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WORK PLAN FOR REMEDIAL INVESTIGATION SITE 3 NCBC GULFPORT MS
3/1/2007
TETRA TECH NUS

Comprehensive Long-term Environmental Action Navy

CONTRACT NUMBER N62467-04-D-0055

Rev. 1
03/26/07

Work Plan
for
Remedial Investigation
at
Site 3 – Northwest Landfill/Burning Pit

Naval Construction Battalion Center
Gulfport, Mississippi

Contract Task Order 0041

March 2007

Naval Facilities Engineering Command
Southeast
2155 Eagle Drive
North Charleston, South Carolina 29406

TETRA TECH NUS, Inc.

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03/26/07

WORK PLAN
FOR
REMEDIAL INVESTIGATION
AT
SITE 3 – NORTHWEST LANDFILL/BURNING PIT

NAVAL CONSTRUCTION BATTALION CENTER
GULFPORT, MISSISSIPPI

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Naval Facilities Engineering Command
Southeast
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CONTRACT NUMBER. N62467-04-D-0055
CONTRACT TASK ORDER 0041

MARCH 2007

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ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
bls	below land surface
BRA	Baseline Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy
COC	Contaminant of Concern
CTO	Contract Task Order
DI	Deionized
DMP	Data Management Plan
DPT	Direct Push Technology
DQO	Data Quality Objective
EA	Environmental Assessment
EE	Envirodyne Engineers, Inc.
EISOPQAM	Environmental Investigation Standard Operating Procedures and Quality Assurance Manual
ERA	Ecological Risk Assessment
FOL	Field Operations Leader
FS	Feasibility Study
ft	foot/feet
HASP	Health and Safety Plan
HHRA	Human Health Risk Assessment
HI	Hazard Index
HLA	Harding Lawson Associates
IAS	Initial Assessment Study
ID	Identification
IDW	Investigation Derived Waste
IMS	Information Management System
IR	Installation Restoration
MCL	Maximum Contaminant Level
MDEQ	Mississippi Department of Environmental Quality
MEK	Methyl Ethyl Ketone
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NAD	North American Datum

ACRONYMS (Continued)

NAVFAC SE	Naval Facilities Engineering Command Southeast
NCBC	Naval Construction Battalion Center
NEESA	Navy Energy and Environmental Support Activity
NGVD	National Geodetic Vertical Datum
NTU	Nephelometric Turbidity Unit
PARCC	Precision, Accuracy, Representativeness, Comparability, and Completeness
PCB	Polychlorinated Biphenyl
PPE	Personal Protective Equipment
PMO	Project Management Office
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAB	Restoration Advisory Board
RAGS	Risk Assessment Guidance for Superfund
RfD	Reference Dose
RI	Remedial Investigation
RSD	Risk-specific Dose
RPM	Remedial Project Manager
SARA	Superfund Amendments and Reauthorization Act
SLERA	Screening Level Ecological Risk Assessment
SOP	Standard Operating Procedure
SRT	Sediment Retention Trap
SVOC	Semivolatile Organic Compound
TAL	Target Analyte List
TCDD	Tetrachlorodibenzo-p-dioxin
TCL	Target Compound List
TFMR	Technical Financial Monthly Report
TOM	Task Order Manager
TtNUS	Tetra Tech NUS, Inc.
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

1.0 INTRODUCTION

1.1 PURPOSE

Tetra Tech NUS, Inc (TtNUS), under contract to the United States Department of the Navy, Naval Facilities Engineering Command Southeast (NAVFAC SE), has prepared this Remedial Investigation (RI) Work Plan for Site 3 - Northwest Landfill/Burning Pit at the Naval Construction Battalion Center (NCBC) in Gulfport, Mississippi. This Work Plan was prepared under the Comprehensive Long-Term Environmental Action Navy (CLEAN) IV, Contract No. N62467-04-D-0055, Contract Task Order (CTO) 0041, which requests that TtNUS conduct the following:

Project Management
Community Relations
Work Plan
Field Investigations
Laboratory Analyses
Data Management
Risk Assessment Report
RI Report
Feasibility Study (FS)

This Work Plan describes the field activities, laboratory analyses, and data management to be performed for the Site 3 RI. The purpose of this Work Plan is to guide the efforts to identify and delineate the impact to environmental media at Site 3 - Northwest Landfill/Burning Pit due to past waste handling practices.

1.2 REGULATORY SETTING

To meet its mission objectives, the Navy performs a variety of operations, some requiring the use, handling, storage, and/or or disposal of hazardous materials. Through accidental spills and leaks as well as through conventional past methods of disposal, hazardous materials may have entered the environment. With growing knowledge of the long-term effects of hazardous materials on the environment, the United States Department of Defense initiated various programs to investigate and remediate conditions related to suspected past releases of hazardous materials at its facilities. One of these programs is the Installation Restoration (IR) program.

The Navy IR program was designed to identify and abate or control contaminant migration resulting from past operations at naval installations, with a goal of expediting and improving environmental response actions while protecting human health and the environment. The IR program is conducted in accordance with Section 120 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 and Executive Order 12580, and in compliance with the guidelines of the National Oil and Hazardous Substances Contingency Plan (NCP) (40 Code of Federal Regulations 300). CERCLA requires compliance by federal facilities, both procedurally and substantively. NAVFAC SE is the agency responsible for the Navy IR program in the southeastern United States.

2.0 SITE BACKGROUND AND HISTORY

2.1 SITE BACKGROUND

NCBC Gulfport is located in the western part of Gulfport, Mississippi, in Harrison County, in the southeastern corner of the state, approximately 2 miles north of the Gulf of Mexico. The base is located on the north side of Gulfport approximately 1 mile from Highway 49 (Figure 2-1). The property for the installation was acquired in April 1942 and occupies approximately 1,100 acres and has an elevation averaging 30 feet above sea level.

The primary mission of NCBC Gulfport is to support military readiness for four battalions of the Naval Construction Force (NCF) and the storage and maintenance of prepositioned War Reserve Materiel Stock. The NCF support consists of mobilization and logistics support for both homeport services and deployed support. Approximately 5,000 military and 1,600 civilian personnel are assigned to, or employed by, the base.

2.2 SITE HISTORY

Site 3 is a former landfill and burning pit approximately 3.5 acres in size and located near the intersection of 8th Street and Colby Avenue and is currently used as part of a fairway at the Pine Bayou Golf Course (Figure 2-2). As shown on Figure 2-2, the eastern boundary of the landfill is adjacent to Canal No. 1. The landfill was operated from 1948 until the mid-1960s. A fire-fighting training pit was also located at the site and was frequently used from the mid-1950s to 1966. During the time this landfill was operated, nearly all of the solid waste and some of the liquid/chemical waste generated at NCBC Gulfport was disposed at this site. The landfill was a trench and fill operation with daily burning of wastes. Waste fuel, oil, solvents, paint, and paint thinners from throughout the installation were also transported to the burning pit in bowsers or 55 gallon drums. During a practice burn, waste liquids were drained into the unlined pit and ignited. An estimated 130,000 gallons of waste fuels, oils, solvents [methyl ethyl ketone (MEK), toluene, and xylenes], paints, and paint thinners were burned at the firefighting training pit. In addition, an estimated 30,000 tons of solid waste (including some additional liquid wastes) were disposed in the trenches (Envirodyne Engineers, Inc. (EE), 1985).

The primary contaminant migration pathway at Site 3 is likely to be groundwater movement through the surficial aquifer, since some of the waste at the site is assumed to be in direct contact with the surficial groundwater. The regional surficial groundwater flow direction is toward the Mississippi Sound, located to the south approximately 2.2 miles from Site 3. However, the local gradient may vary based on topography and may be towards the northwest and toward Canal No. 1 to the east of the site (EE, 1985).

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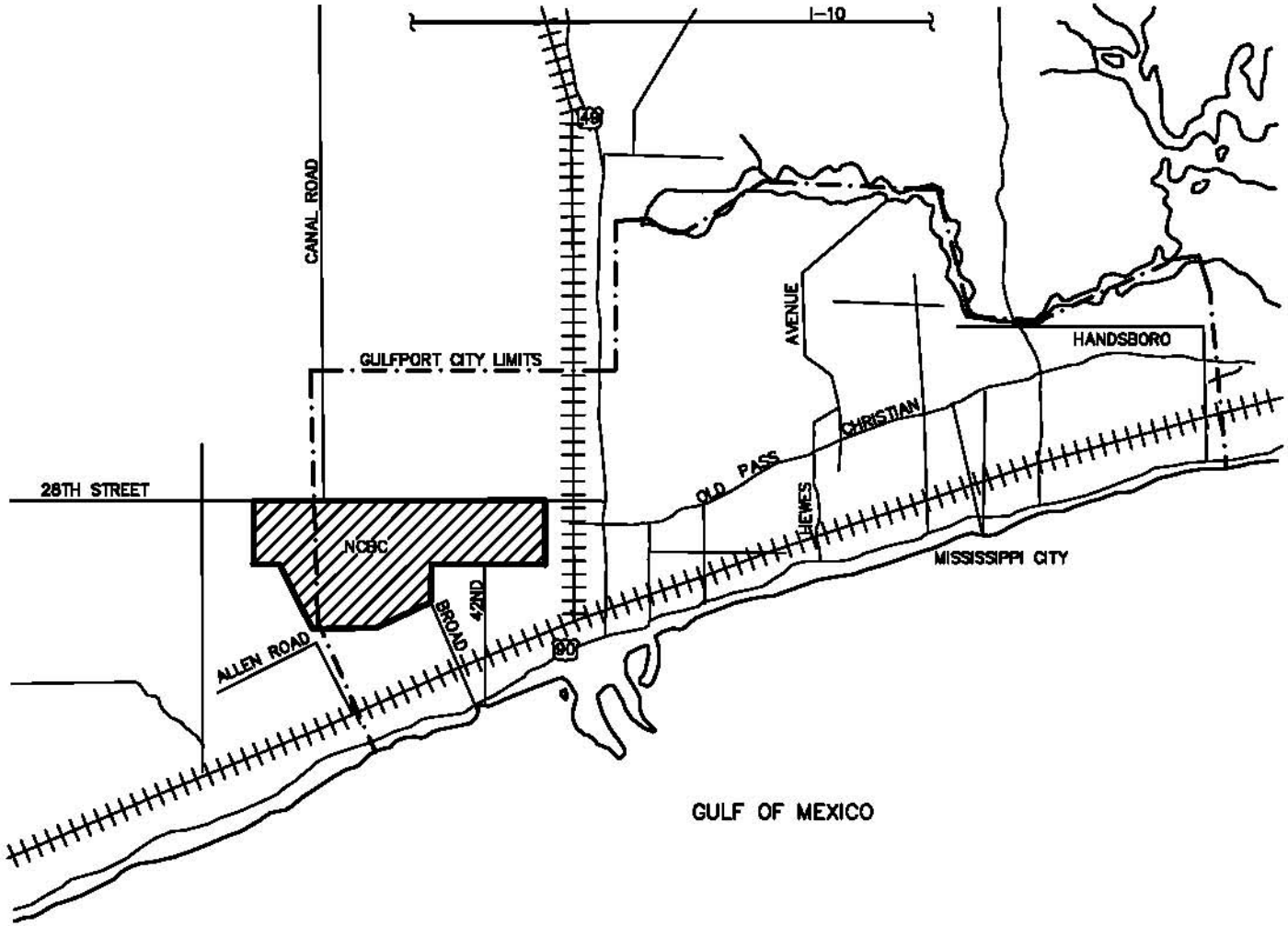

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REVISED BY	DATE		APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-1 / REV. 0

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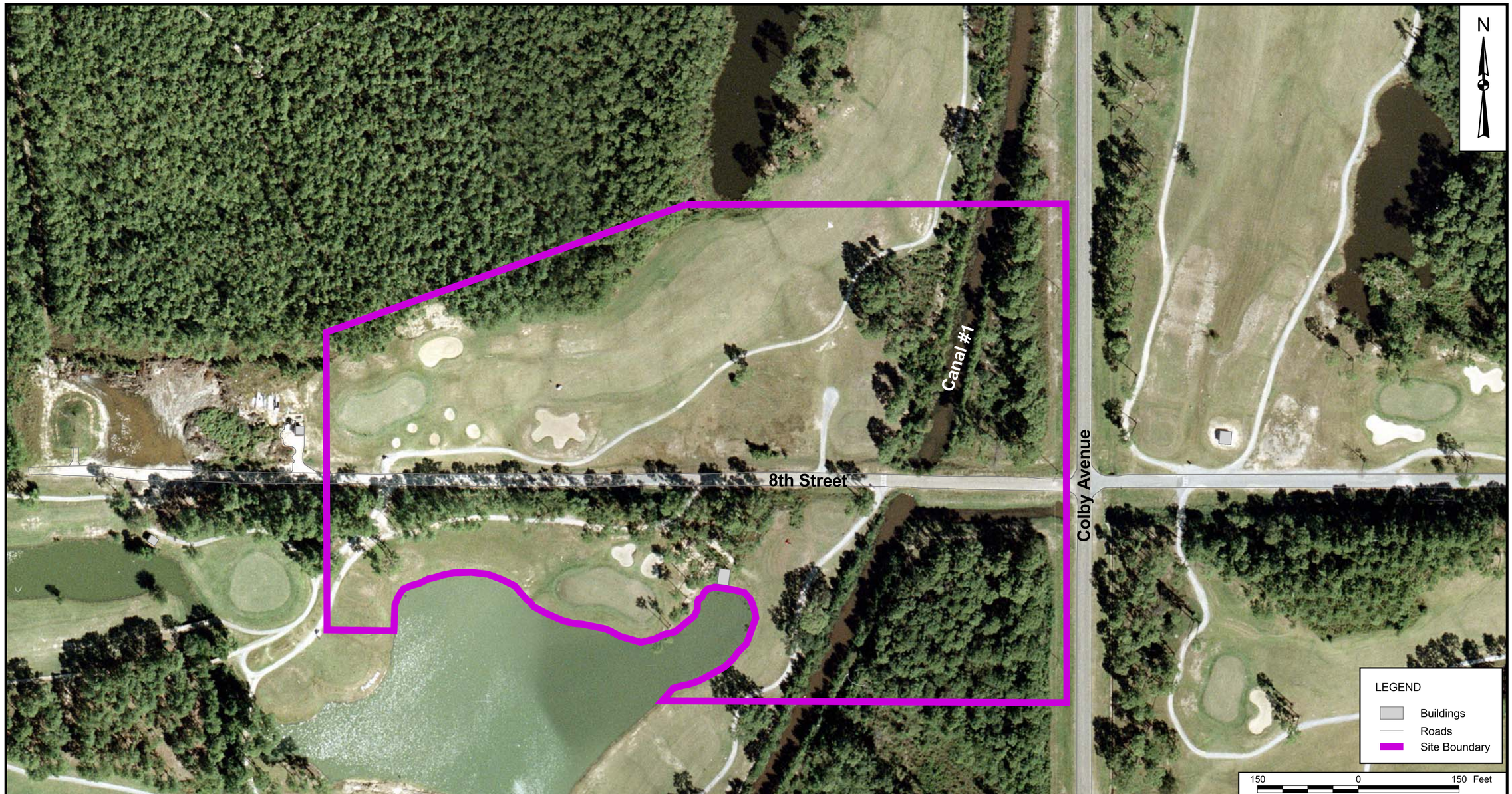

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J. BOURGEOIS	3/21/07		APPROVED BY / DATE
COST/SCHED-AREA			DRAWING NO. FIGURE 2-2 / REV. 0
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3.0 PREVIOUS INVESTIGATIONS

This section summarizes previous investigations at Site 3, discusses potential pathways of contaminant migration, and identifies preliminary response objectives and remedial action alternatives.

3.1 PREVIOUS INVESTIGATION SUMMARIES

Three previous investigations have been undertaken at Site 3, as discussed below.

1985 EE – Initial Assessment Study (IAS) of NCBC Gulfport: The IAS, carried out under Naval Energy and Environmental Support Activity (NEESA), identified and assessed sites at NCBC Gulfport that were a potential threat to human health and the environment. The IAS included the following:

- Records search
- On-site survey
- Site ranking
- Outline for a subsequent Confirmation Study

1999 Harding Lawson Associates (HLA) – Groundwater Monitoring Report: Two downgradient monitoring wells for were installed at Site 3. In addition, two new monitoring wells were installed at Site 3 as replacements for wells damaged during the construction of Pine Bayou Golf Course. No samples were collected from the replacement wells. Dioxin levels in Site 3 wells were low, and no tetrachlorodibenzo -p- dioxin (TCDD) was reported. Pesticide levels were also low; all results were less than Maximum Contaminant Levels (MCLs). The initial characterization of the surficial aquifer at NCBC was refined during this investigation. The relationship between surface water and groundwater at the base was also evaluated and significant interaction between surface water and groundwater was reported. HLA's basewide potentiometric surface map illustrated down gradient groundwater conditions for Site 3.

2006 TtNUS – NCBC Gulfport Sampling to Support Housing Environmental Assessment at Site 3: In addition to supporting NCBC Gulfport's Environmental Assessment (EA) for the northwestern corner of the base, TtNUS's objective was to establish the extent of the site and determine if significant contaminant plumes exist as a result of disposal activities at Site 3. Initial activities included both a geophysical survey (Figure 3-1) to determine site disposal boundaries and

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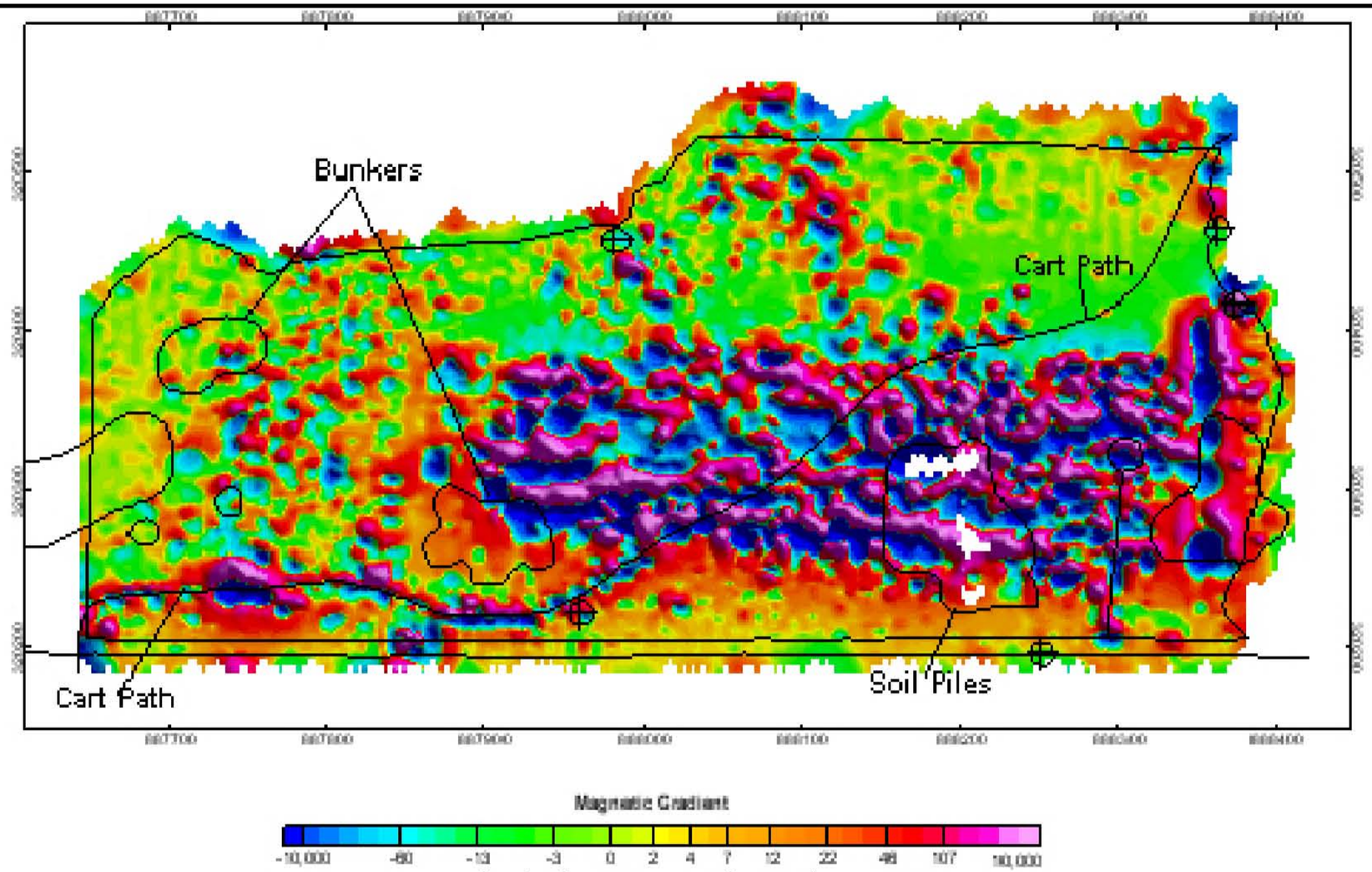

NCBC SITE 3 MAGNETOMETER

MAGNETIC GRADIENT

50 0 50 100

U.S. survey foot

DRAWN BY MF	DATE 8/22/06	SITE 3 MAGNETIC GRADIENT REMEDIAL INVESTIGATION WORKPLAN NAVAL CONSTRUCTION BATTALION CENTER GULFPORT GULFPORT, MISSISSIPPI	CONTRACT NO. 1831
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identify individual disposal cells and the installation of 120 passive soil gas modules. The modules were positioned in a grid pattern biased towards significant geophysical anomalies as well as the suspected location of a former fire fighting training pit. A direct push technology (DPT) groundwater investigation further characterized hotspots identified by the soil gas study. In addition, 16 surface water/sediment samples were collected within the multiple lakes and canals surrounding Site 3. A sizable chlorinated volatile organic compound (VOC) plume was identified in the area of the soil piles (shown on Figure 3-1) that appears to be influenced by the Pine Bayou Golf Course irrigation system. The maximum concentrations of the VOC plume exceed the Tier I TRGs and MCLs.

The 2006 investigation described above will be presented in the RI for Site 3. The 16 surface water and sediment samples completes the extent of the RI sampling for these media.

3.2 POTENTIAL PATHWAYS OF CONTAMINANT MIGRATION

Previous investigations have identified the following potential sources of contamination at Site 3:

- Liquid and solid wastes disposed in the landfill
- Residual flammable liquids in the burning pit
- Metals from paint disposal
- Lead from fuels disposed at the landfill or used at the burning pit
- Backfilled incineration byproducts

Topography at Site 3 is relatively flat, and the ground surface is primarily fill dirt and native sand with a predominantly grassy vegetative cover. The vegetation cover is augmented by fairway and green maintenance by golf course personnel. Canal No. 1 runs along the eastern boundary of the landfill and conveys surface water north where it and exits the base through a culvert under 28th Street. The depth to groundwater at Site 3 (approximately six feet) is somewhat deeper than the surrounding area due to several feet of landfill cover. The cover material is a fine to medium sand with little silt, allowing infiltration or seepage into the landfill. The top of the local silty-clay layer is typically encountered at depths of approximately 30 ft below land surface (bls).

Potential contaminant release mechanisms at Site 3 include the mobilization of contaminants from wastes buried in subsurface soil to local groundwater by infiltration of precipitation and dissolution of soluble contaminants. Soluble constituents can be transported to the shallow aquifer by rainwater infiltration at which point they may continue to move hydrologically downgradient, toward the wetland adjacent to Site

3, and then toward Canal No. 1 east of the site. Groundwater may discharge as seeps or upwelling groundwater to Canal No. 1 although this is unlikely. It is also possible that contaminants may migrate vertically and affect several downgradient water supply wells. However, these were screened approximately 500 ft bls with a significant confining layer at about 150 to 250 ft bls. This confining layer was identified and reported by the Office of Land and Water Resources in *PWS Report PWS-ID: 240005 Source ID: 12, June 31, 1993* and pertains to wells installed within 2 miles of Site 3. Contaminant transport is affected by the chemical and physical properties of both the soil and the contaminants. Figure 3-2 presents the site conceptual model that illustrates these potential contaminant migration pathways.

Currently, erosion and overland transport of particulate matter from site surface soil do not appear to be important transport mechanisms at Site 3 due to the presence of several feet of clean fill covering the site and stabilization of site soils by golf course grass maintenance.

3.3 EXPOSURE ROUTES/PATHWAYS

Based on the potential contaminant sources and contaminant migration pathways, the following exposure routes and pathways will be evaluated in the risk assessment for Site 3.

Soil

Exposure to contaminated soil at Site 3 under current land use is expected to be limited to surface soil. Under future land use, exposure to chemicals in subsurface soil could occur if the soil were uncovered via excavation. A receptor may be exposed to soil by inadvertent ingestion of a small amount of soil, by dermal absorption of contaminants from the soil, or by inhalation of vapors or particulates emitted from soil during or after these potential excavation activities.

Groundwater

Direct exposure to Site 3 groundwater is not expected to occur under current or expected future land usage. Currently available information indicates that no domestic groundwater wells have been installed at or immediately downgradient of Site 3. Therefore, the groundwater is not used as a local source of drinking water. However, to aid in risk management decisions, two conservative scenarios for exposure to groundwater will be evaluated:

- Dermal contact with groundwater by construction workers during future excavation activities.
- Current off-site residents and hypothetical future on-site residents using local groundwater as a source of domestic water.

Worksheet

Baseline Site Conceptual Exposure Model (SCEM)

Site Name: Site 3 - Northwest Landfill/Burning Pit
Site Location: NCBC Gulfport, Gulfport, MS

Completed By: JB
Revision Date: 07 MAR 07

☐ Complete
○ Potentially Complete

☐ Draft
■ Final

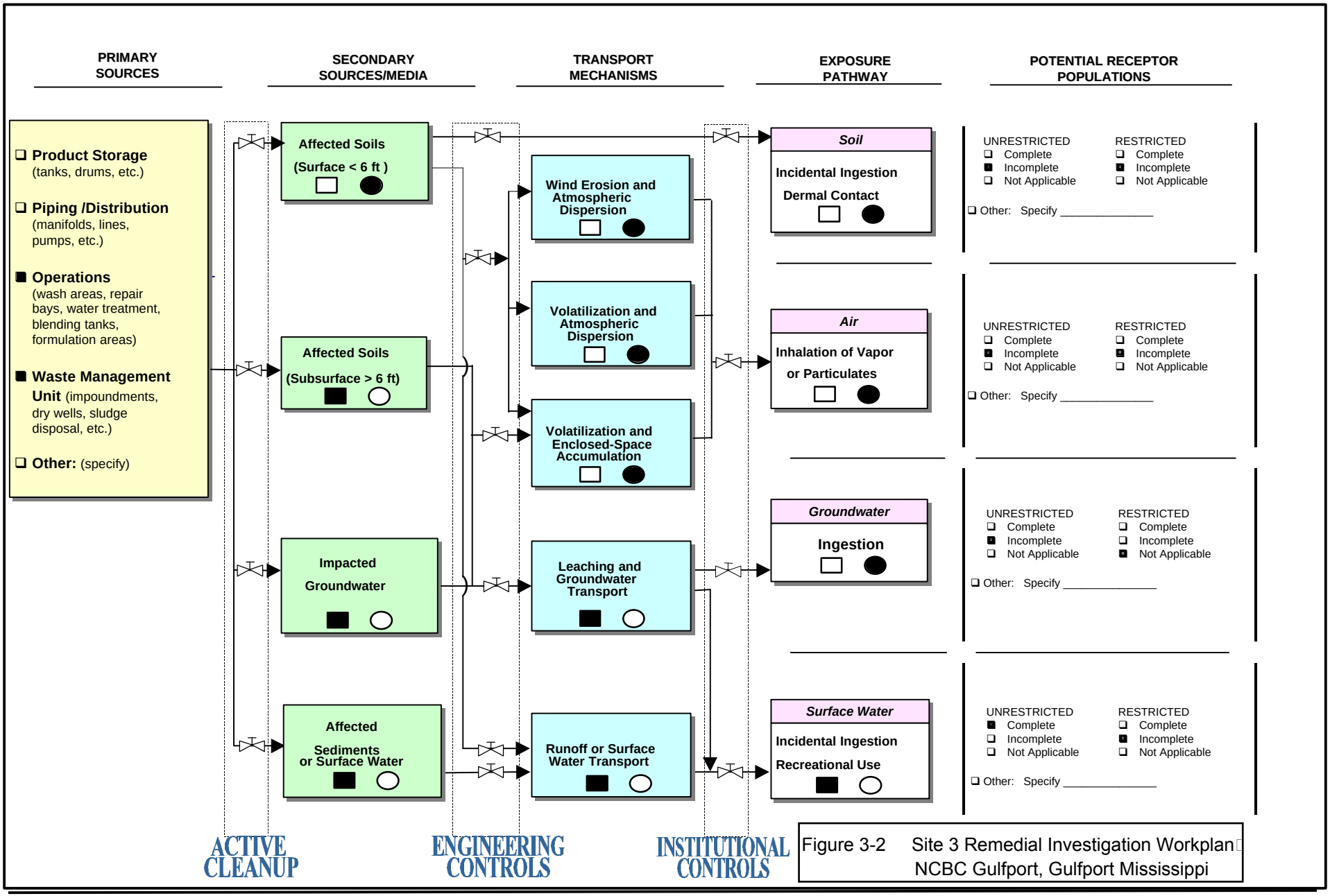


Figure 3-2 Site 3 Remedial Investigation Workplan
NCBC Gulfport, Gulfport Mississippi

→ = *Potential pathway*

Surface Water/Sediment

Exposure to contaminated surface water and sediment in Canal No. 1 and/or the wetland adjacent to the site could occur under current and future land uses. In this scenario, potential receptors are assumed to come into direct contact with surface water and sediment while wading. Individuals may be exposed primarily via dermal contact and incidental ingestion.

Air

This exposure pathway is based on the assumption that a receptor inhales air containing suspended particulates and/or volatile organic vapors originating from soil. Exposure to fugitive dust and vapors would be an applicable exposure pathway mainly if subsurface soil at the site was excavated.

3.4 POTENTIAL RECEPTORS

NCBC Gulfport is an active facility and will remain active for the foreseeable future. Site 3 is currently part of a fairway on the Pine Bayou Golf Course and is expected to be used for this purpose in the future. Access to the site is not restricted and older children could potentially play on the site. Based on current and potential future land use, the following potential receptors may be exposed to contaminated environmental media within the study area:

- Construction/Excavation Workers – Receptors under future land use. Construction activities are currently planned for the study area. Construction workers are considered for future land use only and are assumed to be exposed to subsurface soil and sediment (by ingestion and dermal contact), to groundwater (by dermal contact), and to surface water (by dermal contact).

- Site Commercial/Industrial Workers – Receptors under current and future land use. This includes adult military and civilian personnel working at Site 3. For example, golf course maintenance workers, groundskeepers, and other workers are assumed to be exposed to surface soil, subsurface soil, and sediment (by ingestion and dermal contact) and to surface water (by dermal contact).

- On-Site Workers – Receptors under current and future land use. This receptor scenario includes adult military and civilian personnel assigned to routine daily maintenance tasks of the golf course and base security. This receptor is assumed to be exposed to surface soil, subsurface soil, and sediment (by ingestion and dermal contact) and to surface water (by dermal contact).

- Recreational Users/Trespassers (Adolescent and Adult) – Receptors under current and future land use. This receptor is assumed to be exposed to surface soil, subsurface soil, and sediment (by ingestion and dermal contact) and to surface water (by dermal contact).

- On-Site Residents (Child and Adult) – Receptors under future land use. Although this scenario is highly unlikely, a future residential scenario is typically evaluated in a risk assessment for decision-making purposes. It is assumed that a hypothetical resident may be exposed to surface soil, subsurface soil, and sediment (by ingestion and dermal contact), to groundwater (by ingestion, dermal contact, and inhalation of volatiles), and to surface water (by dermal contact).

- Off-Site Residents (Child and Adult) – Receptors under current and future land use. Because of the potential for residential housing in close proximity to the site, off-site residents are considered to be plausible receptors under current and future land use. Off-site residents are assumed to be exposed in the same manner as on-site residents.

3.5 PRELIMINARY RESPONSE OBJECTIVES AND REMEDIAL ACTION ALTERNATIVES

Preliminary response objectives and remedial action alternatives were identified based on the results of previous investigations and were developed to ensure that the data collection during this RI are sufficient to support the screening and detailed analysis of alternatives during the FS.

Based on the conceptual model for Site 3 (Figure 3-2), the primary affected media are groundwater, subsurface soil, surface water, and sediment; detected concentrations will be compared to Mississippi Department of Environmental Quality (MDEQ) Tier 1 Unrestricted screening values (1999) and United States Environmental Protection Agency (USEPA) MCLs (1999) – the chemical-specific Applicable or Relevant and Appropriate Requirements (ARARs). The remedial action alternatives considered for the impacted media are presented in Table 3-1.

