>Level D - (Minimum Requirements)</p> <ul style="list-style-type: none"> - Standard field attire (long sleeve shirt; long pants) - Tyvek coveralls and disposable boot covers if surface contamination is present or if the potential for soiling work attire exists. - Cotton/leather work gloves with surgical style inner gloves - Steel toe safety shoes - Safety glasses - Hardhat (when overhead hazards exists, or identified as a operation requirement) - Reflective vest for high traffic areas - Hearing protection for high noise areas, or as directed on an operation by operation scenario. <p>Note: The Safe Work Permit(s) for this task (Attachment III) will be reviewed by the SSO with all participants at the beginning with all task participants at the beginning of each work shift. The SSO/FOL must document tailgate meeting participants either on the permit or in their field log book.</p>	<p>Personnel Decontamination will consist of a soap/water wash and rinse for reusable outer protective equipment (boots, gloves, PVC splash suits, as applicable). The decon function will take place at an area adjacent to the site activities. This procedure will consist of:</p> <ul style="list-style-type: none"> - Equipment drop - Soap/water wash and rinse of outer boots and gloves, as applicable - Soap/water wash and rinse of the outer splash suit, as applicable - Disposable PPE will be removed and bagged.

6.0 HAZARD ASSESSMENT

The following section provides information regarding the chemical and physical hazards present at NSA Panama City and the activities conducted as part of this scope of work. Table 6-1 provides information related to chemical constituents that have been identified by analysis or are suspected to be present at the site based on historical data. Specifically, toxicological information, exposure limits, symptoms of exposure, physical properties, and air monitoring and sampling data are discussed in the table.

6.1 CHEMICAL HAZARDS

Historical information and existing analytical data indicate that various contaminants including metals, semi-volatile organic compounds (SVOCs) and polynuclear aromatic hydrocarbons (PAHs), as well as volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs) and pesticides are present at NSA Panama City. Each site to be investigated under this HASP is addressed below to identify the potential contaminants of concern. When available, existing analytical data from previous site investigations has been used to determine which contaminants of concern pose an exposure concern to site personnel engaged in site investigation activities. Table 6-1 provides additional information on many of chemicals that are suspected to have been disposed of or present at the sites of interest as well as some of the specific contaminants of concern that were previously detected.

6.1.1 SWMU 3 Contaminants of Concern

SWMU 3 was a previous burn/disposal area and landfill. The exact location of the landfill is unclear and as a result contaminant concentrations may vary from location to location. Disposed wastes have been reported to include general household garbage as well as paints, paint thinners, solvent cans, bilge water and waste oil (possibly containing PCBs). Previous soil sampling investigations at SWMU 3 have determined the presence of various metals and SVOCs/PAHs. Low concentrations of PCBs (specifically Arochlor-1254) were also determined to be present in soils. Groundwater analytical data from previous investigations at SWMU 3 indicate the presence of various metals. Available analytical data from the most recent field investigation does not show the presence of significant concentrations of VOCs, however, based on historical site use and disposal practices, these contaminants may exist.

Calculations using available analytical data show that none of the contaminants of concern are likely to pose an occupational exposure hazard to site personnel performing site investigation activities. Air monitoring equipment (See Section 7.0 and Table 5-1) will be used to further evaluate the presence of potential VOCs and to alert site workers of conditions which may lead to potential exposure. Additionally,

the use of safe work practices and PPE discussed in this HASP will minimize the potential for exposure to site contaminants that may be present in soil and groundwater.

6.1.2 SWMU 10 Contaminants of Concern

SWMU 10 is an oil-water separator (OWS) that was used to treat bilge water. The OWS may have also been used to dispose of chlorinated solvents and possibly PCBs. Sampling performed in 1992 confirmed the presence of chlorinated solvents in soil and groundwater. The most recent soil sampling at SWMU 10 indicated the presence of metals, SVOCs/PAHs, and low concentrations of VOCs (primarily ethylbenzene, xylene, and toluene) and pesticides. Analytical data from previous groundwater sampling events indicate the presence of metals and very low concentrations of SVOCs and VOCs.

Calculations using analytical data from the most recent field investigation show that none of the contaminants of concern are likely to pose an occupational exposure hazard to site personnel performing site investigation activities. However, air monitoring will be used to evaluate the presence of potential VOCs and to prevent exposures. Additionally, the use of safe work practices and PPE discussed in this HASP will minimize the potential for exposure to site contaminants that may be present in soil and groundwater.

6.1.3 AOC 1 Contaminants of Concern

AOC 1 is a former firefighting training pit. Materials reported to be used for the firefighting exercises included waste oils (possibly containing PCBs), fuels (diesel, gasoline, and JP-5), paint, paint thinner, and bilge water. Previous sampling investigations have indicated the presence of metals and low concentrations of VOCs; primarily chlorinated solvents such as 1,1,1-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethene, and trichloroethene, and constituents of petroleum products such as ethylbenzene, xylenes, and toluene.

Calculations using analytical data from the most recent field investigation show that none of the contaminants of concern are likely to pose an occupational exposure hazard to site personnel performing site investigation activities. However, air monitoring will be used to evaluate the presence of potential VOCs and to prevent exposures. Additionally, the use of safe work practices and PPE discussed in this HASP will minimize the potential for exposure to site contaminants that may be present in soil and groundwater.

**TABLE 6-1
CHEMICALS AND POTENTIAL CONTAMINANTS OF CONCERN FOR
SWMU 3, 10 AND AOC 1
NSA PANANMA CITY, PANAMA CITY, FL**

Substance	CAS No.	Air Monitoring/Sampling Information	Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information	
GENERAL CHEMICALS							
Diesel Fuel No.2-D	Mixture	Components of this substance will be detected readily however no documentation exists as to the relative response ratio of either PID or FID.	Air sampling use charcoal tube as a collection media; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol in accordance with NIOSH Method #1550.	OSHA/NIOSH/ACGIH: 5 mg/m ³ as mineral oil mist. In addition NIOSH and ACGIH establish 10 mg/m ³ as a STEL.	Kerosene odor Recommended Air Purifying cartridges: Organic vapor Recommended gloves: Nitrile	Boiling Pt: <170-400°F; 77-204°C Melting Pt: Not available Solubility: Negligible Flash Pt: 125°F; 52°C LEL/LFL: 0.6% UEL/UFL: 7.5% Vapor Density: >5 Vapor Pressure: <1 mmHg @ 70°F; 21°C Specific Gravity: 0.86 Incompatibilities: strong oxidizers, halogens, and hypochlorites Appearance and odor: Colorless to amber with a kerosene odor	Prolonged or repeated exposures to this product may cause skin and eye irritation. Due to the defatting capabilities this exposure may lead to a dermatitis condition. High vapor concentrations are irritating to the eyes and respiratory tract. Exposure to high airborne concentrations may result in narcotic effects including dizziness, headaches, and anesthetic to unconsciousness. High concentrations in a confined space may adequately displace oxygen thereby resulting in suffocation.
Waste Oils All information is based on mineral oil	N.E. 8012-95-1 for mineral oil	Varies between fractions however waste oils tend to be less volatile. The FID tends to handle the longer chained aliphatic hydrocarbons more efficiently than its PID counterpart and would be selected as the instrument of choice.	Sampling and analytical protocol shall be in accordance with NIOSH Method #5026 is the recommended method for mineral oil mist.	ACGIH; NIOSH: 5 mg/m ³ (Oil mists); 10 mg/m ³ STEL OSHA: 5 mg/m ³ (Oil mists)	Non-volatile substance, therefore no respiratory protection is required. In an aerosol form dust and mist respirator would be considered acceptable for up to 500 mg/m ³ . Recommended gloves: Any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances, and will be acceptable).	Boiling Pt: 680°F; 360°C Melting Pt: Not available Solubility: Insoluble Flash Pt: 275-500°F; 135-260°C depends on the distillation fraction LEL/LFL: Not available UEL/UFL: Not available Vapor Density: Not available Vapor Pressure: <0.5 mmHg Specific Gravity: 0.90 Incompatibilities: None reported Appearance and odor: Colorless, oily, with an odor of burned lubricating oil.	Minor irritation to the eyes, skin, and respiratory system.
Gasoline	8006-61-9	Relative response ratios for the components of gasoline range from 100 - 200% for PID and FID detection.	See components for measurement considerations.	ACGIH & OSHA: 300 ppm 500 ppm STEL NIOSH: Reduce to lowest feasible concentration.	Respiratory Protection: Odor threshold 0.7 ppm, adequate air purifying respirator with organic vapor cartridges up to 100 ppm. Recommended Gloves: Nitrile >6.00 hrs; PV alcohol >6.00 hrs; Viton/neoprene >8.00 hrs	Boiling Pt: 102°F; 39°C Melting Pt: Not available Solubility: Negligible Flash Pt: -50°F; -45°C LEL/LFL: 1.4% UEL/UFL: 7.6% Vapor Density: ~5 Vapor Pressure: 38-300 mmHg (varies seasonally) Specific Gravity: 0.74 @ 20/20°C Incompatibilities: Strong oxidizers, peroxides, strong acids, and perchlorates Appearance and Odor: Colorless liquid with gasoline odor.	Overexposure to this substance may result in irritation to the eyes, skin, and mucous membranes. Systemically, headache, fatigue, blurred vision, dizziness, slurred speech, confusion, possible convulsion, and chemical pneumonia (aspiration). Prolonged or chronic exposures may result in possible liver or kidney damage. Components of this substance have been determined to be confirmed human carcinogens.

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CHEMICALS AND POTENTIAL CONTAMINANTS OF CONCERN FOR
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Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
GENERAL CHEMICALS (Cont.)							
JP-5 Jet Petroleum – 5 Components Petroleum distillates, hydrotreated light (64742-47-8) (100%) and antioxidant and metal deactivator <100 ppm	64742-47-8	PID (10.6 eV Lamp Strength Correction factor = 0.6 FID = LEL Meter = 0.85	Air sample using charcoal tube. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #1501. See also OSHA CSI Method application.	Manufacturer's Recommendation – 100 ppm (750 mg/m ³) for 8-Hour work day. No regulatory or advisory limits have been set.	Petroleum odor threshold ~ 800 ppm Rating - Poor to Adequate Recommended Air Purifying cartridges: Organic vapor Recommended gloves: NitrilSolve 727 (>480 minutes) or Neporene 6780 (287 minutes)	Characteristics vary by fuel blending, grade, and manufacturer (e.g., impurities and additives) Boiling Pt: 338-554°F, 170-290°C Melting Pt: -51° F; -46°C Molecular Weight: ~185 Flash Pt: 140°F, 60°C LEL: 0.9% UEL: 7% Autoignition Temp.: 475°F; 246°C Vapor Density: >1 - 5 Vapor Density: <5 @ 20°C SG: 0.788 to 0.845 Solubility in water: Negligible (<0.1%) @ 77°F; 25°C Viscosity: 8.5 cST@ -4°F -20°C Appearance and Odor: Clear water-white liquid with faint petroleum odor Avoid contact with heat, sparks and flame Avoid contact with strong oxidizing agents.	JP-5 is irritating to the eyes, skin, and respiratory tract (This through direct contact or reaching concentrations >700 ppm). Direct contact may result in mild irritation with a possible drying and defatting of the skin. Ingestion may result in gastrointestinal irritation, nausea, and vomiting and may be harmful or even fatal. Inhalation of vapors or mists of JP-5 may result in headache, nausea, confusion, narcotic effect, and drowsiness. Acute exposures to extreme airborne concentration can result in death. Chronic inhalation of jet fuel vapors may produce symptoms such as fatigue, anxiety, mood changes, liver and kidney damage, and memory difficulties in exposed workers. Repeated exposures to the skin may cause skin cancer.
SVOCs/PAHs							
Acenaphthalene	83-32-9 208-96-8	No information found concerning ionization potentials or relative response ratios for PID or FID detection.	Air sample using charcoal tube; carbon disulfide desorption; GC/FID detection; Sampling and analytical protocol in accordance with OSHA 07 or NIOSH Method #1501	None established for this compound. However, it is recommended that 0.2 mg/m ³ for coal tar pitch volatiles be employed where excessive concentrations may exist. This is more relevant for those PAHs considered carcinogenic.	Information regarding this substance was limited. This material is a natural constituent of coal tar. Adequate - Odor threshold 0.08-0.22 ppm. OSHA accepts the use of air-purifying respirators with organic vapor cartridge up to 10 mg/m ³ , providing cartridges are changed at the beginning of each shift. Recommended gloves: Butyl - >8.00 hrs; are recommended for other coal tar pitch associated substances; Neoprene >4.00 hrs; Nitrile >1.00 hrs	Boiling Pt: 534°F; 279°C Melting Pt: 203°F; 95°C Solubility: Insoluble Flash Pt: Not available LEL/LFL: Not available UEL/UFL: Not available Density: 1.189 Vapor density: 5.32 Vapor Pressure: 10 mmHg Specific Gravity: 1.189 Incompatibilities: Strong oxidizers, caustics, and acids Appearance and Odor: Colorless needles with an aromatic odor at concentrations of 0.08-0.22 ppm	Overexposure may result in irritation to the eyes, nose, throat, and respiratory system.

**TABLE 6-1
CHEMICALS AND POTENTIAL CONTAMINANTS OF CONCERN FOR
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Substance	CAS No.	Air Monitoring/Sampling Information	Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information	
SVOCs/PAHs (Cont.)							
Phenanthrene	85-01-8	Ionization potential for this compound is unknown. This material is combustible however the relative response ratio concerning FID detection is unknown.	Air sample using glass fiber filter, 37 mm cassette with pore size ranging from 0.8 to 1.0 microns in size; Gravimetric or HPLC-UV detection; Sampling and analytical protocol in accordance with OSHA Method #58.	It is recommended that 0.2 mg/m ³ for coal tar pitch volatiles be employed where excessive airborne concentrations may exist. This is more relevant for those PAHs considered carcinogenic. This substance is considered questionable regarding carcinogenic potential.	Information regarding this substance was limited. This material is a natural constituent of coal tar. Adequate - Odor threshold 0.055-0.060 ppm. OSHA accepts the use of air-purifying respirators with organic vapor cartridge up to 10 ppm, providing cartridges are changed at the beginning of each shift. Recommended gloves: Butyl >8.00 hrs; are recommended for other coal tar pitch associated substances; Neoprene >4.00 hrs; Nitrile >1.00 hrs	Boiling Pt: 644°F; 340°C Melting Pt: 212°F; 100°C Solubility: Insoluble in water Flash Pt: Not available LEL/LFL: Not available UEL/UFL: Not available Density: 1.179 @ 77°F; 25°C Vapor Density: 6.14 Vapor Pressure: 1 mmHg @ 245°F; 118.3°C Specific Gravity: 1.025 Incompatibilities: Strong oxidizers, alkalis, and acids. Appearance and Odor: Colorless leaflets with a burnt acid odor.	Overexposure to this substance has shown to be a skin, eye, and mucous membrane irritant. This substance is considered a photosensitizer and mild allergen. This substance is considered mildly to moderately toxic by ingestion.
Benzo(a)pyrene	50-32-8	Particulate form - This substance is not detectable using a PID or FID.	Air sample using a glass fiber or silver membrane filter; analysis by gas chromatography/infrared or other spectrophotometric method or colorimeter. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #1(186).	OSHA: 0.2 mg/m ³ NIOSH: 0.1 mg/m ³	Adequate - use a full-face air-purifying respirator with dust/mist cartridge up to 10 mg/m ³ . Recommended glove: Nitrile	Boiling Pt: 594°F; 312°C Melting Pt: 354°F; 179°C Solubility: Insoluble Flash Pt: Not available LEL/LFL: Not available UEL/UFL: Not available Vapor Density: Not available Vapor Pressure: 10 mmHg @ 594°F; 312°C Specific Gravity: Not available Incompatibilities: Not available Appearance and Odor: Yellow odorless crystals.	Regulated primarily as a result of potential carcinogenic properties. Listed by NTP, IARC, and ACGIH as carcinogenic.

TABLE 6-1
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Substance	CAS No.	Air Monitoring/Sampling Information	Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information	
SVOCs/PAHs (Cont.)							
Creosote / cresol (Fluoranthene, pyrene)	8001-58-9 1319-77-3 (206-44-0)	PID: I.P. of 8.97 eV, relative response ratio unknown. FID: Response factor unknown but given the substances flammability, detection by FID can be anticipated.	Air sampling for cresol (a major constituent of creosote) by silica gel or xad-7 sorbent tube; Acetone desorption and analysis by gas chromatography - flame ionization detector or high-pressure liquid chromatography. Sampling and analytical protocol shall be in accordance with NIOSH Method #2001, or OSHA Method #32	OSHA; ACGIH: 5 ppm NIOSH: 2.3 ppm IDLH: 80 mg/m ³	Adequate - use a full-face air-purifying respirator with organic vapor / dust/mist cartridge up to 250 ppm. Odor Threshold of cresol is 0.00005-0.0079 ppm. Recommended gloves: Viton >96.00 hrs; butyl rubber >90.00 hrs; neoprene >4.50 hrs	Boiling Pt: 376-397°F; 191-203°C Melting Pt: 52-96°F; 10.9-35.5°C Solubility: Insoluble Flash Pt: 178°F; 81°C LEL/LFL: Not available UEL/UFL: Not available Vapor Density: 3.72 Vapor Pressure: 1 mmHg @ 100-127°F; 38-53°C Specific Gravity: 1.030-1.038 Incompatibilities: Nitric acid, oleum, chlorosulfonic acid, oxidizers Appearance and Odor: Yellowish or colorless, flammable, oily liquid (often brownish because of impurities or oxidation)	Regulated based on effects on central nervous system, and respiratory system. Acute exposures may result in difficulty breathing, respiratory failure and skin and eye burns. Chronic exposure may damage the liver, kidneys, lungs and skin.
Metals							
Aluminum	7429-90-5	Particulate form - unable to be detected by PID/FID.	Air sample using a cellulose ester membrane filter (particulate filter); atomic absorption (Method #7013) or ICP (Method #7300). Sampling and analytical protocol shall proceed in accordance with NIOSH Methods #7013 and #7300 as applicable.	OSHA: 15 mg/m ³ Total dust, 5 mg/m ³ Respirable fraction NIOSH: 10 mg/m ³ Total dust, 5 mg/m ³ Respirable fraction ACGIH: 10 mg/m ³	Particulate form - No identifiable warning properties to indicate presence and thereby detection. Employ air purifying respiratory protection suitable for dust and fume. Organic vapor acid gases with HEPA filter. Recommended gloves: this is in the particulate form. Therefore any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances).	Boiling Pt: 4452°F; 2450°C Melting Pt: 1220°F; 660°C Solubility: Insoluble Flash Pt: Nonflammable LEL/LFL: Nonflammable UEL/UFL: Nonflammable It should be noted that finely divided powders or dust when airborne becomes moderately flammable/explosive when exposed to heat, flame, or powerful oxidizers Vapor Density: Not available Vapor Pressure: 1 mm @ 2343°F; 1284 °C Specific Gravity: 2.702 @ 77°F; 25°C Incompatibles: Acids, alkalis, oxidizers, halogens and halocarbons, alcohols Appearance and odor: silvery gray ductile, lustrous metal	Inhalation of finely divided powders or dusts may result in difficulty in breathing, coughing, and has been reported to cause pulmonary fibrosis. This malady known as "Shavers disease" is a form of benign pneumoconiosis.

**TABLE 6-1
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Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Metals (Cont.)							
Lead	7439-92-1	Particulate form - Unable to be detected by either PID or FID.	Air sample using a mixed cellulose ester filter; or HNO ₃ or H ₂ O ₂ desorption; or Atomic absorption detection. NIOSH Method #7082 or #7300.	OSHA: 0.05 mg/m ³ ACGIH: 0.05 mg/m ³ NIOSH: 0.10 mg/m ³ IDLH: 100 mg/m ³ as lead	The use of a air purifying, full-face respirator with high efficiency particulate air filter for up to 2.5 mg/m ³ . Recommended gloves: This is in the particulate form. Therefore any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances).	Boiling Pt: 3164°F; 1740°C Melting Pt: 621°F; 327°C Solubility: Insoluble Flash Pt: Not applicable (Airborne dust may burn or explode when exposed to heat, flame, or incompatible chemicals) LEL/UFL: Not applicable UEL/UFL: Not applicable Vapor Density: Not available Vapor Pressure: 0 mmHg Specific Gravity: 11.34 Incompatibilities: Strong oxidizers, peroxides, sodium acetylde, zirconium, and acids Appearance and Odor: Metal: A heavy ductile, soft gray solid.	Overexposure to this substance via ingestion or inhalation may result in metallic taste in the mouth, dry throat, thirst, Gastrointestinal disorders (burning stomach pain, nausea, vomiting, possible diarrhea sometimes bloody or black, accompanied by severe bouts of colic), CNS effects (muscular weakness, pain, cramps, headaches, insomnia, depression, partial paralysis possibly coma and death. Extended exposure may result in damage to the kidneys, gingival lead line, brain, and anemia.
Manganese	7439-96-5 as Mn	Particulate form - This substance is unable to be detected by PID/FID.	Air sample using particulate filter; acid desorption, ICP detection. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #7300.	OSHA: Ceiling 5 mg/m ³ as a fume 1 mg/m ³ NIOSH: 1 mg/m ³ for dust and fume 3 mg/m ³ as a STEL ACGIH: 5 mg/m ³ for dust 1 mg/m ³ for fume IDLH: 500 mg/m ³	No identifiable warning properties to indicate presence and thereby detection. Recommended APR Cartridge: Suitable for dust and fume. Organic vapor acid gases with HEPA filter. Recommended gloves: This is in the particulate form. Therefore any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances).	Boiling Pt: 3452°F; 1900°C Melting Pt: 2300°F; 1260°C Solubility: Insoluble Flash Pt: Not available (Airborne dust may burn or explode when exposed to heat, flame, or incompatible chemicals. This substance is considered a combustible solid.) LEL/UFL: Not available UEL/UFL: Not available Vapor Density: Not available Vapor Pressure: 1 mmHg @ 2358°F; 1292°C Specific Gravity: 7.20 Incompatibilities: Strong oxidizers, halogens, and nitrates. Will react with water to produce hydrogen gas. Appearance and odor: Silvery solid or reddish-gray, odorless	Overexposure to this product may result in Central Nervous System and pulmonary effects by inhalation. Symptoms may include disturbances in gait and speech, sleepiness, mental confusion, stolid, masklike face, muscular twitching varying from tremors to coarse rhythmical movements of the extremities accompanied by cramps. Symptoms are described as postencephalitic Parkinsonism. Additionally dry throat, tightness in the chest, dyspnea, rales, flu-like symptoms low back pain, and vomiting.

**TABLE 6-1
CHEMICALS AND POTENTIAL CONTAMINANTS OF CONCERN FOR
SWMU 3, 10 AND AOC 1
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Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Metals (Cont.)							
Zinc	7440-66-6	Particulate form - This substance is not detectable using a PID or FID.	Air sample using a particulate filter; acid desorption; AAS detection. Sampling and analytical protocol will proceed in accordance with NIOSH Method #7300.	OSHA: 10 mg/m ³ Total dust, 5 mg/m ³ Respirable fraction NIOSH: 5 mg/m ³ , 15 mg/m ³ (Ceiling) ACGIH: 10 mg/m ³	No identifiable warning properties to indicate presence and thereby detection. Recommended APR Cartridge: Suitable for dust and fume. Organic vapor acid gases with HEPA filter. Recommended gloves: This is in the particulate form. Therefore any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances).	Boiling Pt: 1666°F; 908°C Melting Pt: 788°F; 419.8°C Solubility: Insoluble Flash Pt: Not available (Airborne dust may burn or explode when exposed to heat, flame, or incompatible chemicals) LEL/LFL: Not available UEL/UFL: Not available Vapor Density: Not available Vapor Pressure: 0 mmHg Specific Gravity: 7.14 Incompatibilities: Strong acids, halogens, catalytic metals, combustibles, oxidizers, nitryl fluoride Appearance and odor: Bluish-white, lustrous metal, odorless	Inhalation of fumes may result in metal fume fever. This condition is characterized by metallic taste, dryness of the throat, coughing with generalized aching and flu-like symptoms. Effects through ingestion may include coughing, difficulty in breathing, and sweating. A human skin irritant. Irritation to the eyes may result from mechanical action.
VOCs							
1,1,1-Trichloroethane	71-55-6	PID: I.P. 11.0 eV, Relative response ration unknow FID: 105% relative response ration with FID	Air sample using charcoal tube; carbon disulfide desorption. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #1003	OSHA; ACGIH: 350 ppm NIOSH: 350 ppm ceiling limit.	Odor Threshold 22.4 ppm. APRs may be used however they have a very short service life. Recommended glove: Butyl; Polyvinyl alcohol; Viton	Boiling Pt: 165°F; 74°C Melting Pt: Unkown Solubility: 0.4% Flash Pt: Unkown LEL/LFL: 7.5% UEL/UFL: 12.5% Vapor Density: Unkown Vapor Pressure: 100 mmHg Specific Gravity: 1.34 Incompatibilities: Strong oxidizers, strong caustics, chemically active metals (zinc, aluminum, magnesium powders, sodium and potassium. Appearance and odor: Colorless liquid with a mild, chloroform-like odor.	Overexposure may result in CNS depression, headache, loss of balance, irritation to the skin and eyes, dermatitis, cardiac arrhythmia, and liver damage.
Ethylbenzene	100-41-4	PID: I.P 8.76, High response with PID and 10.2 eV lamp. FID: 100% response with FID.	Air sample using charcoal tube; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol in accordance with OSHA Method #07 or NIOSH Method #1501 Aromatic Hydrocarbon.	ACGIH & NIOSH: 100 ppm; 125 ppm STEL OSHA: 100 ppm IDLH: 800 ppm	Adequate - Can use air-purifying respirator with organic vapor cartridge up to 1,000 ppm. Recommended gloves: Neoprene or nitrile w/ silver shield when potential for saturation; Teflon >3.00 hrs	Boiling Pt: 277°F; 136°C Melting Pt: -139°F; -95°C Solubility: 0.01% Flash Pt: 55°F; 13°C LEL/LFL: 1.0% UEL/UFL: 6.7% Vapor Density: 3.66 Vapor Pressure: 10 mmHg @ 79°F; 26° C Specific Gravity: 0.87 Incompatibilities: Strong oxidizers Appearance and odor: Colorless liquid with an aromatic odor. Odor Threshold of 0.092-0.60.	Regulated primarily because of its potential to irritate the eyes and respiratory system. In addition, effects of overexposure may include headaches, narcotic effects, CNS changes (i.e., coordination impairment, impaired reflexes, tremoring) difficulty in breathing, possible chemical pneumonia, and potentially respiratory failure or coma.

**TABLE 6-1
CHEMICALS AND POTENTIAL CONTAMINANTS OF CONCERN FOR
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Substance	CAS No.	Air Monitoring/Sampling Information	Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information	
VOCs (Cont.)							
Toluene	108-88-3	PID: I.P. 8.82 eV, High response with PID and 10.2 eV lamp. FID: 110% response with FID.	Air sample using charcoal tube; carbon disulfide desorption. Sampling and analytical protocol shall proceed in accordance with OSHA Method #07, or NIOSH Method #1500.	OSHA: 200 ppm 300 ppm (Ceiling) ACGIH: 50 ppm (skin) NIOSH: 100 ppm 150 ppm STEL IDLH: 500 ppm	Adequate - Odor threshold 1.6 ppm is considered good. Can use air-purifying respirator with organic vapor cartridge up to 1,000 ppm. Recommended gloves: Teflon >15.00 hrs; Viton >16.00 hrs; silver shield >6,00 hrs; supported nitrile (Useable time limit 0.5 hr, complete submersion for the nitrile selection); PV alcohol >25.00 hrs	Boiling Pt: 232°F; 111°C Melting Pt: -139°F; -95°C Solubility: 0.05% (61°F;16°C) Flash Pt: 40°F; 4°C LEL/LFL: 1.2% UEL/UFL: 7.1% Vapor Density: 3.14 Vapor Pressure: 20 mmHg @ 65°F; 18° C Specific Gravity: 0.87 Incompatibilities: Strong oxidizers Appearance and odor: Colorless liquid with a sweet pungent aromatic odor.	Overexposure to this substance may result in mild to moderate irritation at all points of contact, and CNS changes including euphoria, confusion, nervousness, and possibly paresthesia characterized by an abnormal burning sensation, pricking, or numbness. At 200-500 ppm exposure has resulted in headaches, nausea, eye irritation, loss of appetite, bad taste, impair coordination, fatigue, and weariness. Chronically, toluene overexposure may result in dermatitis, liver, and kidney damage.
Trichloroethylene	79-01-6	PID: I.P. 9.45 eV, High response with PID and 10.2 eV lamp. FID: 70% Response with FID.	Air sample using charcoal tube; carbon disulfide desorption; Sampling and analytical protocol shall proceed in accordance with OSHA Method #07, or NIOSH Method #1022 or #1003.	OSHA: 50 ppm 200 ppm (Ceiling) ACGIH: 50 ppm 100 ppm STEL NIOSH: 25 ppm IDLH: 1000 ppm	Inadequate - Odor threshold 82 ppm. APRs with organic vapor/acid gas cartridges may be used for escape purposes. Exceedances over the exposure limits require the use of positive pressure-demand supplied air respirator. Recommended gloves: PV Alcohol unsupported >16.00 hrs; Silver shield >6.00 hrs; Teflon >24.00 hrs; or Viton >24.00 hrs; Nitrile (Useable time limit 0.5 hr, complete submersion for the nitrile selection)	Boiling Pt: 188°F; 86.7°C Melting Pt: -99°F; -73°C Solubility: 0.1% @ 77°F; 25°C Flash Pt: 90°F; 32°C LEL/LFL: 8% @ 77°F; 25°C UEL/UFL: 10.5 @ 77°F; 25°C Vapor Density: 4.53 Vapor Pressure: 100 mmHg @ 90°F; 32 °C Specific Gravity: 1.46 Incompatibilities: Strong caustics and alkalis, chemically active metals (barium, lithium, sodium, magnesium, titanium, and beryllium) Appearance and Odor: Colorless liquid with a chloroform type odor. Combustible liquid, however, burns with difficulty.	Central nervous system effects including euphoria, analgesia, anesthesia, paresthesia, headaches, tremors, vertigo, and somnolence. Damage to the liver, kidneys, heart, lungs, and skin have also been reported. Contact may result in irritation to the eyes, skin, and mucous membranes. Ingestion may result in GI disturbances including nausea, and vomiting NIOSH lists this substance a potential human carcinogen.