Table 3-1
Remedial Action Objectives and Alternatives
Site 3 Remedial Investigation Work Plan
NCBC Gulfport
Gulfport, Mississippi

Medium	Remedial Action Objective	Remedial Action Alternatives
Groundwater, Seeps, and Soil	Prevent ingestion or direct contact with material with concentrations resulting in excess cancer risk greater than 10^{-6} or Hazard Indices (HIs) greater than 1.	Institutional controls Natural attenuation (passive) Natural attenuation (active) Containment/capping Collection/treatment
Surface Water	Prevent ingestion or direct contact with surface water with concentrations resulting in excess cancer risk greater than 10^{-6} or HIs greater than 1. Restore surface water to ambient quality.	Monitoring Runoff interception [sediment retention traps (SRTs)] Discharge treatment
Sediment	Prevent direct contact with sediment with concentrations resulting in excess cancer risk greater than 10^{-6} or HIs greater than 1.	Institutional controls Monitoring Runoff interception (SRTs) Excavation
Air	Prevent inhalation of carcinogens in air resulting in excess cancer risk greater than 10^{-6} or non-carcinogens with HIs greater than 1.	Institutional controls Containment/capping

The data collection and evaluation necessary to evaluate these alternatives are presented in Sections 4, 5, 6, and 7. A human health risk assessment (HHRA) and a screening level ecological risk assessment (SLERA) will be performed as part of the RI to establish goals for remedial actions. The methodologies for conducting both the HHRA and SLERA are presented in Section 8.

4.0 WORK PLAN RATIONALE

4.1 DATA QUALITY OBJECTIVES

The Data Quality Objectives (DQOs) for this RI are project specific and are based on the intended use of the data in the decision process (USEPA, 2001). DQO selection is the main factor in identifying the following:

- Types of data/samples to be collected
- Data/sample collection locations
- Types of equipment to be used
- Analytical requirements

The DQOs for Site 3 are presented in Section 4.0 of the Quality Assurance Project Plan (QAPP), which is included as Appendix A of this Work Plan.

4.2 WORK PLAN APPROACH

The goal of RI fieldwork is to determine the nature and extent of contamination at Site 3 and to quantify the risks to human health and the environment. The results of the previous geophysical and soil gas surveys will be used to focus the locations of monitoring well installation and additional media sampling. Hydrological data will be collected during the RI to support the evaluation of remedial action alternatives during the FS.

5.0 FIELD INVESTIGATION

Remedial Investigation fieldwork will be conducted in two phases: Phase I includes surface and subsurface soil sampling; well installation and sampling; and water level measurements. Based on evaluation of Phase I data, Phase II activities will include: additional subsurface soil sampling and well installation/sampling; hydrologic testing; and water level measurements. The following sections describe the proposed field investigation for the RI at Site 3. All field activities will be conducted in accordance with the Health and Safety Plan (HASP) for this site (Appendix B).

5.1 MOBILIZATION

Field mobilization activities will take place on the first day of each shift and will include travel and on-site preparatory activities. These activities will include the marking of sample locations, utility clearance receiving, storage and testing of field equipment, and initiation of the field data management system (computer database and filing system).

5.2 FIELD DOCUMENTATION

Field documentation for the RI will include field logbooks, field log forms, location and sample identification (ID) nomenclature, and sample labels.

5.2.1 Field Logbooks

Dedicated field logbooks will be used to record pertinent field activities [TtNUS Standard Operating Procedure (SOP) SA-6.3, Appendix C]. The project manager's name, Field Operations Leader's (FOL's) name, project name and location, and project number will be recorded on the inside of the front cover of all logbooks. Entries will be recorded with waterproof, non-erasable ink. Each page of the logbook will be numbered and dated. All logbook entries must be legible and contain accurate and complete information about an individual's project activities. At the end of all entries for a particular day, or a particular event if appropriate, the investigator will draw a diagonal line across the page below the last entry and initial indicating the conclusion of entries. All entries will be objective, factual, and free of personal feelings or inappropriate language. Corrections will be made by drawing a single line through the error and entering the correct data. All corrections will be initialed and dated.

5.2.2 Location and Sample ID Nomenclature

The following formats will be used to provide unique nomenclatures for samples and sample locations. Location IDs will consist of six alphanumeric characters. The first two will indicate the site (i.e. 03 for Site 3). The next two will indicate the location type (i.e. surface soil (SS), monitoring well (MW)) and the final two characters will be sequential in number, a 01 would indicate the location was the first of that type installed during the investigation. For example, 03-SS-02 would indicate the second surface soil sample collected at Site 3.

Sample IDs will consist of eight alphanumeric characters. The first six will represent the location ID without dashes. The last two will be a sequential number representing the sequence of collection for a particular matrix from a particular location. For example, 03MW0201 would indicate the first groundwater sample collected from the second monitoring well installed at Site 3.

5.3 UTILITY CLEARANCE

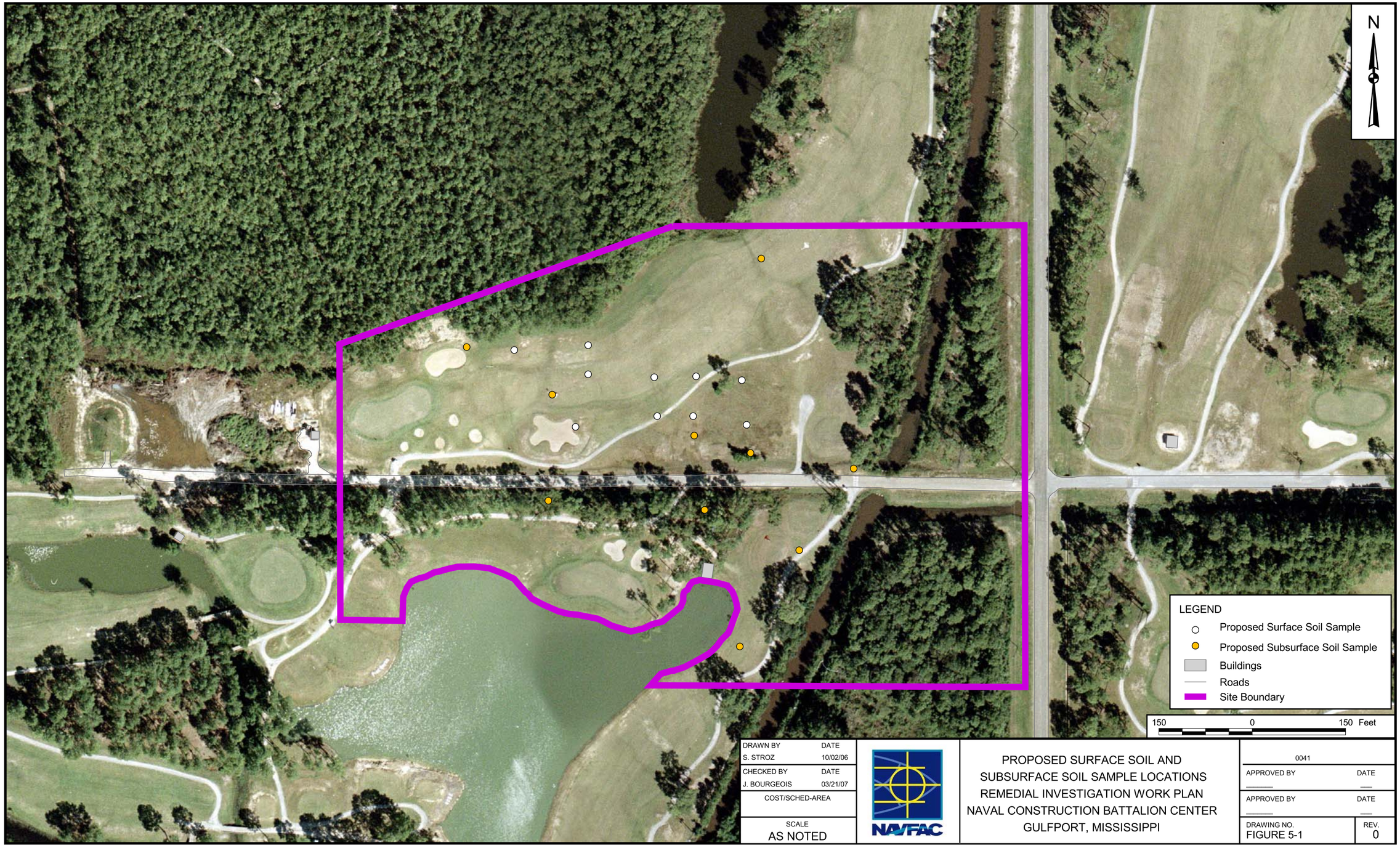
Base personnel will support utility clearance at all required locations and associated activities will be performed in accordance with TtNUS SOP HS-1.0 (Appendix C). Existing records will be reviewed for each intrusive sample location, and each location will be cleared with magnetic location devices. Mississippi One-Call will be contacted to mark all known utilities in the vicinity of sampling and drilling locations. After clearance, each location will be clearly marked (with a wooden stake, pin flag, etc.) indicating that the location has been cleared for underground utilities. The FOL will accompany base utility clearance personnel to the site to review any restrictions to drilling and monitoring well installation activities.

5.4 ADDITIONAL MEDIA SAMPLING

Additional media sampling for this field investigation includes collection of surface soil and subsurface soil at selected locations. Additional details regarding the sampling of each medium is provided below.

Ten surface soil samples (from 0 to 12 inches bls) will be collected at Site 3 (Figure 5-1) from areas indicated by the results of the Additional Investigation at Site 3-Northwest Landfill/Burning Pit completed in October 2006 and other site information. Samples will be collected following the procedures described in TtNUS SOP SA-1.3 (Appendix C). After collection, all samples will be properly labeled and placed in a cooler on ice and sent to a fixed-base laboratory. Proper chain of custody will be maintained. Surface soil samples collected during the RI will be analyzed for the parameters listed in Table 5-1.

P:\GIS\GULFPORT_CBC\MAPDOCS\APR\SITE_03.APR/SITE 3 PROPOSED SS SW SD LOCATIONS LAYOUT 03/21/07 SS



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CHECKED BY	DATE
J. BOURGEOIS	03/21/07
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NAVFAC

PROPOSED SURFACE SOIL AND
SUBSURFACE SOIL SAMPLE LOCATIONS
REMEDIAL INVESTIGATION WORK PLAN
NAVAL CONSTRUCTION BATTALION CENTER
GULFPORT, MISSISSIPPI

0041

APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 5-1	REV. 0

Table 5-1
Additional Media Analyses
Site 3 Remedial Investigation Work Plan
NCBC Gulfport
Gulfport, Mississippi

Subsurface Soil	Surface Soil
TAL Metals + CN (6061B/7000B)	TAL Metals + CN (6061B/7000B)
TCL VOCs (8260B)	TCL VOCs (8260B)
TCL SVOCs (8270C)	TCL SVOCs (8270C)
TCL Pesticides (8081A)	TCL Pesticides (8081A)
TCL PCBs (8082)	TCL PCBs (8082)
Chlorinated Herbicides (8151B)	Chlorinated Herbicides (8151B)

CN = Cyanide
PCBs = Polychlorinated Biphenyl
SVOCs = SemiVolatile Organic Compounds
TAL = Target Analyte List
TCL = Target Compound List
VOCs = Volatile Organic Compounds

Ten subsurface soil samples will be collected at Site 3 from points co-located with Phase I monitoring well locations (see Section 5.5). Samples will be collected following the procedures described in TtNUS SOP SA-1.3 (Appendix C). After collection, all samples will be properly labeled and placed in a cooler on ice and sent to a fixed-base laboratory. Proper chain of custody will be maintained. Sub-surface soil samples will be analyzed for the parameters listed in Table 5-1.

As discussed in Section 3.2, the geophysical survey, soil gas survey, direct-push groundwater investigation, and the surface water/sediment activities were completed in 2006 as part of the NCBC Gulfport's Housing EA. This information will be incorporated into the RI and risk evaluation. The sediment samples were analyzed for the parameters listed in Table 5-1. The groundwater and surface water samples were analyzed for the parameters listed in Table 5-3.

5.5 GROUNDWATER INVESTIGATION

The groundwater investigation at Site 3 will include installation of monitoring wells, well development, and groundwater sampling. An initial group of wells (Phase I) will be installed and sampled to evaluate shallow groundwater. Those results, plus the 2006 Housing EA data, will be used to determine the locations of an additional group of monitoring wells (Phase II). These additional wells will be used to evaluate shallow groundwater in other areas of the site, as well as intermediate (approximately 35 feet) and deep (approximately 50 feet) groundwater. It should be noted that approximate depths are for

planning/cost purposes. Exact depths for each monitoring well will be determined in the field and will be based on the local geology and environmental conditions.

5.5.1 Monitoring Well Installation

Initially, 12 shallow water table monitoring wells (Phase I) will be installed at Site 3 at the locations shown on Figure 5-2. The wells will be installed using the hollow stem auger drilling method following procedures outlined in TtNUS SOP GH-2.8 for monitoring well installation (Appendix C). Well borings will be a minimum of 6.5 inches in diameter and will be advanced to a depth of approximately 20 ft bls. To prevent collapsed borehole material and running sands from entering the augers, a wooden plug will be placed in the head of the auger during drilling, and the wells will be installed through the augers. The wells will be constructed of 2 inch inside diameter, Schedule 40 polyvinyl chloride (PVC) well materials. The well screen will be 0.010 slot and will be 10 ft in length. Well screens will be placed to intersect the water table and allow for seasonal variations in the depth to groundwater. A minimum of 6 inches of filter pack material will be placed below the well screen to provide a firm base and to ensure unrestricted flow under the screen. A filter pack of 20-60-grade clean silica sand will be placed around the screen and will be brought to a minimum of 2 ft above the top of the screen. A 2-foot-thick bentonite seal will then be placed on top of the filter pack and hydrated with potable water. The seal will consist of 30 percent solids bentonite pellets (USEPA, 2001). Care will be taken during placement of the bentonite pellets to ensure that bridging of the pellets inside the augers does not occur. The bentonite seal will then be allowed to hydrate for a minimum of 8 hours. After the bentonite seal has hydrated, the remaining annulus will be filled with a cement/bentonite grout to within 2 ft of the ground surface. The grout will then be allowed to cure for 24 hours prior to beginning surface completion activities.

Each monitoring well will be completed as a flush mount well with an 8-inch-diameter boltdown well vault. Wells will be constructed with a 2 ft by 2 ft concrete pad and a boltdown, water tight well vault approximately 6 inches in diameter. A water tight, expandable, locking cap will be placed on the top of the riser well to prevent surface water infiltration.

Following evaluation of the results from the initial group of monitoring wells and the other media sampling, the location of 16 additional wells (Phase II) will be installed. This information will be provided in a Technical Memorandum or brief letter report. An estimated eight shallow (approximately 20 ft bls), five intermediate (approximately 35 ft bls), and three deep (approximately 50 ft bls) wells will be installed using the same techniques specified for the initial group of monitoring wells. Again, these depths are subject to change based on geological and environmental conditions.

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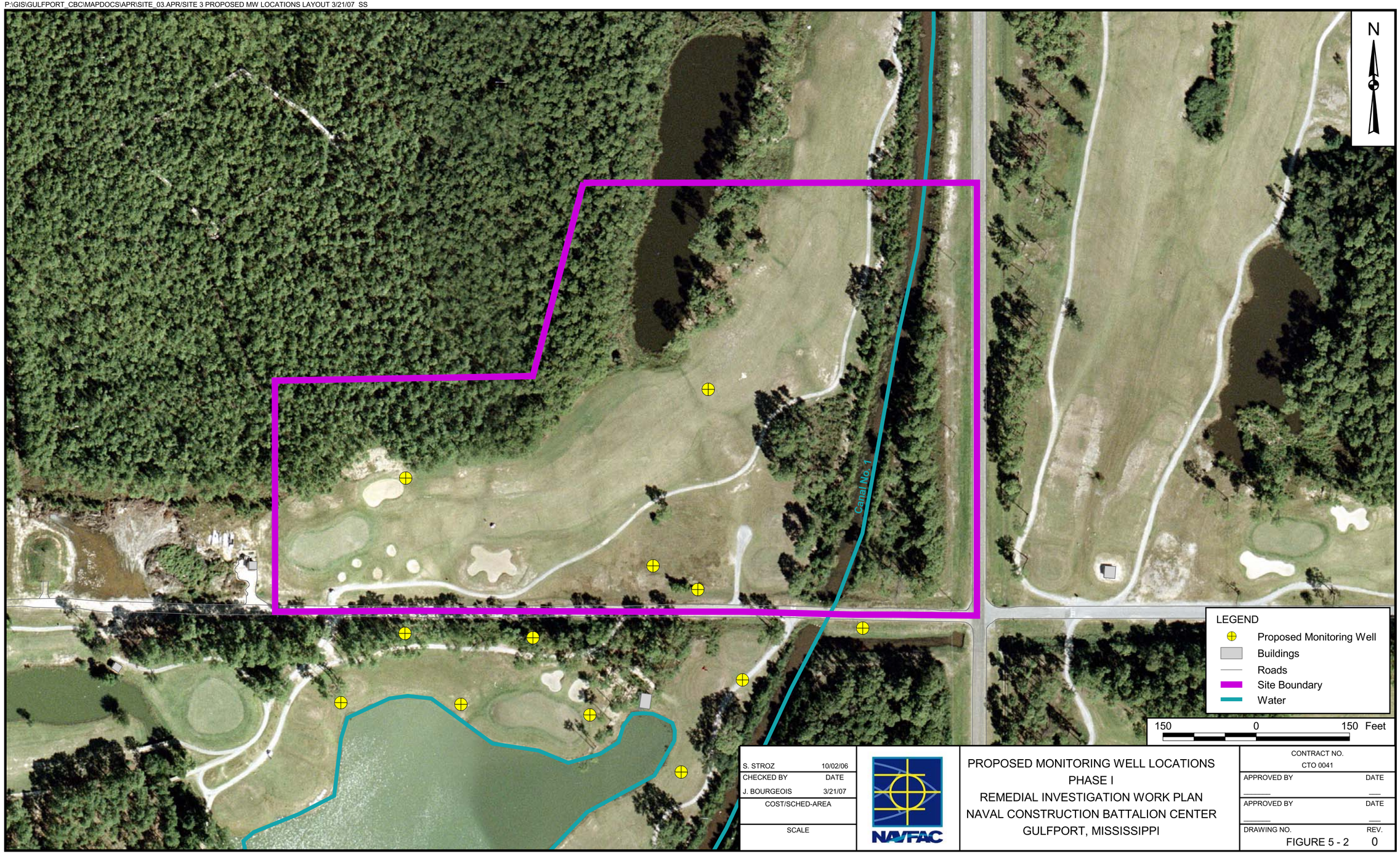


S. STROZ	10/02/06	PROPOSED MONITORING WELL LOCATIONS PHASE I REMEDIAL INVESTIGATION WORK PLAN NAVAL CONSTRUCTION BATTALION CENTER GULFPORT, MISSISSIPPI	CONTRACT NO. CTO 0041
CHECKED BY	DATE		APPROVED BY / DATE
J. BOURGEOIS	3/21/07		APPROVED BY / DATE
COST/SCHED-AREA			DRAWING NO. / REV.
SCALE			FIGURE 5 - 2 / 0

5.5.2 Monitoring Well Development

The newly installed wells will be developed with a mechanical pump to ensure that groundwater samples are representative of site conditions (TtNUS SOP GH-2.8, Appendix C). Well development will involve surging and the removal of a minimum of three and a maximum of five well volumes. The well volume (volume of water within the well casing) will be calculated prior to initiating development by determining the inside diameter of the well and measuring and recording the total depth of the well and the depth to water from the top of the well casing. The water level is then subtracted from the total depth, and this length is then multiplied by the appropriate factor to obtain the amount of water, in gallons, within the well casing. Water quality parameters will be monitored during development with a reading taken at least once for every well volume. The parameters to be measured are listed in Table 5-2. Development will continue until the water in the well is free of visible sediment and the parameters have stabilized as described in Section 6.8 of the Environmental Investigations Standard Operating Procedure Quality Assurance Manual (EISOPQAM) (USEPA, 2001). Development water will be containerized in 55-gallon drums for later disposal. Each drum will be clearly marked with the following information or as otherwise directed by the base contact:

- Source of material (e.g., boring/well ID, decontamination pad, etc.)
- Matrix (e.g., soil, groundwater, decontamination water, etc.)
- Date generated (mmddyy)
- Contractor name and contact phone number

Table 5-2
Water Quality Parameters and Stabilization Criteria
Site 3 Remedial Investigation Work Plan
NCBC Gulfport
Gulfport, Mississippi

Parameter	Stabilization Criteria
pH	+/- 0.2 standard units
Specific Conductance	+/- 10%
Temperature	+/- 10%
Turbidity	< 10 NTUs
ORP	+/- 10%
Salinity	+/- 10%

5.5.3 Groundwater Sampling

Twenty-eight new monitoring wells will be sampled for this field investigation. Prior to sampling, all wells will be purged of approximately three to five well volumes (TtNUS SOP SA-1.1, Appendix C). The well volume (volume of water within the well casing) will be calculated prior to initiating the purge. Additionally, water quality parameters will be measured at the initiation of purging and at a minimum after the removal of each well volume. More frequent measurements may be necessary to confirm stabilization. Purging will continue until at least three well volumes have been removed and the water quality parameters (pH, specific conductance, and temperature) have stabilized and turbidity has either stabilized or is less than 10 nephelometric turbidity units (NTUs). If, after removing five well volumes from the well, the parameters have still not stabilized, it will be at the discretion of the FOL whether to sample or to continue purging.

Sampling should be conducted immediately upon completion of the purging process provided that there is a sufficient volume of water in the well. Wells will be sampled using low-flow technique (TtNUS SOP SA-1.1, Appendix C). New plastic sheeting will be placed around the well to provide a clean work area. The volatile fraction of the sample will be collected first to minimize contaminant losses due to volatilization. Containers for all samples requiring preservation will be pre-preserved by the laboratory. After collection, all samples will be properly labeled and placed in a cooler on ice and sent to a fixed-base laboratory. Proper chain of custody will be maintained. Groundwater samples will be analyzed for the parameters listed in Table 5-3.

Table 5-3
Groundwater Sample Analyses
Site 3 Remedial Investigation Work Plan
NCBC Gulfport
Gulfport, Mississippi

Analyses (Method)
TAL Metals + CN (6061B/7000B)
TCL VOCs (8260B)
TCL SVOCs (8270C)
TCL Pesticides (8081B)
TCL PCBs (8082)
Chlorinated Herbicides (8151B)

5.6 DECONTAMINATION PROCEDURES

All sampling and downhole drilling equipment will be cleaned and decontaminated prior to use and after each subsequent use. A decontamination pad will be constructed in an area provided by the base. The area should be relatively level and free of known surface contamination. The pad will be bermed and lined with plastic so as not to leak. Racks used to hold equipment during cleaning should be high enough to prevent the equipment from being splashed. After cleaning, equipment will only be handled by personnel wearing clean gloves to prevent recontamination. The following is a description of the materials to be used in the decontamination process and the procedures to be used for the specific types of equipment (TtNUS SOP SA-7.1, Appendix C).

Specifications for Cleaning Materials:

- Soap will be a standard phosphate-free laboratory detergent (e.g., Liquinox®).
- Solvent will be pesticide-grade isoproponal.
- Tap water may be from any municipal water system.
- Analyte-Free water deionized (DI) water should contain no detectable heavy metals or other inorganic constituents.

Procedures for Sampling Equipment:

1. Clean with tap water and soap, being sure to remove particulate matter and surface films, using a brush if necessary.
2. Rinse thoroughly with tap water.
3. Rinse thoroughly with DI water.
4. Rinse thoroughly with solvent. PVC or plastic items should not be solvent rinsed.
5. Rinse thoroughly with DI water.
6. Remove from the decontamination area and cover with clean plastic. If equipment is to be stored overnight, it will be wrapped in aluminum foil and covered with clean unused plastic.

Procedures for Water Level Meter:

1. Wash with soap and tap water.
2. Rinse with tap water.
3. Rinse with DI water.

Procedures for Redi-Flo2® Pump:

CAUTION - the pump should be unplugged prior to cleaning.

1. The exterior of the pump, electrical cord, and hose will be scrubbed using a brush, soap, and tap water. Do not wet the electrical plug.
2. Rinse with tap water.
3. Rinse with DI water.
4. Place the equipment in a clean plastic bag.

The pump check valve will be cleaned as follows:

1. Disassemble the check valve assembly.
2. Scrub all components with a brush, soap, and tap water.
3. Rinse with DI water.
4. Reassemble.

Procedures for Downhole Drilling Equipment:

1. Steam clean with soap and high-pressure hot water. If necessary, a brush will be used to remove particulate matter not removed by steam cleaning.
2. Rinse thoroughly with tap water.
3. Remove from the decontamination pad and cover with clean, unused plastic. If the equipment will be stored overnight, the plastic will be secured to ensure that it stays in place.

5.7 AQUIFER TESTING

The following short-term tasks are designed to provide approximate hydrologic conductivity values (slug tests) and evaluate the potential interaction between groundwater contamination and surface water bodies (hydrologic monitoring).

5.7.1 Slug Tests

Slug tests will be conducted at three wells to estimate the characteristics of the surficial aquifer. Well selection will be based on data collected during Phase I. Rising and falling-head slug tests will be performed by respectively adding or removing a slug of known volume to the well, causing a change in the water level. Only rising head slug tests will be performed in wells screened across the water table. The recovery of the water level to static conditions will be measured at frequent intervals with an electronic pressure transducer and electronic data logger. The slug test recovery data will be analyzed using the Bouwer-Rice method to estimate the transmissivity and hydraulic conductivity of the aquifer (TtNUS SOP GH-2.4, Appendix C).

5.7.2 Hydrologic Monitoring

To evaluate the potential interaction between groundwater contamination and surface water bodies, staff gauge monitoring points will be installed in two waterbodies adjacent to Site 3 (Canal No. 1 and the Golf Course Pond). Monitoring point locations will be determined during Phase I field activities and observed during both rounds of water level measurements. The monitoring points will be surveyed and data will be incorporated into a potentiometric surface map in the RI report (TtNUS SOP GH-2.4, Appendix C).

5.8 WATER LEVEL MEASUREMENTS

Two rounds of water level measurements will be collected from the new monitoring wells at Site 3. One round of measurements will be collected following the installation of the initial group of monitoring wells and will be used to refine the proposed locations for the additional group of wells. The second round, of measurements, collected during Phase II and including the Phase II monitoring wells, will be used to determine the hydraulic gradient of the surficial aquifer and will be presented in a potentiometric surface map in the RI Report. All measurements will be collected with an electronic water level meter and will be referenced to the surveyed measuring point identified at the top of each well casing. Measurements will be made and recorded to the nearest 0.01 ft. (TtNUS SOP GH-1.2, Appendix C).

5.9 SURVEYING

The horizontal location and the top of casing elevation of each permanent monitoring well and staff gauge will be surveyed by a TtNUS-subcontracted, State-licensed land surveyor. The horizontal location and

ground surface elevation of all surface and subsurface soil sample locations will also be surveyed. All locations will be referenced to site features such as building corners, roads, etc.

5.10 INVESTIGATION-DERVIVED WASTE MANAGEMENT

TtNUS estimates that approximately 50 drums of investigation-derived waste (IDW) will be generated during the field investigation. The management of IDW will be completed during field operations and will be performed in accordance with Section 5.15 of the EISOPQAM (USEPA, 2001). IDW management includes labeling, record keeping, and staging of materials. All drums will be labeled with the following information:

- Source of material (e.g., boring/well ID, decontamination pad, etc.)
- Matrix (e.g., soil, groundwater, decontamination water, etc.)
- Date generated (mmddyy)
- Contractor name and contact phone number

Personal protective equipment (PPE) will be double bagged and placed in facility dumpsters. TtNUS will be responsible for disposal costs, and NCBC Gulfport will be responsible for signing manifests associated with the disposal of all IDW.

5.11 DEMOBILIZATION

Demobilization will occur at the conclusion of all other field activities related to this investigation. Activities to occur during this phase include the installation of well tags on the new monitoring wells, return of all rental field equipment, verification of proper IDW documentation and staging by the FOL, and securing of the site.

6.0 LABORATORY ANALYSES

This section identifies the analytical program for this field investigation. The number of samples to be collected per matrix is listed in Table 6-1. The analyses and analytical methods to be used and the total number of samples per analysis, including quality assurance/quality control (QA/QC) samples are listed in Table 6-2.

TABLE 6-1

NUMBERS OF SAMPLES

Method	Medium	No. of Samples	QA/QC			
			Duplicates	Rinsate	(MS/MSD)	Trip
Monitoring Wells:						
	Groundwater	28	3	3	2	12
Additional Media:						
	Subsurface soil	10	1	1	1	2
	Surface Soil	10	1	1	1	2

MS/MSD = Matrix Spike/matrix Spike Duplicate

TABLE 6-2

ANALYTICAL PARAMETERS AND METHODS

Parameter	Method (aqueous/soil)	No. Soil	No. Aqueous
TAL Metals +CN	SW-846 6061B/7000A	26	36
TCL VOCs	SW-846 8260B	26	53
TCL SVOCs	SW-846 8270C	26	36
TCL Pesticides	SW-846 8081A	26	36
TCL PCBs	SW-846 8082	26	36
Chlorinated Herbicides	SW-846 8151B	26	36

Note: Soil samples include surface soil, subsurface soil, and associated field duplicates and MS/MSDs.
Aqueous samples include groundwater, associated field duplicates, and MS/MSDs, and rinsate and trip blanks.

7.0 DATA MANAGEMENT

This section will discuss the methods to be used to manage the data generated during the RI. This includes the tracking of data in the field and subsequent data validation. A Data Management Plan (DMP) is included as Appendix D and outlines the project-specific Information Management System (IMS) that will be used to manage the environmental information pertaining to NCBC Gulfport.

7.1 ON-SITE DATA MANAGEMENT

On-site data management involves the day-to-day recording of all sampling and other activities in the field. A project database will be initiated in the field to promote the proper collection and storage of field data and documentation of field activities. The following data will be entered into the project database in the field (TtNUS SOP CT-05, Appendix C):

- Sample information (e.g., identification, sample matrix, sample depth, collection time, analyses, etc.)
- Location information
- Chain of custody information
- Shipping data
- Field descriptions
- Photographic logs

The FOL and/or sample coordinator will be responsible for entering the data into the database in the field.

7.2 DATA VALIDATION

All fixed-base laboratory data will be subjected to full validation. The data will be assessed using precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters using the National Validation Functional Guidelines for Organic Data Review (USEPA, 1999), Laboratory Data Validation Functional Guidelines for Evaluation of Inorganic Analysis (USEPA, 1994), and TtNUS SOPs DV-01 and DV-03 (Appendix C).

8.0 RISK ASSESSMENT

A baseline human health/ecological risk assessment (ERA) will be conducted as part of this RI. Baseline risk assessments (BRA) evaluate the potential threat to human health and the environment in the absence of any remedial action, providing the basis for determining whether remedial action is necessary and the justification for performing remedial actions. The BRA will also be used to support a finding of imminent and substantial endangerment if such a finding is required as part of an enforcement action. Detailed guidance on evaluation of potential human health impacts as part of this baseline assessment is provided in the Risk Assessment Guidance for Superfund (RAGS) (USEPA, 1989). Guidance for evaluating ecological risks is provided in Navy and USEPA documents (see Section 8.3).

8.1 OBJECTIVES OF THE BASELINE RISK ASSESSMENT

In general, the objectives of a BRA may be attained by identifying and characterizing the following:

- Toxicity and levels of hazardous substances present in relevant media (e.g., air, groundwater, soil, surface water, sediment, and biota).
- Environmental fate and transport mechanisms within specific environmental media such as physical, chemical, and biological degradation processes and hydrogeological conditions.
- Potential human and environmental receptors.
- Potential exposure routes and extent of actual or expected exposure.
- Extent of expected impact or threat and the likelihood of such impact or threat occurring (i.e., risk characterization).
- Level(s) of uncertainty associated with the above items.

The level of effort required to conduct a BRA depends largely on the complexity of the site. The goal is to gather sufficient information to adequately and accurately characterize the potential risk from a site, and at the same time conducting this assessment as efficiently as possible. Use of the site conceptual model developed and refined previously (See Sections 3.2 and Figure 3-2) will help focus investigation efforts and therefore streamline this effort. Factors that may affect the level of effort required include the following:

- Number, concentrations, and types of chemicals present.
- Areal extent of contamination.
- Quality and quantity of available monitoring data.
- Number and complexity of exposure pathways (including the complexity of release sources and transport media).
- Required precision of sample analyses, which in turn depends on site conditions such as the extent of contaminant migration and proximity, characteristics, and size of potentially exposed population(s).
- Availability of appropriate standards and/or toxicity data.

8.2 COMPONENTS OF THE BASELINE RISK ASSESSMENT

The risk assessment process can be divided into four components:

- Contaminant identification
- Exposure assessment
- Toxicity assessment
- Risk characterization

A brief overview of each component follows.

Contaminant Identification The objective of contaminant identification is to screen the information available on hazardous substances or wastes present at the site and to identify contaminants of concern (COC) to focus subsequent efforts in the risk assessment process. COC may be selected because of their intrinsic toxicological properties, because they are present in large quantities, or because they are presently in or potentially may move into critical exposure pathways (e.g., drinking water supply).

It may be useful for some sites to select “indicator chemicals” as part of this process. Indicator chemicals are chosen to represent the most toxic, persistent, and/or mobile substances identified at a site that are likely to significantly contribute to the overall risk posed by the site. In some instances, an indicator chemical may be selected for the purpose of representing a “class” of chemicals (e.g., trichloroethene to represent all volatiles). Although the use of indicator chemicals serves to focus and streamline the assessment of those chemicals that are likely to be of greatest concern, a final check will need to be made during remedy selection and the remedial action phase to ensure the waste management strategy to be implemented addresses risks posed by the range of contaminants found at the site.