**TABLE 6-1
CHEMICALS AND POTENTIAL CONTAMINANTS OF CONCERN FOR
SWMU 3, 10 AND AOC 1
NSA PANANMA CITY, PANAMA CITY, FL**

Substance	CAS No.	Air Monitoring/Sampling Information	Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information	
VOCs (Cont.)							
Xylene All isomers o-, m-, p-	1330-20-7	PID: I.P. 8.56 eV, High response with PID and 10.2 eV lamp. FID: 110% response with FID.	Air sample using charcoal tube; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol shall proceed in accordance with OSHA 07, or NIOSH Method 1500.	ACGIH, & NIOSH: 100 ppm, 150 ppm STEL OSHA: 100 ppm IDLH: 900 ppm	Adequate - Odor thresholds for the following isomers: 0.6 m-; 5.4 p-; 20 o- ppm. Can use air-purifying respirator with organic vapor cartridge up to 1,000 ppm concentrations. Recommended gloves: PV Alcohol >12.67 hrs; Viton >8.00 hrs; CPE >1.00 hr; Butyl 0.87 hrs; Nitrile is acceptable for limited operations and contact (>0.20 hrs)	Boiling Pt: 269-281°F; 132-138°C Melting Pt: -130/-54m/56p°F; -250/-48m/13p °C Solubility: 0.02 % Flash Pt: 81-90°F;27-32°C LEL/LFL: 0.9% UEL/UFL: 7.0% Vapor Density: 3.66 Vapor Pressure: 7-9 mmHg @ 70°F; 21° C Specific Gravity: 0.86-0.88 Incompatibilities: Strong oxidizers and strong acids Appearance and odor: Colorless liquid with an aromatic odor.	Effects may of overexposure include irritation at all points of contact, CNS changes (i.e. dizziness, excitement, drowsiness, incoherent, staggering gait), difficulty in breathing, pulmonary edema, and possibly respiratory failure. Chronic effects may include dermatitis and cornea vacuolization.
1,1-Dichloroethane	75-34-3	PID: I.P. 11.06 eV, relative response ratio unknown. FID: 80% relative response ratio with FID.	Air sample using charcoal tube; carbon disulfide desorption. Sampling and analytical protocol shall proceed in accordance with OSHA Method #07-B or NIOSH Method #1003	OSHA; NIOSH; ACGIH: 100 ppm IDLH: 4000 ppm	Questionable warning properties - Odor threshold 49 - 1359 ppm. APRs may be employed for escape only. Exceedances over the exposure limits are recommended to use airline or airline/APR combination type respirator. Recommended glove: Butyl; Polyvinyl alcohol; Viton	Boiling Pt: 135°F; 57°C Melting Pt: -143°F; -97°C Solubility: 0.6% Flash Pt: 2°F; -17°C LEL/LFL: 5.6% UEL/UFL: 11.4% Vapor Density: 3.42 Vapor Pressure: 182 mmHg Specific Gravity: 1.18 Incompatibilities: Strong oxidizers, strong caustics Appearance and odor: Colorless, oily liquid with a chloroform-like odor.	Overexposure may result in CNS depression, skin and eye irritation, and damage to the liver, kidneys, and lungs.
Naphthalene	91-20-3	PID: I.P. 8.12 eV, relative response ratio unknown. No information was found as to the relative response for FID, however it is certain it is detectable at a high response.	Air sample using charcoal tube; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol in accordance with OSHA Method #35 or NIOSH Method #1501.	OSHA; NIOSH; ACGIH: 10 ppm NIOSH; ACGIH: have established a STEL of 15 ppm. IDLH: 250 ppm	Odor Threshold 0.038 ppm, Adequate - Use an air purifying respirator with organic vapors and dust/mists cartridges for concentrations up to 250 ppm. Recommended glove: Nitrile >6.00 hrs; Neoprene >6.00 hrs	Boiling Pt: 424°F; 218°C Melting Pt: 176°F; 80°C Solubility: 0.003% Flash Pt: 174°F; 79°C LEL/LFL: 0.9% UEL/UFL: 5.9% Vapor Density: Not available Vapor Pressure: 1 mmHg Specific Gravity: 1.15 Incompatibilities: Strong oxidizers, chromic anhydride Appearance and odor: Colorless to brown solid with and odor of mothballs	Overexposure to this substance may result in irritation to the eyes, headache, confusion, excitement, nausea, vomiting, abdominal pain, irritation of the bladder, profuse sweating, jaundice, blood in the urine, renal (kidney shutdown), and dermatitis. Prolonged or chronic exposure may further cause optical neuritis, and corneal damage. Target organs are listed as eyes, blood, liver, kidneys, skin, red blood cells, and central nervous system.

**TABLE 6-1
CHEMICALS AND POTENTIAL CONTAMINANTS OF CONCERN FOR
SWMU 3, 10 AND AOC 1
NSA PANANMA CITY, PANAMA CITY, FL**

Substance	CAS No.	Air Monitoring/Sampling Information	Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information	
VOCs (Cont.)							
1,1 Dichloroethene See also vinylidene chloride	75-34-4	PID: I.P. 10.00 eV, relative response ratio is 80%. FID: Relative response ratio for detection with the FID is 40%.	Air sample using a charcoal filter tube; carbon disulfide desorption; GC/FID detection in accordance with NIOSH Method #1015.	ACGIH: 5 ppm, STEL 20 ppm NIOSH & OSHA have not established exposure limits.	Odor threshold - 190 ppm. An air purifying respirator equipped with a organic vapors filter is acceptable for escape purposes only. For exposures greater than the recommended exposures limits should employ supplied air respirators. Recommended glove: Butyl, nitrile, or neoprene.	Boiling Pt: 89°F; 32°C Melting Pt: -188°F; -122°C Solubility: Slight (0.04%) Flash Pt: -2°F; -19°C LEL/LFL: 6.5% UEL/UFL: 15.5% Vapor Density: 3.25 Vapor Pressure: 500 mmHg @ 68°F; 20 °C Specific Gravity: 1.21 @ 20°F; 4°C Incompatibilities: Aluminum, air, copper, and heat. Polymerization may occur if exposed to oxidizers. Appearance and Odor: Colorless liquid with a slight sweet chloroform odor.	Overexposure to this substance may result in irritation to the eyes, nose, throat, and respiratory system. Dermal contact with concentrated solutions may cause slight irritation, redness and inflammation. Systemically, headaches, dizziness, nausea, and difficulty in breathing. Chronic effects may include kidney and liver dysfunction, and pneumonitis. This material has expressed cancer causing potential in laboratory animals including liver and kidney tumors.
PCBs							
Aroclor-1260 (Polychlorinated Biphenyl, PCB) It should be noted that this substance is representative of the more common isomers Aroclor - 1242, 1254, which may be encountered.	11096-82-5 53469-21-9 (42%) 11097-69-1 (54%)	Substance is not volatile (VP=0.00006 mmHg), I.P. is unknown however is anticipated to be elevated, therefore, PID is not anticipated to detect substance. Substance is non combustible and as a result will not be detected by FID.	Air sample using a particulate filter, Florisil sorbent tube with glass fiber filter; hexane desorption; gas chromatography-electron capture detector. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #5503 (PCBs).	OSHA; ACGIH: 0.5 mg/m3 (skin) NIOSH: 0.001 mg/m3 IDLH: 5 mg/m3	Inadequate - However due to the low volatility it is assumed unless agitated this substance does not present a volatile vapor or gas respiratory threat. For dusty conditions where this material may cling to particulates, use a HEPA filter. APRs are approved for escape only when concentrations exceed the exposure limits. Concentrations greater than the exposure limits require PAPR or supplied air respirators. Recommended glove: Butyl rubber >24 hrs; Neoprene rubber >24.00 hrs; Silver shield or Viton (for pure product).	Boiling Pt: distillation range 689- 734° F; 365-390°C Melting Pt: -2 to 50°F; -19 to 10°C Solubility: Insoluble Flash Pt: Not applicable LEL/LFL: Not applicable UEL/UFL: Not applicable Nonflammable liquid, however, exposure to fire results in black soot containing PCBs, dibenzofurans, & chlorinated dibenzo-p-dioxins Vapor Density: Not available Vapor Pressure: 0.00006 - 0.001 mmHg Specific Gravity: 1.566 @ 60°F; 15.5°C Incompatibilities: Strong oxidizers Appearance and Odor: Colorless to pale yellow, viscous liquid or solid (Aroclor 54 below 50°F) with a mild, hydrocarbon odor	This substance is irritating to the eyes and skin. Chronic effects of overexposure may include potential to cause liver damage, chloracne, and reproductive effects. Recognized as possessing carcinogenic properties by NIOSH, and NTP.

**TABLE 6-1
CHEMICALS AND POTENTIAL CONTAMINANTS OF CONCERN FOR
SWMU 3, 10 AND AOC 1
NSA PANANMA CITY, PANAMA CITY, FL**

Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Pesticides							
DDT and the major metabolites; DDD and DDE.	50-29-3 72-54-8 72-55-9	Substance is not volatile, I.P. is unknown, detection by PID is unknown. Substance non-combustible, therefore a FID is anticipated to have reduced response to DDT.	Air sample using a binder free, glass fiber filter; isooctane desorption; gas chromatography-electron capture detector. Sampling and analytical protocol will proceed in accordance with NIOSH Method #3(S274).	OSHA; ACGIH: 1 mg/m3 NIOSH: 0.5 mg/m3	Adequate - Can use air purifying respirator with high efficiency particulate air filter (HEPA). Recommended glove: Nitrile acceptable for incidental contact.	Boiling Pt: 230°F; 110°C Melting Pt: 226°F; 108°C Solubility: Insoluble Flash Pt: 162-171°F; 72-77°C LEL/LFL: Not available UEL/UFL: Not available Vapor Density: Not available Vapor Pressure: Low Specific Gravity: 0.99 Incompatibilities: Strong oxidizers and alkalis Appearance and Odor: Colorless crystals or off-white powder with a slight aromatic odor	Large doses are followed by vomiting due to gastric irritation, diarrhea may follow. Numbness and paresthesias of the lips tongue and face associated with malaise, headache, sorethroat, fatigue and weakness. Coarse tremors (usually first of the neck, head, and eyelids). This may be accompanied by confusion, apprehension, and depression. Convulsions may result and death may occur from respiratory failure. DDT is absorbed and retained in the fat of humans. Chronic exposure may result in damage to the liver, kidneys and Peripheral Nervous System. DDT is recognized as possessing carcinogenic properties by IARC and NTP.

6.2 PHYSICAL HAZARDS

The following is a list of physical hazards that may be encountered at the site or may present during the performance of site activities associated with the scope of work.

- Slip, trip, and fall hazards
- Strain/muscle pulls from manual lifting
- Noise in excess of 85 dBA
- Exposure to pinch or compression points
- Entanglement or contact with moving or rotating equipment/machinery
- Contact with energized sources (aboveground and underground)
- Heat stress
- Inclement weather

These physical hazards are discussed in Table 5-1 as applicable to each site task. Further, many of these hazards are discussed in detail in Section 4.0 of the Health and Safety Guidance Manual. Specific discussions on some of these hazards are presented below.

6.2.1 Heat Stress

Work performed when ambient temperatures exceed 70° F may result in varying levels of heat stress (heat rash, heat cramps, heat exhaustion, and/or heat stroke) depending on variables such as wind speed, humidity, and percent sunshine, as well as physiological factors such as metabolic rate and skin moisture content. Additionally, workload and level of protective equipment will affect the degree of exposure. Site personnel will be encouraged to drink plenty of fluids to replace those lost through perspiration. Additional information such as Work-Rest Regimens and personnel monitoring may be found in Section 4.0 of the Health & Safety Guidance Manual.

6.3 NATURAL HAZARDS

During field activities site personnel may also encounter various natural hazards including:

- Insect bites and stings
- Vector (Ticks, mosquitoes, etc.) transmitted illnesses and diseases
- Snakes and other wild animal encounters
- Poisonous Plants

6.3.1 Insect Bites and Stings

Insect bites and stings are difficult to control given the climate and environmental setting of NSA Panama city. However, in an effort to minimize this hazard the following control measures will be initiated where possible.

- Loose fitting clothing with long sleeves, where possible (given heat stress considerations) should be employed to provide a barrier between the field person and the insects. Commercially available bug sprays and repellents can be used if necessary. Products such as DEET should not be applied directly to the skin due to potential irritation. This product should be applied over clothing articles. For mosquito infested areas mosquito nets may also be used.
- The FOL and/or the SSO will preview all access routes and work areas in an effort to identify physical hazards including nesting areas in and around the work sites. These areas will be communicated to all site personnel.

Various insects and animals may be present and should be considered. For example, fire ants present a unique situation when working outdoors in Florida. Their aggressive behavior and their ability to sting repeatedly can pose a unique health threat. The sting injects venom (formic acid) that causes an extreme burning sensation. Pustules form which can become infected if scratched. Allergic reactions of people sensitive to the venom include dizziness, swelling, shock and in extreme cases unconsciousness and death. People exhibiting such symptoms should see a physician. Fire ants can be identified by their habitat. They build mounds in open sunny areas sometimes supported by a wall or shrub. The mound has no external opening. The size of the mound can range from a few inches across to some which are in excess of two feet or more in height and diameter. When disturbed they defend it by swarming out and over the mound, even running up grass blades and sticks.

Note: It is important that any allergies be reported on the Medical Data Sheets and to the SSO. Additionally, any specific procedure for administering treatment as directed by your physician, must also be communicated to ensure the quickest and most efficient response possible.

6.3.2 Vector (Ticks, Mosquitoes, etc.) Transmitted Illnesses and Diseases

Ticks and mosquitoes, in this case, are the primary vectors of concern. These insects have been identified in the transmission of various diseases, including Lymes disease and malaria. Warm months (spring through early fall) are the predominant time for this hazard to impact personnel. However, due to the climate and environmental setting, this hazard may occur year-round.

There are various areas throughout the U.S. where Lyme Disease is endemic. Fortunately, Florida is not one of these areas. Nonetheless, personnel should be aware of the hazards of tick bites and Lyme Disease. The longer a disease carrying tick remains attached to the body, the greater the potential for contracting the disease. Wearing long sleeved shirts and long pants (tucked into boots). As well as performing frequent body checks will prevent long term attachment. Site first aid kits should be equipped with medical forceps and rubbing alcohol to assist in tick removal. For information regarding tick removal procedures, and symptoms of exposure consult Section 4.0 of the Health and Safety Guidance Manual.

Mosquito-Borne Illness

The Florida Department of Agriculture and Consumer Services (FDACS), Florida Fish and Wildlife Conservation Commission and Florida Department of Health Bureau of Epidemiology monitors mosquitoes in the state and takes actions to control their populations.

West Nile virus (WNV) has emerged in recent years in North America, presenting a threat to public health, equine health, and the health of bird populations. The most serious manifestation of infection is fatal encephalitis (inflammation of the brain) in humans and horses, as well as mortality in certain domestic and wild birds.

Encephalitis is an inflammation of the brain and can be caused by bacteria and viruses. The West Nile encephalitis is caused by a virus transmitted to humans by mosquitoes.

The mosquito becomes infected by feeding on birds infected with the WNV. Infected mosquitoes then transmit the WNV to humans and animals when biting (or taking a blood-meal).

WNV is NOT transmitted from person-to-person. There is no evidence that a person can get the virus from handling live or dead infected birds. However, avoid bare-handed contact when handling any dead animals, including dead birds. Ticks have not been implicated as vectors of West Nile-like virus.

Mild infections are common and include fever, headache, and body aches, often with skin rash and swollen lymph glands. More severe infection is marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, occasional convulsions, paralysis and, rarely, and death (especially in the elderly and very young). The incubation period of WNV is usually 3 to 12 days. There is no specific therapy or vaccine against WNV.

Precautions include:

- Limit outdoor activities during peak mosquito times – at dusk and dawn.
- Avoid standing water
- Wear long-sleeved shirts and long pants whenever you are outdoors.
- Apply insect repellent according to manufacturers instruction to exposed skin. An effective repellent will contain 20% to 30% DEET (N,N-diethyl-meta-toluamide). Avoid products containing more than 30% DEET.
- Spray clothing with repellents containing permethrin or DEET, mosquitoes may bite through thin clothing.

6.3.3 Snakes and Other Wild Animals

Indigenous animals, including snakes (poisonous and non-poisonous), raccoons, and other animals native to the region may be encountered as part of field operations. Some of the work locations may encroach on nesting areas or territories claimed by these animals.

To avoid the obvious hazards conveyed as part of a direct encounter, the following actions will be taken to minimize impact on field crews and/or site operations.

- The FOL and/or SSO will preview access routes and work locations for nesting areas or signs of animal activities (tracks, foraging areas, etc.). All identified suspect areas will be communicated to the field crews.

Snake Bites

All initial efforts will be directed to avoid, where possible, nesting and territorial areas claimed by these reptiles. However, should field personnel receive a bite, the following actions are necessary.

- Obtain a detailed description of the snake. This and the bite mark will enable medical personnel administering aid to provide prompt and correct antidotes as necessary.
- Immobilize the bite victim to the greatest extent possible. Physical exertion will mobilize the toxins (in poisonous varieties) from the bite point systemically through the body.
- Apply a pressure wrap (for extremities), just above and over the bite area. With a couple wraps of the pressure wrap in place over the bite area, apply a splint, and continue the application of the pressure

wrap. The purpose for the splint is to restrict the movement of the extremity; this along with the pressure wrap will aid in restricting the toxins from leaving the site of the bite.

- Seek medical attention immediately.

Alligators

Alligators live in all Florida counties but are most common in the major river drainage basins and large lakes in the central and southern portions of the state. They also can be found in marshes, swamps, ponds, drainage canals, phosphate-mine settling ponds, and ditches. Alligators are tolerant of poor water-quality and occasionally inhabit brackish marshes along the coast. A few even venture into salt water.

- Most human attacks associated with alligators occur when they have been fed by humans or when defending their nests.
- Under no circumstances should you approach an alligator. They are quite agile, even on land. As with any wild animal, alligators merit a measure of respect.
- Alligators are classified as a threatened species and thus enjoy the protection of state and federal law. Only representatives of the Florida Fish and Wildlife Conservation Commission are empowered to handle nuisance alligators.
- It is illegal to feed, tease, harass, molest, capture or kill alligators.
- If a serious problem does exist, contact the Florida Game and Fresh Water Fish Commission.

6.3.4 Poisonous Plants

Various plants that can cause an allergic reaction may be encountered during field work. These include, but are not limited to, poison ivy, poison oak, and poison sumac. Contact may occur when clearing vegetation to gain access to work areas.

Protective measures to control and minimize the effects of poisonous plants include the following:

- Identify plants for field personnel.
 - Poison Ivy plants are characterized climbing shrubbery, three-leaf configuration ovate to elliptical in shape, greenish flowers, and white berries that produce irritating oils.
 - Poison Sumac plants characterized as a tall bush of the sumac family bearing compound leaves (7-13 entire leaflets) branched from a central axis, drooping, with axially clusters of white fruit producing irritating oils.
 - Poison oak plants are characterized as similar to poison ivy consisting of a shrub, stems erect, 0.3 to 2.0 meters tall, leaflets consist of broad thick lobes coarsely serrated configuration, denser at the base, less so than the top.
- Use of disposable garments such as Tyvek when clearing brush. After use remove and properly dispose of disposable PPE, do not reuse.
- Practice personal hygiene. The oils from the plants will only cause an allergic response when the person's protective skin layer is penetrated. This can be accomplished through pores open when perspiring, or through cuts, nicks, scratches, etc. This can also be accomplished when using excessively hot water for cleaning the skin, which also causes pores to open. Prior to break time wash potentially exposed skin with cool water and soap to remove as much of the oils as possible. In heavily vegetated areas of these plants, additional measures including barrier creams and blocks may be used to prevent the oils from accessing and penetrating the dermal layer.

6.3.5 Inclement Weather

Project tasks under this Scope of Work will be performed outdoors and near water. As a result, inclement weather may be encountered. In the event that adverse weather conditions arise (electrical storms, hurricanes, etc.), the FOL and/or the SSO will be responsible for temporarily suspending or terminating activities until hazardous conditions no longer exist.

7.0 HAZARD MONITORING

Although previous analytical data has indicated low concentrations of VOCs and other detectable contaminants of concern, direct reading instruments will be used at the site to evaluate the presence of these contaminants of concern and other potentially hazardous conditions. Specific air monitoring measures and requirements are established in Table 5-1. Additionally, the Health and Safety Guidance Manual, Section 1.0, contains detailed information regarding direct reading instrumentation, as well as general calibration procedures of various instruments.

7.1 INSTRUMENTS AND USE

Direct read monitoring instruments will be used primarily to monitor source points and worker breathing zone areas, while observing instrument action levels. Action levels are discussed in Table 5-1 as they may apply to a specific task or location.

7.1.1 Photoionization Detector or Flame Ionization Detector

A Photoionization Detector (PID) using a lamp energy of 10.6 eV or higher will be used to accurately monitor for VOCs and some SVOCs that may be present in soils and groundwater. This instrument will be used to monitor potential source areas (soil borings, cores, monitoring wells, etc.) and to screen the breathing zones of employees during site activities. The PID has been selected because it is capable of detecting potential organic vapors of concern (NOTE: A Flame Ionization Detector [FID] may be used as an alternative to the PID).

Prior to the commencement of any field activities, the background levels of the site must be determined and noted. Daily background readings will be taken away from any areas of potential contamination. These readings, any influencing conditions (i.e., weather, temperature, and humidity) and site location must be documented in the field operations logbook or other site documentation (e.g., sample log sheet).

7.1.2 Hazard Monitoring Frequency

Table 5-1 presents the frequencies that hazard monitoring will be performed as well as the action levels which will initiate the use of elevated levels of protection. The SSO may decide to increase these frequencies based on instrument responses and site observations. The frequency at which monitoring is performed will not be reduced without the prior consent of the PHSO or HSM.

7.2 INSTRUMENT MAINTENANCE AND CALIBRATION

Hazard monitoring instruments will be maintained and pre-field calibrated by the equipment vendor. Operational checks and field calibration will be performed on all instruments by site personnel each day prior to their use. Field calibration will be performed on instruments according to manufacturer's recommendations (for example, the PID must be field calibrated daily and an additional field calibration must be performed at the end of each day to determine any significant instrument drift). These operational checks and calibration efforts will be performed in a manner that complies with the employees health and safety training, the manufacturer's recommendations, and with the applicable manufacturer standard operating procedure (copies of which can be found in the Health & Safety Guidance Manual which will be maintained on site for reference). All calibration efforts must be documented. Figure 7-1 is provided for documenting these calibration efforts. This information may instead be recorded in a field operations logbook, provided that all of the information specified in Figure 7-1 is recorded. This required information includes the following:

- Date calibration was performed
- Individual calibrating the instrument
- Instrument name, model, and serial number
- Any relevant instrument settings and resultant readings (before and after) calibration
- Identification of the calibration standard (lot no., source concentration, supplier)
- Any relevant comments or remarks

8.0 TRAINING/MEDICAL SURVEILLANCE REQUIREMENTS

8.1 INTRODUCTORY/REFRESHER/SUPERVISORY TRAINING

All site personnel involved in intrusive site activities or tasks that pose a potential for exposure to site contaminants must show documentation demonstrating the successful completion of 40 hours of introductory hazardous waste site training prior to performing work at NSA Panama City. Additionally, site personnel who have had introductory training more than 12 months prior to site work must have completed 8 hours of refresher training within the past 12 months before being cleared for site work. In addition, 8-hour supervisory training in accordance with 29 CFR 1910.120(e)(4) will be required for site supervisory personnel. Documentation of TtNUS introductory, supervisory, and refresher training as well as site-specific training will be maintained at the project site. Copies of certificates or other official documentation will be used to fulfill this requirement.

8.2 SITE-SPECIFIC TRAINING

TtNUS will provide site-specific training to all site personnel who will perform work on this project. Site-specific training will also be provided to all personnel [U.S. Department of Defense (DOD), EPA, etc.] who may enter the site to perform functions that may or may not be directly related to site operations. Site-specific training will include:

- Names of designated personnel and alternates responsible for site safety and health
- Safety, health, and other hazards present on site
- Use of personal protective equipment
- Work practices to minimize risks from hazards
- Medical surveillance requirements
- Signs and symptoms of overexposure
- Contents of the Health and Safety Plan
- Contents of Safe Work Permits
- Emergency response procedures (evacuation and assembly points)
- Spill response procedures
- Review of the use of Safe Work Permits

Site-specific documentation will be established through the use of Figure 8-1. All site personnel and visitors must sign this document upon receiving site-specific training.

8.3 MEDICAL SURVEILLANCE

All TtNUS personnel participating in project field activities will have had a physical examination meeting the requirements of TtNUS's medical surveillance program and will be medically qualified to perform hazardous waste site work using respiratory protection

Subcontractor personnel are required to obtain a certificate of their ability to perform hazardous waste site work and to wear respiratory protection. The "Subcontractor Medical Approval Form" provided in Figure 8-2 of this HASP can be used to satisfy this requirement providing that it is properly completed and signed by a licensed physician.

Subcontractors who have a company medical surveillance program meeting the requirements of paragraph (f) of OSHA 29 CFR 1910.120 can substitute "Subcontractor Medical Approval Form" with a letter, on company letterhead, containing all of the information in the example letter presented in Figure 8-3.

8.3.1 Requirements for All Field Personnel

Each field team member (including subcontractors and visitors entering the exclusion zone) shall be required to complete and submit a copy of the Medical Data Sheet found in Attachment II of this HASP. This shall be provided to the SSO prior to participating in site activities. The purpose of this document is to provide site personnel and emergency responders with additional information that may be necessary in order to administer medical attention.

8.4 SUBCONTRACTOR EXCEPTION

Subcontractors who will not enter the exclusion zone during operation, and whose activities involve no potential for exposure to site contaminants, will not be required to meet the requirements for training/medical surveillance, other than site-specific training as stipulated in Section 8-2. **The use of this type of exception is permissible only with the prior consent of the CLEAN HSM.**

FIGURE 8-2
SUBCONTRACTOR MEDICAL APPROVAL FORM

For employees of _____
Company Name

Participant Name: _____ Date of Exam: _____

Part A

The above-named individual has:

- 1. Undergone a physical examination in accordance with OSHA Standard 29 CFR 1910.120, paragraph (f) and found to be medically -
 - () qualified to perform work at the NSA Panama City work site
 - () not qualified to perform work at the NSA Panama City work site

and,
- 2. Undergone a physical examination as per OSHA 29 CFR 1910.134(b)(10) and found to be medically -
 - () qualified to wear respiratory protection
 - () not qualified to wear respiratory protection

My evaluation has been based on the following information, as provided to me by the employer.

- () A copy of OSHA Standard 29 CFR 1910.120 and appendices.
- () A description of the employee's duties as they relate to the employee's exposures.
- () A list of known/suspected contaminants and their concentrations (if known).
- () A description of any personal protective equipment used or to be used.
- () Information from previous medical examinations of the employee which is not readily available to the examining physician.

Part B

I, _____, have examined _____
Physician's Name (print) Participant's Name
(print)

and have determined the following information:

**FIGURE 8-2
SUBCONTRACTOR MEDICAL APPROVAL FORM
PAGE TWO**

1. Results of the medical examination and tests (excluding findings or diagnoses unrelated to occupational exposure):

2. Any detected medical conditions that would place the employee at increased risk of material impairment of the employee's health:

3. Recommended limitations upon the employee's assigned work:

I have informed this participant of the results of this medical examination and any medical conditions that require further examination of treatment.

Based on the information provided to me, and in view of the activities and hazard potentials involved at the NSA Panama City work site, this participant

- () may
- () may not

perform his/her assigned task.

Physician's Signature _____

Address _____

Phone Number _____

NOTE: Copies of test results are maintained and available at:

Address

FIGURE 8-3
MEDICAL SURVEILLANCE LETTER

The following statements must be typed on company letterhead and signed by an officer of the company:

LOGO

XYZ CORPORATION

555 E. 5th Street

Nowheresville, Kansas 55555

Month, day, year

Mr. Gerald Walker
Task Order Manager
Tetra Tech NUS, Inc.
1401 Oven Park Drive
Suite 201
Tallahassee, Florida 32308

Subject: Medical Surveillance for NSA Panama City Site

Dear Mr. Walker:

As an officer of XYZ Corporation, I hereby state that the persons listed below participate in a medical surveillance program meeting the requirements contained in paragraph (f) of Title 29 of the Code of Federal Regulations (CFR), Part 1910.120 entitled "Hazardous Waste Operations and Emergency Response" I further state that the persons listed below have had physical examinations under this program within the past 12 months and that they have been cleared, by a licensed physician, to perform hazardous waste site work and to wear positive and negative pressure respiratory protection. I also state that, to my knowledge, no person listed below has any medical restriction that would preclude him/her from working at NSA Panama City Site.

LIST FULL NAMES OF EMPLOYEES AND THEIR SOCIAL SECURITY NUMBERS HERE

Should you have any questions, please contact me at (555) 555-5555.

Sincerely,

(Name of Company Officer)

Documentation for medical clearances will be maintained in the TtNUS Pittsburgh office and made available, as necessary.

9.0 SPILL CONTAINMENT PROGRAM

9.1 SCOPE AND APPLICATION

It is not anticipated that quantities of bulk potentially hazardous materials (greater than 55-gallons) will be handled during some of the site activities conducted as part of the scope of work. Significant quantities of wastewater (decontamination, and purge) and Investigative-Derived Wastes (IDW) may be generated as part of site activities. However, it is not anticipated that spillage of these materials would constitute a danger to human health or the environment. Further, it is possible that as the job progresses disposable PPE and other non-reusable items may be generated. As needed, 55 -gallon drums will be used to contain wastewater, IDW, and other unwanted items generated during investigatory activities. These drums will be labeled with the site name and location, drum number, the type of contents (purge waters), volume, the date, and point of contact with telephone number. An updated Inventory Log will be provided to the Base Contact (Mr. Arturo McDonald) and to the TOM at the termination of every 10-day shift. This will be done to keep a running tab of containers retained within an established marshaling area.

Samples will be collected and analyzed to characterize the material and determine appropriate disposal measures. Once characterized they can be removed from the staging area and disposed of in accordance with Federal, State and local regulations.

9.2 POTENTIAL SPILL AREAS

Potential spill areas will be monitored in an ongoing attempt to prevent and control further potential contamination of the environment. Currently, there are various areas vulnerable to this hazard including the following:

- Areas used for central staging of supplies and equipment
- Areas used for central staging of IDW materials
- Decontamination area

Additionally, areas designated for handling, loading, and unloading of potentially contaminated waters, and debris present limited potential for leaks or spills. Monitoring of these areas will be done at least weekly.

9.2.1 Site Drums/Containers

All drums/containers used for containing liquids will be sealed, labeled, and staged within a centralized area awaiting shipment or disposal. Drums used for the storage and transportation of IDW will meet the packaging requirements for steel drums category UN 1A2, removable head as specified in paragraph 9.6.1, United Nations Transport of Dangerous Goods.

9.2.1.1 Staging Area Configuration

The staging or marshaling area as referred to before will be configured to support this spill prevention and control program. The area will be configured as follows:

- Where possible secondary containment should be provided. This would include a bermed area sufficient in size to hold 10% of the total volume or the volume of largest container, whichever is greater. This calculation of secondary containment should also consider any displacement by containers or pallets. This bermed area should be lined (plastic liner or other impermeable surface) to prevent any spillage inside the containment from saturating the ground.
- Drums will be organized no more than four to a pallet. The drums label and the head bolt arranged as such to permit reading/review or removal of the head without requiring the drum to be moved on the pallet. Drums will be segregated to site and media. A minimum of two feet shall be maintained between each row of pallets to permit access for spill response measures.

9.3 LEAK AND SPILL DETECTION

To establish an early detection of potential spills or leaks, a periodic (once a week) walk around by the SSO will be conducted during working hours to visually determine that containers are not leaking. If a leak is detected, the first approach will be to transfer the container contents using a hand pump into a new container. Other provisions for the transfer of container contents will be made and appropriate emergency contacts will be notified, if necessary. In most instances, leaks will be collected and contained using absorbents such as Oil-dry, vermiculite, or sand, which will be stored at the staging area in a conspicuously marked drum. This material too, will be containerized for disposal pending analyses. All inspections will be documented in the Project Logbook.

9.4 PERSONNEL TRAINING AND SPILL PREVENTION

All personnel will be instructed on the procedures for spill prevention, containment, and collection of hazardous materials in the site-specific training. The FOL and/or the SSO will serve as the Spill Response Coordinator for this operation should the need arise.

9.5 SPILL PREVENTION AND CONTAINMENT EQUIPMENT

The following represents the minimum equipment which will be maintained at the staging area at all times for the purpose of supporting this Spill Prevention/Containment Program.

Spill Response Equipment:

- Sand, clean fill, vermiculite, or other noncombustible absorbent (oil-dry);
- Drums (55-gallon U.N. 1A2)
- Portable storage tanks or additional drums
- Shovels, rakes, and brooms
- Labels

PPE stored at the staging area:

- Rubber boot covers, nitrile outer gloves, PVC rain-suit or other form of impermeable splash protection, should it be required.

9.6 SPILL CONTROL PLAN

This section describes the procedures the TtNUS field crewmembers will employ upon the detection of a spill or leak.