Exposure Assessment The objectives of an exposure assessment are to identify actual or potential exposure pathways, to characterize potentially exposed populations, and to determine the extent of exposure. Detailed guidance on conducting exposure assessments is provided in the Superfund Exposure Assessment Manual (USEPA, 1988) and is briefly discussed below.

Identifying potential exposure pathways helps to conceptualize how contaminants may migrate from a source to an existing or potential point of contact. An exposure pathway may be viewed as consisting of the following four elements:

1. A source and mechanism of chemical release to the environment
2. An environmental transport medium (e.g., air, groundwater) for the released chemical
3. A point of potential contact with the contaminated medium (referred to as the exposure point)
4. An exposure route (e.g., inhalation, ingestion) at the exposure point

The analysis of the contaminant source and how contaminants may be released involves characterizing the COC at the site and determining the quantities and concentrations of contaminants released to environmental media. Figure 3-2 presents a conceptual example identifying actual and potential exposure pathways.

After the source(s) and release mechanisms have been identified, an analysis of the environmental fate and transport of the contaminants is conducted. This analysis considers the potential environmental transport (e.g., groundwater migration, airborne transport) transformation (e.g., biodegradation, hydrolysis, and photolysis) and transfer mechanisms (e.g., sorption, volatilization) to provide information on the potential magnitude and extent of environmental contamination. Next, the actual or potential exposure points for receptors are identified, focusing on those locations where actual contact with COC will occur or is likely to occur. Last, potential exposure routes that describe the potential uptake mechanism (e.g., ingestion, inhalation, etc.) a receptor comes into contact with contaminants in a specific environmental medium are identified and described. Environmental media that may need to be considered include air, groundwater, surface water, soil and sediment, and food sources. Detailed procedures for estimating and calculating rates of exposure are described in detail in the Superfund Exposure Assessment Manual.

After the exposure pathway analysis is completed, the potential for exposure should be assessed. Information on the frequency, mode, and magnitude of exposure(s) is gathered. These data are then assessed to yield a value representing the amount of contaminated media contacted per day. This

analysis should include the identification of both current exposures and exposures occurring in the future if no action is taken at the site. Because the frequency, mode, and magnitude of human exposures will vary based on the primary use of the area (e.g., residential, industrial, or recreational), the expected use of the area in the future should be evaluated. The purpose of this analysis is to provide decision makers with an understanding of both current risks and potential future risks if no action is taken. Therefore, as part of this evaluation, a reasonable maximum exposure scenario should be developed, that reflects the type(s) and extent of exposures that could occur based on the likely or expected use of the site (or surrounding areas) in the future. The reasonable maximum exposure scenario is presented to the decision maker so that possible implications of decisions regarding how to best manage uncertainties can be factored into the risk management remedy selection.

The final step in the exposure assessment is to integrate the information and develop a qualitative and/or quantitative estimate of the expected exposure level(s) resulting from the actual or potential release of contaminants from the site.

Toxicity Assessment Toxicity assessment, as part of the Superfund BRA process, considers the following:

1. The types of adverse health or environmental effects associated with individual and multiple chemical exposures;

2. The relationship between magnitude of exposures and adverse effects.

3. Related uncertainties such as the weight of evidence for a chemical's potential carcinogenicity in humans.

Detailed guidance for conducting toxicity assessments is provided in the RAGS (USEPA, 1989).

Typically, the Superfund risk assessment process relies heavily on existing toxicity information and does not involve the development of new data on toxicity or dose-response relationships. Available information on many chemicals has already been evaluated and summarized by various USEPA program offices or cross-agency work groups in health and environmental effects assessment documents. These documents or profiles will generally provide sufficient toxicity and dose-response information to allow both qualitative and quantitative estimates of risks associated with many chemicals found at Superfund sites. These documents often estimate carcinogen exposures associated with a specific lifetime cancer risk [e.g., risk-specific doses (RSDs)] and systemic toxicant exposures not likely to present appreciable risk of significant adverse effects to human populations over a lifetime [e.g., Reference Doses or (RfDs)].

Risk Characterization In the final component of the risk assessment process, a characterization of the potential risks of adverse health or environmental effects, for each of the exposure scenarios derived in the exposure assessment, is developed and summarized. Estimates of risks are obtained by integrating information developed during the exposure and toxicity assessments to characterize the potential or actual risk, including carcinogenic risks, noncarcinogenic risks, and environmental risks. The final analysis should include a summary of the risks associated with a site, including each projected exposure route for COC and the distribution of risk across various sectors of the population. In addition, such factors as the weight of evidence associated with toxicity information and any uncertainties associated with exposure assumptions should be discussed.

Characterization of environmental risks involves identifying potential exposures to surrounding ecological receptors and evaluating the potential effects associated with such exposure(s). Important factors to consider include disruptive effects to populations (both plant and animal) and the extent of perturbations to the ecological community.

The results of the BRA may indicate that the site poses little or no threat to human health or the environment. In such situations, the FS should be either scaled down as appropriate to the site and its potential hazard, or eliminated altogether. The results of the RI and the BRA would serve as the primary means of documenting a no-action decision. If it is decided that the scope of the FS will be less than what is presented in here or eliminated altogether, the Navy should document this decision and receive the concurrence of the USEPA.

8.3 SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT

The SLERA follow the USEPA Guidance Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments (1997). The guidance requires that a screening level be completed to determine whether the site poses no (or negligible) risk, or whether further evaluation is required. Although the screening level will be consistent with the referenced guidance document it will also be consistent with methodologies and current guidance materials from USEPA and the Navy including the following:

- Department of Navy Environmental Policy Memorandum 97-04: Use of Ecological Risk Assessments (1997)
- Chief of Naval Operations Letter 5090 Ser N453E/9U 59 5335 (1999)

- Navy Policy for Conducting Ecological Risk Assessment (1999)
- Supplemental Guidance to RAGS: Region 4 Bulletins, Ecological Risk Assessment (USEPA, 1995 through 2001).
- Final Guidelines for Ecological Risk Assessment (USEPA, 1998)

The SLERA conducted as part of the RI assessment will include a hazard assessment, exposure assessment, toxicity assessment, risk characterization, and a summary and recommendations.

9.0 COSTS AND KEY ASSUMPTIONS

Key assumptions used for the scoping of this RI are contained in Section 4.0 of this Work Plan and in the Plan of Action (dated 22 May 06). Cost information is also provided in the Plan of Action.

Field operations that deviate from this Work Plan but do not have an impact on project costs will be documented via Field Change Request Forms available at the site. These deviations will not take place until the project manager has signed off and the Remedial Project Manager (RPM) has been notified of the proposed changes.

Any changes or deviations that result in a change of scope cannot be acted upon until the project manager has been notified and has received an approval letter from the RPM through the Project Management Office (PMO).

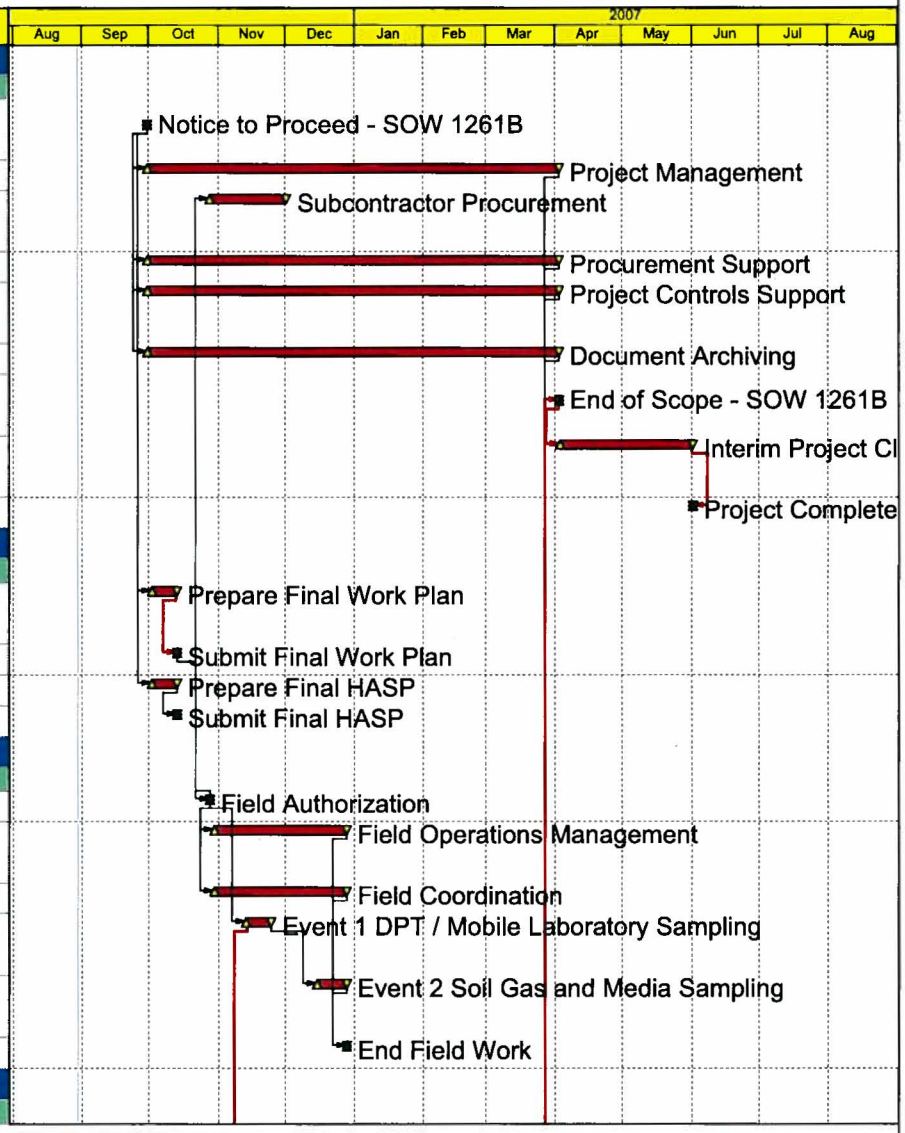
Significant modifications to this study, or contaminant discoveries during the investigation, will be communicated to the MDEQ project manager in a timely manner. Public notification of any findings and/or results will be coordinated through the RPM, and only after the MDEQ project manager has been notified.

10.0 SCHEDULE

Note: The durations shown on the schedule below are *contract-default values* and do not necessarily reflect subsequent partnering team decisions.

CTO 0041 USDA GULFPORT - ADDITIONAL SAMPLING @ SITE 3

Activity ID	Activity Description	Cal ID	Early Start	Early Finish	OD
PROJECT MANAGEMENT			30-Sep-06	01-Jun-07	175
Mod 02			30-Sep-06	01-Jun-07	175
01.001A	Notice to Proceed - SOW 1261B	1	30-Sep-06		0
01.100A	Project Management	1	30-Sep-06	02-Apr-07	185
01.101A	Subcontractor Procurement	1	28-Oct-06	01-Dec-06	35
01.103A	Procurement Support	1	30-Sep-06	02-Apr-07	185
01.104A	Project Controls Support	1	30-Sep-06	02-Apr-07	185
01.105A	Document Archiving	1	30-Sep-06	02-Apr-07	185
01.111A	End of Scope - SOW 1261B	1		02-Apr-07	0
01.113A	Interim Project Closeout	1	03-Apr-07	01-Jun-07	60
01.114A	Project Complete	1		01-Jun-07	0
WORK PLANS			02-Oct-06	13-Oct-06	10
Mod 02			02-Oct-06	13-Oct-06	10
04.100A	Prepare Final Work Plan	2	02-Oct-06	13-Oct-06	10
04.101A	Submit Final Work Plan	2		13-Oct-06	0
04.110A	Prepare Final HASP	2	02-Oct-06	13-Oct-06	10
04.112A	Submit Final HASP	2		13-Oct-06	0
FIELD INVESTIGATION			28-Oct-06	28-Dec-06	44
Mod 02			28-Oct-06	28-Dec-06	44
05.050A	Field Authorization	1	28-Oct-06		0
05.100A	Field Operations Management	2	30-Oct-06	28-Dec-06	44
05.105A	Field Coordination	2	30-Oct-06	28-Dec-06	44
05.125A	Event 1 DPT / Mobile Laboratory Sampling	2	13-Nov-06	24-Nov-06	10
05.135A	Event 2 Soil Gas and Media Sampling	2	15-Dec-06	28-Dec-06	10
05.201A	End Field Work	2		28-Dec-06	0
LABORATORY ANALYSES			14-Nov-06	15-Jan-07	45
Mod 02			14-Nov-06	15-Jan-07	45



NAVFAC Naval Facilities Engineering Command

Project Name: 0041P-1
Start Date: 30-Aug-06
Finish Date: 01-Jun-07
Run Date: 07-Sep-06
Page 1 of 2

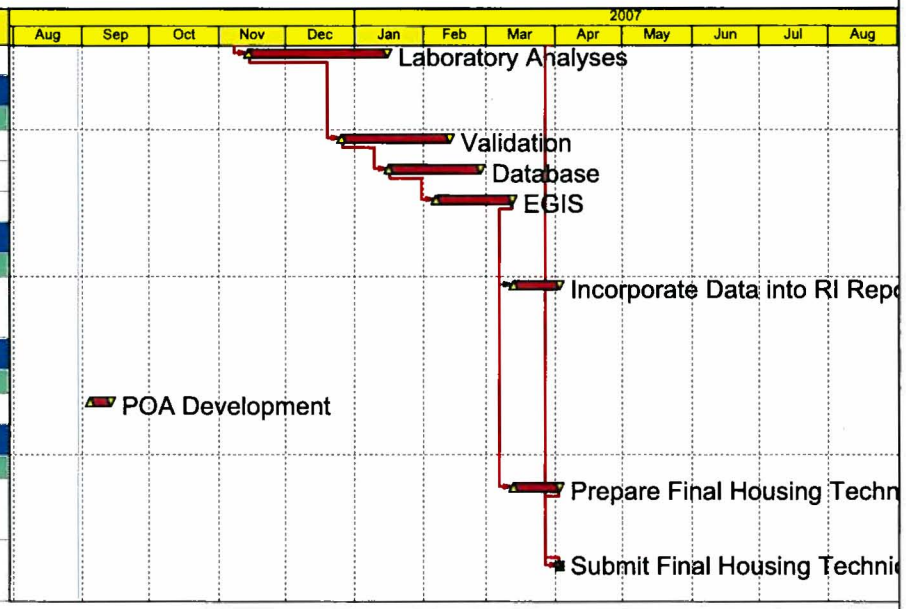
NAVY CLEAN IV POA SCHEDULE

Proposed Level of Effort
◆ Milestone

TetraTech NUS

CTO 0041 USDA GULFPORT - ADDITIONAL SAMPLING @ SITE 3

Activity ID	Activity Description	Cal ID	Early Start	Early Finish	OD
06.110A	Laboratory Analyses	2	14-Nov-06	15-Jan-07	45
DATA MANAGEMENT			26-Dec-06	12-Mar-07	55
Mod 02			26-Dec-06	12-Mar-07	55
07.100A	Validation	2	26-Dec-06	12-Feb-07	35
07.110A	Database	2	16-Jan-07	26-Feb-07	30
07.120A	EGIS	2	06-Feb-07	12-Mar-07	25
RI/RFI REPORT			13-Mar-07	02-Apr-07	15
Mod 02			13-Mar-07	02-Apr-07	15
09.100A	Incorporate Data into RI Report	2	13-Mar-07	02-Apr-07	15
PLAN OF ACTION (POA)			04-Sep-06	13-Sep-06	8
Mod 02			04-Sep-06	13-Sep-06	8
24.991	POA Development	1	04-Sep-06	13-Sep-06	10
MISCELLANEOUS			13-Mar-07	02-Apr-07	15
Mod 02			13-Mar-07	02-Apr-07	15
37.110A	Prepare Final Housing Technical Memorandum	2	13-Mar-07	02-Apr-07	15
37.113A	Submit Final Housing Technical Memorandum	1		02-Apr-07	0



Project Name: 0041P-1
Start Date: 30-Aug-06
Finish Date: 01-Jun-07
Run Date: 07-Sep-06
Page 2 of 2

NAVY CLEAN IV POA SCHEDULE

Proposed Level of Effort
◆ Milestone

TetraTech NUS

11.0 PROJECT MANAGEMENT

Day-to-day project management includes resource planning, monitoring, and control; Technical Financial Monthly Report (TFMR) generation and review; routine internal review meetings and weekly reports; general communication with NAVFAC SE, the installation, and subcontractors; and overall project oversight.

11.1 STAFFING

The Project Manager (PM) for this project is Robert Fisher, P.G. Mr. Fisher can be reached in TtNUS' Tallahassee, Florida office by phone at (850) 385-9899, by facsimile at (850) 385-9860, and by e-mail at Robert.Fisher@ttnus.com.

The Technical Lead and FOL for the Site 3 RI will be Jason Bourgeois. Mr. Bourgeois is available at the Tallahassee, Florida office by phone at (850) 385-9899, by facsimile at (850) 385-9860, and by e-mail at Jason.Bourgeois@ttnus.com.

11.2 COORDINATION

The Task Order Manager (TOM) will receive daily updates from the Technical Lead regarding the progression of project activities during the execution of the field investigation. The TOM and Technical Lead will be responsible for anticipating cost and schedule progression, and the TOM will relay these updates to the PMO and RPM on a weekly basis.

The TOM will provide project information to the public via the Restoration Advisory Board (RAB) meetings scheduled to coincide with project milestones (RI Report and the Action Memorandum review period).

REFERENCES

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APPENDIX A

QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE PROJECT PLAN

REMEDIAL INVESTIGATION
FOR SITE 3
NAVAL CONSTRUCTION BATTALIAN CENTER GULFPORT
GULFPORT, MISSISSIPPI

Submitted to:
Naval Facilities Engineering Command
Southeast
2155 Eagle Drive
North Charleston, South Carolina 29406

Submitted by:
Tetra Tech NUS, Inc.
661 Andersen Drive, Foster Plaza 7
Pittsburgh, Pennsylvania 15220

In support of:

"CLEAN" CONTRACT NUMBER N62467-04-D-0055
CONTRACT TASK ORDER 0041

MARCH 2007

PREPARED UNDER THE SUPERVISION OF:	APPROVED BY:
ROBERT FISHER, P.G. TASK ORDER MANAGER TETRA TECH NUS, INC TALLAHASSEE, FLORIDA	RICHARD NINESTEEL QUALITY ASSURANCE MANAGER TETRA TECH NUS, INC PITTSBURGH, PENNSYLVANIA

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ACRONYMS

AA	Atomic Absorption
BFB	Bromofluorobenzene
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-Term Environmental Action, Navy
CLP	Contract Laboratory Program
COC	Contaminant of Concern
C-O-C	Chain of Custody
CTL	Clean-up Target Level
CTO	Contract Task Order
CVAA	Cold Vapor Atomic Absorption
DFTPP	Decafluorotriphenylphosphine
DO	Dissolved Oxygen
DPT	Direct-Push Technology
DQO	Data Quality Objective
EDB	Ethylene Dibromide
EISOPQAM	Environmental Investigations Standard Operation Procedure and Quality Assurance Manual
FID	Flame Ionization Detector
FOL	Field Operations Leader
FTMR	Field Task Modification Request
GC/MS	Gas Chromatograph/Mass Spectrometer
GFAA	Graphite Furnace Atomic Absorption
HASP	Health & Safety Plan
HR	High Resolution
HSM	Health and Safety Manager
ICP	Inductively-Coupled Plasma
IDL	Instrument Detection Limit
LCS	Laboratory Control Sample
MCL	Maximum Contamination Level
MDEQ	Mississippi Department of Environmental Quality
MDL	Method Detection Limit
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NA	Not Applicable
NAVFAC SE	Naval Facilities Engineering Command Southeast
NCBC	Naval Construction Battalion Center
NELAC	National Environmental Laboratory Accreditation Conference
NFESC	Naval Facilities Engineering Service Center
NIST	National Institute of Science and Technology
NTU	Nephelometric Turbidity Unit
ORP	Oxidation-Reduction Potential
PAH	Polynuclear Aromatic Hydrocarbon
PARCC	Precision, Accuracy, Representativeness, Comparability, Completeness
PCB	Polychlorinated Biphenyl
PFK	Perfluorokerosene
PID	Photo Ionization Detector
PM	Program Manager
ppm	parts per million
PQL	Practical Quantitation Limit
RBC	Risk-Based Concentration
QA	Quality Assurance
QAM	Quality Assurance Manager
QAO	Quality Assurance Officer

ACRONYMS (continued)

QAPP	Quality Assurance Project Plan
QC	Quality Control
RDL	Required Detection Limit
RI	Remedial Investigation
RL	Reporting Limit
RPD	Relative Percent Difference
RQL	Required Quantitation Limit
SDG	Sample Delivery Group
SOP	Standard Operating Procedure
EISOPQAM	Standard Operation Procedure and Quality Assurance Manual
SOW	Statement of Work
SVOC	Semi-Volatile Organic Compound
SW	Solid Waste
TAL	Target Analyte List
TCL	Target Compound List
TOC	Total Organic Carbon
TOM	Task Order Manager
TtNUS	Tetra Tech NUS, Inc.
UMhos/cm	micromhos per centimeter
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
WP	Work Plan
%R	Percent Recovery
µg/L	microgram per liter
mg/L	milligram per liter
mg/kg	milligram per kilogram
mV	millivolt
ng/kg	nanogram per kilogram
pg/L	picogram per liter

1.0 PROJECT DESCRIPTION

1.1 INTRODUCTION

This Quality Assurance Project Plan (QAPP) has been prepared by Tetra Tech NUS, Inc. (TtNUS) on behalf of the United States Navy, Naval Facilities Engineering Command Southeast (NAVFAC SE) and the Naval Construction Battalion Center (NCBC) Gulfport, Gulfport, Mississippi, under the Comprehensive Long-Term Environmental Action Navy (CLEAN) IV Contract Number N62467-04-D-0055, Contract Task Order (CTO) 041. The project planning documents for the remedial investigation (RI) to be performed at NCBC Gulfport Site 3, located in Gulfport, Mississippi include the QAPP and the following associated documents:

- The United States Environmental Protection Agency (USEPA) Region IV Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM)
- The RI Workplan (WP), prepared by TtNUS, dated October 2006
- The Health and Safety Plan (HASP)

This QAPP presents the organization, objectives, planned activities, and specific Quality Assurance/Quality Control (QA/QC) procedures associated with the sampling and analysis program. Specific protocols for sample collection, sample handling and storage, chain-of-custody, and laboratory and field analyses are described within this document. The QA/QC procedures for this project are structured in accordance with applicable technical standards, the Naval Facilities Engineering Service Center (NFESC) guidance document “Navy Installation Restoration Chemical Data Quality Manual” (September 1999), and USEPA Region IV and Mississippi Department of Environmental Quality (MDEQ) requirements, regulations, guidance, and technical standards.

1.2 FACILITY DESCRIPTION

A description of NCBC Gulfport, including its location, size and borders, site conditions, natural and man-made features, and zones of investigation, is provided in Section 2.0 of the WP.

1.3 SITE HISTORY

The site history, including historical and background information, is provided in Sections 2.0 and 3.0 of the WP.

1.4 PROJECT OBJECTIVES

This section discusses the overall project objectives, the anticipated target parameters, and intended data uses for both field and laboratory analytical data.

1.4.1 Overall Project Objectives

The RI field investigation at Site 3 is being conducted to provide sufficient data to:

- Fully characterize the nature and extent of contamination.
- Assess the risk to the human health and the environment.
- Develop a baseline risk assessment to determine if a remedial response is required.

In order to achieve these objectives, samples from soil (surface and subsurface), surface water, sediment, and groundwater will be collected and analyzed. Analytical results from the various media sampled will be used to confirm the extent of a chlorinated VOC plume detected during previous investigations and to support the baseline risk assessment. Project objectives are discussed in more detail in Section 4.0 of the WP.

1.4.2 Project Target Parameters and Intended Data Uses

This section discusses the field and laboratory analytical information to be generated during the course of the investigation. Field parameters and intended data uses are discussed in Section 1.4.2.1. Laboratory parameters and intended data uses are discussed in Section 1.4.2.2.

1.4.2.1 Field Parameters

Field parameters will include those parameters associated with groundwater and soil sampling and analysis. Field measurements will be completed using simple field instrumentation.

The following field parameters will be measured during the course of groundwater sampling:

- specific conductance,
- pH,

- turbidity,
- temperature,
- oxidation-reduction potential (ORP), and
- Salinity

Specific conductance, pH, turbidity and temperature will be used to determine the progress of well purging prior to groundwater sample collection. Specific conductance and pH will also be used as general indicators of water quality. Specific conductance, pH, turbidity, temperature and ORP will be measured using field water-quality meters. Only relative readings are required to determine stability of well sampling conditions. Further details regarding field-sampling methods are provided in Section 16 of the USEPA EISOPQAM.

The following field parameter will be measured during the course of soil sampling:

- soil headspace organic vapor concentration

The soil headspace organic vapor concentration will be used for selection of soil samples submitted for off site laboratory analysis. The soil headspace organic vapor concentration will be measured using a portable flame-ionization detector (FID) or photo-ionization detector (PID) organic vapor analyzer. Only relative readings are required to determine the highest volatile organic compound (VOC) readings. Further details regarding field-sampling methods are provided in the HASP.

1.4.2.2 Laboratory Parameters

The analytical methods to be used for the Site 3 groundwater, surface water, soil, and sediment samples have been selected based on data from previous investigations at NCBC Gulfport. A chlorinated VOC plume was discovered and appears to be influenced by nearby water bodies. The analytical data will be used to fully characterize the nature and extent of the contamination at Site 3. The suite of analyses for the Site 3 investigation is listed in Table 1-1.

Tables 1-2 through 1-7 provide a summary of the target compounds, analytes, and associated Required Quantitation Limits/ Required Detection Limits (RQLs/RDLs). The RQLs listed in the tables meet the required Maximum Contamination Limits (MCLs) as provided in the USEPA Drinking Water Regulations and Health Advisories, October 1996. If an MCL is not available for a given analyte, then the USEPA Region III Risk-Based Concentrations (RBCs) are used for comparison. Analytical methods are further discussed in Section 8.0 of this QAPP.

TABLE 1-1

ANALYTICAL METHODS AND SAMPLING SUMMARY

ALL MEDIA

NCBC GULFPORT SITE 3

Parameter	Method (aqueous/soil)	No. Soil	No. Aqueous
TAL Metals +CN	SW-846 6061B/7000A	35	52
TCL VOCs	SW-846 8260B (25 mL purge)	35	72
TCL SVOCs	SW-846 8270C	35	52
TCL Pesticides	SW-846 8081B	35	52
TCL PCBs	SW-846 8082A	35	52
Chlorinated Herbicides	SW-846 8151B	35	52

CN = Cyanide
mL = milliliter
PCBs = Polychlorinated biphenyls
SVOCs = Semivolatile organic compounds
VOCs = Volatile organic compounds
TAL = Target Analyte List
TCL = Target Compound List

TABLE 1-2

SW-846 8260B ANALYTICAL QUANTITATION LIMITS

TCL* VOCs

NCBC GULFPORT SITE 3

Page 1 of 2

Parameter	Required Quantitation Limit	
	Solid Samples	Aqueous Samples
Volatile Organic Compounds	**µg/kg**	**µg/L**
Acetone	10	5
Benzene	10	1
Bromodichloromethane	10	1
Bromoform	10	1
Bromomethane	10	1
2-Butanone	10	5
Carbon disulfide	10	1
Carbon tetrachloride	10	1
Chlorobenzene	10	1
Chloroethane	10	1
Chloroform	10	1
Chloromethane	10	1
Dibromochloromethane	10	1
1,2-Dibromo-3-chloropropane	NA	1
1,2-Dibromoethane	10	1
1,2-Dichlorobenzene	NA	1
1,3-Dichlorobenzene	NA	1
1,4-Dichlorobenzene	NA	1
1,1-Dichloroethane	10	1
1,2-Dichloroethane	10	1
1,1-Dichloroethene	10	1
cis-1,2-Dichloroethene	NA	1
1,1,2-Trichloro –1,2,2-trifluoroethane	10	1
MethylAcetate	10	1
Methyl tert-butylether	10	1
Bromochloromethane	10	1
Cyclohexane	10	1
1,2-Dichloropropane	10	1
Methylcyclohexane	10	1
Isopropylbenzene	10	1
1,2,3-Trichlorobenzene	10	1
1,2,4-Trichlorobenzene	10	1

TABLE 1-2

SW-846 8260B ANALYTICAL QUANTITATION LIMITS
TCL* VOCs

NCBC GULFPORT SITE 3

Page 2 of 2

Parameter	Required Quantitation Limit	
	Solid Samples	Aqueous Samples
Volatile Organic Compounds	**µg/kg**	**µg/L**
1,2-Dichloroethene (total)	10	NA
cis-1,3-Dichloropropene	10	1
trans-1,3-Dichloropropene	10	1
Ethylbenzene	10	1
2-Hexanone	10	5
4-Methyl-2-pentanone	10	5
Methylene chloride	10	2
Styrene	10	1
1,1,2,2-Tetrachloroethane	10	1
1,1,1-Trichloroethane	10	1
1,1,2-Trichloroethane	10	1
Trichloroethene	10	1
Tetrachloroethene	10	1
Toluene	10	1
Vinyl chloride	10	1
Xylenes (total)	10	1
Trichlorofluoromethane	NA	5
Dichlorodifluoromethane	NA	1

*Target Compound List from the Contract Laboratory Program, Organic Analytical Statement of Work (OLM04.2, USEPA)

ug/kg = micrograms per kilogram
ug/l = microgram per liter
TCL = Target Compound List
VOC = Volatile Organic Compound

TABLE 1-3
SW-846 8270D ANALYTICAL QUANTITATION LIMITS
TCL* SVOCs

NCBC GULFPORT SITE 3

PAGE 1 OF 3

Parameter	Required Quantitation Limit	
	Solid Samples	Aqueous Samples
Semivolatile Organic Compounds	**µg/kg**	**µg/L**
Acenaphthene	330	10
Acenaphthylene	330	10
Anthracene	330	10
Benzo(a)anthracene	330	10
Benzo(a)pyrene	330	10
Benzo(b)fluoranthene	330	10
Benzo(g,h,i)perylene	330	10
Benzo(k)fluoranthene	330	10
Bis(2-chloroethoxy)methane	330	10
Bis(2-chloroethyl)ether	330	10
Bis(2-ethylhexyl)phthalate	330	5
4-Bromophenyl-phenylether	330	10
Butylbenzylphthalate	330	10
Carbazole	330	NA
4-Chloro-3-methylphenol	330	10
4-Chloroaniline	330	10
2-Chloronaphthalene	330	10
2-Chlorophenol	330	10
4-Chlorophenyl-phenylether	330	10
Chrysene	330	10
Dibenz(a,h)anthracene	330	10
Dibenzofuran	330	10
3,3'-Dichlorobenzidine	330	10
Diethylphthalate	330	10
Di-n-butylphthalate	330	10
Di-n-octylphthalate	330	10
4,6-Dinitro-2-methylphenol	830	25
2,4-Dinitrophenol	830	25
2,4-Dinitrotoluene	330	10
Benzaldehyde	330	10
Caprolactam	330	10
1,1' -Biphenyl	330	10
Atrazine	330	10

TABLE 1-3
SW-846 8270D ANALYTICAL QUANTITATION LIMITS
TCL* SVOCs

NCBC GULFPORT SITE 3

PAGE 2 OF 3

Parameter	Required Quantitation Limit	
	Solid Samples	Aqueous Samples
Semivolatile Organic Compounds	**µg/kg**	**µg/L**
1,2,4,5-Tetrachlorobenzene	330	10
Acetaphenone	330	10
2,4-Dimchlorophenol	330	10
Dimethylphthalate	330	10
2,4-Dimethylphenol	330	10
2,6-Dinitrotoluene	330	10
Fluoranthene	330	10
Fluorene	330	10
Hexachlorobenzene	330	10
Hexachlorobutadiene	330	10
Hexachlorocyclopentadiene	330	10
Hexachloroethane	330	10
Indeno(1,2,3-cd)pyrene	330	10
Isophorone	330	10
2-Methylnaphthalene	330	10
2-Methylphenol	330	10
4-Methylphenol	330	10
Naphthalene	330	10
2-Nitroaniline	330	25
3-Nitroaniline	830	25
4-Nitroaniline	830	25
Nitrobenzene	330	10
2-Nitrophenol	330	10
4-Nitrophenol	830	25
N-nitroso-di-n-propylamine	330	10
N-nitrosodiphenylamine	330	10
2,2'-Oxybis(1-chloropropane)	330	10
Pentachlorophenol	830	25
Phenanthrene	330	10

TABLE 1-3
SW-846 8270D ANALYTICAL QUANTITATION LIMITS
TCL* SVOCs

NCBC GULFPORT SITE 3

PAGE 3 OF 3

Parameter	Required Quantitation Limit	
	Solid Samples	Aqueous Samples
Semivolatile Organic Compounds	µg/kg	µg/L
Phenol	330	10
Pyrene	330	10
2,4,5,-Trichlorophenol	830	25
2,4,6,-Trichlorophenol	330	10

* Target Compound List from the Contract Laboratory Program, Organic Analytical Statement of Work (OLM04.2, USEPA)
NA Not Applicable

TCL= Target Compound List
SVOC = Semi-Volatile Organic Compound
ug/kg = microgram per kilogram
ug/l = microgram per liter

TABLE 1-4
SW-846 8081B ANALYTICAL QUANTITATION LIMITS
TCL* PESTICIDES

NCBC GULFPORT SITE 3

Parameter	Required Quantitation Limit	
	Solid Samples	Aqueous Samples
Pesticides	**µg/kg**	**µg/L**
Aldrin	1.7	0.05
alpha-Benzene hexachloride (BHC)	1.7	0.05
alpha-Chlordane	1.7	0.05
beta-BHC	1.7	0.1
4,4'-DDE	3.3	0.1
4,4'-DDD	3.3	0.1
4,4'-DDT	3.3	0.1
delta-BHC	1.7	0.05
Dieldrin	3.3	0.1
Endosulfan I	1.7	0.05
Endosulfan II	3.3	0.05
Endosulfan sulfate	3.3	0.1
Endrin	3.3	0.1
Endrin aldehyde	3.3	0.1
Endrin ketone	3.3	NA
gamma-BHC (Lindane)	1.7	0.2
gamma-Chlordane	1.7	0.05
Heptachlor	1.7	0.05
Heptachlor epoxide	1.7	0.1
Methoxychlor	17	0.4
Toxaphene	170	1.0

* Target Compound List from the Contract Laboratory Program, Organic Analytical Statement of Work (OLM04.2, USEPA)

TABLE 1-5
SW-846 8082 ANALYTICAL DETECTION LIMITS
TCL* PCBs

NCBC GULFPORT SITE 3

Parameter	Required Quantitation Limit	
	Solid Samples	Aqueous Samples
PCB's	**µg/kg**	**µg/L**
Aroclor-1016	33	PQL[(2)]
Aroclor-1221	67	PQL
Aroclor-1232	33	PQL
Aroclor-1242	33	PQL
Aroclor-1248	33	PQL
Aroclor-1254	33	PQL
Aroclor-1260	33	PQL

* Target Compound List from the Contract Laboratory Program, Organic Analytical Statement of Work (OLM04.2, USEPA)
(2) PQL Practical Quantitation Limit, determined by the laboratory

TCL = Target Compound List
ug/kg = microgram per kilogram
ug/L = microgram per liter
PCB,s = Polychlorinated Biphenyl

TABLE 1-6
SW-846 8151A ANALYTICAL DETECTION LIMITS
APPENDIX IX* CHLORINATED HERBICIDES LIST

NCBC GULFPORT SITE 3

Parameter	**Required Quantitation Limit**
	Aqueous Samples
Target Compound List	**µg/L**
2,4-Dichlorophenoxyaceticacid[2,4-D]	PQL[(2)]
Dinoseb	PQL
-[2,4,5-Trichlorophenoxyl] propionic acid[2,4,5-TP][Silvex]	PQL
2, 4, 5-Trichlorophenoxyaceticacid [2,4,5-T]	PQL

* Appendix IX List defined in 40 CFR, Part 264, Appendix IX Groundwater Monitoring List
[(2)] PQL Practical Quantitation Limit, determined by the laboratory

ug/L = microgram per liter

TABLE 1-7
SW-846 6010B and 9012 ANALYTICAL DETECTION LIMITS
TAL INORGANICS and CYANIDE

NCBC GULFPORT SITE 3

Parameter	Required Detection Limit	
	Soil Samples	Aqueous Samples
Inorganics	**µg /kg**	**µg/L**
Aluminum	IDL	IDL
Antimony	IDL	IDL
Arsenic	IDL	IDL
Barium	IDL	IDL
Beryllium	IDL	IDL
Cadmium	IDL	IDL
Calcium	IDL	IDL
Chromium (total)	IDL	IDL
Cobalt	IDL	IDL
Copper	IDL	IDL
Iron	IDL	IDL
Lead	IDL	IDL
Magnesium	IDL	IDL
Manganese	IDL	IDL
Mercury	IDL	IDL
Nickel	IDL	IDL
Potassium	IDL	IDL
Selenium	IDL	IDL
Silver	IDL	IDL
Sodium	IDL	IDL
Thallium	IDL	IDL
Vanadium	IDL	IDL
Zinc	IDL	IDL
Cyanide	IDL	IDL

Detection Limit for soil adjusted for the amount of sample analyzed and percent moisture.