- 1) Notify the SSO or FOL immediately upon the detection of a leak or spill.
- 2) Employ the personnel protective equipment stored at the staging area. Take immediate actions to stop the leak or spill by plugging or patching the drum or raising the leak to the highest point. Spread the absorbent material in the area of the spill covering completely.
- 3) Transfer the material to a new container, collect and containerize the absorbent material. Label the new container appropriately. Await analyses for treatment or disposal options.

- 4) All spills occurring on soils, grassy areas, gravel lots will be re-containerized including 2-inches of top cover on which the spill occurred, and await test results for treatment or disposal options.

It is not anticipated that a spill will occur in which the field crews cannot handle. Should this occur notification of appropriate emergency response agencies will be carried out by the FOL or SSO.

10.0 SITE CONTROL

This section outlines the means by which TtNUS will delineate work zones and use these work zones in conjunction with decontamination procedures to prevent the spread of contaminants into previously unaffected areas of the site. It is anticipated that a three-zone approach will be used during work at this site. This three-zone approach will utilize an exclusion zone, a contamination reduction zone, and a support zone. It is also anticipated that this control measure will be used to control access to site work areas. Use of such controls will restrict the general public, minimize the potential for the spread of contaminants, and protect individuals who are not cleared to enter work areas.

10.1 EXCLUSION ZONE

The exclusion zone will be considered those areas of the site of known or suspected contamination. It is not anticipated that significant amounts of surface contamination are present in the proposed work areas of this site. It is anticipated that this will remain so until/unless contaminants are brought to the surface by intrusive activities, such as soil boring or sampling operations. Furthermore, once intrusive activities have been completed and surface contamination has been removed, the potential for exposure is again diminished and the area can then be reclassified as part of the contamination reduction zone. Therefore, the exclusion zones for this project will be limited to those areas of the site where active work is being performed plus a designated area surrounding the point of operation (see Table 5-1 for specific operation). The exclusion zone for this activity will be fragmented to represent the areas where the soil is disturbed through drilling or sampling activities. When possible, exclusion zones will be delineated using barrier tape, cones and/or drive poles, and postings to inform site personnel.

10.1.1 Exclusion Zone Clearance

Prior to the initiation of site activities, utility locations will be identified by utility companies contacted through the NSA Panama City Contact. Additional utility surveys may be conducted by TtNUS through the use of available documentation provided by NSA Panama City and/or local utility companies. The positions of identified utilities will be field located and staked, to minimize the potential for damage during intrusive activities. Sample locations can be located to avoid buried utilities. In the event that a utility is struck during a subsurface investigative activity, the emergency numbers provided in Section 2.9 and Table 2-1 will be notified.

Access to work areas will be controlled by TtNUS personnel. No personnel will be permitted to enter site exclusion zones without site-specific training. Site visitors will be provided site-specific training and will be escorted by TtNUS personnel at all times.

10.2 CONTAMINATION REDUCTION ZONE

The contamination reduction zone (CRZ) will be a buffer area between the exclusion zone and any area of the site where contamination is not suspected. The personnel and equipment decontamination will not take place in this area, but will take place at a central location established for this project. This area instead will serve as a focal point in supporting exclusion zone activities. When applicable, this area will be delineated using barrier tape, cones and/or drive poles, and postings to inform and direct facility personnel.

10.3 SUPPORT ZONE

The support zone for this project will include a staging area where site vehicles will be parked, equipment will be unloaded, and where food and drink containers will be maintained. In all cases, the support zones will be established at areas of the site where exposure to site contaminants would not be expected during normal working conditions or foreseeable emergencies.

10.4 SITE VISITORS

Site visitors for the purpose of this document are identified as representing the following groups of individuals:

- Personnel invited to observe or participate in operations by TtNUS
- Regulatory personnel (EPA, OSHA, FDEP, etc.)
- Navy and NSA Panama City Field Personnel
- Other authorized visitors

All personnel working on this project are required to gain initial access to the site by coordinating with the TtNUS FOL or designee and following established site access procedures.

Once access to the site is obtained, visitors will be required to obtain permission from the FOL and SSO. Upon gaining access to the site, all site visitors wishing to observe operations in progress will be escorted by a TtNUS representative (arranged for by the FOL) and shall be required to meet the minimum requirements discussed below:

- All site visitors will be routed to the FOL, who will sign them into the field logbook. Information to be recorded in the logbook will include the individual's name (proper identification required), the entity which they represent, and the purpose of the visit.
- All site visitors will be required to produce the necessary information supporting clearance to the site. This shall include information attesting to applicable training (40-hours of HAZWOPER training) and medical surveillance as stipulated in Section 8.0 of this document. In addition, to enter the site operational zones during planned activities, all visitors will be required to first go through site-specific training covering the topics stipulated in Section 8.2 of this HASP.

Once the site visitors have completed the above items, they will be permitted to enter the operational zone. All visitors are required to observe the protective equipment and site restrictions in effect at the site at the time of their visit. Any and all visitors not meeting the requirements stipulated in this plan will not be permitted to enter the site operational zones during planned activities. Any incidence of unauthorized site visitation will cause the termination of all onsite activities until the unauthorized visitor is removed from the premises. Removal of unauthorized visitors will be accomplished with support from the FOL, SSO or on-site security personnel.

10.5 SITE SECURITY

Site security will be accomplished using existing base security resources and procedures, supplemented by TtNUS or subcontractor personnel if necessary. TtNUS will retain control over active operational areas. The first line of security will take place at the station wide fences restricting the general public. The second line of security will take place at the work site referring interested parties to the FOL. The FOL will serve as a focal point for site personnel, and will serve as the final line of security and the primary enforcement contact.

10.6 SITE MAPS

Once the areas of contamination, access routes, utilities, topography, and dispersion routes are determined, a site map will be generated and adjusted as site conditions change. These maps will show utility locations, potential points of contact with the public, roadways, and other significant characteristics that may impact site operations and safety. Site maps will be posted to illustrate up-to-date collection of contaminants and adjustment of zones and access points.

10.7 BUDDY SYSTEM

Personnel engaged in onsite activities will practice the "buddy system" to ensure the safety of all personnel involved in this operation.

10.8 MATERIAL SAFETY DATA SHEET (MSDS) REQUIREMENTS

TtNUS and subcontractor personnel will provide MSDSs for all chemicals brought on site. The contents of these documents will be reviewed by the SSO with the user(s) of the chemical substances prior to any actual use or application of the substances on site. A chemical inventory of all chemicals used on site will be developed using Tab 5 of the Health and Safety Guidance Manual. The MSDSs will then be maintained in a central location and will be available for anyone to review upon request.

10.9 COMMUNICATION

TtNUS personnel will be working in close proximity to each other at NSA Panama City. As a result, hand signals, voice commands, and line of site will provide sufficient means of communication. When project tasks are performed simultaneously on different sites, vehicle horns will be used to communicate emergency situations.

External communication will be accomplished by using either site, or cellular telephones or hand held two-way radios. All radio frequent emitting devices (two-way radios, cellular phones) will be approved by the base contact prior to use. External communication will primarily be used for the purpose of resource and emergency resource communications.

10.10 SAFE WORK PERMITS

All exclusion zone work conducted in support of this project will be performed using Safe Work Permits to guide and direct field crews on a task by task basis. An example of the Safe Work Permit to be used is illustrated in Figure 10-1. These work permits will be further supported by the daily meetings conducted during their generation. This effort will ensure all site-specific considerations and changing conditions are incorporated into the planning effort. All permits will require the signature of the FOL and SSO.

Use of these permits will provide the communication line for reviewing protective measures and hazards associated with each operation. This HASP will be used as the primary reference for selecting levels of protection and control measures. The work permit will take precedence over the HASP when more conservative measures are required based on specific site conditions.

**FIGURE 10-1
SAFE WORK PERMIT**

Permit No. _____ Date: _____ Time: From _____ to _____

SECTION I: General Job Scope (To be filled in by person performing work)

- I. Work limited to the following (description, area, equipment used): _____

- II. Names: _____
- III. Onsite Inspection conducted Yes No Initials of Inspector _____

TtNUS

SECTION II: General Safety Requirements (To be filled in by permit issuer)

- IV. Protective equipment required Respiratory equipment required

Level D <input type="checkbox"/>	Level B <input type="checkbox"/>	Full face APR <input type="checkbox"/>	Escape Pack <input type="checkbox"/>
Level C <input type="checkbox"/>	Level A <input type="checkbox"/>	Half face APR <input type="checkbox"/>	SCBA <input type="checkbox"/>
Detailed on Reverse		SKA-PAC SAR <input type="checkbox"/>	Bottle Trailer <input type="checkbox"/>
		Skid Rig <input type="checkbox"/>	None <input type="checkbox"/>
- Modifications/Exceptions: _____

V. Chemicals of Concern	Action Level(s)	Response Measures
_____	_____	_____
_____	_____	_____

- VI. Additional Safety Equipment/Procedures

Hardhat..... <input type="checkbox"/> Yes <input type="checkbox"/> No	Hearing Protection (Plugs/Muffs)..... <input type="checkbox"/> Yes <input type="checkbox"/> No
Safety Glasses..... <input type="checkbox"/> Yes <input type="checkbox"/> No	Safety belt/harness..... <input type="checkbox"/> Yes <input type="checkbox"/> No
Chemical/splash goggles..... <input type="checkbox"/> Yes <input type="checkbox"/> No	Radio..... <input type="checkbox"/> Yes <input type="checkbox"/> No
Splash Shield..... <input type="checkbox"/> Yes <input type="checkbox"/> No	Barricades..... <input type="checkbox"/> Yes <input type="checkbox"/> No
Splash suits/coveralls..... <input type="checkbox"/> Yes <input type="checkbox"/> No	Gloves (Type)..... <input type="checkbox"/> Yes <input type="checkbox"/> No
Steel toe/shank Workboots... <input type="checkbox"/> Yes <input type="checkbox"/> No	Work/rest regimen..... <input type="checkbox"/> Yes <input type="checkbox"/> No
- Modifications/Exceptions: _____

- VII. Procedure review with permit acceptors

	Yes	NA		Yes	NA
Safety shower/eyewash (Location & Use).....	<input type="checkbox"/>	<input type="checkbox"/>	Emergency alarms.....	<input type="checkbox"/>	<input type="checkbox"/>
Procedure for safe job completion.....	<input type="checkbox"/>	<input type="checkbox"/>	Evacuation routes.....	<input type="checkbox"/>	<input type="checkbox"/>
Contractor tools/equipment inspected.....	<input type="checkbox"/>	<input type="checkbox"/>	Assembly points.....	<input type="checkbox"/>	<input type="checkbox"/>

- VIII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vehicle and Foot Traffic Routes Cleared and Established.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Physical Hazards Barricaded and Isolated.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emergency Equipment Staged.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- IX. Additional Permits required (Hot work, confined space entry, excavation etc.)..... Yes No
If yes, fill out appropriate section(s) on safety work permit addendum

- X. Special instructions, precautions: _____

Permit Issued by: _____ Permit Accepted by: _____
Job Completed by: _____ Date: _____

11.0 CONFINED SPACE ENTRY

It is not anticipated, under the proposed scope of work, that confined space and permit-required confined space activities will be conducted. **Therefore, personnel under the provisions of this HASP are not allowed, under any circumstances, to enter confined spaces.** A confined space is defined as an area which has one or more of the following characteristics:

- Is large enough and so configured that an employee can bodily enter and perform assigned work.
- Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry).
- Is not designed for continuous employee occupancy.

A Permit-Required Confined Space is one that:

- Contains or has a potential to contain a hazardous atmosphere.
- Contains a material that has the potential to engulf an entrant.
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section.
- Contains any other recognized, serious, safety or health hazard.

For further information on confined space, consult the Health and Safety Guidance Manual or call the PHSO. If confined space operations are to be performed as part of the scope of work, detailed procedures and training requirements will have to be addressed, and the HSM will have to be notified.

12.0 MATERIALS AND DOCUMENTATION

The TtNUS FOL shall ensure the following materials/documents are taken to the project site and used when required.

- A complete copy of this HASP
- Health and Safety Guidance Manual
- Incident Reports
- Medical Data Sheets
- Material Safety Data Sheets for all chemicals brought on site, including decon solutions, fuels, lime, sample preservatives, calibration gases, etc.
- A full-size OSHA Job Safety and Health Poster (posted in the site trailers)
- Training/Medical Surveillance Documentation Form (Blank)
- Emergency Reference Form (Section 2.0, extra copy for posting)

12.1 MATERIALS TO BE POSTED AT THE SITE

The following documentation is to be posted at the site for quick reference purposes. In situations where posting of these documents is not feasible (such as no office trailer), these documents should be filed in a transportable file container and immediately accessible. The file should remain in the FOL's possession.

Chemical Inventory Listing (posted) - This list represents all chemicals brought on site, including decontamination solutions, sample preservatives, fuel, calibration gases, etc.. This list should be posted in a central area.

Material Safety Data Sheets (MSDSs) (maintained) - The MSDSs should also be in a central area accessible to all site personnel. These documents should match all the listings on the chemical inventory

list for all substances employed on site. It is acceptable to have these documents within a central folder and the chemical inventory as the table of contents.

The OSHA Job Safety & Health Protection Poster (posted) - This poster, as directed by 29 CFR 1903.2 (a)(1), should be conspicuously posted in places where notices to employees are normally posted. Each FOL shall ensure that this poster is not defaced, altered, or covered by other material.

Site Clearance (maintained) - This list is found within the training section of the HASP (See Figure 8-2). This list identifies all site personnel, dates of training (including site-specific training), and medical surveillance and indicates not only clearance but also status. If personnel do not meet these requirements, they do not enter the site while site personnel are engaged in activities.

Emergency Phone Numbers and Directions to the Hospital(s) (posted) - This list of emergency numbers and hospital directions will be maintained at all phone communications points and in each site vehicle.

Medical Data Sheets/Cards (maintained) - Medical Data Sheets will be filled out by all onsite personnel and filed in a central location. The Medical Data Sheet will accompany any injury or illness requiring medical attention to the medical facility. A copy of this sheet or a wallet card will be given to all personnel to be carried on their person.

Hearing Conservation Standard (29 CFR 1910.95) (posted) - This standard will be posted anytime hearing protection or other noise abatement procedures are employed.

Personnel Monitoring (maintained) - All results generated through personnel sampling (levels of airborne toxics, noise levels, etc.) will be posted to inform individuals of the results of that effort.

Placards and Labels (maintained) - Where chemical inventories have been separated, because of quantities and incompatibilities, these areas will be conspicuously marked using Department of Transportation (DOT) placards and acceptable [Hazard Communication 29 CFR 1910.1200 (f)] labels.

The purpose of maintaining or posting this information, as stated above, is to allow site personnel quick access. Variations concerning location and methods of presentation are acceptable, providing the objection is accomplished.

13.0 GLOSSARY

ACGIH	American Conference of Governmental Industrial Hygienists
APR	Air Purifying Respirators
AOC	Area of Concern
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CNS	Central Nervous System
CLEAN	Comprehensive Long-Term Environmental Action – Navy
CRZ	Contamination Reduction Zone
NSA	Coastal Systems Station
DOD	Department of Defense
DOT	Department of Transportation
DPT	Direct Push Technology
EPA	Environmental Protection Agency
eV	electron Volts
FDEP	Florida Department of Environmental Protection
FID	Flame Ionization Detector
FOL	Field Operations Leader
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HEPA	High Efficiency Particulate Air
HSM	Health and Safety Manager
IDW	Investigative Derived Waste
LEL/O ₂	Lower Explosive Limit/Oxygen
MSDS	Material Safety Data Sheet
N/A	Not Available
NNSA	Naval Coastal Systems Station
NIOSH	National Institute Occupational Safety and Health
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor)
PEL	Permissible Exposure Limit
PHSO	Project Health and Safety Officer
PID	Photo Ionization Detector
PPE	Personal Protective Equipment
SAP	Sampling and Analysis Plan
SCBA	Self Contained Breathing Apparatus
SSO	Site Safety Officer

STEL	Short Term Exposure Limit
SWMU	Solid Waste Management Unit
SWP	Safe Work Permit
TOM	Task Order Manager
TtNUS	Tetra Tech NUS, Inc.
TWA	Time Weighted Average
UN	United Nations
UV	Ultra Violet

ATTACHMENT I

**INJURY/ILLNESS PROCEDURE
AND REPORT FORM**

TETRA TECHNUS, INC.

INJURY/ILLNESS PROCEDURE WORKER'S COMPENSATION PROGRAM

WHAT YOU SHOULD DO IF YOU ARE INJURED OR DEVELOP AN ILLNESS AS A RESULT OF YOUR EMPLOYMENT:

- If injury is minor, obtain appropriate first aid treatment.
- If injury or illness is severe or life threatening, obtain professional medical treatment at the nearest hospital emergency room.
- If incident involves a chemical exposure on a project work site, follow instructions in the Health & Safety Plan.
- Immediately report any injury or illness to your supervisor or office manager. In addition, you must contact your Human Resources representative, Marilyn Duffy at (412) 921-8475, and the Corporate Health and Safety Manager, Matt Soltis at (412) 921-8912 within 24 hours. You will be required to complete an Injury/Illness Report (attached). You may also be required to participate in a more detailed investigation from the Health Sciences Department.
- If further medical treatment is needed, The Hartford Network Referral Unit will furnish a list of network providers customized to the location of the injured employee. These providers are to be used for treatment of Worker's Compensation injuries subject to the laws of the state in which you work. Please call Marilyn Duffy at (412) 921-8475 for the number of the Referral Unit.

ADDITIONAL QUESTIONS REGARDING WORKER'S COMPENSATION:

Contact your local human resources representative, corporate health and safety coordinator, or Corporate Administration in Pasadena, California, at (626) 351-4664.

Worker's compensation is a state-mandated program that provides medical and disability benefits to employees who become disabled due to job related injury or illness. Tetra Tech, Inc. and its subsidiaries (Tetra Tech or Company) pay premiums on behalf of their employees. The type of injuries or illnesses covered and the amount of benefits paid are regulated by the state worker's compensation boards and vary from state to state. Corporate Administration in Pasadena is responsible for administering the Company's worker's compensation program. The following is a general explanation of worker's compensation provided in the event that you become injured or develop an illness as a result of your employment with Tetra Tech or any of its subsidiaries. Please be aware that the term used for worker's compensation varies from state to state.

WHO IS COVERED:

All employees of Tetra Tech, whether they are on a full-time, part-time or temporary status, working in an office or in the field, are entitled to worker's compensation benefits. All

TETRA TECHNUS, INC.
INJURY/ILLNESS PROCEDURE
WORKER'S COMPENSATION PROGRAM

employees must follow the above injury/illness reporting procedures. Consultants, independent contractors, and employees of subcontractors are not covered by Tetra Tech's Worker's Compensation plan.

WHAT IS COVERED:

If you are injured or develop an illness caused by your employment, worker's compensation benefits are available to you subject to the laws of the state you work in. Injuries do not have to be serious; even injuries treated by first aid practices are covered and must be reported. Please note that if you are working out-of-state and away from your home office, you are still eligible for worker's compensation benefits.



TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT

To: _____
Subsidiary Health and Safety Representative

Prepared by: _____

Position: _____

cc: _____
Workers Compensation Administrator

Office: _____

Project name: _____

Telephone number: _____

Project number: _____

Fax number: _____

Information Regarding Injured or Ill Employee

Name: _____

Office: _____

Home address: _____

Gender: M F No. of dependents: _____

Marital status: _____

Home telephone number: _____

Date of birth: _____

Occupation (regular job title): _____

Social security number: _____

Department: _____

Date of Accident: _____

Time of Accident: _____ a.m. p.m.

Time Employee Began Work: _____

Check if time cannot be determined

Location of Incident

Street address: _____

City, state, and zip code: _____

County: _____

Was place of accident or exposure on employer's premises? Yes No

Information About the Incident

What was the employee doing just before the incident occurred? Describe the activity as well as the tools, equipment, or material the employee was using. Be specific. Examples: "Climbing a ladder while carrying roofing materials"; "Spraying chlorine from hand sprayer"; "Daily computer key-entry"

What Happened? Describe how the injury occurred. Examples: "When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time"

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.



TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)

Information About the Incident (Continued)

What was the injury or illness? Describe the part(s) of the body affected and how it was affected. Be more specific than "hurt," "pain," or "sore." Examples "Strained back"; "Chemical burn, right hand"; "Carpal tunnel syndrome, left wrist"

Describe the Object or Substance that Directly Harmed the Employee: Examples: "Concrete floor"; "Chlorine"; "Radial arm saw." If this question does not apply to the incident, write "Not applicable."

Did the employee die? Yes [] No [] Date of death: _____

Was employee performing regular job duties? Yes [] No []

Was safety equipment provided? Yes [] No [] Was safety equipment used? Yes [] No []

Note: Attach any police reports or related diagrams to this report.

Witness (Attach additional sheets for other witnesses.)

Name: _____

Company: _____

Street address: _____

City: _____ State: _____ Zip code: _____

Telephone number: _____

Medical Treatment Required? [] Yes [] No [] First aid only

Name of physician or health care professional: _____

If treatment was provided away from the work site, provide the information below.

Facility name: _____

Street address: _____

City: _____ State: _____ Zip code: _____

Telephone number: _____

Was the employee treated in an emergency room? [] Yes [] No

Was the employee hospitalized over night as an in-patient? [] Yes [] No

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.



TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)

Corrective Action(s) Taken by Unit Reporting the Accident:

Corrective Action Still to be Taken (by whom and when):

Name of Tetra Tech employee the injury or illness was first reported to: _____

Date of Report: _____ **Time of Report:** _____

I have reviewed this investigation report and agree, to the best of my recollection, with its contents.

Printed Name of Injured Employee

Telephone Number

Signature of Injured Employee

Date

The signatures provided below indicate that appropriate personnel have been notified of the incident.

Title	Printed Name	Signature	Telephone Number	Date
Office Manager				
Project Manager				
Site Safety Coordinator or Office Health and Safety Representative				

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.



TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)

To Be Completed by the Subsidiary Health and Safety Representative

Classification of Incident:
 Injury Illness

Result of Incident:
 First aid only
 Days away from work
 Remained at work but incident resulted in job transfer or work restriction
 Incident involved days away and job transfer or work restriction
 Medical treatment only

No. of days away from work _____
 Date employee left work _____
 Date employee returned to work _____
 No. of days placed on restriction or job transfer: _____

OSHA Recordable Case Number _____

To Be Completed by Human Resources

Social security number: _____
 Date of hire: _____ Hire date for current job: _____
 Wage information: \$ _____ per Hour Day Week Month
 Position at time of hire: _____
 Current position: _____ Shift hours: _____
 State in which employee was hired: _____
 Status: Full-time Part-time Hours per week: _____ Days per week: _____
 Temporary job end date: _____

To Be Completed during Report to Workers Compensation Carrier

Date reported: _____ Reported by: _____
 Confirmation number: _____
 Name of contact: _____
 Field office of claims adjuster: _____

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.

ATTACHMENT II
MEDICAL DATA SHEET

MEDICAL DATA SHEET

This Medical Data Sheet must be completed by all on-site personnel and kept in the command post during the conduct of site operations. This data sheet will accompany any personnel when medical assistance is needed or if transport to hospital facilities is required.

Project _____

Name _____ Home Telephone _____

Address _____

Age _____ Height _____ Weight _____

Name of Next Kin _____

Drug or other Allergies _____

Particular Sensitivities _____

Do You Wear Contacts? _____

Provide a Checklist of Previous Illnesses or Exposure to Hazardous Chemicals _____

What medications are you presently using? _____

Do you have any medical restrictions? _____

Name, Address, and Phone Number of personal physician: _____

I am the individual described above. I have read and understand this HASP.

Signature

Date

MEDICAL DATA SHEET

This Medical Data Sheet must be completed by all on-site personnel and kept in the command post during the conduct of site operations. This data sheet will accompany any personnel when medical assistance is needed or if transport to hospital facilities is required.

Project _____

Name _____ Home Telephone _____

Address _____

Age _____ Height _____ Weight _____

Name of Next Kin _____

Drug or other Allergies _____

Particular Sensitivities _____

Do You Wear Contacts? _____

Provide a Checklist of Previous Illnesses or Exposure to Hazardous Chemicals _____

What medications are you presently using? _____

Do you have any medical restrictions? _____

Name, Address, and Phone Number of personal physician: _____

I am the individual described above. I have read and understand this HASP.

Signature

Date

ATTACHMENT III

SAFE WORK PERMITS

**SAFE WORK PERMIT FOR
DPT SOIL BORING AND SAMPLING
NSA PANAMA CITY, FLORIDA**

Permit No. _____ Date: _____ Time: From _____ to _____

SECTION I: General Job Scope

- I. Work limited to the following (description, area, equipment used): Subsurface soil samples collected via DPT and AOC 1.
- II. Required Monitoring Instruments: PID or FID (used to screen samples)
- III. Field Crew: _____
- IV. On-site Inspection conducted Yes No Initials of Inspector TtNUS

SECTION II: General Safety Requirements (To be filled in by permit issuer)

- V. Protective equipment required Respiratory equipment required
- Level D Level B Full face APR Escape Pack
- Level C Level A Half face APR SCBA
- Detailed on Reverse
- Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, safety footwear, and nitrile gloves. Safety glasses, hard hats, and hearing protection will be worn when working near or sampling in the vicinity of the DPT rig or other operating equipment.

VI. Chemicals of Concern	Action Level(s)	Response Measures
<u>Low concentrations of</u>	<u>No visible dust/avoid contact</u>	<u>Suspend site activities</u>
<u>Metals, SVOCs/PAHs, and</u>	<u>Any sustained readings</u>	<u>report to an unaffected area.</u>
<u>VOCs.</u>	<u>above 10 ppm</u>	
	<u>in worker breathing zone</u>	

- VII. Additional Safety Equipment/Procedures
- | | | | |
|------------------------------------|---|---------------------------------------|---|
| Hard-hat..... | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | Hearing Protection (Plugs/Muffs) | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Safety Glasses | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | Safety belt/harness | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Chemical/splash goggles | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Radio..... | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Splash Shield..... | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Barricades..... | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Splash suits/coveralls | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Gloves (Type - Nitrile) | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Steel toe Work shoes or boots..... | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | Work/rest regimen..... | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
- Modifications/Exceptions: Reflective vests for high traffic areas. Tyvek coverall if there is a potential for soiling work cloths. PVC or PE coated Tyvek if saturation or work cloths may occur.

- | | | | | |
|--|--------------------------|--------------------------|-------------------------|--------------------------|
| VIII. Procedure review with permit acceptors | Yes | NA | Yes | NA |
| Safety shower/eyewash (Location & Use)..... | <input type="checkbox"/> | <input type="checkbox"/> | Emergency alarms | <input type="checkbox"/> |
| Procedure for safe job completion | <input type="checkbox"/> | <input type="checkbox"/> | Evacuation routes | <input type="checkbox"/> |
| Contractor tools/equipment/PPE inspected | <input type="checkbox"/> | <input type="checkbox"/> | Assembly points..... | <input type="checkbox"/> |

- | | | |
|--|--------------------------|--------------------------|
| IX. Site Preparation | Yes | NA |
| Utility Locating and Excavation Clearance completed | <input type="checkbox"/> | <input type="checkbox"/> |
| Vehicle and Foot Traffic Routes Cleared and Established..... | <input type="checkbox"/> | <input type="checkbox"/> |
| Physical Hazards Barricaded and Isolated | <input type="checkbox"/> | <input type="checkbox"/> |
| Emergency Equipment Staged | <input type="checkbox"/> | <input type="checkbox"/> |

- X. Additional Permits required (Hot work, confined space entry, excavation etc.)..... Yes No
If yes, complete permit required or contact Health Sciences, Pittsburgh Office

- XI. Special instructions, precautions: Inspect site equipment in accordance with equipment inspection procedures in Attachment V. Keep hands and other body parts away from advancing parts or other moving equipment/machinery. Maintain good communication between the operator of the DPT rig and the other crew members. Use manufacturer recommended tools to hold and cut acetate liners. Injuries have occurred when other devices/tools have been used or when liners are improperly supported. Although analysis by mobile lab includes analysis for BTEX, naphthalene, and chlorinated solvents, available data indicates concentrations in soil are unlikely to present a significant exposure concern to site workers. If visible dusts are observed contact the PHSO. Wash hands and face prior to performing hand to mouth activities to prevent inadvertent ingestion of contaminated media.

Permit Issued by: _____ Permit Accepted by: _____

**SAFE WORK PERMIT FOR
MULTI MEDIA SAMPLING AND IDW ACTIVITIES
NSA PANAMA CITY, FLORIDA**

Permit No. _____ Date: _____ Time: From _____ to _____

SECTION I: General Job Scope

- I. Work limited to the following (description, area, equipment used): Multi media sampling including surface and subsurface samples (See Safe Work Permit for soil boring activities), groundwater and sediments (at SWMU 3). IDW sampling activities are included in this task since they involve the handling of potentially contaminated media (soils)
- II. Required Monitoring Instrument(s): PID or FID
- III. Field Crew: _____
- IV. On-site Inspection conducted Yes No Initials of Inspector TtNUS

SECTION II: General Safety Requirements (To be filled in by permit issuer)

- V. Protective equipment required Respiratory equipment required
- | | | |
|--|--|--------------------------------------|
| Level D <input checked="" type="checkbox"/> Level B <input type="checkbox"/> | Full face APR <input type="checkbox"/> | Escape Pack <input type="checkbox"/> |
| Level C <input type="checkbox"/> Level A <input type="checkbox"/> | Half face APR <input type="checkbox"/> | SCBA <input type="checkbox"/> |
| Detailed on Reverse | | |
- Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, safety footwear, safety glasses, and nitrile gloves

- | | | |
|--------------------------------|--------------------------------------|--------------------------------------|
| VI. Chemicals of Concern | Action Level(s) | Response Measures |
| <u>Low concentrations of</u> | <u>No visible dust/avoid contact</u> | <u>Suspend site activities</u> |
| <u>Metals, SVOCs/PAHs, and</u> | <u>Any sustained readings</u> | <u>report to an unaffected area.</u> |
| <u>VOCs.</u> | <u>above 10 ppm</u> | |
| | <u>in worker breathing zone</u> | |

- VII. Additional Safety Equipment/Procedures
- | | |
|---|---|
| Hard-hat <input type="checkbox"/> Yes <input type="checkbox"/> No | Hearing Protection (Plugs/Muffs) <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Safety Glasses <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | Safety belt/harness <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Chemical/splash goggles <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Radio <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Splash Shield <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Barricades <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Splash suits/coveralls <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Gloves (Type - Nitrile) <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Steel toe Work shoes or boots <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | Work/rest regimen <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
- Modifications/Exceptions: Reflective vests for high traffic areas. Tyvek coverall if there is a potential for soiling work cloths and PVC or PE coated Tyvek if saturation or work cloths may occur. Rubber boots or hip waders when water or mud are encountered. USCG life vests if workers must enter or work near water.

- | | | | |
|--|--------------------------|--------------------------|--|
| VIII. Procedure review with permit acceptors | Yes | NA | Emergency alarms <input type="checkbox"/> Yes <input type="checkbox"/> NA |
| Safety shower/eyewash (Location & Use)..... | <input type="checkbox"/> | <input type="checkbox"/> | Evacuation routes <input type="checkbox"/> Yes <input type="checkbox"/> NA |
| Procedure for safe job completion | <input type="checkbox"/> | <input type="checkbox"/> | Assembly points <input type="checkbox"/> Yes <input type="checkbox"/> NA |
| Contractor tools/equipment/PPE inspected | <input type="checkbox"/> | <input type="checkbox"/> | |

- IX. Site Preparation
- | | | |
|--|--------------------------|--------------------------|
| Utility Locating and Excavation Clearance completed | Yes | NA |
| Vehicle and Foot Traffic Routes Cleared and Established..... | <input type="checkbox"/> | <input type="checkbox"/> |
| Physical Hazards Barricaded and Isolated | <input type="checkbox"/> | <input type="checkbox"/> |
| Emergency Equipment Staged | <input type="checkbox"/> | <input type="checkbox"/> |

- X. Additional Permits required (Hot work, confined space entry, excavation etc.)..... Yes No
If yes, complete permit required or contact Health Sciences, Pittsburgh Office

- XI. Special instructions, precautions Use manufacturer recommended tools to hold and cut acetate liners. Injuries have occurred when other devices/tools have been used or when liners are improperly supported. If visible dusts are observed contact the PHSO. Wash hands and face prior to performing hand to mouth activities to prevent inadvertent ingestion of contaminated media. Use safe lifting procedures and obtain assistance when handling heavy or awkward objects (e.g., sample coolers). Use drum dolly when moving heavy drums.