TAL = target Analyte List
ug/kg = microgram per kilogram
ug/L = microgram per liter
IDL = Instrument Detection Limit

1.5 SAMPLE NETWORK DESIGN AND RATIONALE

The sample network design and rationale is discussed in **Section 4.0** of the WP. Figures displaying all proposed sampling locations are provided in **Section 5.0** of the WP.

1.6 PROJECT SCHEDULE

The project schedule is discussed **Section 10.0** of the WP.

2.0 PROJECT ORGANIZATION

The overall organization of the Site 3 RI is outlined in Figure 2-1. The various quality assurance and management responsibilities of key TtNUS project personnel are defined in the following paragraphs.

CLEAN Program Manager - The TtNUS Program Manager is Ms. Debra Humbert she is responsible for the execution of all contractual obligations. She serves as the primary Program point of contact for the client and provides an interface between the Navy and the project staff.

CLEAN Task Order Manager - The Task Order Manager (TOM) is Mr. Robert Fisher he is responsible for project performance, budget, and schedule, and for ensuring the availability of necessary personnel, equipment, subcontractors, and services. He will direct the development of the field program, evaluation of findings, determination of conclusions and recommendations, and preparation of technical reports.

Field Operations Leader/Sampling Coordinator – The TtNUS Field Operations Leader (FOL) is responsible for providing onsite supervision of day-to-day activities on the project. The FOL serves as the primary onsite contact with the client and subcontractors. The FOL is also responsible for all field QA/QC and safety-related issues as defined in the HASP. In addition, the FOL will coordinate the schedule of field sampling activities with the schedule and capacity requirements of the selected analytical laboratory. All sampling will be coordinated to assure that environmental sampling is conducted in a manner that complies with all QA/QC requirements and is in compliance with holding time and analytical procedure requirements. The TtNUS FOL for CTO No. 041 is Jason Bourgeois.

Health and Safety Manager - The Program Health and Safety Manager (HSM) will review and internally approve the HASP tailored to the specific needs of the investigation. In consultation with the TOM and FOL, the HSM will ensure that an adequate level of personal protection exists for anticipated potential hazards for all field personnel. As the HSM does not report to either the Program or TOM, his actions are not dictated by Program or project constraints (such as budget and schedule) other than the assurance of appropriate safeguards while conducting investigation activities. The TtNUS HSM is Mr. Matthew Soltis, CIH.

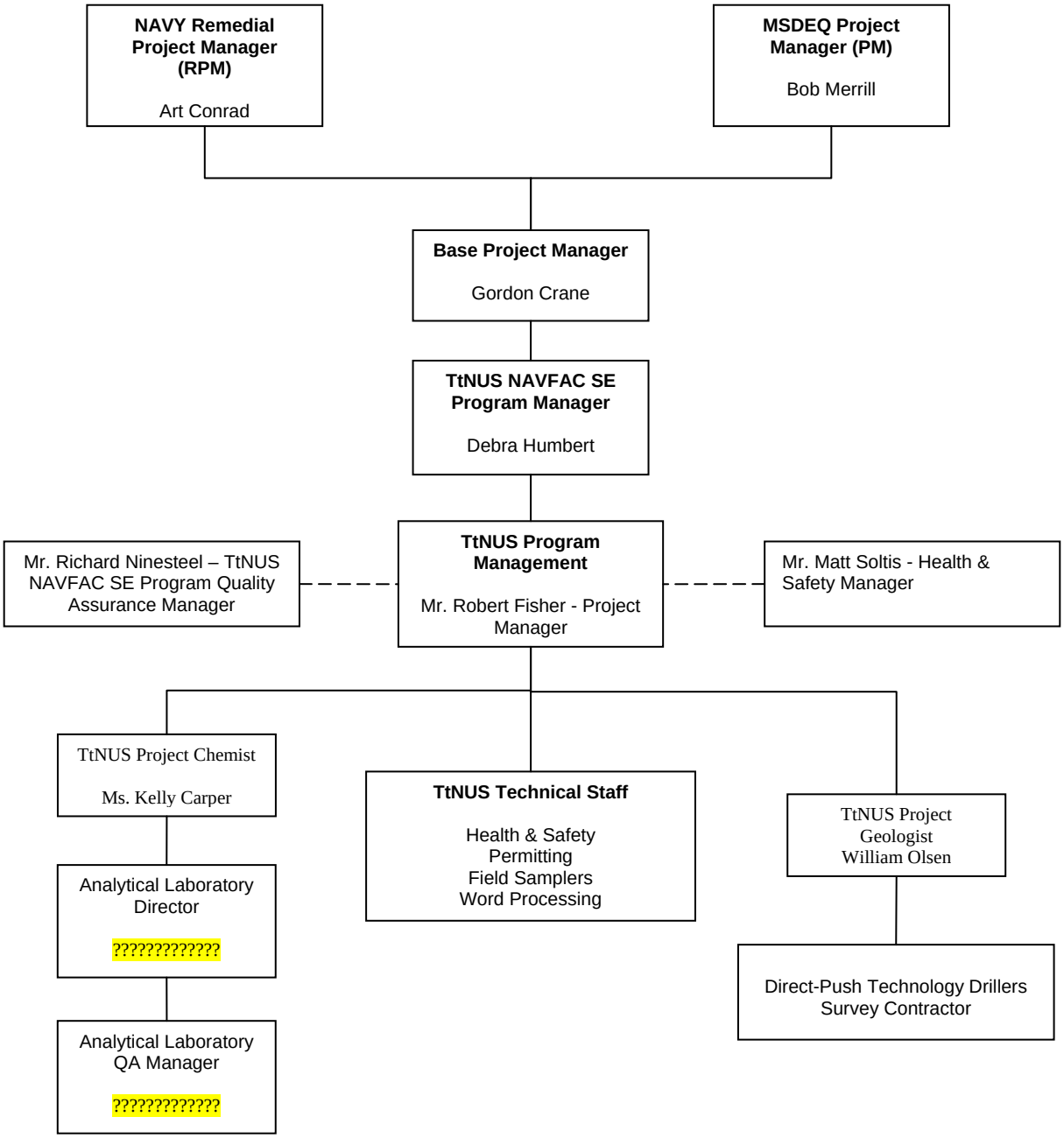
Quality Assurance Manager - The TtNUS Quality Assurance Manager (QAM) for this study is Mr. Richard Ninesteel. The QAM operates independently of the TOM and is responsible for all Program-wide, QA issues and the development of the QAPP. The QAM appoints a project Quality Assurance Officer (QAO) for the project. The specific responsibilities of the QAO include reviewing laboratory reports to ensure that all the QA/QC requirements have been met, and inspecting work activities and project deliverables to

make sure that QC activities are not compromised. The QAO will communicate issues of non-compliance directly to the TOM and the QAM. The TtNUS QAO for CTO No. 041 is Dr. Tom Johnston.

Project Laboratory – The laboratory will be subcontracted by TtNUS to perform the routine chemical analyses for the environmental samples collected for the corrective measures implementation program. The laboratory is responsible for checking laboratory quality against the requirements of the QAPP before the laboratory reports are transferred to TtNUS. Analytical results reported in electronic data deliverables must agree with the hard copy results contained in analytical data packages.

FIGURE 2-1

PROJECT ORGANIZATION
NCBC GULFPORT, GULFPORT, MISSISSIPPI



3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The overall QA objective for this RI is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and data reporting that will provide valid and relevant data to support the RI decision process. Intended data uses are described in Section 1.4.2 of this QAPP. Specific procedures for sampling, chain-of-custody, laboratory instrument calibration, laboratory analysis, reporting of data, internal QC, audits, preventive maintenance of field and laboratory equipment, and corrective action are described in other sections of this QAPP.

The precision, accuracy, representativeness, comparability, and completeness (PARCC) parameters are qualitative and/or quantitative statements regarding the quality characteristics of the data used to support project objectives and ultimately, environmental decisions. These parameters are discussed in the remainder of this section. Specific routine procedures used to assess the quantitative parameters (precision, accuracy, and completeness) are provided in Section 12.0.

3.1 PRECISION

Precision is a measure of the amount of variability and bias inherent in a data set. Precision describes the reproducibility of measurements of the same parameter for samples under similar conditions. The equation for computing relative percent difference (RPD) and determining precision is provided in Section 12.2.

3.1.1 Field Precision Objectives

Duplicate field measurements for aqueous matrix samples will not be required for target analytes but stability of water quality during well purging will be evaluated through of comparison of replicate measurements. In lieu of using matrix spikes (MS) and using independent QC check standards for target analytes, frequent continuing calibrations will be performed. Field measurement meters will be calibrated immediately before the initial analysis and every four hours after the initial calibration, while sampling.

3.1.2 Laboratory Precision Objectives

Laboratory precision QC samples are analyzed at a frequency of 5 percent (i.e., one QC sample per 20 environmental samples). Laboratory precision is measured via comparison of calculated RPD values and precision control limits specified in the analytical method or by the laboratory's QA/QC Program.

Precision for organic analyses will be measured via the RPDs for matrix spike/matrix spike duplicate (MS/MSD) samples and laboratory control sample/laboratory control sample duplicates (LCS/LCSD). The analytical method for low-concentration volatile analysis does not require a specific QC sample to monitor precision, although the calibration requirements of the method (i.e., specific limits of precision for the calibration standards) do ensure that a sufficient level of precision is achieved. (Calibration is further discussed in Section 7.0.).

Precision for metals analyses will be measured via the RPDs for duplicate sample analyses.

Precision for the remaining parameters will be measured via the RPD results for laboratory duplicate samples. Internal laboratory control limits for precision will be used for evaluation of precision for these parameters and the laboratory and field precision will be compared to ensure that laboratory precision is generally no worse than precision associated with field duplicates.

3.2 ACCURACY

Accuracy is the degree of agreement between the observed value and an accepted reference value. The equation for determining accuracy is provided in Section 12.1.

3.2.1 Field Accuracy Objectives

The determination of accuracy in the field is not required. In lieu of using matrix spikes and using independent QC check standards, frequent continuing calibrations will be performed. Field measurement meters will be calibrated immediately before the initial analysis and every four hours after the initial calibration, while sampling.

3.2.2 Laboratory Accuracy Objectives

Accuracy in the laboratory is measured through the comparison of a spiked sample result against a known or calculated value expressed as a percent recovery (%R). Percent recoveries are derived from the analysis of known amounts of compounds spiked into deionized water [i.e., laboratory control sample (LCS) analysis], or into actual samples (i.e., surrogate or MS analysis). LCS analyses measure the accuracy of laboratory operations relative to an independent source of chemical standards. Surrogate and MS analyses also measure the accuracy of laboratory operations, but as affected by the actual sample matrix. LCS and/or MS analyses are performed with a frequency of one per twenty associated samples of like matrix. Surrogate spike analysis is performed for all chromatographic organic analyses. Laboratory accuracy is assessed via comparison of calculated Percent Recoveries (%Rs) with accuracy control limits specified in the analytical method or by the laboratory's QA/QC Program.

Accuracy for inorganic (metals) analyses will be measured via the Percent Recovery (%R) for laboratory control sample (LCS) and MS analyses.

Accuracy for the remaining parameters will typically be measured via %Rs for MSs and/or LCSs. Internal laboratory control limits for accuracy will be used for evaluation of accuracy for these parameters.

3.3 COMPLETENESS

Completeness is a measure of the amount of usable, valid analytical data obtained, compared to the amount expected. Completeness is expressed as a percentage. The equation for completeness is presented in Section 12.3.

The ideal objective for completeness is 100 percent (i.e., every sample planned to be collected is collected; every sample submitted for analysis yields valid data). However, samples can be rendered unusable during shipping or preparation (e.g., bottles broken or extracts accidentally destroyed), errors can be introduced during analysis (e.g., loss of instrument sensitivity, introduction of ambient laboratory contamination), or strong matrix effects can skew analytical results (e.g., extremely low matrix spike recovery).

These instances may result in data that do not meet the completeness criterion. Based on these considerations, 95 percent is considered an acceptable target for the data completeness objective. If critical data points are lost, resampling and/or reanalysis might be required. This will be determined when reconciling data with Data Quality Objectives (DQO).

As further discussed in Section 11.2.2, one hundred percent of the laboratory data for the NCBC Gulfport Site 3 investigation program will undergo a full validation review. A full data validation review is defined in Section 11.2.2. Data rejected as a result of the review process will be treated as unusable data unless additional review shows that the data are usable. Use of rejected data will be justified and will typically be limited to qualitative uses such as identifying gross trends.

3.4 REPRESENTATIVENESS

Representativeness is an expression of the degree to which the data accurately and precisely depict the actual characteristics of a population or environmental condition existing at an individual sampling point and time. Use of standardized sampling, handling, analytical, and reporting procedures ensures that the final data accurately represent actual site conditions.

3.4.1 Measures to Ensure Representativeness of Field Data

Representativeness depends on the proper design of the sampling program. It will be satisfied by ensuring that the WP and this QAPP are followed and that proper sampling techniques are used. The sampling network for the NCBC Gulfport Site 3 sampling program was designed to provide data representative of site conditions. During development of this network, consideration was given to the baseline condition determined from prior sampling and analytical data. The rationale of the sampling network is discussed in detail in Section 3.0 of the WP.

3.4.2 Measures to Ensure Representativeness of Laboratory Data

Representativeness in the laboratory data is ensured by using the proper analytical procedures, meeting sample-holding times, and analyzing and assessing laboratory QC samples.

3.5 COMPARABILITY

Comparability is defined as the confidence with which one data set can be compared to another (e.g., between sampling points; between sampling events). Comparability is achieved by using standardized sampling and analysis methods, and data reporting formats (including use of consistent units of measure), and meeting QC criteria. Collection of quantitative precision, accuracy, and detection limit estimates, facilitates comparisons of different data sets by identifying significant differences in data quality if they exist. Additionally, consideration is given to seasonal conditions and other environmental variations that could influence data results.

3.5.1 Measures to Ensure Comparability of Field Data

Comparability is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the WP is followed. It also depends on recording field measurements using the correct units.

3.5.2 Measures to Ensure Comparability of Laboratory Data

Planned analytical data will be comparable when similar sampling and analytical methods are used and documented. Results will be reported in units that ensure comparability with previous data and with current State and Federal standards and guidelines. Comparability will also be ensured by examining the QC parameters of precision, accuracy, and detection limits.

3.6 LEVEL OF QUALITY CONTROL EFFORT

Trip blank, rinsate blank, method blank, field and laboratory duplicate, laboratory control, and MS samples will be analyzed to assess the quality of the data resulting from the field sampling and analytical programs.

External QC measures (i.e., field quality control samples) consist of field duplicates, trip blanks, and equipment rinsate blanks. Information gained from these analyses further characterizes the level of data quality obtained to support project goals. Each of these types of field quality control samples undergoes the same preservation, analysis, and reporting procedures as the related environmental samples. Each type of field QC sample is discussed below.

Field duplicates are two samples collected independently at a sampling location (e.g., surface water). Field duplicates are collected and analyzed by the laboratory for all chemical constituents to measure the precision of the sampling and analysis methods employed. The level of the QC effort will be one field duplicate for every 10 samples and then 10% of the number of additional investigative samples

Trip blanks, consisting of analyte-free water, will be submitted to the laboratory to provide the means to assess the quality of the VOC data resulting from the field-sampling program. Trip blanks only pertain to VOC analysis. The trip blanks are used to assess the potential for contamination of samples by VOC migration into sample containers during sample shipment and storage. Trip blanks are prepared by the laboratory prior to the sampling event, shipped to the site with the sample containers, and kept with the investigative samples throughout the sampling event. They are then packaged for shipment with other VOC samples and sent for analysis. There will be one trip blank included in each sample-shipping container that contains samples for VOC analysis. At no time after preparation will the sample containers for the trip blanks be opened before they reach the laboratory.

Equipment rinsate blanks are obtained under representative field conditions by collecting the rinse water generated by running analyte-free water through sample collection equipment after decontamination and

prior to use. At least one equipment blank will be collected per day, per matrix. If pre-cleaned, dedicated, or disposable sampling equipment is used, one rinsate blank per type of equipment used must be collected as a "batch blank." Rinsate blanks are analyzed by the laboratory for the same chemical constituents as the associated environmental samples.

Method blank samples are generated within the laboratory and used to assess contamination resulting from laboratory procedures. Samples with positive results corresponding to positive results in the method blank will be designated with a qualifier by the laboratory. Method blanks are further discussed in Section 10 of this QAPP. During data validation (see Section 11.2) blank contamination will be evaluated and may lead to adjustment of reported concentrations in accordance with the established data validation guidelines.

MS/MSD samples are investigative samples spiked with known quantities of target analytes. MS/MSDs provide information about the effect of the sample matrix on the measurement methodology. One MS/MSD sample will be collected/designated for every 20 or fewer investigative samples per sample matrix.

The level of QC effort for analytical testing will conform to the appropriate analytical methods.

4.0 DATA QUALITY OBJECTIVES

The DQO Process is a planning approach used to determine the appropriate environmental data collection activities for a specific project. The DQO, generated during this process establish the data collection design for the project and define:

- The purpose of the data collection
- Where and when to collect samples or measurements
- Which analyses to run
- The requirements for the quality of the data
- How to collect the samples or measurements.

Satisfying the DQOs will result in a data collection design that meets all performance criteria and any other requirements. The DQO Process has been conducted, by all involved parties, on an informal basis throughout the investigation of Site 3. This resulted in a series of meetings and teleconferences designed to establish the DQOs during the period of January to March 2007. The participants varied but over time included the TOM, the FOL, the project geologist and the project risk assessor.

Nature of contamination will be determined based on the best professional judgment. This judgment will be based on a determination as to whether the chemical form, distribution throughout various media, and other chemical/physical characteristics are known well enough to characterize risk and to support the presumed remedy. Extent of contamination will be established by uncontaminated samples outside an area of contamination and contaminated samples within the area of contamination. Also, determine whether the nature and extent of contamination is adequately determined. If the nature and extent of contamination has not been adequately determined then collect the data necessary to establish it. If delineation of contamination is adequate, stop delineating the extent of contamination, otherwise continue collecting data until the contamination boundary is delineated.

4.1 PROJECT OBJECTIVE

The primary objective of the RI is to provide suitable data in order to support the preparation of a remedy for contamination at Site 3 that is protective of human health ecological health and the environment. In order to achieve this primary objective, samples from various media will be collected and analyzed. Samples will be collected and analyzed to evaluate the nature and extent of contaminants that may have been released at the site, including waste fuels and solvent-related contamination previously documented at the site.

4.2 SELECTION OF MEDIA

Based on the Site Conceptual Model (Figure 3-2, Workplan) the media selected for investigation include those identified as potential contaminant sources and migration pathways. Subsurface soil, surface water, sediment, groundwater, and surface soil data will be collected to fully define the nature and extent of the contamination at Site 3. These media represent environmental media that may be contaminated as well as sample locations outside of potentially contaminated regions that will be used to establish the extent of the contamination. The data used for this purpose will also be used for the risk evaluations.

4.2.1 Subsurface Soil Data

Soil samples will be collected from locations in the landfill area determined following the geophysical investigation. Subsurface soil will be sampled and screened continuously from the ground surface to a depth of approximately 40 feet. This data will detail the distribution of contaminants and the lithology of the subsurface soil at Site 3. The subsurface soil sample data will be compared to groundwater sample data to determine if contaminants in the subsurface soil are present in site groundwater.

4.2.2 Sediment/Surface Water Data

Surface water and sediment data from past sampling will be used to meet project objectives and new data for these two media will not be collected during field activities governed by the WP. The data from the sediment samples will be used to determine if contamination from the landfill area is being transported from the site by sediment movement within the ditch. Samples will be collected from locations in Canal No. 1 upstream, adjacent to, and downstream of the landfill. Sediment samples will also be collected from adjacent wetlands/ponds that may serve as local capture zones.

Surface water sample data will be compared to sediment sample data to determine if sediment contaminants are present in surface water in the ditch and to groundwater sample data to determine if groundwater contaminants are present in surface water in the ditch.

The data from the surface water and sediment samples will also provide information that can be used to determine if human health risk is an immediate concern.

4.2.3 Groundwater Data

Groundwater samples will be collected from new and existing monitoring wells following the geophysical investigation. Groundwater sample locations will be located in the landfill area as well as downgradient. Groundwater sample data will be compared to subsurface soil and surface water data to determine if contaminants in the subsurface soil are present in site groundwater or if groundwater contaminants are present in the surface water in Canal No. 1.

4.2.4 Seep Data

Groundwater and surface soil samples will be collected from any observable seeps located on the banks of Canal No. 1 if site conditions permit. The groundwater seep and surface soil data will be compared to surface water and sediment data to determine if contaminants in the groundwater are discharging into Canal No. 1.

4.3 SELECTION OF ANALYSES

The laboratory analytical parameters selected for the RI were chosen based on the potential for release of materials due to past landfill operations at Site 3. A wide range of materials have been used and disposed of at NCBC Gulfport, therefore it was determined that samples collected at Site 3 will be analyzed for the following:

- TCL VOCs,
- TCL SVOCs,
- TCL Pesticides/PCBs,
- TAL Metals and Cyanide,
- Chlorinated Herbicides

Based on previous investigations and knowledge of past disposal practices at NCBC Gulfport, the selected analyses should provide a suitable assessment of the nature of the contamination at Site 3.

4.4 DATA QUALITY EVALUATION

Data quality is discussed in Sections 11.0 and 12.0 of this QAPP. These sections specifically address data reduction, validation, reporting, precision, accuracy, completeness, and usability.

4.5 SAMPLING AND MEASUREMENT PROCEDURES

Sampling and measurement procedures are specifically discussed in Section 5.0 of this QAPP.

5.0 SAMPLING PROCEDURES

The specific types of field sampling for the NCBC Gulfport Site 3 sampling program are discussed in the WP and will follow the EISOPQAM. In addition, the EISOPQAM and the WP addresses the following field investigation tasks:

- Groundwater-level measurements - Section 5.8, Section 5.9, RI WP
- Monitoring well purging - Section 7.2, EISOPQAM
- Sample containers, preservatives, and volume requirements – Appendix A, EISOPQAM
- Field measurements – Sections 16, EISOPQAM
- Decontamination procedures – Section 5.6, RI WP
- Investigation derived waste – Section 5.10, EISOPQAM
- Sample nomenclature system - Section 5.2.2 RI WP
- Sample packaging and shipping procedures – Appendix D, EISOPQAM
- Recordkeeping – TtNUS Corporate SOP SA-6.3 (Appendix B)

6.0 CUSTODY PROCEDURES

Sample custody is one of several factors which impact the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for admissibility; relevance and authenticity.

Sample custody is addressed in three parts: field sample collection, laboratory analysis, and final evidence files. Final evidence files, including all originals of laboratory reports and purge files, are maintained under document control in a secure area. An environmental sample or evidence file is considered under custody if:

- the item is in the actual physical possession of an authorized person, or;
- the item is in view of the person after being in his or her possession, or;
- the item was placed in a secure area to prevent tampering; or
- the item is in a designated and identified secure area with access restricted to authorized personnel only.

The chain-of-custody (C-O-C) report is a multi-part, standardized form used to summarize and document pertinent sample information, such as sample identification and type, matrix, date and time of collection, preservation, and requested analyses. Furthermore, through the sequential signatures of various sample custodians (e.g., sampler, air bill number, laboratory sample custodian); the C-O-C report documents sample custody and tracking. A “Cradle-to-Grave” sample tracking will be employed. Custody procedures apply to all environmental and associated field QC samples obtained as part of the data collection system.

6.1 FIELD CUSTODY PROCEDURES

The FOL; or designee is responsible for the care and custody of the samples from the time of collection until the samples are relinquished to the analyzing laboratory or entrusted to a commercial courier for transport to the laboratory. C-O-C reports are completed for each sample shipment. The reports are filled out in a legible manner, using waterproof ink, and are signed and dated by the sampler. Pertinent notes, such as whether the sample was field filtered, or whether the sample is suspected to be high in contaminant concentration, are also indicated on the C-O-C report. Information similar to that contained in the C-O-C report is also provided on the sample label, which is securely attached to the sample bottle. C-O-C report forms and sample labels will be supplied by the laboratory subcontractor. In accordance with NFESC guidelines, samples for chemical constituent analysis must be sent (for next-day receipt) to the laboratory within 24-hours of collection.

Full details regarding sample C-O-Cs (including use of custody seals and sample shipment protocols) are contained in TtNUS Corporate Standard Operating Procedure (SOP) SA-6.1, which is provided as Appendix A. TtNUS Corporate SOP SA-6.3, also provided as Appendix B, discusses maintenance of site logbooks, site notebooks, and other field records. All sample records are eventually docketed into the TtNUS project central file.

6.2 LABORATORY CUSTODY PROCEDURES

When samples are received by the laboratory subcontractor, the laboratory's sample custodian examines each cooler's custody seals to verify that they are intact and that the integrity of the environmental samples has been maintained. The sample custodian then signs the C-O-C report. The custodian then opens the cooler and measures its internal temperature. The temperature reading is noted on the accompanying C-O-C report. The sample custodian then examines the contents of the cooler. Sample container breakages or discrepancies between the C-O-C report and sample label documentation are recorded. With the exception of samples for volatile analysis, the pH of chemically preserved samples is checked using pH paper and recorded. All problems or discrepancies noted during this process are to be promptly reported to the TtNUS TOM (or designee). Inter-laboratory C-O-C procedures and specific procedures for sample handling, storage, disbursement for analysis, and remnant disposal will be followed as specified by the subcontract laboratory's SOPs and/or QA Plan.

The laboratory will maintain a hardcopy file of all analytical data associated with this project in a secure area. Access to the data will be limited to laboratory, TtNUS, and Navy personnel. The hardcopy files will be maintained by the laboratory for a minimum of seven years.

6.3 FINAL EVIDENCE FILES

The TtNUS central file will be the repository for all documents, which constitute evidence relevant to sampling and analysis activities as described in this QAPP. TtNUS is the custodian of the evidence file and maintains the contents of these files, including all relevant records, reports, logs, field notebooks, photographs, subcontractor reports and data reviews in a secure, limited access location and under custody of the TtNUS facility manager. The control file will include at a minimum:

- field logbooks
- field data and data deliverables
- photographs
- drawings
- soil boring logs
- laboratory data deliverables

- data validation reports
- data assessment reports
- progress reports, QA reports, interim project reports, etc.
- all custody documentation (C-O-C forms, air bills, etc.)

Upon completion of the contract, all pertinent files will be relinquished to the custody of the United States Navy.

7.0 CALIBRATION PROCEDURES AND FREQUENCY

Instrumentation used to perform chemical measurements must be properly calibrated prior to use in order to obtain valid and usable results. The requirement to properly calibrate instruments prior to use applies equally to field instruments as it does to fixed laboratory instruments. Field instrument calibration is discussed in Section 7.1. Laboratory instrument calibration is discussed in Section 7.2.

7.1 FIELD INSTRUMENT CALIBRATION

Field instrument calibration will be conducted according to TtNUS SOPs.

7.2 LABORATORY INSTRUMENT CALIBRATION

Calibration procedures for a specific laboratory instrument will consist of initial calibration (typically 3 to 5 calibration points) and continuing calibration verification. In all cases, the initial calibration will be verified using an independently prepared calibration verification solution. The frequency of calibration will be performed according to the requirements of the specific methods.

All standards used to calibrate analytical instruments must be obtained from the National Institute of Standards and Technology (NIST) or through a reliable commercial supplier with a proven record for quality standards. All commercially supplied standards must be traceable to NIST reference standards where possible and appropriate documentation will be obtained from the supplier. In cases where documentation is not available, the laboratory will analyze the standard and compare the results to an USEPA-supplied known or previous NIST-traceable standard.

The calibration procedures and frequencies used by the subcontract laboratory will comply with the applicable analytical method. Brief descriptions of calibration procedures for major instrument types follow.

7.2.1 <u>GC/MS Volatile Organic Compound Analyses</u>

For VOCs, the gas chromatograph/mass spectrometer (GC/MS) system will be tuned and calibrated in accordance with the appropriate analytical method. A bromofluorobenzene (BFB) instrument performance check (tuning check) must be run prior to the initial calibration and each continuing calibration and must meet all method-specified criteria before analysis may continue. Initial calibration is required before any samples are analyzed and must include a blank and a minimum of five different concentrations as specified in the method. A BFB tuning check and a continuing calibration check,

including the mid-range standard and a blank, must be performed at the beginning of each 12-hour period during which analyses are performed.

7.2.2 GC/MS Semi-Volatile Organic Compound Analyses

For SVOCs, the GC/MS system will be tuned and calibrated in accordance with the appropriate analytical method. A decafluorotriphenylphosphine (DFTPP) instrument performance check (tuning check) must be run prior to the initial calibration and each continuing calibration and must meet all method-specified criteria before analysis may continue. Initial calibration is required before any samples are analyzed and must include a blank and a minimum of five different concentrations as specified in the method. A DFTPP tuning check and a continuing calibration check, including the mid-range standard and a blank, must be performed at the beginning of each 12-hour period during which analyses are performed.