**SAFE WORK PERMIT FOR
MULTI MEDIA SAMPLING AND IDW ACTIVITIES
NSA PANAMA CITY, FLORIDA**

Permit Issued by: _____ Permit Accepted by: _____

ATTACHMENT IV

**UTILITY LOCATING AND
EXCAVATION CLEARANCE**



TETRA TECH NUS, INC.

STANDARD OPERATING PROCEDURES

Number HS-1.0	Page 1 of 15
Effective Date 12/03	Revision 2
Applicability Tetra Tech NUS, Inc.	
Prepared Health & Safety	
Approved D. Senovich	

Subject
UTILITY LOCATING AND EXCAVATION CLEARANCE

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1.0 PURPOSE

Utilities such as electric service lines, natural or propane gas lines, water and sewage lines, telecommunications, and steam lines are very often in the immediate vicinity of work locations. Contact with underground or overhead utilities can have serious consequences including employee injury/fatality, property and equipment damage, substantial financial impacts, and loss of utility service to users.

The purpose of this procedure is to provide minimum requirements and technical guidelines regarding the appropriate procedures to be followed when performing subsurface and overhead utility locating services. It is the policy of Tetra Tech NUS, Inc. (TtNUS) to provide a safe and healthful work environment for the protection of our employees. The purpose of this Standard Operating Procedure (SOP) is to aid in achieving the objectives of this policy, to present the acceptable procedures pertaining to utility locating and excavation clearance activities, and to present requirements and restrictions relevant to these types of activities. This SOP must be reviewed by any employee potentially involved with underground or overhead utility locating and avoidance activities.

2.0 SCOPE

This procedure applies to all TtNUS field activities where there may be potential contact with underground or overhead utilities. This procedure provides a description of the principles of operation, instrumentation, applicability, and implementability of typical methods used to determine the presence and avoidance of contact with utility services. This procedure is intended to assist with work planning and scheduling, resource planning, field implementation, and subcontractor procurement. Utility locating and excavation clearance requires site-specific information prior to the initiation of any such activities on a specific project. This SOP is not intended to provide a detailed description of methodology and instrument operation. Specialized expertise during both planning and execution of several of the methods presented may also be required.

3.0 GLOSSARY

Electromagnetic Induction (EMI) Survey - A geophysical exploration method whereby electromagnetic fields are induced in the ground and the resultant secondary electromagnetic fields are detected as a measure of ground conductivity.

Magnetometer – A device used for precise and sensitive measurements of magnetic fields.

Magnetic Survey – A geophysical survey method that depends on detection of magnetic anomalies caused by the presence of buried ferromagnetic objects.

Metal Detection – A geophysical survey method that is based on electromagnetic coupling caused by underground conductive objects.

Vertical Gradiometer – A magnetometer equipped with two sensors that are vertically separated by a fixed distance. It is best suited to map near surface features and is less susceptible to deep geologic features.

Ground Penetrating Radar – Ground Penetrating Radar (GPR) involves specialized radar equipment whereby a signal is sent into the ground via a transmitter. Some portion of the signal will be reflected from the subsurface material, which is then recorded with a receiver and electronically converted into a graphic picture.

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4.0 RESPONSIBILITIES

Project Manager (PM)/Task Order Manager (TOM) - Responsible for ensuring that all field activities are conducted in accordance with this procedure.

Site Manager (SM)/Field Operations Leader (FOL) - Responsible for the onsite verification that all field activities are performed in compliance with approved SOPs or as otherwise directed by the approved project plan(s).

Site Health & Safety Officer (SHSO) – Responsible to provide technical assistance and verify full compliance with this SOP. The SHSO is also responsible for reporting any deficiencies to the Corporate Health and Safety Manager (HSM) and to the PM/TOM.

Health & Safety Manager (HSM) – Responsible for preparing, implementing, and modifying corporate health and safety policy and this SOP.

Site Personnel – Responsible for performing their work activities in accordance with this SOP and the TtNUS Health and Safety Policy.

5.0 PROCEDURES

This procedure addresses the requirements and technical procedures that must be performed to minimize the potential for contact with underground and overhead utility services. These procedures are addressed individually from a buried and overhead standpoint.

5.1 Buried Utilities

Buried utilities present a heightened concern because their location is not typically obvious by visual observation, and it is common that their presence and/or location is unknown or incorrectly known on client properties. This procedure must be followed prior to beginning any subsurface probing or excavation that might potentially be in the vicinity of underground utility services. In addition, the Utility Clearance Form (Attachment 3) must be completed for every location or cluster of locations where intrusive activities will occur.

Where the positive identification and de-energizing of underground utilities cannot be obtained and confirmed using the following steps, the PM/TOM is responsible for arranging for the procurement of a qualified, experienced, utility locating subcontractor who will accomplish the utility location and demarcation duties specified herein.

1. A comprehensive review must be made of any available property maps, blue lines, or as-builts prior to site activities. Interviews with local personnel familiar with the area should be performed to provide additional information concerning the location of potential underground utilities. Information regarding utility locations shall be added to project maps upon completion of this exercise.
- 2., A visual site inspection must be performed to compare the site plan information to actual field conditions. Any findings must be documented and the site plan/maps revised. The area(s) of proposed excavation or other subsurface activities must be marked at the site in white paint or pin flags to identify those locations of the proposed intrusive activities. The site inspection should focus on locating surface indications of potential underground utilities. Items of interest include the presence of nearby area lights, telephone service, drainage grates, fire hydrants, electrical service vaults/panels, asphalt/concrete scars and patches, and topographical depressions. Note the location of any emergency shut off switches. Any additional information regarding utility

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locations shall be added to project maps upon completion of this exercise and returned to the PM/TOM.

3. If the planned work is to be conducted on private property (e.g., military installations, manufacturing facilities, etc.) the FOL must identify and contact appropriate facility personnel (e.g., public works or facility engineering) before any intrusive work begins to inquire about (and comply with) property owner requirements. It is important to note that private property owners may require several days to several weeks advance notice prior to locating utilities.
4. If the work location is on public property, the state agency that performs utility clearances must be notified (see Attachment 1). State "one-call" services must be notified prior to commencing fieldwork per their requirements. Most one-call services require, by law, 48- to 72-hour advance notice prior to beginning any excavation. Such services typically assign a "ticket" number to the particular site. This ticket number must be recorded for future reference and is valid for a specific period of time, but may be extended by contacting the service again. The utility service will notify utility representatives who then mark their respective lines within the specified time frame. It should be noted that most military installations own their own utilities but may lease service and maintenance from area providers. Given this situation, "one call" systems may still be required to provide location services on military installations.
5. Utilities must be identified and their locations plainly marked using pin flags, spray paint, or other accepted means. The location of all utilities must be noted on a field sketch for future inclusion on project maps. Utility locations are to be identified using the following industry-standard color code scheme, unless the property owner or utility locator service uses a different color code:

white	excavation/subsurface investigation location
red	electrical
yellow	gas, oil, steam
orange	telephone, communications
blue	water, irrigation, slurry
green	sewer, drain
6. Where utility locations are not confirmed with a high degree of confidence through drawings, schematics, location services, etc., the work area must be thoroughly investigated prior to beginning the excavation. In these situations, utilities must be identified using safe and effective methods such as passive and intrusive surveys, or the use of non-conductive hand tools. Also, in situations where such hand tools are used, they should always be used in conjunction with suitable detection equipment, such as the items described in Section 6.0 of this SOP. Each method has advantages and disadvantages including complexity, applicability, and price. It also should be noted that in some states, initial excavation is required by hand to a specified depth.
7. At each location where trenching or excavating will occur using a backhoe or other heavy equipment, and where utility identifications and locations cannot be confirmed prior to groundbreaking, the soil must be probed using a device such as a tile probe which is made of non-conductive material such as fiberglass. If these efforts are not successful in clearing the excavation area of suspect utilities, hand shoveling must be performed for the perimeter of the intended excavation.
8. All utilities uncovered or undermined during excavation must be structurally supported to prevent potential damage. Unless necessary as an emergency corrective measure, TtNUS shall not make any repairs or modifications to existing utility lines without prior permission of the utility owner, property owner, and Corporate HSM. All repairs require that the line be locked-out/tagged-out prior to work.

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5.2 Overhead Power Lines

If it is necessary to work within the minimum clearance distance of an overhead power line, the overhead line must be de-energized and grounded, or re-routed by the utility company or a registered electrician. If protective measures such as guarding, isolating, or insulating are provided, these precautions must be adequate to prevent employees from contacting such lines directly with any part of their body or indirectly through conductive materials, tools, or equipment.

The following table provides the required minimum clearances for working in proximity to overhead power lines.

<u>Nominal Voltage</u>	<u>Minimum Clearance</u>
0 -50 kV	10 feet, or one mast length; whichever is greater
50+ kV	10 feet plus 4 inches for every 10 kV over 50 kV or 1.5 mast lengths; whichever is greater

6.0 UNDERGROUND LOCATING TECHNIQUES

A variety of supplemental utility locating approaches are available and can be applied when additional assurance is needed. The selection of the appropriate method(s) to employ is site-specific and should be tailored to the anticipated conditions, site and project constraints, and personnel capabilities.

6.1 Geophysical Methods

Geophysical methods include electromagnetic induction, magnetics, and ground penetrating radar. Additional details concerning the design and implementation of electromagnetic induction, magnetics, and ground penetrating radar surveys can be found in one or more of the TtNUS SOPs included in the References (Section 8.0).

Electromagnetic Induction

Electromagnetic Induction (EMI) line locators operate either by locating a background signal or by locating a signal introduced into the utility line using a transmitter. A utility line acts like a radio antenna, producing electrons, which can be picked up with a radiofrequency receiver. Electrical current carrying conductors have a 60HZ signal associated with them. This signal occurs in all power lines regardless of voltage. Utilities in close proximity to power lines or used as grounds may also have a 60HZ signal, which can be picked up with an EM receiver. A typical example of this type of geophysical equipment is an EM-61.

EMI locators specifically designed for utility locating use a special signal that is either indirectly induced onto a utility line by placing the transmitter above the line or directly induced using an induction clamp. The clamp induces a signal on the specific utility and is the preferred method of tracing since there is little chance of the resulting signals being interfered with. A good example of this type of equipment is the Schonstedt® MAC-51B locator. The MAC-51B performs inductively traced surveys, simple magnetic locating, and traced nonmetallic surveys.

When access can be gained inside a conduit to be traced, a flexible insulated trace wire can be used. This is very useful for non-metallic conduits but is limited by the availability of gaining access inside the pipe.

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Magnetics

Magnetic locators operate by detecting the relative amounts of buried ferrous metal. They are incapable of locating or identifying nonferrous utility lines but can be very useful for locating underground storage tanks (UST's), steel utility lines, and buried electrical lines. A typical example of this type of equipment is the Schonstedt® GA-52Cx locator. The GA-52Cx is capable of locating 4-inch steel pipe up to 8 feet deep.

Non-ferrous lines are often located by using a typical plumbing tool (snake) fed through the line. A signal is then introduced to the snake that is then traced.

Ground Penetrating Radar

Ground Penetrating Radar (GPR) involves specialized radar equipment whereby a signal is sent into the ground via a transmitter. Some portion of the signal will be reflected from the subsurface material, which is then recorded with a receiver and electronically converted into a graphic picture. In general, an object which is harder than the surrounding soil will reflect a stronger signal. Utilities, tunnels, UST's, and footings will reflect a stronger signal than the surrounding soil. Although this surface detection method may determine the location of a utility, this method does not specifically identify utilities (i.e., water vs. gas, electrical vs. telephone); hence, verification may be necessary using other methods. This method is somewhat limited when used in areas with clay soil types or with a high water table.

6.2 Passive Detection Surveys

Acoustic Surveys

Acoustic location methods are generally most applicable to waterlines or gas lines. A highly sensitive Acoustic Receiver listens for background sounds of water flowing (at joints, leaks, etc.) or to sounds introduced into the water main using a transducer. Acoustics may also be applicable to determine the location of plastic gas lines.

Thermal Imaging

Thermal (i.e., infrared) imaging is a passive method for detecting the heat emitted by an object. Electronics in the infrared camera convert subtle heat differentials into a visual image on the viewfinder or a monitor. The operator does not look for an exact temperature; rather they look for heat anomalies (either elevated or suppressed temperatures) characteristic of a potential utility line.

The thermal fingerprint of underground utilities results from differences in temperature between the atmosphere and the fluid present in a pipe or the heat generated by electrical resistance. In addition, infrared scanners may be capable of detecting differences in the compaction, temperature and moisture content of underground utility trenches. High-performance thermal imagery can detect temperature differences to hundredths of a degree.

6.3 Intrusive Detection Surveys

Vacuum Excavation

Vacuum excavation is used to physically expose utility services. The process involves removing the surface material over approximately a 1' x 1' area at the site location. The air-vacuum process proceeds with the simultaneous action of compressed air-jets to loosen soil and vacuum extraction of the resulting

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debris. This process ensures the integrity of the utility line during the excavation process, as no hammers, blades, or heavy mechanical equipment comes into contact with the utility line, eliminating the risk of damage to utilities. The process continues until the utility is uncovered. Vacuum excavation can be used at the proposed site location to excavate below the "utility window" which is usually 8 feet.

Hand Excavation

When the identification and location of underground utilities cannot be positively confirmed through document reviews and/or other methods, borings and excavations may be cleared via the use of non-conductive hand tools. This should always be done in conjunction with the use of detection equipment. This would be required for all locations where there is a potential to impact buried utilities. The minimum hand-excavation depth that must be reached is to be determined considering the geographical location of the work site. This approach recognizes that the placement of buried utilities is influenced by frost line depths that vary by geographical region. Attachment 2 presents frost line depths for the regions of the contiguous United States. At a minimum, hand excavation depths must be at least to the frost line depth (see Attachment 2) plus two (2) feet, but never less than 4 feet below ground surface (bgs). For hand excavation, the hole created must be reamed large enough to be at least the diameter of the drill rig auger or bit prior to drilling. For soil gas surveys, the survey probe shall be placed as close as possible to the cleared hand excavation. It is important to note that a post-hole digger must not be used in this type of hand excavation activity.

Tile Probe Surveys

For some soil types, site conditions, and excavation requirements, non-conductive tile probes may be used. A tile probe is a "T"-handled rod of varying lengths that can be pushed into the soil to determine if any obstructions exist at that location. Tile probes constructed of fiberglass or other nonconductive material are readily-available from numerous vendors. Tile probes must be performed to the same depth requirements as previously specified. As with other types of hand excavating activities, the use of a non-conductive tile probe, should always be in conjunction with suitable utility locating detection equipment.

7.0 INTRUSIVE ACTIVITIES SUMMARY

The following list summarizes the activities that must be performed prior to beginning subsurface activities:

1. Map and mark all subsurface locations and excavation boundaries using white paint or markers specified by the client or property owner.
2. Notify the property owner and/or client that the locations are marked. At this point, drawings of locations or excavation boundaries shall be provided to the property owner and/or client so they may initiate (if applicable) utility clearance.

Note: Drawings with confirmed locations should be provided to the property owner and/or client as soon as possible to reduce potential time delays.

3. Notify "One Call" service. If possible, arrange for an appointment to show the One Call representative the surface locations or excavation boundaries in person. This will provide a better location designation to the utilities they represent. You should have additional drawings should you need to provide plot plans to the One Call service.
4. Implement supplemental utility detection techniques as necessary and appropriate to conform utility locations or the absence thereof.

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5. Complete Attachment 3, Utility Clearance Form. This form should be completed for each excavation location. In situations where multiple subsurface locations exist within the close proximity of one another, one form may be used for multiple locations provided those locations are noted on the Utility Clearance Form. Upon completion, the Utility Clearance Form and revised/annotated utility location map becomes part of the project file.

8.0 REFERENCES

OSHA Letter of Interpretation, Mr. Joseph Caldwell, Attachment 4
 OSHA 29 CFR 1926(b)(2)
 OSHA 29 CFR 1926(b)(3)
 TtNUS Utility Locating and Clearance Policy
 TtNUS SOP GH-3.1; Resistivity and Electromagnetic Induction
 TtNUS SOP GH-3.2; Magnetic and Metal Detection Surveys
 TtNUS SOP GH-3.4; Ground-penetrating Radar Surveys

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**ATTACHMENT 1
LISTING OF UNDERGROUND UTILITY CLEARANCE RESOURCES**



American Public Works Association
2345 Grand Boulevard, Suite 500, Kansas City, MO 64108-2625
Phone (816) 472-6100 • Fax (816) 472-1610
Web www.apwa.net • E-mail apwa@apwa.net

**ONE-CALL SYSTEMS INTERNATIONAL
CONDENSED DIRECTORY**

Alabama Alabama One-Call 1-800-292-8525	Iowa Iowa One-Call 1-800-292-8989	New Jersey New Jersey One Call 1-800-272-1000
Alaska Locate Call Center of Alaska, Inc. 1-800-478-3121	Kansas Kansas One-Call System, Inc. 1-800-344-7233	New Mexico New Mexico One Call System, Inc. 1-800-321-2537 Las Cruces- Dona Ana Blue Stakes 1-888-526-0400
Arizona Arizona Blue Stake 1-800-782-5348	Kentucky Kentucky Underground Protection Inc. 1-800-752-6007	New York Dig Safely New York 1-800-862-7962 New York City- Long Island One Call Center 1-800-272-4480
Arkansas Arkansas One Call System, Inc. 1-800-482-8998	Louisiana Louisiana One Call System, Inc. 1-800-272-3020	North Carolina The North Carolina One-Call Center, Inc. 1-800-632-4949
California Underground Service Alert North 1-800-227-2600 Underground Service Alert of Southern California 1-800-227-2600	Maine Dig Safe System, Inc. 1-888-344-7233	North Dakota North Dakota One-Call 1-800-795-0555
Colorado Utility Notification Center of Colorado 1-800-922-1987	Maryland Miss Utility 1-800-257-7777 Miss Utility of Delmarva 1-800-282-8555	Ohio Ohio Utilities Protection Service 1-800-362-2764 Oil & Gas Producers Underground Protect'n Svc 1-800-925-0988
Connecticut Call Before You Dig 1-800-922-4455	Massachusetts Dig Safe System, Inc. 1-888-344-7233	Oklahoma Call Okie 1-800-522-6543
Delaware Miss Utility of Delmarva 1-800-282-8555	Michigan Miss Dig System, Inc. 1-800-482-7171	Oregon Oregon Utility Notification Center/One Call Concepts 1-800-332-2344
Florida Sunshine State One-Call of Florida, Inc. 1-800-432-4770	Minnesota Gopher State One Call 1-800-252-1168	Pennsylvania Pennsylvania One Call System, Inc. 1-800-242-1776
Georgia Underground Protection Center, Inc. 1-800-282-7411	Mississippi Mississippi One-Call System, Inc. 1-800-227-6477	Rhode Island Dig Safe System, Inc. 1-888-344-7233
Hawaii Underground Service Alert North 1-800-227-2600	Missouri Missouri One-Call System, Inc. 1-800-344-7483	South Carolina Palmetto Utility Protection Service Inc. 1-888-721-7877
Idaho Dig Line Inc. 1-800-342-1585 Kootenai County One-Call 1-800-428-4950 Shoshone - Benewah One-Call 1-800-398-3285	Montana Utilities Underground Protection Center 1-800-424-5555 Montana One Call Center 1-800-551-8344	South Dakota South Dakota One Call 1-800-781-7474
Illinois JULIE, Inc. 1-800-892-0123 Digger (Chicago Utility Alert Network) 312-744-7000	Nebraska Diggers Hotline of Nebraska 1-800-331-5666	Tennessee Tennessee One-Call System, Inc. 1-800-351-1111
Indiana Indiana Underground Plant Protection Service 1-800-382-5544	Nevada Underground Service Alert North 1-800-227-2600	
	New Hampshire Dig Safe System, Inc. 1-888-344-7233	

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Texas

Texas One Call System
1-800-245-4545
Texas Excavation Safety System, Inc.
1-800-344-8377
Lone Star Notification Center
1-800-669-8344

Utah

Blue Stakes of Utah
1-800-662-4111

Vermont

Dig Safe System, Inc.
1-888-344-7233

Virginia

Miss Utility of Virginia
1-800-552-7001
Miss Utility (Northern Virginia)
1-800-257-7777

Washington

Utilities Underground Location Center
1-800-424-5555
Northwest Utility Notification Center
1-800-553-4344
Inland Empire Utility Coordinating
Council
509-456-8000

West Virginia

Miss Utility of West Virginia, Inc.
1-800-245-4848

Wisconsin

Diggers Hotline, Inc.
1-800-242-8511

Wyoming

Wyoming One-Call System, Inc.
1-800-348-1030
Call Before You Dig of Wyoming
1-800-849-2476

District of Columbia

Miss Utility
1-800-257-7777

Alberta

Alberta One-Call Corporation
1-800-242-3447

British Columbia

BC One Call
1-800-474-6886

Ontario

Ontario One-Call System
1-800-400-2255

Quebec

Info-Excavation
1-800-663-9228

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**ATTACHMENT 3
UTILITY CLEARANCE FORM**

Client: _____ Project Name: _____
 Project No.: _____ Completed By: _____
 Location Name: _____ Work Date: _____
 Excavation Method/Overhead Equipment: _____

1. Underground Utilities Circle One
- a) Review of existing maps? yes no N/A
 - b) Interview local personnel? yes no N/A
 - c) Site visit and inspection? yes no N/A
 - d) Excavation areas marked in the field? yes no N/A
 - e) Utilities located in the field? yes no N/A
 - f) Located utilities marked/added to site maps? yes no N/A
 - g) Client contact notified yes no N/A
 Name _____ Telephone: _____ Date: _____
 - g) State One-Call agency called? yes no N/A
 Caller: _____
 Ticket Number: _____ Date: _____
 - h) Geophysical survey performed? yes no N/A
 Survey performed by: _____
 Method: _____ Date: _____
 - i) Hand excavation performed (with concurrent use of utility
 detection device)? yes no N/A
 Completed by: _____
 Total depth: _____ feet Date: _____
 - j) Trench/excavation probed? yes no N/A
 Probing completed by: _____
 Depth/frequency: _____ Date: _____

2. Overhead Utilities Present Absent
- a) Determination of nominal voltage yes no N/A
 - b) Marked on site maps yes no N/A
 - c) Necessary to lockout/insulate/re-route yes no N/A
 - d) Document procedures used to lockout/insulate/re-route yes no N/A
 - e) Minimum acceptable clearance (SOP Section 5.2): _____

3. Notes:

Approval:

 Site Manager/Field Operations Leader Date

c: PM/Project File
 Program File

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**ATTACHMENT 4
OSHA LETTER OF INTERPRETATION**

Mr. Joseph Caldwell
Consultant
Governmental Liaison
Pipeline Safety Regulations
211 Wilson Boulevard
Suite 700
Arlington, Virginia 22201

Re: Use of hydro-vacuum or non-conductive hand tools to locate underground utilities.

Dear Mr. Caldwell:

In a letter dated July 7, 2003, we responded to your inquiry of September 18, 2002, regarding the use of hydro-vacuum equipment to locate underground utilities by excavation. After our letter to you was posted on the OSHA website, we received numerous inquiries that make it apparent that aspects of our July 7 letter are being misunderstood. In addition, a number of industry stakeholders, including the National Utility Contractors Association (NUCA), have provided new information regarding equipment that is available for this work.

To clarify these issues, we are withdrawing our July 7 letter and issuing this replacement response to your inquiry.

***Question:** Section 1926.651 contains several requirements that relate to the safety of employees engaged in excavation work. Specifically, paragraphs (b)(2) and (b)(3) relate in part to the safety of the means used to locate underground utility installations that, if damaged during an uncovering operation, could pose serious hazards to employees.*

Under these provisions, what constitutes an acceptable method of uncovering underground utility lines, and further, would the use of hydro-vacuum excavation be acceptable under the standard?

Answer

Background

Two sections of 29 CFR 1926 Subpart P (Excavations), 1926.651 (Specific excavation requirements), govern methods for uncovering underground utility installations. Specifically, paragraph (b)(2) states:

When utility companies or owners cannot respond to a request to locate underground utility installations within 24 hours * * * or cannot establish the exact location of these installations, the employer may proceed, provided the employer does so with caution, and provided detection equipment or other acceptable means to locate utility installations are used. (emphasis added).

Paragraph (b)(3) provides:

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When excavation operations approach the estimated location of underground installations, the exact location of the installations shall be determined by safe and acceptable means. (emphasis added).

Therefore, “acceptable means” must be used where the location of the underground utilities have not been identified by the utility companies and detection equipment is not used.

Subpart P does not contain a definition of either “other acceptable means” or “safe and acceptable means.” The preambles to both the proposed rule and the final rule discussed the rationale behind the wording at issue. For example, the preamble to the proposed rule, 52 Fed. Reg. 12301 (April 15, 1987), noted that a 1972 version of this standard contained language that specified “careful probing or hand digging” as the means to uncover utilities. The preamble then noted that an amendment to the 1972 standard later deleted that language “to allow other, *equally effective means* of locating such installations.” The preamble continued that in the 1987 proposed rule, OSHA again proposed using language in section (b)(3) that would provide another example of an acceptable method of uncovering utilities that could be used where the utilities have not been marked and detection equipment is not being used – “probing with hand-held tools.” This method was rejected in the final version of 29 CFR 1926. As OSHA explained in the preamble to the final rule, 54 Fed. Reg. 45916 (October 31, 1989):

OSHA received two comments * * * and input from ACCSH [OSHA’s Advisory Committee on Construction Safety and Health] * * * on this provision. All commenters recommended dropping ‘such as probing with hand-held tools’ from the proposed provision, because this could create a hazard to employees by damaging the installation or its insulation.

In other words, the commenters objected to the use of hand tools being used unless detection equipment was used in conjunction with them. OSHA then concluded its discussion relative to this provision by agreeing with the commentators and ultimately not including any examples of “acceptable means” in the final provision.

Non-conductive hand tools are permitted

This raises the question of whether the standard permits the use of hand tools alone -- without also using detection equipment. NUCA and other industry stakeholders have recently informed us that non-conductive hand tools that are appropriate to be used to locate underground utilities are now commonly available.

Such tools, such as a “shooter” (which has a non-conductive handle and a snub nose) and non-conductive or insulated probes were not discussed in the rulemaking. Since they were not considered at that time, they were not part of the class of equipment that was thought to be unsafe for this purpose. Therefore, we conclude that the use of these types of hand tools, when used with appropriate caution, is an “acceptable means” for locating underground utilities.

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Hydro-vacuum excavation

It is our understanding that some hydro-vacuum excavation equipment can be adjusted to use a minimum amount of water and suction pressure. When appropriately adjusted so that the equipment will not damage underground utilities (especially utilities that are particularly vulnerable to damage, such as electrical lines), use of such equipment would be considered a "acceptable means" of locating underground utilities. However, if the equipment cannot be sufficiently adjusted, then this method would not be acceptable under the standard.

Other technologies

We are not suggesting that these are the only devices that would be "acceptable means" under the standard. Industry stakeholders have informed us that there are other types of special excavation equipment designed for safely locating utilities as well.

We apologize for any confusion our July 7 letter may have caused. If you have further concerns or questions, please feel free to contact us again by fax at: U.S. Department of Labor, OSHA, Directorate of Construction, Office of Construction Standards and Compliance Assistance, fax # 202-693-1689. You can also contact us by mail at the above office, Room N3468, 200 Constitution Avenue, N.W., Washington, D.C. 20210, although there will be a delay in our receiving correspondence by mail.

Sincerely,

Russell B. Swanson, Director
Directorate of Construction

NOTE: OSHA requirements are set by statute, standards and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at <http://www.osha.gov>.

ATTACHMENT V
EQUIPMENT INSPECTION CHECKLIST

EQUIPMENT INSPECTION

COMPANY: _____ **UNIT NO.** _____

FREQUENCY: Inspect daily, document prior to use and as repairs are needed.

Inspection Date: ___/___/___ Time: _____ Equipment Type: _____

	(e.g., bulldozer)		
	Good	Need Repair	N/A
Tires or tracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hoses and belts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cab, mirrors, safety glass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Turn signals, lights, brake lights, etc. (front/rear) for equipment approved for highway use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Is the equipment equipped with audible back-up alarms and back-up lights?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Horn and gauges	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Brake condition (dynamic, park, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fire extinguisher (Type/Rating - _____)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fluid Levels:			
- Engine oil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Transmission fluid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Brake fluid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Cooling system fluid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Windshield wipers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Hydraulic oil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oil leak/lube	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coupling devices and connectors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exhaust system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Blade/boom/ripper condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Accessways: Frame, hand holds, ladders, walkways (non-slip surfaces), guardrails?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power cable and/or hoist cable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Steering (standard and emergency)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Safety Guards:

	Yes	No
- Around rotating apparatus (belts, pulleys, sprockets, spindles, drums, flywheels, chains) all points of operations protected from accidental contact? _____	<input type="checkbox"/>	<input type="checkbox"/>
- Hot pipes and surfaces exposed to accidental contact? _____	<input type="checkbox"/>	<input type="checkbox"/>
- All emergency shut offs have been identified and communicated to the field crew? _____	<input type="checkbox"/>	<input type="checkbox"/>
- Have emergency shutoffs been field tested? _____	<input type="checkbox"/>	<input type="checkbox"/>
- Results? _____	<input type="checkbox"/>	<input type="checkbox"/>
- Are any structural members bent, rusted, or otherwise show signs of damage? _____	<input type="checkbox"/>	<input type="checkbox"/>
- Are fueling cans used with this equipment approved type safety cans? _____	<input type="checkbox"/>	<input type="checkbox"/>

- Have the attachments designed for use (as per manufacturer's recommendation) with this equipment been inspected and are considered suitable for use? _____

Portable Power Tools:

- Tools and Equipment in Safe Condition? _____
- Saw blades, grinding wheels free from recognizable defects (grinding wheels have been sanded)? _____
- Portable electric tools properly grounded? _____
- Damage to electrical power cords? _____
- Blade guards in place? _____
- Components adjusted as per manufacturers recommendation? _____

Cleanliness:

- Overall condition (is the decontamination performed prior to arrival on-site considered acceptable)? _____
- Where was this equipment used prior to its arrival on site? _____
- Site Contaminants of concern at the previous site? _____
- Inside debris (coffee cups, soda cans, tools and equipment) blocking free access to foot controls? _____

Operator Qualifications (as applicable for all heavy equipment):

- Does the operator have proper licensing where applicable, (e.g., CDL)? _____
- Does the operator, understand the equipments operating instructions? _____
- Is the operator experienced with this equipment? _____
- Does the operator have emotional and/or physical limitations which would prevent him/her from performing this task in a safe manner? _____
- Is the operator 21 years of age or more? _____

Identification:

- Is a tagging system available, for positive identification, for tools removed from service? _____

Additional Inspection Required Prior to Use On-Site

- | | Yes | No |
|--|--------------------------|--------------------------|
| - Does equipment emit noise levels above 90 decibels? | <input type="checkbox"/> | <input type="checkbox"/> |
| - If so, has an 8-hour noise dosimetry test been performed? | <input type="checkbox"/> | <input type="checkbox"/> |
| - Results of noise dosimetry: _____ | | |
| - Defects and repairs needed: _____ | | |
| - General Safety Condition: _____ | | |
| - Operator or mechanic signature: _____ | | |
| Approved for Use: <input type="checkbox"/> Yes <input type="checkbox"/> No | | |

Site Safety Officer Signature