7.2.3 GC Pesticide/PCB/Herbicide Analyses

For Pesticide/PCB/Herbicide, the gas chromatograph (GC) system will be calibrated in accordance with the appropriate analytical method. Initial calibration is required before any samples are analyzed and must include a blank and a minimum of five different concentrations as specified in the method. A continuing calibration check, including the mid-range standard and a blank, must be performed at the beginning of each 10-sample period during which analyses are performed.

7.2.4 ICP Inorganic Analyte Analyses

For metals, the inductively coupled plasma (ICP)-atomic emission spectrometry system will be calibrated in accordance with the appropriate analytical method. Initial calibration is required before any samples are analyzed and must include a preparation blank. A continuing calibration check and a blank must be performed at the beginning of each 10-sample period during which analyses are performed.

7.2.5 Atomic-Absorption Mercury Analysis

For mercury, the atomic absorption (AA) spectrophotometer will be calibrated in accordance with the appropriate analytical method. Initial calibration is required before any samples are analyzed and must include a preparation blank. A continuing calibration check and a blank must be performed at the beginning of each 10-sample period during which analyses are performed.

7.2.6 Miscellaneous Parameters

Calibration and standardization requirements for the analysis of the remaining parameters will be performed as specified in the applicable analytical methods and manufacturer's recommendation.

8.0 ANALYTICAL AND MEASUREMENT PROCEDURES

Samples will be subjected to field and laboratory parameter measurement as necessary based on the sample matrix and location under investigation. The analytical program for environmental samples collected at each anticipated location is provided in Section 5.4 and 5.5 of the WP.

Groundwater chemical/physical parameters to be measured using field instrumentation include:

- temperature,
- specific conductance,
- pH,
- Dissolved oxygen,
- turbidity, and
- Oxidation-Reduction Potential (ORP).

Soil chemical/physical parameters to be measured using field instrumentation include:

- Soil headspace organic vapor

Measurement of field parameters and calibration of field instruments are discussed in Section 16 and Section 17 of the USEPA EISOPQAM.

The analytical laboratory responsible for the chemical analyses will be NFESC-approved, certified by the National Environmental Laboratory Accreditation Conference (NELAC) for all analyses that are requested by TtNUS**.** Documentation of the certifications will be provided to TtNUS as described in the TtNUS analytical Statement of Work (SOW) for the contracted laboratory.

Environmental samples submitted for VOC, SVOC, Pesticide/PCB, chlorinated herbicides or inorganic analysis will be analyzed in accordance with current SW-846 methods. Groundwater samples for miscellaneous parameter analyses will be analyzed in accordance with current EPA approved methods. Table 1-1 provides a summary of the laboratory analytical methods for the NCBC Gulfport Site 3 sampling program.

A complete list of the target compounds/analytes RQLs is provided in Section 1.4.2.2 of this QAPP. Data generated through use of the SW-846 method protocols will be reported to the RQL for nondetected compounds from organics analysis. Compounds which are positively identified and which can be quantitated at concentrations less than the RQL, but above the calculated method detection limit (MDL) will be reported as specified in the appropriate analytical method. Inorganic analytes which are positively identified will be reported to the Instrument Detection Limit (IDL). Environmental data generated through use of non-SW-846 methods will be reported to the laboratory's Reporting Limit (RL). An analyte's RL is an expression of the method quantitation limit with adjustments typically made to facilitate data reporting. The RLs are not provided in the tables in Section 1.4.2.2 since these values vary based on the laboratory.

Quantitation and detection limits will also be adjusted, as necessary, based on dilutions and sample volume.

9.0 PREVENTIVE MAINTENANCE PROCEDURES

Measuring equipment used in environmental monitoring or analysis for the NCBC Gulfport Site 3 sampling program shall be maintained in accordance with the manufacturer's operation and maintenance manuals. Equipment and instruments shall be calibrated in accordance with the procedures, and at the frequency, discussed in Section 7.0 (Calibration Procedures and Frequency). Preventive maintenance for field and laboratory equipment is discussed in the remainder of this section.

9.1 FIELD EQUIPMENT PREVENTIVE MAINTENANCE

TtNUS has established a program for the maintenance of field equipment to ensure the availability of equipment in good working order when and where it is needed. This program consists of the following elements:

- The TtNUS equipment manager keeps an inventory of the equipment in terms of items (model and serial number), quantity, and condition. Each item of equipment is signed out when in use, and its operating condition and cleanliness checked upon return.

- The equipment manager conducts routine checks on the status of equipment and is responsible for the stocking of spare parts and equipment readiness. The equipment manager also maintains the equipment manual library.

- The FOL is responsible for working with the equipment manager to make sure that the equipment is tested, cleaned, charged, and calibrated in accordance with the manufacturer's instructions and SOPs before being taken to the job site and during field activities.

- During calibration, an appropriate maintenance check is performed on each piece of equipment. Any problems encountered while operating the instrument will be recorded in the field log book including a description of the symptoms and corrective actions taken.

- If a problem with the equipment is detected or should require service, the equipment should be logged, tagged, and segregated from equipment in proper working order. Use of the instrument will not be resumed until the problem is resolved.

9.2 LABORATORY INSTURMENT PREVENTIVE MAINTENANCE

Proper maintenance of laboratory instruments and equipment is essential to ensuring their readiness when needed. Based on the instrument manufacturer's recommendations, maintenance intervals are established for each instrument. All major instruments must be labeled with a model number and serial

number, and a maintenance logbook must be maintained for each major instrument. Personnel must be alert to the maintenance status of the equipment they are using at all times.

9.2.1 Major Instruments

Table 9-1 provides a summary of preventive maintenance procedures typically performed for key analytical instruments. Maintenance of key instruments is sometimes covered under service contracts with external firms. These contracts provide for periodic routine maintenance to help guard against unexpected instrument downtime. The contracts also provide for quick response for unscheduled service calls when malfunctions are observed by the operator.

The use of manufacturer recommended grades or better of supporting supplies and reagents is also a form of preventive maintenance. For example, gases used in the various GCs and metals instruments should be of sufficient grade to minimize fouling of the instrument. The routine use of septa, chromatographic columns, ferrules, AA furnace tubes, and other supporting supplies from reputable manufacturers will assist in averting unnecessary periods of instrument downtime.

9.2.2 Refrigerators/Ovens

The temperatures of refrigerators used for sample storage and drying ovens will be monitored a minimum of once daily. The acceptable range for refrigerator temperatures is 4°C ±2°C. Required temperatures of ovens will vary based on the analytical methods for which the ovens are used. The temperatures will be recorded on temperature logs. The logs will contain the following information at a minimum:

- Date
- Temperature
- Initials of person performing the check

Maintenance of the logs is typically the responsibility of the sample custodian. However, assignment of responsibilities for temperature monitoring to specific personnel does not preclude the participation of other laboratory personnel. If unusual temperature fluctuations are noted, it is the responsibility of the observer to immediately notify the person in charge of the equipment item that the discrepancy has occurred before the condition of the samples is compromised.

Unstable or fluctuating temperatures may be indicative of malfunctions in the cooling or heating system. On the other hand, the instability may be due to frequent opening of the door. Regardless of the cause,

such an observation must be investigated, and modifications must be made to access procedures or repairs to equipment must be made to prevent jeopardizing the integrity of the samples.

TABLE 9-1

TYPICAL PREVENTIVE MAINTENANCE FOR KEY ANALYTICAL INSTRUMENTS NCBC GULFPORT SITE 3, GULFPORT, MISSISSIPPI

Instrument	Preventive Maintenance	Maintenance Frequency
GC/MS	Bake oven, replace septum, check carrier gas, clip column, clean injection port. Replace solvent washes and clean syringe.	As required. Daily.
GC	Bake oven, replace septum, check carrier gas, clip column, clean injection port. Replace solvent washes and clean syringe.	As required. Daily.
HRGC/HRMS	Bake oven, replace septum, check carrier gas, clip column, clean injection port. Replace solvent washes and clean syringe.	As required. Daily.
ICP	Change sample introduction tubing, clean nebulizer, clean spray chamber, clean torch, manual profile, and automatic profile optics.	As required.
CVAA	Change sample introduction tubing, change drying cell, re-zero detector	As required

GC/MS = Gas Chromatograph/Mass Spectrometer
HRGC/HRMS = High Resolution Gas Chromatograph/High Resolution Mass Spectrometer
ICP = Iductively Coupled Plasma
CVAA = Cold Vapor Atomic Absorption

10.0 INTERNAL QUALITY CONTROL CHECKS

Field-related QC checks were discussed in Section 3.0 of this QAPP. This section provides additional information regarding internal QC checks for the field and the laboratory.

10.1 FIELD QUALITY CONTROL CHECKS

QC procedures for field measurements will include calibrating the instruments as discussed in Section 16 of the USEPA EISOPQAM. Assessment of field sampling precision and bias will be made by collection of field duplicates and rinsate blanks for laboratory analysis as discussed in Section 3.6 of this QAPP.

10.2 LABORATORY QUALITY CONTROL CHECKS

The subcontract laboratory has a QC program that ensures the reliability and validity of the analyses performed at the laboratory. Internal QC procedures for analyses will comply with the applicable analytical method requirements.

Several internal laboratory QC checks are briefly discussed in the remainder of this section.

Laboratory method blanks are prepared and analyzed in accordance with the analytical method employed to indicate whether contaminants originating from laboratory sources have been introduced and may have affected environmental sample analyses. A method blank generally consists of an aliquot of analyte-free water that is subjected to the same preparation and analysis procedures as the environmental samples undergoing analysis. With the exception of recognized volatile and semivolatile common laboratory contaminants (e.g., methylene chloride, acetone, 2-butanone, and phthalates), method blanks must not contain detected levels of target analytes greater than the reported quantitation limits (above 2.5X the RQL for methylene chloride and above 5X the RQL for acetone and 2-butanone). Under no circumstances are laboratory method blank contaminant values subtracted from environmental sample analysis results.

Matrix spike (MS) analysis for organic fraction analyses is performed in duplicate as a measure of laboratory precision. For inorganic (metals) analyses, one MS analysis and one **laboratory duplicate** analysis are performed for every 20 environmental sample analyses of like matrix. With the exception of VOC matrix spike duplicate (MSD) analyses, laboratory duplicates are prepared by thoroughly mixing and splitting a sample aliquot into two portions and analyzing each portion following the same analytical procedures that are used for the environmental sample analyses. For VOC MSD analyses, a second sample aliquot is used for analysis in order to avoid VOC constituent loss. The field crew provides extra volumes of sample matrices designated for laboratory QC analyses, as required.

Surrogates are organic compounds (typically brominated, fluorinated, or isotopically labeled) which are similar in nature to the compounds of concern, and which are not likely to be present in environmental media. Surrogates are spiked into each sample, standard, and method blank prior to analysis, and are used only in organic chromatographic analysis procedures as a check of method effectiveness and extraction efficiency. As discussed in Section 3.0 of this QAPP, surrogate recoveries are evaluated against control limits specified in the associated method, where applicable, or laboratory-derived control limits.

Laboratory control samples serve to monitor the overall performance of each step during the analysis, including the sample preparation. LCS analysis will be performed for volatiles and as required by the applicable analytical method. Aqueous LCS results must fall within the control limits specified in the analytical method, where applicable, or established by the laboratory. Aqueous LCSs shall be analyzed utilizing the same sample preparations, analytical methods, and QA/QC procedures as employed for the samples.

Internal standard performance criteria ensure that organic GC/MS analysis sensitivity and response are stable during every analytical run. Internal standard area counts for samples and blanks must not vary by more than a factor of two (- 50% to + 100%) from the associated calibration standard. The retention time of the internal standards in samples and blanks must not vary by more than ±30 seconds from the retention time of the associated calibration standard.

11.0 DATA REDUCTION, VALIDATION, AND REPORTING

This section describes the procedures to be used for data reduction, review, and reporting for the NCBC Gulfport Site 3 sampling program. Data generated during the course of the investigation will be maintained in hardcopy format by TtNUS in the NAVFAC SE designated central files located in TtNUS' Pittsburgh, Pennsylvania office. In addition to the central files, photocopies of hardcopy data (as well as electronic data) will be maintained in the Chemistry/Toxicology/Risk Assessment Department database located in TtNUS' Pittsburgh, Pennsylvania office. Upon completion of the contract, the data files will be relinquished to the Navy.

11.1 DATA REDUCTION

Data reduction will be completed for both field measurements and laboratory-generated analytical data. Field data reduction will be relatively limited versus the degree of laboratory data reduction required for the project. Reduction of both field data and laboratory data are discussed in the remainder of this section.

11.1.1 Field Data Reduction

Field groundwater data will be recorded from on-site water quality testing for general indicator parameters including pH, specific conductance, turbidity, temperature, and ORP. Field soil data will be recorded from on-site soil headspace organic vapor testing.

The field parameters will be recorded in the site logbook or on sample log sheets immediately after the measurements are taken and later encoded in the NCBC Gulfport database for presentation in the RI Report. If an error is made in the logbook, the error will be legibly crossed out (single-line strikeout), initialed and dated by the field member, and corrected in a space adjacent to the original (erroneous) entry. No calculations will be necessary to reduce these data for inclusion in the RI Report. Field data will be entered in the electronic database manually, and the entries will be verified by an independent reviewer to make sure that no "transcription" errors occurred.

Field groundwater parameter measurements will be recorded and reported in the following units:

- Hydronium ion activity (standard pH units)
- Temperature (degrees Celsius)
- Specific Conductance (uMhos/cm)
- ORP (millivolts mV)
- Turbidity (Nephelometric turbidity units, NTUs)

Field soil parameter measurements will be recorded and reported in the following units:

- Organic vapor concentration in parts per million (ppm)

11.1.2 Laboratory Data Reduction

Laboratory data reduction of analytical results generated via non-SW-846 methods will be completed in accordance with the applicable analytical methods.

Laboratory analytical data will be reported using standard concentration units to ensure comparability with regulatory standards/guidelines and previous analytical results. Reporting units for aqueous matrices (groundwater, surface water, aqueous QA/QC) for the classes of chemicals under consideration are as follows:

- Volatile organics - µg/L
- Semi-Volatile organics - µg/L
- Pesticides - µg/L
- PCBs – ug/L
- Chlorinated Herbicides – ug/L
- Inorganics (metals and cyanide) – mg/L

Reporting units for solid matrices (soil and/or sediment) for the classes of chemicals under consideration are as follows:

- Volatile organics - µg/kg
- Semi-Volatile organics - µg/kg
- Pesticides - µg/kg
- PCBs – ug/kg
- Chlorinated Herbicides – ug/kg
- Inorganics (metals and cyanide) – mg/kg

Field QC sample results will be included in the database for the NCBC Gulfport Site 3 sampling program. Specifically, the analytical results for field duplicates, trip blanks, and rinsate blanks will be provided. The results for field QC samples will be considered during the course of data review (in concert with laboratory method blanks) to eliminate false positive results according to the 5- and 10-times rules specified in the National Functional Guidelines for Organic Review. The results for laboratory QC samples such as

method blanks will not be presented in the Report database. In addition, only the original (unspiked) sample results for MS/MSD samples will be provided in the database.

11.2 DATA VALIDATION

Validation of field measurements and laboratory analytical data are discussed in this section. Validation of field data will be limited to real time checks to ensure that data reporting is consistent with QAPP requirements and that the results are plausible.. Laboratory analytical data will be reviewed against data validation rules described below. Review of field measurement data is discussed in Section 11.2.1. Review of laboratory analytical data is discussed in Section 11.2.2.

11.2.1 Field Measurement Data Validation

Field measurements will not be subjected to a formal data validation process. However, field technicians will ensure that the equipment used for field measurement is performing accurately via calibration as discussed in Section 16 of the USEPA EISOPQAM. The FOL will ensure that the field tests are performed in accordance with the test manufacturer's instruction and that the field meters are used in accordance with the instrument's manufacturer's instruction. The results of field tests and measurements will be recorded in field logbooks or sample log sheets. This information will be reviewed by the FOL to verify the information was recorded properly (i.e. for transcription errors) and the proper field analyses were performed. The field data entered into the electronic database will be independently reviewed for transcription errors. A comparison will be made of the number of samples actually collected relative to number of samples planned for collection to ensure that the intended samples have been collected.

11.2.2 Laboratory Data Review

One hundred percent of the laboratory data will undergo a full data validation. A full data validation includes, but is not limited to:

- sample holding times,
- method blank analyses,
- initial and continuing calibration standards,
- data completeness,
- reported detection limits,
- lab control sample analysis,
- MS/MSD analysis, and
- duplicate sample analyses.

Review of analytical data will be completed by the TtNUS Chemistry Department located in TtNUS' Pittsburgh, Pennsylvania office. Final review and approval of reviewed deliverables will be completed by the Department's Data Validation Manager. The TOM will maintain contact with the Data Validation Manager to ensure that management of the acquired data proceeds in an organized and expeditious manner.

Organic data analytical results will be reviewed versus the applicable analytical method. Data will be accepted, rejected, or qualified based on the results of the limited review items. Guidelines established in the USEPA National Functional Guidelines for Organic Data Review (October 1999), the USEPA National Functional Guidelines for Inorganic Data Review (February 1994), and the NFESC guidelines "Navy Installation Restoration Chemical Data Quality Manual" (September 1999) will be used as guidance to define the criteria for the full data validation items.

11.3 DATA REPORTING

11.3.1 Field Measurement Data Reporting

Field data will be reported in the units discussed in Section 10.1.1. The Report will include a comprehensive database including all field measurements. Field measurements will be transferred from the site logbook or sample log sheets to the electronic database manually and will be reviewed for accuracy by an independent reviewer. Transcription of field measurements to the electronic database will be completed shortly after completion of the field investigation and prior to receipt of laboratory analytical data.

Hard copy records regarding field measurements (i.e., field logbooks, sampling logbooks, and sample log sheets) will be placed in TtNUS' NAVFAC SE central files upon completion of the field effort. Entry of these results in the database will require removal of these results from the files. Outcards will be used to document the removal of any such documentation from the files (date, person, subject matter). Field measurement data will be reported in an appendix to the RI Report at a minimum and may also be reported in summary fashion if they are indicative of the presence of contamination (e.g., high specific conductance readings).

11.3.2 Laboratory Data Reporting

Data reported by the laboratory will be in accordance with the reporting format described in TtNUS' analytical SOW for the contracted laboratory. All pertinent quality control data including method blanks,

standards analysis, calibration information, etc. will be provided for the non-SW-846 method analyses. Case narratives and a certificate of analysis will be provided for each Sample Delivery Group (SDG).

Environmental and field QC sample results (trip blanks, field duplicates, rinsate blanks) will be included in the RI Report as an appendix. The database will include pertinent sampling information such as sample number, sampling date, general location, depth, and survey coordinates (if applicable). Sample-specific detection limits will be reported for nondetected analytes. Units will be clearly summarized in the database and will conform to those identified in Section 11.1.2. The analytical data may also be reported in summary fashion within the body of the RI Report text in tabular and graphic fashion.

Data will be handled electronically pursuant to the electronic deliverable requirements specified in TtNUS' purchase order with analytical laboratories. This agreement requires the analytical laboratories to provide data in both hardcopy and electronic form. The laboratory will provide a 28 calendar-day turnaround time for the delivery of the SDG in both hardcopy and electronic format. The original electronic diskettes and the original hardcopy analytical data are maintained in TtNUS' NAVFAC SE central files as received.

Data review will be completed using the hard copy data. Upon completion of the review of a SDG and review by the Data Validation Manager, review qualifiers will be entered in the electronic database and will be subjected to independent review for accuracy. During this review process, the electronic data base printout will also be contrasted with the hard copy data to ensure that the hard copy data and electronic data are consistent.

In addition, a summary of the data qualifiers for all project samples will be prepared. This summary will include a list of chemicals identified as laboratory and/or field QC blank contaminants, holding time exceedances, samples exhibiting field duplicate/replicate imprecision as well as affected chemicals, rejected results and associated specific causes, and general causes of estimated results. This summary will facilitate the preparation of a summary of the data review results and completeness assessment for inclusion in the RI Report.

12.0 SPECIFIC ROUTINE PROCEDURES USED TO ASSESS DATA PRECISION, ACCURACY, COMPLETENESS, FIELD DUPLICATES, AND DATA USABILITY

Compliance with the QC objectives outlined in Section 3.0 will be monitored via two separate mechanisms. Precision and accuracy will be assessed through data, while compliance with the completeness objectives for field and laboratory data/measurement will be calculated by hand (field measurements) and electronically via a database subroutine (laboratory data). Information necessary to complete the precision and accuracy calculations will be provided in electronic and hardcopy form by the subcontract laboratory. Equations to be used for the precision, accuracy, and completeness assessment are outlined in the remainder of this section.

12.1 ACCURACY ASSESSMENT

To assure the accuracy of the analytical procedures, a minimum of 1 of every 20 samples is spiked with a known amount of the analyte or analytes to be evaluated. The spiked sample is then analyzed. The increase in concentration of the analyte observed in the spiked sample, because of the addition of a known quantity of the analyte, compared to the reported value of the same analyte in the unspiked sample determines the percent recovery. Control charts are plotted for each commonly analyzed compound and kept on matrix-specific and analyte-specific bases. The %R for a spiked sample is calculated according to the following formula:

$$\%R = \frac{\text{Amount in Spiked Sample} - \text{Amount in Sample}}{\text{Known Amount Added}} \text{ X } 100\,\%$$

12.2 PRECISION ASSESSMENT

Duplicate samples and MS/MSD samples are prepared and analyzed in the laboratory at a minimum frequency of 1 per every 20 environmental samples. Duplicate samples are provided by the field crew.

MS/MSD samples are prepared by spiking each of the aliquots with a known amount of analyte. The duplicate samples are handled just like the other environmental samples included in the analytical sample set. The RPD between the sample (or MS) and duplicate sample (or MSD) is calculated and plotted. The RPD is calculated according to the following formula:

$$\text{RPD} = \frac{\text{Amount in Sample} - \text{Amount in Duplicate}}{0.5\ (\text{Amount in Sample} + \text{Amount in Duplicate})} \text{ X } 100\ \%$$

12.3 COMPLETENESS ASSESSMENT

Completeness is the ratio of the number of valid sample results to the total number of sample results expected to be obtained for the project as a whole. Following the completion of the analytical testing and data validation, the percent completeness will be calculated by the following equation:

$$\text{Completeness} = \frac{\text{(number of valid measurements)}}{\text{(number of measurements planned)}} \text{ X } 100\ \%$$

The results of the data validation process and the completeness assessment will be summarized in the RI Report using the summary format discussed in Section 11.3.2 and an electronic database subroutine.

12.4 FIELD DUPLICATE ASSESSMENT

Field duplicate sample results and their associated sample results will be assessed using the calculated average of the two results, when performing risk and ecological assessments.

$$= \text{(sample result + duplicate result) X } 0.5$$

12.5 DATA USABILITY ASSESSMENT

Data validation, accuracy, precision, completeness, and duplicate assessments are completed with regards to specific criteria. The results of the validation and assessments are applied to project specific standards, which determine the usability of the data. The impact of any rejected data must be addressed to determine if the overall project objective has been compromised. This section details the technical criteria on which the validation and assessments are based, the project-specific standards applied to the "qualified data", and the impact of rejected data on the overall project objective.

Technical Criteria

Accuracy, precision, and duplicate assessments (the calculations are detailed in Sections 12.1, 12.2, and 12.4, respectively) are based on the technical criteria listed in Section 3 of this QAPP. A completeness assessment is also performed. The data must meet 95% completeness (the calculation is detailed in Section 12.3) to fulfill the completeness standard as stated in Section 3.3 of this QAPP. Guidelines established in the USEPA National Functional Guidelines for Organic Data Review (October 1999), the USEPA National Functional Guidelines for Inorganic Data Review (February 1994), and the NFESC guidelines "Navy Installation Restoration Chemical Data Quality Manual" (September 1999) will be used as guidance to define the criteria for the limited data validation. The results of the assessments and the validation provide the data user with "qualified data".

Standards

Project-specific standards addressed in this section are used to determine the usability of the qualified data. The following list details the standards to be used when determining the usability of the data:

- Any data collected using procedures not specified in the WP and without prior approval from the TOM will be rejected unless they can be shown to be valid data supported by appropriate calibrations and QC checks.
- If the completeness assessment returns a less than 95% complete
- Any data point rejected during the data validation or assessments will be rejected.
- If a data point is qualified as estimated during the validation or subsequent assessments the impact to the project will be evaluated:

1. Will the qualified result affect any decisions for the project or site?

   - No – then the result is rejected and not included.
   - Yes – continue to Test #2.

2. Could the result be biased high?

   - No – continue to Test #3.
   - Yes – continue to Test #4.

3. Could the result be biased low?

   - No – then the result is accepted and included.
   - Yes – continue to Test #4.

4. If the result is biased high or low, how will the result affect the decisions for the project or site?

   - If a biased high contamination result will result in the exceedance of MCLs, the result will be accepted and included.
   - If a biased high contamination result will result in no exceedance of MCLs, the result will be accepted and included.
   - If a biased low contamination result will result in no exceedance of MCLs, the result will be accepted and included.
   - If a biased low contamination result will result in the exceedance of MCLs, the result will be accepted and included.

Using these standards to determine the usability of the data will ensure that the integrity of the project objectives is maintained. Maintaining the project objectives will ensure that accurate decisions are made when determining the most appropriate action for the project or site. Rejected data must be considered to determine the impact on the decisions.

Rejected Data

Rejected data can have significant impact on the decisions that will determine the status of the project or site. Specific questions about the rejected data must be addressed and answered before making any final decisions. Question to be addressed about rejected data are:

Is it possible that MCLs will not be exceeded when the rejected data is not included?

- Yes – Additional data will be collected to determine if non-rejected data will or will not exceed MCLs.
- No – Additional data will not be collected. Final decisions will be made without the rejected data.

Answers to this question will determine if and how the project objective will be met.

Using technical criteria to determined the validity of the collected data, project-specific standards to determine the usability of the qualified data, and determining the impact of rejected data on project objectives will ensure that quality data and informed decisions are made with respect to the project objective and future studies at the site.

13.0 PERFORMANCE AND SYSTEM AUDITS

Performance and system audits will be performed periodically to ensure that work is being implemented in accordance with the approved Project Plans and in an overall satisfactory manner. Such audits will be performed by various personnel and will include evaluation of field, laboratory, data review, and data reporting processes. Examples of pertinent audits are as follows:

- The FOL will supervise and check daily that the field measurements are made accurately, equipment is thoroughly decontaminated, samples are collected and handled properly, and fieldwork is documented accurately and neatly.

- Performance and system audits of the laboratory will be performed regularly (every 18 months) by a Navy Contractor (internal), and in accordance with the Laboratory Quality Assurance Plan (internal).

- Data reviewers will evaluate (on a timely basis) the chemical analytical data packages submitted by the laboratory. The data reviewers will check that the data were obtained through use of an approved methodology, that the appropriate level of QC effort and reporting was conducted, and whether or not the results are in conformance with QC criteria. Based on these factors, the data reviewer will generate a report describing data limitations, which will be reviewed internally by the Data Validation Manager prior to submittal to the TOM.

- A formal audit of the field sampling procedures may be conducted by the TtNUS QAM or designee in addition to the auditing that is an inherent part of the daily project activities. The purpose of this audit is to ensure that sample collection, handling, and shipping protocols, as well as equipment decontamination and field documentation procedures, are being performed in accordance with the approved Project Plans and SOPs. An audit will be performed if the TtNUS TOM, TtNUS QAM, Navy Remedial Project Manager, USEPA Regulator, or FDEP Project Manager develops concerns with regards to the field sampling effort.

14.0 CORRECTIVE ACTION

Under TtNUS' QA/QC program, it is required that any and all personnel noting conditions adverse to quality report these conditions immediately to the TOM and the QAO. These parties, in turn, are charged with performing root-cause analyses and implementing appropriate corrective action in a timely manner. It is ultimately the responsibility of the QAO to document all findings and corrective actions taken and to monitor the effectiveness of the corrective measures performed.

14.1 FIELD CORRECTIVE ACTION

Field nonconformances or conditions adverse to quality must be identified and corrected as quickly as possible so that work integrity or quality of product is not compromised. The need for corrective action may arise based on deviations from Project Plans and procedures, adverse field conditions, or other unforeseen circumstances. Corrective action needs may become apparent during the performance of daily work tasks or as a consequence of internal or external field audits.

Corrective action may include resampling and may involve amending previously approved field procedures. If warranted by the severity of the problem (e.g., if a change in the approved Project Plan documents or SOPs is required), the Navy will be notified in writing via a Field Task Modification Request (FTMR), and Navy approval (in conjunction with USEPA Region IV and MDEQ) will be obtained. The FOL is responsible for initiating FTMRs; an FTMR will be initiated for all deviations from the Project Plan documents, as applicable. An example of an FTMR is provided as Figure 14-1. Copies of all FTMRs will be maintained with the onsite project planning documents and will be placed in the final evidence file.

Minor modifications to field activities such as a slight offset of a boring location will be initiated at the discretion of the FOL, subject to onsite approval by NCBC Gulfport personnel. Approval for major modifications (e.g., elimination of a sampling point) must be obtained via an FTMR.

FIGURE 14-1

TETRA TECH NUS, INC.
FIELD TASK MODIFICATION REQUEST FORM

_____ _____ _____
Client Identification Project Number FTMR Number

To_____Location_____Date_____

Description:

_____
_____
_____
_____

Reason for Change:

_____
_____
_____
_____

Recommended Disposition:

_____
_____
_____
_____

_____
Field Operations Leader (Signature, if applicable) Date

Disposition:

_____
_____
_____
_____

_____
Task Order Manager (Signature, if required) Date

_____
Distribution:
Program Manager
Quality Assurance Officer
Task Order Manager
Field Operations Leader

Others as required_____
_____
_____
_____

14.2 LABORATORY CORRECTIVE ACTION

In general, laboratory corrective actions are warranted whenever an out-of-control event or potential out-of-control event is noted. The specific corrective action taken depends on the specific analysis and the nature of the event. Generally, the following occurrences alert laboratory personnel that corrective action may be necessary:

- QC data are outside established warning or control limits;
- Method blank analyses yield concentrations of target analytes above acceptable levels;
- Undesirable trends are detected in spike recoveries or in duplicate RPDs;
- There is an unexplained change in compound detection capability;
- Inquiries concerning data quality are received; and
- Deficiencies are detected by laboratory QA staff audits or from performance evaluation sample test results.

Corrective actions are typically documented for out-of-control situations on a corrective action form. Using a corrective action form, any employee may notify the QAO of a problem. The QAO generally initiates the corrective action by relating the problem to the appropriate Laboratory Manager and/or Internal Coordinator, who then investigates or assigns responsibility for investigating the problem and its cause. Once determined, an appropriate corrective action is approved by the QAO. Its implementation is verified and documented on the corrective action form and is further documented through audits.

14.3 CORRECTIVE ACTION DURING DATA REVIEW AND DATA ASSESSMENT

The need for corrective action may become apparent during data review and assessment. Data is sometimes qualified or rejected due to deviations from project-SOPs or project-specific control limits. Section 13.4 details the technical criteria and project-specific standards used when determining the usability of the data. The impact of rejected data and corrective actions to be used when data is rejected is also discussed in Section 13.4. The performance of rework or instituting a change in work procedures, are possible corrective actions relevant to data evaluation activities. The TOM will be responsible for approving the implementation of corrective action.

15.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

QA reports to management will be provided in three primary formats during the course of the NCBC Gulfport Site 3 sampling program. Data review letter reports will be prepared on a SDG-specific basis and will summarize QA issues for the subcontract laboratory data. In addition, written weekly reports summarizing accomplishments and QA/QC issues during the field investigation will be provided by the FOL. Finally, monthly progress reports are provided by the TOM. In addition, a summary of data review qualifiers and a completeness assessment for all project samples will be included in the RI Report.

15.1 CONTENTS OF PROJECT QUALITY ASSURANCE REPORTS

The data review letter reports address major and minor laboratory noncompliances as well as noted sample matrix effects. In the event that major problems occur with the analytical laboratory (e.g., holding time exceedances or calibration noncompliances, etc.) the Data Validation Manager will notify the TOM, the Technical Program Manager, and the Laboratory Services Coordinator. Such notifications (if necessary) are typically provided via internal memoranda and are placed in the project file. Such reports contain a summary of the noncompliance, a synopsis of the impact on individual projects, and recommendations regarding corrective action and compensational adjustments. Corrective actions are initiated at the program level.

The FOL will provide the TOM with weekly reports regarding accomplishments, deviations from the WP, upcoming activities, and a QA summary during the course of the field investigation. In addition, monthly project review meetings are held for all active Navy CLEAN III/IV projects. Issues discussed at the project review meeting include all aspects of budget and schedule compliance, and QA/QC problems. The TOM provides a monthly progress report to the Navy, which addresses the project budget, schedule, accomplishments, planned activities, required revisions of the QAPP, and QA/QC issues and intended corrective actions.

15.2 INDIVIDUALS RECEIVING/REVIEWING QUALITY ASSURANCE REPORTS

Data review QA Reports are provided to the TOM for inclusion in the project files. In the event that major problems are observed for a given laboratory, the Program Manager, Deputy Program Manager, QAM, TOM, QAO, and Laboratory Services Coordinator are provided with copies of the QA report. Weekly field progress reports are provided to the TOM. Monthly progress reports are provided to the Navy CLEAN III Program Manager and the Navy CLEAN III Contracting Officers Technical Representative.

APPENDIX B

HEALTH AND SAFETY PLAN

HEALTH AND SAFETY PLAN
FOR
SITE 3 – NORTHWEST LANDFILL/BURNING PIT
REMEDIAL INVESTIGATION
AT THE
NAVAL CONSTRUCTION BATTALION CENTER GULFPORT
GULFPORT, MISSISSIPPI

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

Submitted to:
Naval Facilities Engineering Command
Southeast
2155 Eagle Drive
North Charleston, South Carolina 29406

Submitted by:
Tetra Tech NUS, Inc.
661 Andersen Drive, Foster Plaza 7
Pittsburgh, Pennsylvania 15220

CONTRACT NUMBER N62467-04-D-0055
CONTRACT TASK ORDER 0041

MARCH 2007

PREPARED UNDER THE SUPERVISION OF:

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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) IV
Contract Number: N62467-04-D-0055
Contract Task Order: 0041

Application: This HASP has been written to encompass site activities that are to be conducted at the Naval Construction Battalion Center (NCBC) located in Gulfport, Mississippi. 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:

- Occupational Safety and Health Administration (OSHA), 29 Code of Federal Regulations (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, Inc. (TtNUS) Health and Safety Program

This HASP must be accompanied by the TtNUS Health and Safety Guidance Manual (HSGM). The Guidance Manual provides additional information on program support, standard operating procedures, and safe work practices.

Modifications/Changes: The following conditions are considered sufficient basis review and possible changes to this document:

- The addition or modification of activities outside of those specified in Section 4.0, Scope of Work.
- New information becomes available through the course of the investigation or from outside sources.

Changes to this HASP will be requested through the Task Order Manager (TOM) to the TtNUS Health and Safety Manager (HSM). It is the responsibility of the TOM to notify affected personnel of changes to this HASP. Changes to the HASP will be documented using a Document Review Record.

1.1 KEY PROJECT PERSONNEL AND ORGANIZATION

This section defines responsibility for site safety and health for TtNUS and subcontractor employees engaged in on-site activities. Personnel assigned to these positions will exercise the primary responsibility for on-site 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 on-site activities.

- The **TtNUS 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:
  i. Providing information regarding site contaminants and physical hazards associated with the site and tasks to be conducted.
  ii. Establishing air monitoring and decontamination procedures.
  iii. Assigning personal protective equipment (PPE) based on task and potential hazards.
  iv. Determining emergency action/response procedures and emergency contacts.
  v. Stipulating training and medical surveillance requirements.
  vi. Providing standard work practices to minimize potential injuries and exposures associated with hazardous waste work.
  vii. Modifying this HASP, as it becomes necessary.

- The **TtNUS Field Operations Leader (FOL)** is responsible for implementation of the HASP with the assistance of an appointed Site Safety Officer (SSO). The FOL manages field activities, executes the work plan, and enforces safety procedures as applicable to the work plan.

- The **Site Safety Officer (SSO)** supports site activities by advising the FOL on the aspects of health and safety on-site. In this capacity the SSO:
  i. Coordinates health and safety activities with the FOL.
  ii. Selects, applies, inspects, and maintains personal protective equipment.
  iii. Establishes work zones and control points in areas of operation.
  iv. Implements air monitoring program for on-site activities.
  v. Verifies training and medical clearance of on-site personnel status in relation to site activities.
  vi. Implements Hazard Communication and Respiratory Protection Programs and other associated health and safety programs as they may apply to site activities.
  vii. Coordinates TtNUS emergency actions with the facilities emergency services.
  viii. Provides site-specific training for on-site personnel.

ix. Investigates accidents and injuries (see Attachment I - Illness/Injury Procedure and Report Form)

x. Provides input to the PHSO regarding the need to modify this HASP or applicable health and safety associated documents per site-specific requirements.

Compliance with the requirements stipulated in this HASP is monitored by the SSO and coordinated through the TtNUS CLEAN HSM.

Note: In some cases one person may be designated responsibilities for more than one position. For example, the FOL may also be responsible for the SSO duties. This action will be performed only as credentials, experience, and availability permits.

1.2 SITE INFORMATION AND PERSONNEL ASSIGNMENTS

Site Name: Naval Construction Battalion Center Gulfport

Site Address: 5200 NCBC 2nd Street
Gulfport, Mississippi 39501-5000

Facility Contacts: John Gallagher **Facility Phone Number**: (228) 822-3134
Kenny Peterman

Purpose of Site Visit: This activity is divided into a multi-task operation (see Section 4.0).

Project Team:

TtNUS Personnel:	Discipline/Tasks Assigned:	Phone Number:
Robert Fisher	Task Order Manager (TOM)	850/385-9866 Ext. 20
Matthew M. Soltis, CIH, CSP	CLEAN Health and Safety Manager (HSM)	412/921-8912
Clyde Snyder	Project Health and Safety Officer (PHSO)	412/921-8904
Jason Bourgeois	Field Operations Leader (FOL)	850/385-9866 Ext. 23
TBD	Site Safety Officer (SSO)	

Non-TtNUS Personnel	Affiliation/Discipline/Tasks Assigned	
Empirical Laboratories	Analytical Laboratory	(410) 392-7600
FedEx	Parcel/Sample Shipment	(800) 463-3339
Prosonic Drilling	Drilling Contractor	(865)-690-0128

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

Clyde Snyder

TBD - To Be Determined

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. In the event of an emergency that cannot be handled by on-site personnel, site personnel will be evacuated 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. Therefore, TtNUS will not provide emergency response support for significant emergency events beyond the capabilities of on-site response. Workers who are ill or who have suffered a non-serious injury may be transported by site personnel to nearby medical facilities, provided 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 operations, a factor that ensures adequate emergency response time. This emergency action plan conforms to the requirements of OSHA Standard 29 CFR 1910.38(a), as allowed in OSHA 29 CFR 1910.120(l)(1)(ii).

In the event of an emergency, TtNUS personnel will, provide necessary initial response measures for incidents such as:

- Incipient firefighting support and prevention
- Incipient spill control and containment measures and prevention
- Removal of personnel from emergency situations
- Provision of initial medical support for injury/illness requiring only first-aid level support
- Provision of site control and security measures as necessary

2.2 EMERGENCY PLANNING

Injuries/illnesses resulting from exposure to chemical or physical contact with hazards and fire are the most probable emergencies that could occur during site activities. To minimize or eliminate these potential emergency situations, emergency planning activities will include the following:

- Coordinating response actions with NCBC Gulfport Emergency Services personnel to ensure that TtNUS emergency action activities are compatible with existing facility 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 (for substances used on site), with Material Safety Data Sheets
  - On-site personnel medical records (Medical Data Sheets)
  - A logbook identifying personnel on site each day
  - Emergency notification phone numbers in site vehicles
- Identifying a chain or command for emergency action.
- Educating site workers to the hazards and control measures associated with planned activities at the site, and providing early recognition and prevention, where possible.

It is the responsibility of the TtNUS FOL to ensure that this information is available and present at the site.

2.3 EMERGENCY RECOGNITION AND PREVENTION

2.3.1 Recognition

It is anticipated that foreseeable emergency situations that may be encountered during site activities will be recognizable by worker observation or through air monitoring equipment readings. Through site-specific training, site personnel will have knowledge regarding the signs and symptoms of overexposure to contaminants of concern. This knowledge will assist site personnel in identifying potential emergency situations and to alert personnel of potential hazards. Many of the potential hazards and recommended control measures are discussed in Sections 5.0 and 6.0 of this document. Additionally, early recognition will be supported by periodic site surveys to eliminate conditions that may predispose site personnel or property to an emergency. Site surveys will be conducted at least once a week during the initiation of this effort.

The above actions will provide early recognition for potential emergency situations. Should an incident take place, TtNUS will take defensive and offensive measures to control the situation. However, if the FOL and/or the SSO determine that an incident has progressed to a serious situation, TtNUS will withdraw and notify appropriate response agencies.

2.3.2 Prevention

TtNUS will minimize the potential for emergencies by following the HSGM and ensuring compliance with the HASP and applicable OSHA regulations. In the event that an activity or operation is covered by more than one of these documents, the most stringent requirement shall apply.

2.4 SAFE DISTANCES AND PLACES OF REFUGE

In the event that the site must be evacuated, personnel will immediately stop activities and report to the TtNUS FOL at the safe refuge area. Safe places of refuge will be determined prior to commencement of site activities and will be conveyed to personnel as part of the daily safety meeting conducted each morning. Upon reporting to the refuge location, personnel will remain there until directed otherwise by the 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 confirm the location of site personnel. The site logbook will be used to take and record the head count. Ideally, the places of refuge should offer a point for communication.

2.5 EVACUATION ROUTES AND PROCEDURES

An evacuation will be initiated whenever recommended hazard controls are insufficient to protect the health, safety, or welfare of site workers. Once an evacuation is initiated, 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 (to be identified) and remain there until further notification from the FOL. The use of these locations as assembly points provides communication and a direction point for emergency services.

Evacuation procedures will be discussed prior to the initiation of work at the site. This shall include identifying primary and secondary evacuation routes and assembly points. Evacuation routes from the site 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) will influence the designation of evacuation routes. As a result, multiple assembly points will be selected at NCBC Gulfport, and in the event of an emergency, field personnel will proceed to these points by the most direct route possible without further endangering themselves.

2.6 EMERGENCY ALERTING AND ACTION/RESPONSE PROCEDURES

TtNUS personnel will be working in close proximity to each other at NCBC Gulfport. 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. The following signals shall be utilized when communication via vehicle horn is necessary:

HELP	three short blasts	▪ ▪ ▪
EVACUATION	three long blasts	▬ ▬ ▬

- Report to the designated refuge point.

- Once non-essential personnel are evacuated, appropriate response procedures will be enacted to control the situation.

- Describe to the FOL (FOL will serve as the Incident Coordinator) pertinent incident details.

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 and call other pertinent emergency contacts listed in 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.

2.7 EMERGENCY CONTACTS

Prior to performing work at the site, personnel will be briefed on the emergency procedures to be followed in the event of an incident. A mobile phone shall be available on site. Table 2-1 provides a list of emergency contacts and their corresponding telephone numbers. This table must be posted on site where it is readily available to site personnel.

TABLE 2-1

EMERGENCY REFERENCE

NCBC GULFPORT

AGENCY	**TELEPHONE**
EMERGENCY	9-1-1
Police	(228) 871-2222
Fire/Hazardous Materials Release	(228) 871-2333
Ambulance Services	(228) 871-2444
Base Contact, Mr. Gordon Crane Pager	(228) 871-2485 (800) 343-3472
Memorial Hospital at Gulfport 4500 13th Street Gulfport, Mississippi 39501-2569	(228) 867-4000
Task Order Manager Robert Fisher, P.E.	(850) 510-2743
CLEAN Health and Safety Manager Matthew Soltis, CIH, CSP	(412) 921-8912
Project Health and Safety Officer Clyde Snyder	(412) 921-8904
Utilities (On Base) (Utility Clearances and Emergencies) Public Works Maintenance Division	(228) 871-2244
Utilities (Public Utility Locating Service) Mississippi One Call System Inc.	(800) 227-6477
Chemtrec	(800) 424-9300
National Response Center	(800) 424-8802
Mississippi Regional Poison Control Center	(800) 222-1222
Tetra Tech NUS, Tallahassee Office	(850) 359-9899
Tetra Tech NUS, Pittsburgh Office	(412) 921-7090

2.8 EMERGENCY ROUTE TO HOSPITAL

Directions from NCBC Gulfport are as follows. See Figure 2-1 for a route map.

Start at:

From Site 3, go to the intersection of 4th Street and Colby Avenue, go south on Colby.

Proceed south on Colby Ave. to Engram Drive

Turn Left on Marvin Shields Blvd. Proceed due east to Broad Ave..

Turn Right on Broad Avenue.

Turn Left on 13th Street

End at:

Memorial Hospital at Gulfport
4500 13th Street

Gulfport, Mississippi 39501-2569

Figure 2-1

Route to Hospital

2.9 DECONTAMINATION PROCEDURES/EMERGENCY MEDICAL TREATMENT

During a site evacuation, decontamination procedures will be performed only if doing so does not further jeopardize the welfare of site workers. Decontamination will be postponed if the action that initiates an evacuation would further endanger the lives of workers. However, a situation that would require workers to evacuate without first performing decontamination procedures is unlikely to occur at this site. If the emergency involves personnel to exposures to chemicals, follow the steps provided in Figure 2-2.

2.10 INJURY/ILLNESS REPORTING

If 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 the information obtained at the time of the incident. Also, as soon as possible, the Navy Contact must be informed of incidents or accidents that require medical attention.

Pertinent information regarding allergies to medications or other special conditions will be provided to medical services personnel. 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.

2.11 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. At least one first-aid kit supplied with equipment to protect against blood borne pathogens will also be available on site. Personnel identified within the field crew with blood borne pathogen and first-aid training will be the only personnel permitted to offer first-aid assistance.

FIGURE 2-2
POTENTIAL EXPOSURE 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 (e.g., 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 that may be appropriate. WorkCare physicians will monitor the care of the victim. Site officers and personnel should not attempt to get this information because 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 be 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 are gathered and the scenario becomes more clearly defined, this information should be forwarded to WorkCare.

WorkCare will compile the results of the 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-Medicated: _____ Physician Treated: _____

3.0 SITE BACKGROUND

3.1 SITE DESCRIPTION

NCBC Gulfport, Mississippi was commissioned as the homeport of the Atlantic Fleet Seabees in 1966. The base occupies approximately 1,100 acres in the western part of Gulfport in the southeastern coastal area of Mississippi. The Navy previously used the property as a Naval Training Center and Naval Storehouse starting in 1942. Presently, four Naval Mobile Construction Battalions (NMCBs) are based at Gulfport.

3.2 SITE LOCATION AND HISTORY

Site 3, referred to as the Northwest Landfill/Burning Pit, encompasses approximately 3.5 acres near the intersection of 8th Street and Colby Avenue. The site was operated as a landfill from 1948 to the mid-1960s. There was a fire-fighting training pit from the mid-1950s to the mid-1960s. During landfill operations, nearly all the solid waste and some of the liquid/chemical waste generated at the facility were disposed there. The landfill was a “trench and fill” landfill, with daily burning of the wastes. Thirty thousand tons of solid waste are estimated to have been dumped in the trenches. An estimated 130,000 gallons of waste fuel, oil, solvents [methyl ethyl ketone (MEK), toluene, and xylenes], paint, and paint thinners were drained into the unlined pit and ignited. The receptors of greatest concern are the shallow surficial aquifer, the adjacent Canal No. 1, and several water supply wells. The cover on the landfill is 5 to 6 feet thick. The site is currently part of a fairway for the Pine Bayou Golf Course operated by NCBC Gulfport.

4.0 SCOPE OF WORK

This section discusses the specific tasks that are to be conducted as part of this scope of work as identified by CTO 0041. These tasks are the only ones addressed by this HASP. Any tasks to be conducted outside of the elements listed here will be considered a change in scope requiring modification of this document. The TOM or a designated representative will submit the requested modifications to this document to the HSM.

Specific tasks to be conducted include, but are not necessarily limited to, the following:

- Mobilization/demobilization activities
  - Soil borings including subsurface soil sampling
- Direct push technology drilling (DPT)
- Multimedia sampling including:
  - Surface water
  - Sediment
  - Surface soil
  - Subsurface soil
- Investigation-derived waste (IDW) management and handling
- Geographical
- Decontamination

For more detailed description of the associated tasks, refer to the Work Plan.

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 be used as well as appropriate air monitoring techniques and site-specific conditions. The evaluation of each task provides detailed information including anticipated hazards, recommended control measures, air monitoring recommendations, required PPE, and decontamination measures. This table must be updated if the scope of work, contaminants of concern, or pertinent conditions change.

Table 5-1 and the HASP are meant to be accompanied by the TtNUS HSGM. 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 Standard Operating Procedures (SOPs) are also provided in the Guidance Manual.

Safe Work Permits will be issued for the exclusion zone activities (See Section 10.2). The FOL and/or the SSO will use the elements defined in Table 5-1 as the primary reference. The FOL and/or the SSO completing the Safe Work Permit will add additional site-specific information as warranted. In situations where the Safe Work Permit 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 following general safe work practices are to be followed when conducting work on site. These safe work practices address a pattern of general precautions and measures for reducing risks associated with site operations. This list may be amended as necessary.

- Eating, drinking, chewing gum or tobacco, taking medication, and smoking is prohibited 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.

- Take note of the location of the nearest telephone and emergency telephone numbers.

- 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.

- Rehearse unfamiliar operations prior to implementation.

- Buddies should maintain visual contact with each other and with other on-site team members by remaining in close proximity to assist each other in case of emergency.

- Establish appropriate safety zones.

- Establish appropriate decontamination procedures for leaving the site.

- Immediately report injuries, illnesses, and unsafe conditions, practices, and equipment to the SSO.

- Observe co-workers for signs heat stress.

- Inform co-workers of potential symptoms of illness, such as headaches, dizziness, nausea, or blurred vision.

5.2 SOIL BORING - SAFE WORK PRACTICES

The following safe work practices are to be followed when working in or around DPT or like operations.

- Identify underground utilities and buried structures before performing intrusive activities. Use the Utility Locating and Excavation Clearance SOP provided in Attachment II.

- DPT or like rigs will be inspected by a Competent Person (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 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 cleared/graded to the extent possible to remove any trip hazards near or surrounding operating equipment.

- The operator must verbally notify the crew before physically beginning DPT or like operations

- Minimize contact to the extent possible with contaminated tooling and environmental media.

- Support functions (sampling and screening stations) will be maintained a minimum distance from the drilling rig of the height of the mast plus 5 feet 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.

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

- 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 equipment will be shutdown and bonded to the fuel provider.

- When not in use drilling equipment 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.

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TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES
NAVAL CONSTRUCTION BATTALION CENTER, GULFPORT, MISSISSIPPI

Tasks/Operations/ Location	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment *(Items in italics are deemed optional as conditions or the FOL/SSO require.)*	Decontamination Procedures
Mobilization/ Demobilization	***Chemical hazards:*** 1) Site contaminants are unlikely to be encountered during this task. However, the TtNUS Hazard Communication Program will be followed for any chemicals (fuels, sample preservatives, decontamination solvents, etc.) that are brought onsite in support of site activities. ***Physical hazards:*** 2) Lifting (strain/muscle pulls) 3) Slip, trips, and falls 4) Ambient temperature extremes (heat stress) 5) Clearing brush ***Natural hazards:*** 6) Insect/animal bites and stings, poisonous plants, etc.	1) Implement the Hazard Communication Program (Section 5.0 TtNUS Health and Safety Guidance Manual) and assure that personnel understand its use. Inventory and obtain MSDSs for materials in use. - Chemical inventories and manufacturer Material Safety Data sheets (MSDS) will be maintained on site. - Information contained within MSDS will be used to determine necessary safe work practices and PPE requirements. - Maintain an MSDS binder in a location readily accessible by site personnel. 2) Use machinery or multiple personnel for heavy lifts. - Use proper lifting techniques as defined in Section 4.0 of this Health and Safety Guidance Manual. 3) Preview work locations for unstable/uneven terrain. 4) Wear appropriate clothing for weather conditions. - Provide acceptable shelter and liquids for field crews. - Additional information regarding heat stress concerns is provided in Section 4 of the TtNUS Health and Safety Guidance Manual. 5) Ensure the handle of the weed wacker is in good condition - Ensure all cutting tools are maintained. Blades shall be sharp without knicks and gouges in the blade. - All personnel will maintain a 10-foot perimeter around persons clearing brush. 6) Avoid nesting areas, use commercially available repellents. Report potential hazards to the SSO.	Not required	Level D - (Minimum Requirements) - Standard field attire (sleeved shirt; long pants) - Steel toe work shoes/boots - *Cotton or leather work gloves when required* - *Safety glasses* - *Hardhat (when overhead hazards exists, or identified as a operation requirement)* - *Reflective vest for high traffic areas* **Note:** A Safe Work Permit (Attachment III) for this task 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.	Not required
Soil Gas Sampler Installation and sampling using a ¾" drill and 3+ft. bit.	***Chemical hazards:*** 1) Site history has indicated the landfill and burning pit under the landfill cap contained hazardous wastes. See Table 6-1 for more information on the chemicals of concern. ***Physical hazards:*** 2) Contact with utilities 3) Slip, trips, and falls 4) Ambient temperature extremes (heat stress) ***Natural hazards:*** 5) Insect/animal bites and stings, poisonous plants, etc. 6) Inclement weather	1) Use real-time monitoring instrumentation, action levels, and identified PPE to control exposures to potentially contaminated media. 2) Drilling activities will proceed in accordance with the Utility Locating and Excavation Clearance SOP in Attachment II of this HASP. All utility clearances will be obtained in writing, and locations identified and marked, prior to activities. Utility clearance is being provided NCBC Gulfport. 3) Preview work locations for unstable/uneven terrain. 4) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding heat stress concerns is provided in the TtNUS Health and Safety Guidance. 5) Avoid nesting areas, use commercially available repellents. - Spiders and bees next in well protective casings - Snakes are often found on monitoring well pads - Report potential hazards to the SSO. - Follow guidance presented in Section 4 of the Health and Safety Guidance Manual. 6) Suspend or terminate operations until directed otherwise by the SSO.	A Photoionization Detector (PID) w/a 10.6 eV lamp or a Flame ionization Detector (FID) will be used detect any vapors that may have escaped from the landfill through fissures in the landfill cap. The following general guidance applies: Source (borehole) and breathing zone monitoring will be conducted at each sample location. Elevated readings above daily established background levels observed at a source area will require the SSO obtain readings within the breathing zone (BZ) of potentially affected employees. If sustained readings (more than 1 minute in duration) greater than background are observed within a workers BZ initiate measures to minimize exposure (retreat to an unaffected area, station personnel in an upwind location, etc.). Workers must evacuate to a safe area if sustained BZ concentrations exceed 1 ppm above background levels. If elevated readings persist, contact the PHSO for additional air monitoring guidance.	Level D protection will be utilized for the initiation of sampling activities. Level D - (Minimum Requirements) - Standard field attire (Sleeved shirt; long pants) - Steel toe safety shoes/boots - Safety glasses - Surgical style gloves (double-layered if necessary) - *Reflective vest for high traffic areas* - *Hardhat (when overhead hazards exist, such as golf balls, or identified as a operation requirement)* *- Tyvek coveralls and disposable boot covers if surface contamination is present, if the potential for soiling work attire exists, or in tall brush. Tyvek aids in tick identification and removal.* **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.	**Personnel Decontamination** will consist of a removal and disposal of non-reusable PPE (gloves, coveralls, etc., as applicable). The decon function will take place at the end of the shift. This procedure will consist of: - Wipe the drill and ¾" drill bit. - Removal and disposal of gloves. - Clean face and hands with hygienic wipes until access to a decon station or rest room is obtained. - Check body carefully for ticks when exiting wooded or brush areas.

TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES
NAVAL CONSTRUCTION BATTALION CENTER, GULFPORT, MISSISSIPPI

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring - Type and Action Levels	Personal Protective Equipment *(Items in italics are deemed optional as conditions or the FOL or SSO require.)*	Decontamination Procedures
Soil borings using DPT rigs. This task includes subsurface soil sampling	***Chemical hazards:*** 1) The potential health hazards associated with this task include inhalation, ingestion, and dermal contact with various contaminants that may be present in shallow and deep soils and groundwater. Based on evidence from a past investigation, TPH and BTEX is expected to be encountered but no data exists indicating specific levels for these contaminants. Prelimininary groundwater results indicate the presence of 1,2-Dichloroethene, trichloroethylene and Vinyl Chloride. 2) Transfer of contamination into clean areas or onto persons ***Physical hazards:*** 3) Heavy equipment hazards (pinch/compressions points, rotating equipment, hydraulic lines, etc.) 4) Noise in excess of 85 dBA 5) Energized systems (contact with underground or overhead utilities) 6) Lifting (strain/muscle pulls) 7) Slips, trips, and falls 8) Vehicular and foot traffic 9) Ambient temperature extremes (heat/cold stress) 10) Flying projectiles 11) Cuts/lacerations ***Natural hazards:*** 12) Inclement weather	1) As a general rule, avoiding contact with contaminated media (air, water, soils, etc.) will be a universal control measure. 2) Restrict the cross use of equipment and supplies between locations and activities without first going through a suitable decontamination. Use a rigid decontamination procedure will be used between locations and ensure materials are not carried and deposited in unaffected areas. 3) Equipment will be: - Inspected in accordance with Federal safety and transportation guidelines, OSHA (1926.600.601.602), and manufacturer's design. Inspections will be documented using the Equipment Inspection Checklist found in Attachment V of this HASP. - Operated and supported by knowledgeable operators, and ground crew. - Used within safe work zones, with routes of approach clearly demarcated. Personnel not directly supporting this operation will remain at least 25 feet from the point of operation. See Section 9.0 of this HASP. This will be the area identified as the exclusion zone. In addition to equipment considerations, the following safe operating procedures will be incorporated: - 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. - Hand signals will be established prior to the commencement of the operation. - A remote sampling device must be used to sample drill cuttings near rotating or advancing tools - Only manufacturer-approved equipment may be used in conjunction with equipment repair procedures - Work areas will be kept clear of clutter. - Secure loose articles to avoid possible entanglement during coring activities. - Self-propelled equipment shall be equipped with movement warning systems. - 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 ensure its operational status. - Areas will be inspected prior to the movement of the drill rig and support vehicles to eliminate any physical hazards. This will be the responsibility of the FOL and/or SSO. - The drill rig and support vehicles will be moved no closer than 10 feet to unsupported side-walls of embankments. 4) Hearing protection will be used during subsurface activities using a DPT rig when noise levels are > 85 dBA. (during operation). Boundaries will be established to limit noise hazard. Height of the mast + 5 feet or a minimum of 25 feet is normal. Excessive noise levels are being approach when you have to raise your voice to be heard by someone within 2 feet of your location. 5) Boring activities will proceed in accordance with the Utility Locating and Excavation Clearance SOP in Attachment II of this HASP. Utility clearances will be obtained, in writing, and locations identified and marked prior to activities. Overhead utilities will also be identified. 6) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques. 7) Preview work locations for unstable/uneven terrain. 8) Use traffic-warning signs, flag persons, and high visibility vests as determined by the SSO when working in or along traffic thoroughfares. 9) Wear appropriate clothing for weather conditions. Acceptable shelter and liquids for field crews. 10) Wear eye protection and hard hat when the DPT rig is operating. Restrict others from the area. 11) Use manufacturer approved devices (macro core holder and cutter) to cut cores. Do not rest cores on knees or near other body parts when cutting. 12) Suspend or terminate operations until directed otherwise by SSO.	A direct reading Photoionization Detector (PID) with a 10.6 eV lamp source (or higher) or a Flameionization Detector (FID) will be used to screen samples and to detect the presence of any potential volatile organics. Source monitoring at the borehole will be conducted at regular intervals to be determined by the SSO. Positive sustained results at a source or downwind location(s) which may impact operations crew will require the following actions: - Monitor the breathing zone of at-risk and downwind employees. Any sustained readings (greater than 1 minute in duration) above background 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 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.	Boring operations will be performed in Level D protection, including the following articles: **Sampler / Oversight Personnel**: - Standard field dress (long pants, Sleeved shirts) - Steel toe safety shoes or work boots - Hard hat - Safety eyewear (glasses) - *Reflective vest for high traffic areas* **Driller and Driller Helper** - Standard field attire including sleeved shirt and long pants - Safety shoes (Steel toe/shank) - Safety glasses - Nitrile inner gloves - Hard hat (when overhead hazard exists) - Hearing protection for high noise areas - *Reflective vest for traffic areas* **Note:** The Safe Work Permit(s) for this task (see Attachment III of this HASP) 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. Protective levels may require modification should this activity be required to be conducted within a controlled zone due to an on-going operation.	**Personnel Decontamination** will consist of a soap/water wash and rinse for reusable protective equipment. Non-reusable protective equipment will be removed and disposed of at the site. If contamination, free product or mud is present that requires the use of modified Level D protection, the following sequential procedure will be used: Stage 1: Equipment drop, remove outer protective wrapping; Decon personnel will wipe down the outer shell. Stage 2: Soap/water wash and rinse of outer boots and gloves Stage 3: Soap/water wash and rinse of the outer splash suit, as applicable. If personnel are wearing cotton coveralls these may be vacuumed at this point. Stage 4: Disposable PPE will be removed and bagged. Stage 5: Wash face and hands Stage 6: Depending on ambient conditions, you may be required to report for medical evaluation. This evaluation consists of pulse, breathing rate, oral temperature, and body weight. This medical screening will be performed when ambient conditions dictate and during periods of acclimatization. **Equipment Decontamination** - Heavy equipment decontamination will take place at a centralized decontamination pad. Heavy equipment will have the wheels and tires cleaned along with any loose debris removed, prior to transporting to the central decontamination area. Site vehicles will have restricted access to exclusion zones, and 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. **Sampling Equipment Decontamination** Sampling equipment will be decontaminated as per the requirements in the Sampling and Analysis Plan and/or Work Plan. 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 on-site, leaving the site, and between locations. No equipment will be authorized access, exit, or movement to another location without this evaluation.

TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES
NAVAL CONSTRUCTION BATTALION CENTER, GULFPORT, MISSISSIPPI

Tasks/Operation/Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring - Type and Action Levels	Personal Protective Equipment *(Items in italics are deemed optional as conditions or the FOL or SSO require.)*	Decontamination Procedures
Multimedia sampling, including: • Surface water • Sediment • Surface soil	***Chemical hazards:*** 1) The potential health hazards associated with this task include inhalation, ingestion, and dermal contact with various contaminants that may be present in shallow and deep soils and groundwater. Based on evidence from a past investigation, TPH and BTEX is expected to be encountered but no data exists indicating specific levels for these contaminants. Preliminary groundwater results indicate the presence of 1,2-Dichloroethene, trichloroethylene and Vinyl Chloride. 2) Transfer of contamination into clean areas or onto persons. into clean areas ***Physical hazards:*** 3) Slips, trips, and falls 4) Ambient temperature extremes (heat/cold stress) 5) Vehicular and foot traffic 6) Site Characterization 7) Cuts/lacerations ***Natural hazards:*** 8) Inclement weather	1) As a general rule, avoiding contact with contaminated media (air, water, soils, etc.) and any potential free product will be a universal control measure. 2) Decontaminate equipment and supplies between sampling locations and prior to leaving the site. See decontamination of heavy and sampling equipment for direction in this task. 3) Preview work locations for unstable/uneven terrain. - Ruts, roots, and other tripping hazards should be eliminated from around the rotating apparatus to minimize trips and falls when approaching the rotating tooling. - Use multiple persons and small loads to pack sampling resources to remote locations. - Construct rope ladders and other engineered assistance for traversing hills and inclines > 45°. 4) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding heat/cold stress is provided in Section 4.0 of the Health and Safety Guidance Manual. 5) Traffic and equipment considerations are to include the following: - Establish safe zones of approach (i.e. Mast or Boom + 5 feet). See Section 9 of the HASP for specific safety zones and established clearance recommendations. - Self-propelled equipment shall be equipped with movement warning systems. - When sampling along roadways, use signs to indicate men working as well flag persons, as necessary. Personnel working in and around any established traffic patterns should wear high visibility vests to increase visual recognition. 6) Work areas will be surveyed prior to committing personnel or resources. The survey will be conducted by the FOL and/or the SSO. The purpose is to identify physical and natural hazards that may impact the proposed work area. These hazards are to be identified, barricaded, or eliminated to the extent possible to minimize potential effect to field crew. 7) Use manufacturer approved devices (macro core holder and cutter) to cut cores. Do not rest cores on knees or near other body parts when cutting. 8) Suspend or terminate operations until directed otherwise by the SSO.	A direct reading Photoionization Detector (PID) with a 10.6 eV lamp source (or higher) or a Flameionization Detector (FID) will be used to screen samples and to detect the presence of any potential volatile organics. Source monitoring at the borehole will be conducted at regular intervals to be determined by the SSO. Positive sustained results at a source or downwind location(s) which may impact operations crew will require the following actions: - Monitor the breathing zone of at-risk and downwind employees. Any sustained readings (greater than 1 minute in duration) above background 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 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. Site contaminants may adhere to or be part of airborne dusts or particulates generated during site activities. Generation of dusts should be minimized to avoid inhalation of contaminated dusts or particulates. Evaluation of dust concentrations will be performed by observing work conditions for visible dust clouds. Potential exposure to contaminated dust will be controlled using water suppression, by avoiding dust plumes, or evacuating the operation area until dust subsides.	Level D protection will be utilized for the following sampling activities Surface soils, subsurface soils, surface water, groundwater, and sediments Level D - (Minimum Requirements) - Standard field attire (Sleeved shirt; long pants) - Steel toe safety shoes/boots - Safety glasses - Surgical style gloves *(double-layered if necessary)* - *Reflective vest for high traffic areas* - *Hardhat (when overhead hazards exists, or identified as a operation requirement)* - *Tyvek coveralls and disposable boot covers if surface contamination is present or if the potential for soiling work attire exists.* - *Hearing protection for high noise areas, or as directed on an operation by operation scenario.* **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.	**Personnel Decontamination** Personal decontamination will vary based on the type of sampling conducted. These are as follows: Supporting subsurface investigations at the drill rig. - Decontamination will be the same as prescribed for the soil boring activity Sampling surface water, groundwater, and sediments, the following provisions will apply - Upon completion of the sampling dedicated trowels, tubing, etc. will be bagged for transport back to the central decontamination area. - PPE (gloves) will be removed and also bagged for disposal. - Handi-Wipes or similar product will be used to clean hands prior to moving to the next location. **Equipment Decontamination** Equipment used in remote sampling locations will be brought back to the central decontamination area for decontamination and re-use or decontamination and gross removal of contamination prior to disposal. **Note:** Field screening instruments will be wrapped to minimize the necessary decontamination except for wiping down parts which are necessary to expose to the external environment. The equipment reference above is largely directed at hand tools. Decontamination of equipment (sampling and hand tools) will proceed as indicated in the Sampling and Analysis Plan and/or Work Plan.
Geophysical and Geographical Surveying	***Chemical hazards:*** Significant exposure to site contaminants is anticipated to be unlikely given the nature of this task. ***Physical hazards:*** 1) Slips, trips, and falls 2) Struck by 3) Ambient temperature extremes (heat stress) ***Natural hazards:*** 4) Inclement weather	1) Preview work locations and site lines for uneven and unstable terrain. Clear necessary vegetation, establish temporary means for traversing hazardous terrain (i.e., rope ladders, etc.) 2) If hand tools (brush hooks, machetes, etc.) are necessary to clear and carry lines and bench marks to the area of operation the following precautions are recommended - Ensure handles are of good construction (no cracks, splinters, loose heads/cuuting apparatus. - Esure cutting tools are maintained. Blades shall be sharp without knicks and gouges in the blade. - Hand tools (brush hooks, machetes, etc.) with cutting blades shall be provided with a sheath to protect individuals when not in use. - Personnel will maintain a 10-foot perimeter around persons clearing brush. 3) Wear appropriate clothing for weather conditions. Acceptable shelter and liquids for field crews. 4) Suspend or terminate operations until directed otherwise by SSO See Section 4.0 of the TtNUS Health and Safety Guidance Manual and Section 6.3 of this HASP for additional information concerning natural hazards.	No air monitoring is needed given the unlikelihood that airborne contaminants will be present. The potential for exposure to site contaminants during this activity is considered minimal. As most of this activity is conducted either before or after the intrusive aspect of this operation, therefore, minimizing potential exposure.	Surveying activities shall be performed in Level D protection Level D Protection consists of the following: - Standard field dress including sleeved shirt and long pants - Steel toe safety shoes/boots - Work gloves shall be worn when clearing brush. - *Safety glasses, hard hats (if working near machinery, or overhead hazards)* - *Snake chaps for heavily wooded area where encounters are likely.* - *Tyvek coveralls may be worn to provide additional protection against poisonous plants and insects, particularly ticks.* **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. Protective levels may require modification should this activity be required to be conducted within a controlled zone due to an on-going operation.	**Personnel Decontamination** - A structured decontamination is not required as the likelihood of encountering contaminated media is considered remote. However, survey parties should inspect themselves and one another for the presence of ticks when exiting wooded areas, grassy fields, etc. This action will be employed to stop the transfer of these insects into vehicles, homes, and offices.

TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES
NAVAL CONSTRUCTION BATTALION CENTER, GULFPORT, MISSISSIPPI

Tasks/Operation/Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring - Type and Action Levels	Personal Protective Equipment *(Items in italics are deemed optional as conditions or the FOL or SSO dictate.)*	Decontamination Procedures
IDW Management and Handling This activity includes the following tasks: - Containerization - Labeling - Staging - Monitoring of IDW generated in support of site activities.	***Chemical hazards:*** 1) The only anticipated chemical hazard associated with IDW management is the potential for a spill. In situations such as that the spill containment program identified in Section 9.0 of this HASP will be employed. ***Physical hazards:*** 1) Strains and sprains 2) Compressions 3) Loading bulk transport containers	1) It is not anticipated that chemical hazards will be significant during this operation, as the IDW will be in sealed containers. It is anticipated that the IDW will represent a limited chemical hazard, if the container is breached. Control measures in this case will represent PPE and good work hygiene practices to control potential exposures during the implementation of the Spill Containment Program (See Section 9.0 of this HASP). 2) The predominant hazard associated with this activity is the movement of full or partially full 55-gallong drums of soils and/or water. To minimize hazards of this nature the following provisions shall be incorporated as applicable: - Use machinery (preferred method) or multiple personnel for heavy lifts - Use proper lifting techniques --Lift with your legs, not your back, bend your knees move as close to the load as possible, and ensure good hand holds are available. --Minimize the horizontal distance to the center of the lift to your center of gravity. --Minimize turning and twisting when lifting as the lower back is especially vulnerable at this time. --Break lifts into steps if the vertical distance (from the start point to the placement of the lift) is excessive. --Plan your lifts – Place heavy items on shelves between the waist and chest; lighter items on higher shelves. --Periods of high frequency lifts or extended duration lifts should provide sufficient breaks to guard against fatigue and injury. In determining whether you can lift or move an item several factors must be considered, these are as follows: - Area available to maneuver the lift. - Area of the lift – Work place clutter, slippery surfaces, rough terrain - Overall physical condition 3) Another hazard frequently associated with this task is the compression of hands and fingers when placing the containers on pallets. This typically occurs when rolling and lowering the container in its place. To combat this hazard, the following provision shall be employed. Material handling devices shall be used for moving drums within the satellite storage area. This includes drum dollies with pneumatic tires, drum grapplers, etc. to handle drums of IDW. These pieces of equipment are engineered to allow placement of these containers while keeping hands from pinch/compression points.	None Required, unless spill containment provisions are invoked. Then monitoring will proceed as described in the activity associated with the task when the materials were generated such as Soil boring or well installation.	Level D - (Minimum Requirements) - Standard field attire (Sleeved shirt; long pants) - Steel toe safety shoes/boots - Leather or canvas work gloves - *Safety glasses (When utilizing cables or slings to move the containers)* - *Hardhat (when overhead hazards exists, or identified as a operation requirement)* <u>PPE changes may be made with the implementation of the Spill Containment Program. This represents the only anticipated modification to this level of protection.</u>	Not required, unless the implementation of the Spill Containment Program is required due to a spill and/or release. At that point the decontamination procedures for those activities such as soil borings and/or well installation. The reference reflects the tasks conducted when the materials were generated.

TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES
NAVAL CONSTRUCTION BATTALION CENTER, GULFPORT, MISSISSIPPI

Tasks/Operation/Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring - Type and Action Levels	Personal Protective Equipment *(Items in italics are deemed optional as conditions or the FOL or SSO dictate.)*	Decontamination Procedures
Decontamination of Sampling and Heavy Equipment It is anticipated that this activity will take place at a centralized location. Gross contamination will be removed to the extent possible at the site. Contaminated tooling then will be wrapped in polyethylene sheeting for transport to the centralized location for a full decontamination and evaluation.	***Chemical hazards:*** 1) The potential health hazards associated with this task include inhalation, ingestion, and dermal contact with various contaminants that may be present in shallow and deep soils and groundwater. Based on evidence from a past investigation, TPH and BTEX is expected to be encountered but no data exists indicating specific levels for these contaminants. Prelimininary groundwater results indicate the presence of 1,2-Dichloroethene, trichloroethylene and Vinyl Chloride. 2) Decontamination fluids - Liquinox (detergent); isopropanol (decontamination solvent) ***Physical hazards:*** 3) Lifting (strain/muscle pulls) 4) Noise in excess of 85 dBA 5) Flying projectiles 6) Slips, trips, and falls ***Natural hazards:*** 7) Inclement weather	1) and 2) Employ protective equipment to minimize contact with site contaminants and hazardous decontamination fluids. Control potential non-occupational exposures through good work hygiene practices (i.e., avoid hand to mouth contact; wash hands and face before breaks and lunch; minimize contact with contaminated media). Obtain manufacturer's MSDS for any decontamination fluids used on-site. Solvents may only be used in well-ventilated areas, such as outdoors. Use appropriate PPE as identified on MSDS or within this HASP. Chemicals used must be listed on the Chemical Inventory for the site, and site activities must be consistent with the Hazard Communication Program provided in Section 5.0 of the TtNUS Health and Safety Guidance Manual. 3) Use multiple persons where necessary for lifting and handling heavy equipment, such as auger flights for decontamination purposes. - Employ proper lifting techniques as described in Table 5-1, Mobilization/Demobilization. 4) Wear hearing protection when operating the pressure washer and/or steam cleaner. Sound pressure levels measured during the operation of similar pieces of equipment indicate a range of 87 to 93 dBA. 5) Use eye and face protective equipment when operating the pressure washer and/or steam cleaner, due to flying projectiles. Other personnel must be restricted from the area. In addition to minimize hazards (flying projectiles, water lacerations and burns) associated with this operation, the following controls will be implemented - A Fan Tip 25° or greater will be used on pressurized systems over 3,000 psi. This will reduce the possibility of water lacerations or punctures. - Thermostat control will be in place and operational to control the temperature levels of the water where applicable. - Visual evaluations of hoses and fittings for structural defects - Construct deflection screens as necessary to control overspray and to guard against dispersion of contaminants driven off by the spray. 6) The decontamination pad should be constructed to contain wash waters generated during decontamination procedures. Temporary decontamination pads are usually 10-30 mil polyethylene or polyvinyl chloride tarp construction. Although these items when used as a liner offer containment, they also present a slipping hazard. When these temporary liners are employed, it is recommended that a light coating of sand be spread over the walking surface to provide traction. - In addition, adequate slope should be provided to the pad to permit drainage away from the object being cleaned. The collection point for wash waters should be of adequate distance that the decontamination workers do not have to walk through the wash waters while completing their tasks. - Hoses should be gathered when not in use to eliminate potential tripping hazards. 7) Suspend or terminate operations until directed otherwise by SSO.	Use visual observation and real-time monitoring instrumentation to ensure that equipment has been properly cleaned of contamination and dried.	For Heavy Equipment This applies to pressure washing and/or steam cleaning operations and soap/water wash and rinse procedures. Level D Minimum requirements: - Standard field attire (Long sleeve shirt; long pants) - Safety shoes (Steel toe/shank) - Chemical resistant boot covers - Nitrile outer gloves over nitrile inner gloves - Safety glasses underneath a splash shield - Hearing protection (plugs or muffs) - Hooded PVC Rainsuits or PE or PVC coated Tyvek For sampling equipment (trowels, Macro-Core Samplers, bailers, etc.), the following PPE is required **Note**: Consult MSDS for PPE guidance. Otherwise, observe the following. Level D Minimum requirements - - Standard field attire (Long sleeve shirt; long pants) - Safety shoes (Steel toe/shank) - Nitrile outer gloves over nitrile inner gloves - Safety glasses - Impermeable apron In the event of overspray of chemical decontamination fluids, employ PVC Rainsuits or PE or PVC coated Tyvek as necessary. **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.	**Personnel Decontamination** will consist of a soap/water wash and rinse for reusable and non-reusable outer protective equipment (boots, gloves, PVC splash suits, as applicable). This decontamination function may be subdivided into two locations. Gross contamination of outer boots and outer gloves will be removed at a satellite location near the operation. Final wash and rinse will take place at the centralized decontamination pad. The sequential procedure is as follows: Stage 1: Equipment drop, remove outer protective wrapping; personnel will wipe down the outer shell and pass hand equipment through as necessary. Stage 2: Soap/water wash and rinse of outer boots and gloves Stage 3: Soap/water wash and rinse of the outer splash suit, as applicable Stage 4: Disposable PPE will be removed and bagged. Stage 5: Wash face and hands Stage 6: Depending on ambient conditions, you may be required to report for medical evaluation. This evaluation consists of pulse, breathing rate, oral temperature, and body weight. This medical screening will be performed when ambient conditions dictate and during periods of acclimatization. **Equipment Decontamination** - Heavy equipment decontamination will take place at a centralized decontamination pad utilizing a steam cleaner. Heavy equipment will have the wheels and tires cleaned along with any loose debris removed, prior to transporting to the central decontamination area. Site vehicles will have restricted access to exclusion zones, and 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 on-site activity. **Sampling Equipment Decontamination** Sampling equipment will be decontaminated as per the requirements in the Sampling and Analysis Plan and/or Work Plan. 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 on-site, leaving the site, and between locations. No equipment will be authorized access, exit, or movement to another location without this evaluation. This will include the screening process for radiological contaminants.

6.0 HAZARD ASSESSMENT

This section provides information regarding the chemical, physical, and natural hazards associated with the sites to be investigated and the activities that are to be conducted as part of the scope of work. Table 6-1 provides information on potential chemical contaminants, including exposure limits, symptoms of exposure, physical properties, and air monitoring and sampling data.

6.1 CHEMICAL HAZARDS

The potential health hazards associated with NCBC Gulfport include inhalation, ingestion, and dermal contact of various contaminants that may be present in shallow and deep soils. Based on a previous investigation, benzene, ethylene, toluene and xylenes (BTEX) and total petroleum hydrocarbons (TPH) are the contaminants of concern. Waste fuel, oil, solvents, paint, and paint thinners were disposed and burned at this site. The site has been capped with a soil cover that is 5 to 6 feet thick. Preliminary groundwater results indicate the presence of 1,2-dichloroethene, trichloroethene, and vinyl chloride.

Exposure to site contaminants is most likely to occur through inhalation or dermal contact of contaminated soil, or through ingestion via hand-to-mouth contact during soil disturbance activities. For this reason, PPE and basic hygiene practices (e.g., washing face and hands before leaving site) will be extremely important. As a precautionary measure, airborne concentrations of detectable site contaminants will be monitored and evaluated using a photoionization detector (PID). Given the nature of planned activities and that work will be conducted outside in the open air, it is unlikely that any appreciable airborne concentrations will be present. Because potential site contaminants have not been thoroughly characterized, conservative action levels for air monitoring have been established. Any elevated readings in worker breathing zones will require site activities to be suspended.

Other sources of potential chemical exposure are decontamination fluids (e.g., Liquinox, isopropanol), and analytical preservatives. For any substances brought onto the site, the SSO is responsible for instituting a site-specific Hazard Communication Program (see Section 5.0 of the TtNUS HSGM) and for collecting the appropriate Material Safety Data Sheets (MSDSs) from the chemical manufacturers/suppliers. The SSO is also responsible for completing the Safe Work Permit for the decontamination task using the appropriate MSDSs and for reviewing the contents of the MSDSs and Safe Work Permit with anyone who will use these substances.

TABLE 6-1
CHEMICAL, PHYSICAL AND TOXICOLOGICAL DATA
NCBC – GULFPORT, MISSISSIPPI – CTO 041

Substance	CAS No.	Air Monitoring	Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Benzene	71-43-2	PID: I.P 9.24 eV, 100% response with PID and 10.2 eV lamp. FID: 150% relative response ratio with FID.	OSHA: 1 ppm ACGIH: 0.5 ppm NIOSH: 0.1 ppm IDLH: 500 ppm	Inadequate - Odor threshold 34-199 ppm. OSHA accepts the use of air-purifying respirators with organic vapor cartridge up to 10 ppm despite the inadequate warning properties providing cartridges are changed at the beginning of each shift. **Recommended gloves:** Butyl/neoprene blend - >8.00 hrs; Silver shield as a liner - >8.00 hrs; Viton - >8.00 hrs	**Boiling Pt:** 176°F; 80°C **Melting Pt:** 42°F; 5.5°C **Solubility:** 0.07% **Flash Pt:** 12°F; -11°C **LEL/LFL:** 1.3% **UEL/UFL:** 7.9% **Vapor Density:** 2.77 **Vapor Pressure:** 75 mmHg **Specific Gravity:** 0.88 **Incompatibilities:** Strong oxidizers, fluorides, perchlorates, and acids **Appearance and Odor:** Colorless to a light yellow liquid with an aromatic odor	Overexposure may result in irritation to the eyes, nose, throat, and respiratory system. CNS effects include giddiness, lightheadedness, headaches, staggered gait, fatigue, and lassitude and depression. Additional effects may include nausea. Long duration exposures may result in respiratory collapse. Regulated as an OSHA carcinogen. May cause damage to the blood forming organs and may cause a form of cancer called leukemia.
Ethylbenzene	100-41-4	PID: I.P 8.76, High response with PID and 10.2 eV lamp. FID: 100% response with FID.	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.
Toluene	108-88-3	PID: I.P 8.82 eV, High response with PID and 10.2 eV lamp. FID: 110% response with FID.	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.

TABLE 6-1
CHEMICAL, PHYSICAL AND TOXICOLOGICAL DATA
NCBC – GULFPORT, MISSISSIPPI – CTO 041

Substance	CAS No.	Air Monitoring	Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
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.	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:** -13o/-54m/56p°F; -25o/-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.
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.	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.
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%.	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.

TABLE 6-1
CHEMICAL, PHYSICAL AND TOXICOLOGICAL DATA
NCBC – GULFPORT, MISSISSIPPI – CTO 041

Substance	CAS No.	Air Monitoring	Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Trichloroethene	79-01-6	PID: I.P. 9.45 eV, High response with PID and 10.2 eV lamp. FID: 70% Response with FID.	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.
Vinyl chloride	75-01-4	PID: I.P. 9.99 eV, High response with PID and 10.2 eV lamp. FID: 40% response with FID.	OSHA: 1.0 ppm; 5.0 ppm (Ceiling) ACGIH: 5 ppm NIOSH: Lowest Feasible Concentration	Inadequate - Odor threshold 10-20 ppm. Gas Mask with a vinyl chloride Type N canister may be employed for concentrations up to 25 ppm. Canisters employed must have a minimum service life of 4-hrs. Exceedances over 25 ppm, must use a positive pressure demand, open-circuit, self-contained breathing apparatus, pressure demand type, with full facepiece. Refer to 29 CFR 1910.1017(g) for specific requirements based on atmospheric concentrations of vinyl chloride. **Recommended gloves:** Silver shield >6.00 hrs; Nitrile 5.70 hrs; or Viton 4.4 hrs	**Boiling Pt:** 7°F; -13.9°C **Melting Pt:** -256°F; -160°C **Solubility:** 0.1% @ 77°F; 25°C **Flash Pt:** 18°F; -8°C **LEL/LFL:** 3.6% **UEL/UFL:** 33% **Vapor Density:** 2.21 **Vapor Pressure:** 3.3 atm **Specific Gravity:** N.A. **Incompatibilities:** Oxidizers, copper, aluminum, peroxides, iron, steel, **Appearance and Odor:** Colorless gas or liquid (below 7°F) with a pleasant odor at high concentrations.	A severe skin, eye, and mucous membrane irritant(Liquid: frostbite). Narcotic effect causing weakness, abdominal pains, GI bleeding, and pallor skin or cyanosis. Chronic exposure has been linked to the formation of malignant tumors originating from blood lymphatic vessels in the liver (associated enlargement of the liver), and kidneys (angiosarcoma and nephroblastoma). Listed as a carcinogen by NTP, IARC and ACGIH.

6.2 PHYSICAL HAZARDS

In addition to the chemical hazards discussed above, the following physical hazards may be present during the performance of the site activities.

- Slips, trips, and falls
- Cuts (or other injuries associated with hand tool use)
- Lifting (strain/muscle pulls)
- Ambient temperature extremes (cold and heat stress)
- Pinches and compressions
- Heavy equipment hazards (rotating equipment, hydraulic lines, etc.)
- Energized systems (contact with underground or overhead utilities)
- Vehicular and foot traffic
- Noise in excess of 85 dBA
- Flying projectiles

Each of these physical hazards is discussed in greater detail in Section 4.0 of the TtNUS HSGM. Additionally, information on the associated control measures for these hazards is discussed in Table 5-1 of this HASP. Some of these hazards and the associated control measures are discussed below due to the emphasis on incident and injury history.

6.2.1 Slips, Trips, and Falls

Conditions such as steep terrain and/or heavy vegetation may create an increased potential for slip, trip, and fall hazards.

- The safest approach to sample points will be identified and cleared to permit field crew access to sample locations.
- Footwear with an adequate traction.
- Prepare work areas by removing tripping hazards (ruts, roots, debris).

6.2.2 Cuts or Other Injuries Associated with Hand Tool Use

The clearing of brush and vegetation will be performed using weed trimming equipment. The control measures presented below will help minimize the potential for physical and cutting hazards.

- Wear leather or heavy cotton work gloves when using tools to protect against blisters, cuts, or other hand injuries.
- Wear eye protection (safety glasses with side shields) to protect the eyes from twigs, sticks, or flying debris.
- Clear the immediate cutting area of personnel (radius of the tool swing area).
- Wear long pants and long-sleeved shirts to protect against abrasions.
- Wear hard hats if work will involve areas with overhead hazards (e.g., overhanging branches).
- Wear sturdy work boots.

6.2.3 Energized Systems (Contact with Underground or Overhead Utilities)

Underground utilities such as pressurized lines, water, telephone, buried utility, and high voltage power lines may be present throughout the facility. Therefore, subsurface activities must be conducted following the requirements of TtNUS SOP HS-1.0, Utility Locating and Excavation Clearance. A copy of this SOP is provided as Attachment II. Clearance of underground and overhead utilities for each location will be coordinated with the NCBC Gulfport Public Works Department – Maintenance Division through Mr. Gordon Crane, giving them a 10-day advance notification.

In certain cases, there may be a need to de-energize electrical cables using facility lockout/tagout procedures to insure electrical hazards are eliminated. For this, assistance from the Public Works Maintenance Division will be sought.

6.3 NATURAL HAZARDS

Insect/animal bites and stings, poisonous plants, and inclement weather are natural hazards that may be present given the location of activities to be conducted. As previously discussed, some portions of the site include vegetated areas which increases the potential for field crews to encounter ticks, bees, mosquitoes/insects, snakes, and poisonous vegetation.

6.3.1 Inclement Weather

Project tasks under this Scope of Work will be performed outdoors. 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.

A National Oceanic and Atmospheric Administration (NOAA) Weather Radio is the best means to receive watches and warnings from the National Weather Service. The National Weather Service continuously

broadcasts updated hurricane advisories that can be received by widely available NOAA Weather Radios.

7.0 HAZARD MONITORING – TYPES AND ACTION LEVELS

Direct-reading instruments will be used at the site to evaluate the presence of detectable site contaminants and other potentially hazardous conditions. As a result, specific air monitoring measures and requirements are established in Table 5-1 pertaining to the specific hazards and tasks of an identified operation. Additionally, the HSGM, Section 1.0, contains detailed information regarding direct-reading instrumentation, as well as general calibration procedures of various instruments.

7.1 INSTRUMENTS AND USE

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 (PID)

In order to accurately monitor for any substances that may present an exposure potential to site personnel, a PID using a lamp energy of 10.6 eV or higher will be used. This instrument will be used to monitor potential source areas (boreholes, monitoring wells) and to screen the breathing zones of employees during site activities.

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, 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 that 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 TtNUS Equipment Manager and/or rental service employed. Operational checks and field calibration will be performed on the instruments each day prior to their use. Field calibration will be performed on instruments according

to manufacturers' 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 manufacturers' recommendations, and with the applicable manufacturer standard operating procedure. Calibration efforts must be documented. Figure 7-1 is provided for documenting these calibration activities. This information may instead be recorded in a field operations logbook, provided that 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

7.3 DOCUMENTING INSTRUMENT READINGS

The SSO is responsible for ensuring that monitoring instruments are used in accordance with the specifications of this HASP and with manufacturers' specifications/recommendations. In addition, the SSO is also responsible for ensuring that the instrument use is documented. This requirement can be satisfied either by recording instrument readings on pre-printed sampling log sheets or in a field logbook. This includes the requirement for documenting instrument readings that indicate no elevated readings above noted daily background levels (i.e., no-exposure readings). At a minimum, the SSO must document the following information for each use of an air monitoring device:

- Date, time, and duration of the reading
- Site location where the reading was obtained
- Instrument used
- Personnel present at the area where the reading was noted
- Other conditions that are considered relevant to the SSO (e.g., possible instrument interferences, etc.)

FIGURE 7-1

DOCUMENTATION OF FIELD CALIBRATION

SITE NAME: _____ **PROJECT NO.:**_____

Date of Calibration	Instrument Name and Model	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot Number)	Remarks/ Comments
				Pre-Calibration	Post-Calibration	Pre-Calibration	Post-Calibration		

8.0 TRAINING/MEDICAL SURVEILLANCE REQUIREMENTS

8.1 INTRODUCTORY/REFRESHER/SUPERVISORY TRAINING

This section specifies health and safety training and medical surveillance requirements for both TtNUS and subcontractor personnel participating in on site activities. TtNUS and subcontractor personnel who will engage in field associated activities as described in this HASP must have:

- Completed 40 hours of introductory hazardous waste site training or equivalent work experience as defined in OSHA Standard 29 CFR 1910.120(e).
- Completed 8-hour Refresher Training, if the identified persons had introductory training more than 12 months prior to site work.
- Completed 8-hour Supervisory Training in accordance with 29 CFR 1910.120(e)(4), if their assigned function will involve the supervision of subordinate personnel.

Documentation of introductory training or equivalent work experience, supervisory, and refresher training as well as site-specific training will be maintained at the 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 TtNUS employees and subcontractor personnel who will perform work on this project.

Figure 8-1 will be used to document the provision and content of the project-specific and associated training. Site personnel will be required to sign this form prior to commencement of site activities.

TtNUS will conduct a pre-activities training session prior to initiating site work. Additionally, a brief meeting will be held daily to discuss operations planned for that day. At the end of the workday, a short meeting may be held to discuss the operations completed and any problems encountered. This activity will be supported through the use of a Safe Work Permit System (See Section 10.2).

8.3 MEDICAL SURVEILLANCE

TtNUS and subcontractor personnel participating in project field activities will have had a physical examination. Physical examinations shall meet the minimum requirements of paragraph (f) of OSHA 29 CFR 1910.120.

Documentation for medical clearances will be maintained at the job site and made available, as necessary. Subcontractor personnel may use an alternative documentation for this purpose. The "Subcontractor Medical Approval Form" can be used to satisfy this requirement as can a letter from an officer of the company. The letter should state that the persons listed in the letter participate in a medical surveillance program meeting the requirements contained in paragraph (f) of Title 29 of the CFR, Part 1910.120, entitled "Hazardous Waste Operations and Emergency Response." The letter should further state the following:

- The persons listed have had physical examinations under this program within the frequency as determined sufficient by their occupational health care provider.
- Dates of the exams.
- The persons identified have been cleared, by a licensed physician, to perform hazardous waste site work.

A sample Subcontractor Medical Approval Form and form letter have been provided to eligible subcontractors in the Bid Specification package.

8.3.1 Medical Data Sheets

Each field team member, including subcontractors and visitors, entering the exclusion zone(s) shall be required to complete and submit a copy of the Medical Data Sheet that is available in Attachment IV 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

If through the execution of their contract elements, the subcontractor will not enter the exclusion zone and there is no potential for exposure to site contaminants, subcontractor personnel may be exempt from the training and medical surveillance requirements with the exception of Section 8.2. Examples of subcontractors who may qualify as exempt from training and medical surveillance requirements may include surveyors who perform surveying activities in site perimeter areas or areas were there is no potential for exposure to site contaminants and support or restoration services. Use of this Subcontractor Exception is strictly limited to the authority of the CLEAN HSM.

FIGURE 8-1

SITE-SPECIFIC TRAINING DOCUMENTATION

My signature below indicates that I am aware of the potential hazardous nature of performing field investigation activities at NCBC Gulfport, Mississippi and that I have received site-specific training that included the elements presented below:

- 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
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- Contents of the Health and Safety Plan
- Emergency response procedures (evacuation and assembly points)
- Incipient response procedures
- Review of the contents of relevant Material Safety Data Sheets
- Review of the use of Safe Work Permits

I have been given the opportunity to ask questions and that my questions have been answered to my satisfaction and that the date of my training and my medical surveillance requirements indicated below are accurate.

Name (Printed and Signature)	Site-Specific Training Date	40-Hour Training (Date)	8-Hour Refresher Training (Date)	8-Hour Supervisory Training (Date)	Medical Exam

9.0 SPILL PREVENTION AND CONTAINMENT PROGRAM

9.1 SCOPE AND APPLICATION

It is not anticipated that bulk hazardous materials (over 55 gallons) will be handled at any time as part of this scope of work. It is also not anticipated that such spillage would constitute a danger to human health or the environment. However, as the job progresses, the potential may exist for accumulating IDW such as decontamination fluids, limited soil cuttings, and purge and well development waters in a central staging area. As needed, 55-gallon drums will be used to contain purge water, decon fluids, and soil cuttings generated during field activities. Once all fluids and other materials have been characterized, they can be removed from this area and properly disposed. Because these fluids and soils remained uncharacterized while in the staging area, a spill containment program will be developed and instituted as part of this HASP.

9.2 POTENTIAL SPILL AREAS

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

- Resource deployment
- Waste transfer
- Central staging

It is anticipated all IDW generated as a result of this scope of work will be containerized, labeled, and staged to await further analyses. The results of this analysis will determine the method of disposal.

9.3 LEAK AND SPILL DETECTION

To establish an early detection of potential spills or leaks, a periodic walk-around by the personnel staging or disposing of drums in the staging area will be conducted during working hours to visually determine that storage vessels are not leaking. If a liquid leak is detected, the contents will be transferred, using a hand pump, into a new vessel. The leak will be collected and contained using absorbents such as Oil-Dry, or sand, which are stored at the vulnerable areas in a conspicuously marked drum. Leaks of solid substances will be shoveled into an appropriate container. These materials will be containerized and secured for disposal pending analysis. All inspections will be documented in the project log book.

9.4 PERSONNEL TRAINING AND SPILL PREVENTION

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

9.5 PREVENTION AND CONTAINMENT EQUIPMENT

The following represents the minimum equipment that will be maintained at the staging areas at all times for the purpose of supporting this Spill Prevention/Containment Program:

- Sand, clean fill, vermiculite, or other non-combustible absorbent (Oil-Dry)
- Drums [55-gallon United States Department of Transportation (DOT) 17-E or 17-H; UN1A2]
- Shovels, rakes, and brooms
- Container labels

9.6 SPILL CONTROL PLAN

The following describes the procedures the TtNUS field personnel will employ upon the detection of a spill or leak:

1. Notify the FOL or SSO immediately upon detection of a leak or spill.

2. Employ the PPE stored at the staging area. Take immediate actions to stop the leak or spill by plugging or patching the container or raising the leak to the highest point in the vessel. Spread the absorbent material in the area of the spill, covering it completely.

3. Transfer the material to a new vessel; collect and containerize the absorbent material. Label the new container appropriately. Await analyses for treatment and disposal options.

4. Recontainerize spills, including 2-inch of top cover (if over soils) impacted by the spill. Await test results for treatment or disposal options.

It is not anticipated that a spill will occur that the field crew cannot handle. Should this occur, however, notification of the appropriate Emergency Response agencies will be carried out by the FOL or SSO in accordance with the procedures discussed in Section 2.0 of this HASP.

10.0 SITE OPERATIONS AND CONTROL

Site operations and control will be facilitated through the use of established work zones and security and control of those zones. These activities will minimize the impact and spread of contaminants brought to the surface through subsurface investigative methods as well as protect personnel and visitors within these zones during ongoing operations.

10.1 WORK ZONES

TtNUS will delineate and use work zones in conjunction with decontamination procedures to prevent the spread of contaminants to other areas of the site. A three-zone approach will be used for work at this site; an Exclusion Zone, a Contamination Reduction Zone, and a Support Zone. These will be used to control access to the work areas, restricting the general public, avoiding potentials to spread any contaminants, and to protect individuals who are not cleared to enter by way of training and/or medical surveillance qualifications.

10.2 SAFE WORK PERMITS

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 is included in Figure 10-1. The daily meetings conducted by the FOL/SSO will further support these work permits. The use of these permits will ensure that site-specific considerations and changing conditions are incorporated into the planning effort. Safe Work Permits will require the signatures of either the FOL or the SSO. Personnel engaged in on-site activities must be made aware of the elements indicating levels of protection and precautionary measures to be used.

The use of these permits will establish and provide 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 Safe Work Permit will take precedence over the HASP when more conservative measures are required based on specific site conditions.

Upon completion of the work for which the Safe Work Permit was assigned, the Safe Work Permit will be turned in to the FOL or the SSO. Concerns, complaints, and suggestions may be made on the reverse of the Safe Work Permit for consideration by the FOL and/or the SSO. Permits turned in with suggestions, difficulties, or complaints will be forwarded to the PHSO for review.

FIGURE 10-1
SAFE WORK PERMIT

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

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

II. Primary Hazards: Potential hazards associated with this task include _____

III. Field Crew: _____

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____TtNUS
Equipment Inspection required ☐ Yes ☐ No Initials of Inspector _____TtNUS

V. Protective equipment required
Level D ☒ Level B ☐
Level C ☐ Level A ☐

Respiratory equipment required
Yes ☐ Specify on the reverse
No ☐

Modifications/Exceptions: _____

VI.

Chemicals of Concern	Hazard Monitoring	Action Level(s)	Response Measures

Primary Route(s) of Exposure/Hazard: _____

(Note to FOL and/or SHSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)

VII. Additional Safety Equipment/Procedures

Hard-hat	☐ Yes	☐ No	Hearing Protection (Plugs/Muffs)	☐ Yes	☐ No
Safety Glasses	☐ Yes	☐ No	Safety belt/harness	☐ Yes	☐ No
Chemical/splash goggles	☐ Yes	☐ No	Radio/Cellular Phone	☐ Yes	☐ No
Splash Shield	☐ Yes	☐ No	Barricades	☐ Yes	☐ No
Splash suits/coveralls	☐ Yes	☐ No	Gloves (Type –_____)	☐ Yes	☐ No
Impermeable apron	☐ Yes	☐ No	Work/rest regimen	☐ Yes	☐ No
Steel toe Work shoes or boots	☐ Yes	☐ No	Chemical Resistant Boot Covers	☐ Yes	☐ No
High Visibility vest	☐ Yes	☐ No	Tape up/use insect repellent	☐ Yes	☐ No
First Aid Kit	☐ Yes	☐ No	Fire Extinguisher	☐ Yes	☐ No
Safety Shower/Eyewash	☐ Yes	☐ No	Other	☐ Yes	☐ No

Modifications/Exceptions: _____

VIII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place	☐	☐	☐
Physical Hazards Identified and Isolated (Splash and containment barriers)	☐	☐	☐
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).	☐	☐	☐

IX. Additional Permits required (Hot work, confined space entry, excavation etc.). ☐ Yes ☐ No
If yes, SHSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090

X. Special instructions, precautions: _____

Permit Issued by: _____ Permit Accepted by: _____

The Safe Work Permit and the HASP will serve as the primary reference for work place evaluations and audits conducted to determine if the task is being conducted under the direction conveyed by the HASP and the Safe Work Permit.

10.3 SITE MAP

Once the areas of contamination, access routes, topography, and dispersion routes are determined, a site map will be generated and adjusted as site conditions change. This map will be posted at the field support trailer to illustrate up-to-date information of contaminants and adjustment of zones and access points.

10.4 BUDDY SYSTEM

Personnel engaged in on-site activities will practice the "buddy system" to ensure the safety of the personnel involved in this operation.

10.5 MATERIAL SAFETY DATA SHEET (MSDS) REQUIREMENTS

TtNUS personnel will provide MSDSs for 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 or the substances on site. The MSDSs will be maintained in a central location (e.g., temporary office) and will be available for anyone to review upon request. The SSO will be responsible for implementing a site-specific Hazard Communication Program (See Section 5.0 of the TtNUS HSGM). This includes collection of MSDSs, creation and maintenance of an accurate Chemical Inventory Listing, addressing container labeling and personnel training issues, and other aspects of Hazard Communication.

10.6 COMMUNICATION

It is anticipated that site personnel will be working in close proximity during proposed field activities. In the event that site personnel are in isolated areas or are separated by significant distances, a supported means of communication between field crews will be utilized. Two-way radio communication devices, if needed, will be used only with NCBC Gulfport approval.

External communications will be accomplished utilizing telephones at predetermined and approved locations or through cellular phones. External communication will primarily be used for the purpose of resource and emergency resource communications. Prior to the commencement of site activities, the

FOL will determine and arrange for telephone communications, if it is determined that cellular means will not be used.

10.7 SITE VISITORS

Potential site visitors that may be encountered during the performance of the field work could include the following:

- Personnel invited to observe or participate in operations by TtNUS.
- Regulatory personnel (i.e., DoD, MDEQ, EPA, OSHA, etc.)
- NAVFAC SE personnel

Non-DoD personnel working on this project are required to gain initial access to the base by coordinating with the TtNUS TOM or designee and following established base access procedures.

Once access to the base is obtained, personnel who require access to TtNUS work sites (areas of ongoing operations) will be required to obtain permission from the FOL and the Base Contact. Upon gaining access to the work site, site visitors wishing to observe operations in progress will be required to meet the following minimum requirements:

- Site visitors will be routed to the FOL, who will sign them into the field log book. Information to be recorded in the log book will include the individual's name (proper identification required), who they represent, and the purpose for the visit. The FOL is responsible for ensuring that site visitors are always escorted while on site.

- Site visitors will be required to produce the necessary information supporting clearance on to the site. This includes information attesting to applicable training (40-hours of HAZWOPER training required for NAVFAC SE Personnel), and medical surveillance as stipulated in Section 8.3 of this document. In addition, to enter the sites operational zones during planned activities, 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 site and applicable operational areas. Visitors are required to observe the protective equipment and site restrictions in effect at the work areas visited. Any visitors not meeting the requirements as stipulated in this plan for site clearance will not be permitted to enter the site operational zones during planned activities. Any incidence of unauthorized site visitation will cause on-site activities to be terminated until

that visitor can be removed. Removal of unauthorized visitors will be accomplished with support form the Base Contact, if necessary. At a minimum, the Base Contact will be notified of any unauthorized visitors.

10.8 SITE SECURITY

Because this activity will take place at a Navy facility, the first line of security will be provided by the base gate restricting the general public. The second line of security will take place at the work site referring interested parties to the FOL and Base Contact.

Security at the work areas will be accomplished using field personnel. This is a multiple-person operation, involving multiple operational zones. TtNUS personnel will retain complete control over active operational zones. The Base Contact will serve as the focal point for base personnel and interested parties and will serve as the primary enforcement contact.

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 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 (e.g., 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 HSGMI 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 that the following materials/documents are taken to the project site and used when required.

- A complete copy of this HASP
- HSGM
- Incident Reports
- Medical Data Sheets
- MSDSs for chemicals brought on site, including decontamination solutions, fuels, 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 Information (Section 2.0, extra copy for posting)

12.1 MATERIALS TO BE POSTED OR MAINTAINED AT THE SITE

The following documentation is to be posted or maintained at the site for quick reference purposes. In situations where posting these documents is not feasible (such as no office trailer), these documents should be separated and immediately accessible.

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

MSDSs (maintained) - The MSDSs should also be in a central area accessible to site personnel. These documents should match the listings on the Chemical Inventory Listing for substances used 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 and 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 site personnel, dates of training (including site-specific training), and medical surveillance. The list 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 numbers and directions will be maintained at the phone communications points and in each site vehicle.

Medical Data Sheets/Cards (maintained) - Medical Data Sheets will be filled out by on-site personnel and filed in a central location. The Medical Data Sheet will accompany any person with an injury or illness requiring medical attention to the medical facility. A copy of this sheet or a wallet card will be given to 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) - The results generated through personnel sampling (levels of airborne toxins, 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 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 this objective is accomplished.

13.0 GLOSSARY

ACGIH	American Conference of Governmental Industrial Hygienists
APR	Air Purifying Respirator
BTEX	Benzene, Ethylbenzene, Toluene, and Xylenes
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-Term Environmental Action Navy
CNS	Central Nervous System
CRZ	Contamination Reduction Zone
CTO	Contract Task Order
DoD	Department of Defense
DOT	Department of Transportation
DPT	Direct-Push Technology
EPA	Environmental Protection Agency
eV	Electron Volts
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
HSGM	Health and Safety Guidance Manual
HSM	Health and Safety Manager
IDW	Investigation-Derived Waste
LEL/O_2	Lower Explosive Limit/Oxygen
MDEQ	Mississippi Department of Environmental Quality
MSDS	Material Safety Data Sheet
MEK	Methyl Ethyl Ketone
NAVFAC SE	Naval Facilities Engineering Command Southeast
NCBC	Naval Construction Battalion Center
NIOSH	National Institute Occupational Safety and Health
NMBC	Naval Mobile Construction Battalion
NOAA	National Oceanic and Atmospheric Administration
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor)
PEL	Permissible Exposure Limit
PHSO	Project Health and Safety Officer

PID	Photoionization Detector
PPE	Personal Protective Equipment
SOP	Standard Operating Procedure
SSO	Site Safety Officer
STEL	Short Term Exposure Limit
TOM	Task Order Manager
TPH	Total Petroleum Hydrocarbons
TtNUS	Tetra Tech NUS, Inc.
TWA	Time Weighted Average

ATTACHMENT I

INJURY/ILLNESS PROCEDURE AND REPORT FORM

Insert pdf of I/I form

ATTACHMENT II

STANDARD OPERATING PROCEDURE
FOR
UTILITY LOCATING AND EXCAVATION CLEARANCE

INSERT SOP HERE .PDF FORMAT

ATTACHMENT III

SAFE WORK PERMITS

Attach Safe Work Permits here.

ATTACHMENT IV

MEDICAL DATA SHEET

MEDICAL DATA SHEET

This brief Medical Data Sheet will be completed by onsite personnel and visitors who are cleared and will enter defined areas of operation. The medical data sheets will be kept in a central location 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: NCBC Gulfport; CTO 0019 Site 3

Name: _____ Home Telephone: _____

Address: _____

_____

Age: _____ Height: _____ Weight: _____

Name of Next Kin: _____

Telephone Numbers: Home: _____ Work: _____ Cell: _____

Address _____

_____

Drug or other Allergies: _____

Particular Sensitivities: _____

Do You Wear Contacts? _____

Provide a Checklist of Previous Illnesses or Overexposure to Hazardous Chemicals Resulting in signs and symptoms of overexposure and/or the necessity for Medical Attention and/or First-aid: _____

_____

Do you have any medical restrictions? _____

Past Medical History/Review of Systems (Check if you have had positive history)

- ☐ Heart Conditions (chest pains, angina, heart attacks)
- ☐ Gastrointestinal Conditions (ulcers, liver, GI bleeding)
- ☐ Pulmonary(difficult breathing, coughing, asthma, pneumonia)
- ☐ Muscular/Skeleton (arthritis, fractures, etc.)
- ☐ Kidney/Urological Disorder (kidney stones, renal failure)
- ☐ Endocrine (thyroid, diabetes)
- ☐ Hematological (Clotting, anemia)
- ☐ Cancer
- ☐ Neurological (headache, dizzy, stroke CVA, TIA]
- ☐ Other (recent Illnesses, weight loss, fever, etc.)

Comments: (Please explain positive indications): _____

_____

Immunization History: Last Tetanus Shot or Booster (Date): _____ Pneumonia Vaccination (Date): _____

Flu Vaccination (Date): _____ Other: _____

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

_____

_____

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

Signature

Date

ATTACHMENT V

EQUIPMENT INSPECTIONS

APPENDIX C

TETRA TECH NUS STANDARD OPERATING PROCEDURES (SOPS)

STANDARD OPERATING PROCEDURES (SOPS)
LIST FOR SITE 3 WORK PLAN

TAB

1. ~~SA 1.2 - Surface Water and Sediment Sampling~~
2. GH 2.4 - In-Situ Hydraulic Conductivity Testing
3. GH 2.8 - Groundwater Monitoring Well Installation
4. SA 6.3 - Field Documentation
5. SA 1.1 - Groundwater Sample Acquisition and Onsite Water Quality Testing
6. CT 05 - Database Records and Quality Assurance
7. DV 03 – Data Validation – CLP Inorganics for Solid and Aqueous Matrices
   DV 01 - Data Validation – CLP Organics for Solid and Aqueous Matrices
8. HS 1.0 - Utility Locating and Excavation Clearance
9. SA 1.3 - Soil Sampling
10. CT 04 - Sample Nomenclature
11. ~~GH 3.2 - Magnetic and Metal Detection Surveys~~
12. ~~GH 3.1 - Resistivity and Electromagnetic Induction~~
13. GH 1.2 - Evaluation of Existing Monitoring Wells and Water Level Measurement
14. ~~SA 2.4 - Soil Gas Sampling~~
15. SA 7.1 - Decontamination of Field Equipment

APPENDIX D

DATA MANAGEMENT PLAN

1.0 Introduction

This document presents the DMP for NCBC Gulfport. The DMP describes the project-specific IMS, which consists of a relational database and Geographic Information System (GIS) that is being used to manage environmental information pertaining to the Base. The relational database stores chemical, geological, and hydrogeological data collected during environmental investigations. The GIS is built from the relational database and contains subsets of the larger data pool. Using the GIS, environmental data may be posted on base mapping to provide a spatial, graphical representation of the information. The GIS is used as a decision-making tool and to generate mapping for reports.

It is the responsibility of the Data Management Leader (DML) to populate and update the site-specific Data Catalog and distribute the most recent version to the project team. It is the responsibility of the TOM to ensure that the Data Catalog is accurate and current, and to notify the DML of any newly generated data that will support the needs of the project. It is the responsibility of the DML to update the TOM should any significant changes occur.

2.0 The Data Flow Process

Attachment 1 presents a flowchart describing, in general terms, the IMS data flow process from the analytical laboratory to the final end users. As shown, the data passes through the Sample Management Coordinator (SMC), the Data Validation Manager (DVM) and the DML before entering the master, project-specific database. This database is built and maintained using either Microsoft Access or SQL Server 7.0. The master database output is then routed into the GIS platform, which includes ArcView 3.2 and/or ArcInfo. In addition to database output, the GIS also accepts base mapping in many formats, including AutoCAD, Intergraph, DXF, and standard images formats. The GIS then generates output for various decision-making teams, report generation teams, Internet sites, and three-dimensional visualization using C-Tech's EVS Pro 3.0. Data contained within the relational database and GIS will be provided to third parties with prior approval from the Navy.

3.0 Project Planning

At the beginning of each task order, the TOM shall call a kick-off meeting to outline the data needs of the task order. Attendees to the kick-off meeting shall include the TOM, the Human Health Risk Assessment (HHRA) Leader, the FOL, the Project Chemist, the DML, and the GIS Leader (GISL). The DML shall distribute a copy of the data management checklist (Attachment 2) and shall guide the project team through its contents. The data management checklist allows the project team to determine how the data will be managed and manipulated in order to achieve the project needs and objectives.

The DML and GISL may prepare a Needs Assessment and DQOs outline for the project. The Needs Assessment identifies the short-term and long-term data needs for the project. The Needs Assessment and DQO outline describe who the decision makers are, integration of existing data, how data will be collected, how data will be used, and how data will be presented.

4.0 Newly Generated Data

When TtNUS is requested to collect new data at the project site, the TOM shall coordinate with the designated DML and GISL lead for the project. It is the responsibility of the FOL to comply with the sample and location nomenclature outlined in the site-specific work plan. It is also the responsibility of the FOL to coordinate with the GISL to ensure that all survey technical specifications are consistent with the underlying coordinate system in the GIS. The default coordinate system is State Plane Coordinate System - North American Datum (NAD) 1983 for the horizontal and National Geodetic Vertical Datum (NGVD) 1988 for the vertical. Other systems may be used if appropriate for the site.

Prior to field mobilization, the FOL shall coordinate with the SMC to initiate the sample tracking and database creation process. A list of sample numbers, location names, laboratory analyses, and bottle requirements should be provided to the SMC for entry into the sample tracking database. The SMC will print a paper copy of the sample jar labels for the FOL to review. When requested, the final version of the sample jar labels will be printed onto labels and provided to the FOL prior to field mobilization. An advance paper copy of the labels and sample tracking database should be forwarded to the analytical laboratory for pre-login into the Laboratory Information Management System (LIMS).

Once field sampling is underway, the FOL shall forward a copy of the Chain-of-Custody (COC) to the SMC via facsimile at the end of each day. It is the responsibility of the TOM to ensure that this communication is taking place. The SMC shall compare the entries on the COCs to the sample tracking database and enter the sample date and sample depth (for soil samples). In the event that the SMC discovers a discrepancy between the sample tracking database and the COC, the SMC shall contact the TOM and FOL to resolve the discrepancy. In the event that a field change has taken place, the FOL is required to complete the Field Change Notification Form. In addition, the SMC is required to inform the laboratory project manager that a field change has taken place.

According to the laboratory technical specifications, the laboratory is required to deliver the analytical data in the TtNUS standard Electronic Data Deliverable (EDD) format (Attachment 3). Particular attention should be paid to the EDD requirements for validated vs. non-validated data. All EDDs shall be delivered

to the SMC in the TtNUS Pittsburgh office. The SMC shall electronically query the EDDs against the sample tracking database to ensure that the laboratory has completed all samples and analyses. Once all samples and analyses have been accounted for, the SMC shall begin loading the analytical data into the relational database, which is located on the Local Area Network (LAN) in the TtNUS Pittsburgh office. The relational database structure is presented in Attachment 4. If the newly collected data are not to be validated, the relational database is created from the EDD. If the data are to be validated, the DVM shall print packages of data for each Sample Delivery Group (SDG) and analytical fraction (e.g., Volatile Organics) and distribute that package to the data validator. The data validator shall mark all data qualifiers and qualifier codes on the hardcopy printout and return to the DVM. The DVM will enter the data qualifiers and qualifier codes into the project database and print the final validated data for incorporation into the data validation letter. The DVM shall send an e-mail to the DML stating the data validation has been completed and the project database is complete and correct.

The DML and GISL shall coordinate with the TOM to outline the data and mapping requirements of the task. The DML shall create GIS-specific database tables as outlined in Attachment 5 and provide them to the GISL for loading into the ArcView-based Environmental GIS (EGIS). In order to ensure consistency, any and all changes or additions to the data shall be made in the project database only and filtered back into the GIS.

5.0 Historical Data

In the event that hardcopy historical data must be incorporated into the project database, the TOM shall inform the DML of the data requirements. The DML shall review the hardcopy data and prepare a summary of the samples and analyses that will be entered. The format of the summary table should be similar to the sample tracking database. It is the responsibility of the TOM to review the sample summary table and verify that the entry of these data satisfies the project requirements. The DML shall physically edit the hardcopy analytical data to clearly designate which information on the hardcopy will be entered into the database. Copies of the marked-up data must be distributed to two separate parties for entry into Excel spreadsheets. Upon completion of the dual-key entry, the DML shall electronically compare the two data files to identify discrepancies and correct the data appropriately. The database should then be queried against the sample summary table to ensure that all pertinent data have been entered and checked for accuracy.

The DML shall coordinate with the GISL to acquire locational coordinates for each of the sample locations that will be entered. Historical sample location maps should be used to digitize the sample locations onto the GIS base-mapping layer. To the extent possible, the GISL shall capture, as metadata, the accuracy

of the historical sample location maps used to digitize the location coordinates. If no sample location maps or other positional information exist for the historical data, the TOM should re-evaluate the utility of these data in the database.

6.0 Mapping and Graphics

The GIS will utilize a standard coordinate system. If mapping or graphics are provided in another coordinate system, they must be converted to the standard system prior to integration into the GIS. In addition to computer automated drafting and design (CADD) mapping, Digital Ortho Quarter Quads (DOQQs), Aerial Photography, and United States Geological Survey (USGS) 7.5 minute Quads may be obtained. As necessary, the images are warped to the predetermined coordinate system.

From survey data, sampling locations are organized, and then a sample-vs-location table is built. The sample locations are placed into standard database format, and then incorporated into the GIS.

7.0 Geographic Information System

All environmental data collected in support of the project shall be incorporated into the GIS. The GIS is based on ArcView 3.2 and/or ArcInfo software, developed by the Environmental Software Research Institute (ESRI). The data structure of the ArcView GIS is presented in Attachment 5.

The GIS will demonstrate multi-application functionality to allow for quicker access to the information it contains. In other words, the GIS will be customized to enhance the speed and ease with which the user may move through the system and extract relevant information. This customization may be achieved through a multi-application process that utilizes ArcView and/or other software packages. The Avenue programming language has been used to create a customized EGIS application to facilitate decision-making by non-GIS staff.

8.0 Assimilation of Data from Outside Sources

When environmental data are collected by a contractor other than TtNUS, it is the responsibility of the NAVFAC SE RPM to notify the TtNUS TOM. The RPM should forward a scope of work directing TtNUS to coordinate with the contractor and incorporate their data into the basewide database and GIS. To the extent possible, the RPM should direct the Navy Contractor to supply the data to TtNUS in the formats describe previously.

9.0 Software

TtNUS will standardize on the following software packages when managing and manipulating data for the NCBC Site 3 project:

Data Management - Microsoft Access, Visual FoxPro, and SQL Server 7.0
GIS - ArcView 3.2, ArcInfo, and ArcIMS
Geophysical Data Analysis - Geosoft Oasis Montaj
3-D Visualization – EVS Pro
Geostatistics - GeoPack
Groundwater Modeling - GMS
Classical Statistics - Statistica 5.1
Terrain Analysis - TerraModel 9.4.1
Internet GIS - ESRI ArcIMS (Internet Map Server) 3.0
Portable Document File (PDF) Generation – Adobe Acrobat Exchange

10.0 Storage of Data

TtNUS utilizes Microsoft Windows Server 2003 as its network management system. The file system is backed up on a daily basis, thereby disallowing more than one day of work being lost should an accident occur. The database management and GIS groups have been allocated distinct drives on the LAN.

ATTACHMENT 2

DATABASE CHECKLIST

Checklist (pg 1)

Checklist (pg 2)

Checklist (pg 3)

Checklist (pg 4)

Checklist (pg 5)

ATTACHMENT 3

ELECTRONIC DATA DELIVERABLE REQUIREMENTS FOR ANALYTICAL LABORATORIES

ELECTRONIC DATA FORMAT REQUIREMENTS

1.0 INTRODUCTION

The laboratory is to provide a compact disk (CD) containing separate text (TXT) files in the format specified in this Attachment. The electronic deliverable includes all environmental samples, sample dilutions, sample reanalysis, and laboratory quality control samples. **All entries in the electronic deliverable must agree exactly with the final entries reported on the hardcopy data package sample result summaries**. The LAB_RESULT for nondetects should be populated with sample quantitation limits. Any corrections made to the hardcopy data must also be made to the electronic file. Appropriate qualifiers as identified by the analytical protocol must also be designated; laboratory QC non-compliance codes are not to be depicted.

Each CD is to be properly labeled with the laboratory name, project name, file name(s), and laboratory point of contact. Electronic files should be delivered in the same fashion, as are the hard copy data packages. A separate .txt file shall be made for each analytical fraction (by method) and each SDG. The files shall be named with the first character being the analytical fraction designator, followed by an underscore, followed by the SDG name. For example, the file for the volatile fraction for SDG TT001 should be named V_TT001.TXT. Additionally, the laboratory must provide a hardcopy listing all electronic files saved to the CD, indicating what analytical fraction and matrix the file data contained therein pertain to. All electronic data deliverables are due within the same time established for the associated hardcopy data packages.

In addition, the laboratory QC officer must read and sign a copy of the Quality Assurance Review Form displayed on the next page of this Attachment. Electronic deliverables are not considered to be complete without the accompanying Quality Assurance Review Form.

I _____, as the designated Quality Assurance Officer, hereby attest that all electronic deliverables have been thoroughly reviewed and are in agreement with the associated hardcopy data. The enclosed electronic files have been reviewed for accuracy (including significant figures), completeness and format. The laboratory will be responsible for any labor time necessary to correct enclosed electronic deliverables that have been found to be in error. I can be reached at (area code)_____ if there are any questions or problems with the enclosed electronic deliverables.

Signature:_____ Title: _____ Date: _____

The analytical data shall be delivered electronically in an ASCII comma delimited (double quotes around text fields) text file (filename.txt). The exact structure of the database is described in the table below. It shall be the responsibility of the laboratory to ensure that all electronic entries are in strict accordance with the information provided on the Form I.

An example database shall be sent for review prior to the first electronic deliverable in .txt format. The example file will be examined for completeness and comments will be sent to the laboratory. Any questions regarding the electronic deliverable shall be directed to Ricky DePaul at Tetra Tech NUS (412) 921-7112.

DATA FIELD	DATA TYPE	FIELD WIDTH	DATA FIELD DESCRIPTION
SAMPLE_NO	C	25	Field sample ID as listed on the chain-of-custody. The sample number indicated in this field should never be truncated. The only exception for this field not matching the chain-of-custody is for reanalyses, dilution, and matrix spike results in which a RE, DL, or MS suffix will be added to the sample number respectively.
MATRIX	C	2	Matrix as indicated on the Chain of Custody.
COLL_METH	C	2	“G” (Grab) or “CP” (Composite) as indicated on the Chain of Custody.
LAB_ID	C	15	Laboratory number for the given sample.
LABORATORY	C	25	Laboratory name.
BATCH_NO	C	10	Laboratory code for batch of samples included in a given run.
ASSOC_BLNK	C	15	Laboratory name of the method blank associated with that particular batch of samples.
QC_TYPE	C	10	Normal Environmental Sample = “NORMAL”, Laboratory Duplicate = “DUPLICATE”, Matrix Spike = “MS”, Matrix Spike Duplicate = “MSD”, Laboratory Control Sample = “LCS”, Laboratory Control Sample Duplicate = “LCSD”, Method Blank = “M_BLANK”, Preparation Blank = “P_BLANK”.
RUN_TYPE	C	12	Initial, dilution 1, dilution 2, dilution 3, reanalysis 1, reanalysis 2, reanalysis 3
RES_TYPE	C	5	Surrogate Recoveries = “SUR”, Target Compound = “TRG”, Internal standards = “IS”, Tentatively Identified Compounds = “TIC”
SAMP_DATE	D	8	Date of sample collection as indicated on the Chain of Custody. Example: 11/07/93.
SAMP_TIME	T	5	Time of sample collection as indicated on the Chain of Custody. Reported as five character string.
REC_DATE	D	8	Date sample was received by the laboratory.
EXTR_DATE	D	8	Date sample was extracted or prepared by the laboratory.
ANAL_DATE	D	8	Date sample was analyzed by the laboratory.

DATA FIELD	DATA TYPE	FIELD WIDTH	DATA FIELD DESCRIPTION
RUN_NUMBER	N	2 (0)	The number of the analytical run for a given sample in sequence. For example, if a sample is diluted and reanalyzed, the original run number would be 1 and the reanalysis would be 2.
SDG	C	15	Sample delivery group identifier assigned by the laboratory. This number should exactly match the SDG designated on the hardcopy data package.
PROJECT_NO	C	10	Identification of Project Number or Contract Task Order (CTO) number.
PROJ_MNGR	C	25	The Tetra Tech NUS Project Manager's last name, followed by a comma, followed by the first initial of the Project Manager. Example: HUTSON, D.
PARAMETER	C	45	Chemical or analyte name exactly as reported on Form I.
CAS_NO	C	10	Chemical Abstract Service number for the parameter listed. The CAS number should be reported exactly as it is listed in publications such as the Merck Index. This field should be left blank for those parameters not having CAS numbers (e.g., Total Organic Carbon).
FRACTION	C	8	Metals = 'M', Volatiles = 'OV', Semivolatiles/BNAs = 'OS', Pesticides = 'PEST', Herbicides = 'HERB', Polychlorinated Biphenyls = 'PCB', Explosives = 'EXP', Any petroleum hydrocarbon or fuel = 'TPH', Radionuclide = 'RAD', Miscellaneous = 'MISC', Dioxin/Furans = 'DIOX
SORT	C	5	Leave this field blank. To be filled in by Tetra Tech NUS, Inc.
EXTR_METH	C	20	Extraction method used. Example: '5035' for SW-846 Method 5035.
ANAL_METH	C	20	Analytical method used to quantitate parameter concentrations as listed in the laboratory technical specification. Example: 8270C for SW-846 Method 8270C.
LAB_RESULT	N	20	Reported value in units specified in the UNITS field containing the proper number of significant digits. Nondetects must be reported as sample quantitation limits (i.e., reporting limits adjusted for sample volume, percent moisture, and dilution factors as appropriate). **The % Recovery for matrix spikes, laboratory control samples, and surrogates shall ALSO be placed in this field.**
UNITS	C	5	The units of measure as reported on the Form I.
LAB_QUAL	C	2	The laboratory qualifier as reported on the Form I. For example, a 'U' qualifier should be used for all nondetected results.
IDL	N	15 (6)	Instrument detection limit in units specified in the UNITS field.
MDL	N	15 (6)	Method detection limit in units specified in the UNITS field and method specified in the METHOD field.
CRDL_CRQL	N	15 (6)	Contract Required Detection/Quantitation Limit in the units specified in the UNITS field. RDL for non-CLP parameters.

DATA FIELD	DATA TYPE	FIELD WIDTH	DATA FIELD DESCRIPTION
DIL_FACTOR	N	6 (1)	Dilution factor.
PCT_MOIST	N	5 (1)	Percent moisture for soil samples; blank for water samples.
RET_TIME	T	10	Retention time of analyte. Required for TICs. Format requested as HHHH:MI:SS (e.g., 1 day - 1 hr -10 min as 25:10:00)
COMMENTS	C	20	Analytical result qualifier or comment other than that listed in the LAB_QUAL field. Example: 'Reanalysis'.

C = Character string (everything shall be reported in capital letters)
N = Numeric string (decimal places are in parentheses in field width column)
D = Date (Ex: 010/07/04)
T = Time HHHH:MI:SS (e.g. 1 day - 1 hr -10 min as 25:10:00)

ATTACHMENT 4

DATABASE STRUCTURE

ATTACHMENT 5

ARCVIEW GIS DATA STRUCTURE

1.0 INTRODUCTION

This document describes the table structures and field descriptions of the database used in the Environmental Geographic Information System (EGIS). Electronic data interchange (EDI) tools can improve the quality and timeliness of data exchange, establish consistent methods, streamline processes and procedures, and reduce costs while increasing the effectiveness information. As part of this effort the EGIS was designed by TtNUS to combine the power and versatility of a relational database management system and a user-friendly GIS interface. The EGIS allows integration of a facility's environmental information with real-world images and drawings. This accessibility provides easy, real-time access to an organization's environmental data.

2.0 TABLE STRUCTURES

The EGIS database table structures are defined and discussed below in Tables 2.1 – 2.3. This information is provided for users who want to manipulate the data beyond the EGIS application, using another database or application.

TABLE 2.1

FILE STRUCTURE AND DEFINITIONS FOR PROJECT

The Project document is a single dBASE file containing specific information about the project.

FIELD	FIELD TYPE	DESCRIPTION
Facility	Character (80)	Name of the facility concatenated with "– Environmental Geographic Information System (EGIS)". For ArcView 3.x, this name will also be displayed in the EGIS *Title Bar*.
View	Character (40)	Name of the facility the analytical data or spatial layer is associated with. For ArcView 3.x, this will also be the name of the *View* document.
Name	Character (40)	Name of the analytical data or spatial layer as it will appear in the ArcView 3.x or ArcGIS Table of Contents (TOC).
Source	Character (80)	Directory path of the analytical data or spatial layer.
Tag	Character (20)	Type of analytical data or spatial layer. Label as *img* for reference raster layer, *ref* for reference vector layer, *ltbl* for location table, *rtbl* for results table, or leave blank for default raster and vector spatial layers presented during initial startup.
Order	Numeric (20,5)	Order from top to bottom in which analytical data and spatial layers will appear in the TOC. Label from *1* through *n.*
Maxscale	Numeric (20,5)	Maximum scale at which the analytical data or spatial layer should be displayed. Label as *0* for no restriction or as *n* for appropriate scale.
Minscale	Numeric (20,5)	Minimum scale at which analytical data or spatial layer should be displayed. Label as *0* for no restriction or as *n* for an appropriate scale.
Visible	Numeric (20,5)	Boolean to determine default display in the TOC for analytical data or spatial layer during initial startup. Label as *0* for 'off' and *1* for 'on'.

TABLE 2.2

FILE STRUCTURE AND DEFINITIONS FOR LOCATIONS

The locations file structure format used to develop dBASE tables containing location information for specific sample matrices. Each unique matrix has its own unique table (i.e., loc_gw.dbf, loc_so.dbf, etc.)

FIELD	FIELD TYPE	DESCRIPTION
LocID	Character (25)	The commonly used unique identification of each location
Northing	Numeric (15,4)	Northing (Y) Coordinate System location for each LocID point
Easting	Numeric (15,4)	Easting (X) Coordinate System location for each LocID point
GElevation	Numeric (10,4)	Ground surface elevation (MSL) of LocID
Type	Character (4)	Indicates the type of location by the LocID
Status	Character (15)	Indicates if a well is Active or Abandoned
Surveyed	Character (1)	Indicates if a well was professionally surveyed.
Site	Character (25)	The designated site number
LocAlias	Character (25)	An alternative identification for LocID

TABLE 2.3

FILE STRUCTURE AND DEFINITIONS FOR RESULTS

The results file structure format used to develop dBASE tables containing result information for its perspective sample location matrix (i.e. res_gw.dbf, res_so.dbf, etc.).

FIELD	FIELD TYPE	DESCRIPTION
LocID	Character (25)	The commonly used unique identification of each location.
SampleID	Character (35)	Unique identification number for each distinct sample collected in the field, for a specific sampling day or episode.
SampleCode	Character (4)	Code for identifying sample types (i.e. Trip Blanks, Field Duplicates, etc.)
CAS	Character (12)	Chemical Abstract Service number.
Parameter	Character (50)	Indicates the analyte, parameter or chemical name for which results are being presented.
Result	Character (20)	Result, concentration, or value of the analyte, parameter or chemical in a numeric format.
Qualifier	Character (3)	Validation qualifier
Unit	Character (5)	Unit of measurement for the Result.
Detect	Character (1)	Identifies if a result is a detect, non-detect or rejected result.
ParaClass	Character (10)	Chemical class or fraction type.
ResType	Character (5)	Identifies a parameter as being a target analyte, surrogate, etc.
Matrix	Character (40)	Indicates the matrix represented by the sample.
RepRes	Character (1)	Indicates if a results is a reportable result.
DepthTop	Numeric (10,4)	Depth to the top of the sample, measured from ground surface.
DepthBot	Numeric (10,4)	Depth to the bottom of the sample, measured from ground surface.
DepthStat	Character (10)	Indicates if the sample depth has been excavated.
SampleDate	Date	The date the sample was collected in the field
ProjDesc	Character (50)	Interval description of sample data collected within a finite period of time. For multiple rounds of sampling, this field may contain the year and round number (i.e. 20001)
CollMeth	Character (10)	Identifies the collection method of the sample.
DataSrc	Character (35)	Code for reference to field duplicates.