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FINAL WORK PLAN FOR REMEDIAL INVESTIGATION SITE 5 NCBC GULFPORT MS
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TETRA TECH NUS

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FINAL WORK PLAN
For
REMEDIAL INVESTIGATION
At SITE 5,
HEAVY EQUIPMENT TRAINING AREA,
NAVAL CONSTRUCTION BATTALION CENTER
GULFPORT
GULFPORT, MISSISSIPPI

Southern Division
Naval Facilities Engineering Command
Contract Number N62467-94-D-0888
Contract Task Order 0156

June 2001

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ACRONYMS AND ABBREVIATIONS

BLS	Below Land Surface
CADD	Computer Automated Drafting and Design
CLEAN	Comprehensive Long-Term Environmental Action, Navy
COC	Chain-of-Custody
DDT	1,1,1-Trichloro-2,2-bis(p-chlorophenyl)ethane
DOQQ	Digital Ortho Quarter Quads
DQO	Data Quality Objective
DVC	Data Validation Coordinator
EDD	Electronic Data Deliverable
EGIS	Environmental Geographic Information System
EISOPQM	Environmental Investigations Standard Operating Procedures and Quality Assurance Manual
EM	Electromagnetic
FID	Flame Ionization Detector
FOL	Field Operations Leader
FS	Feasibility Study
GIS	Geographic Information System
GPR	Ground Penetrating Radar
HASP	Health and Safety Plan
HHRA	Human Health Risk Assessment
IDW	Investigation Derived Waste
IMS	Information Management System
IR	Installation Restoration
LAN	Local Area Network
LIMS	Laboratory Information Management System
MCL	Maximum Contamination Level
MDEQ	Mississippi Department of Environmental Quality
MEK	methyl ethyl ketone
NAD	North American Datum
NCBC	Naval Construction Battalion Center
NGVD	National Geodetic Vertical Datum
NTUs	nephelometric turbidity units
PID	Photo Ionization Detector

QAPP	Quality Assurance Project Plan
RBCVs	Risk-Based Concentration Values
RI	Remedial Investigation
RPM	Rëmedial Project Manager
SAP	Sampling and Analysis Plan
SDG	Sample Delivery Group
SMC	Sample Management Coordinator
SOUTHDIV	Southern Division
SOW	Statement of Work
SUs	Standard Units
SVOC	Semivolatile Organic Compound
TAL	Target Analyte List
TCDD	Tetrachlorodibenzo-p-dioxin
TCL	Target Compound List
TFMR	Technical Financial Monthly Reports
TOM	Task Order Manager
TSSDS	Tri-Service Spatial Data Standards
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VOC	Volatile Organic Compound
TtNUS	Tetra Tech NUS

1.0 INTRODUCTION

Tetra Tech NUS (TtNUS) is under contract to the U. S. Department of the Navy, Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM). This Remedial Investigation Work Plan was prepared for the Naval Construction Battalion Center (NCBC) in Gulfport, Mississippi. This Work Plan was prepared under the comprehensive Long-term Environmental Action Navy (CLEAN III), Contract No. N62467-94-D-0888.

The Statement of Work (SOW) #172, Revision A dated September 15, 2000 requests that TtNUS conduct:

- Development of a Sampling Plan
- Remedial Investigation (RI) at Site 5
- Delineation of the groundwater dioxin plume in the southwest portion of Site 5
- RI Report
- Action Memorandum

This RI Work Plan describes the activities involved in the field investigation. The purpose of this Work Plan is to guide the efforts to identify and delineate impacted environmental media at Site 5, Heavy Equipment Training Area. The following sections outline the site history, objectives, purpose, and scope of the RI Work Plan.

2.0 SITE BACKGROUND AND HISTORY

NCBC Gulfport is located in the western part of the city of Gulfport, in the southwestern corner of Mississippi, Harrison County, approximately 2 miles from the Gulf of Mexico (Figure 2-1). The base occupies 1,100 acres and has an average elevation of 30 feet above mean sea level, an exception being linear piles of bauxite stored at the base. These piles range from 30 to 40 feet above the grade of the base.

Site 5 is a former 8.5 acre landfill located approximately 200 feet west of the intersection of 4th Street and Colby Avenue, in an area currently used for heavy equipment training (Figure 2-2). The landfill was operated from 1972 until 1976 and was the only operating landfill on the base at that time. However, during that period, a private contractor was disposing of most of the solid waste being generated at the base at an off base landfill. The landfill was a trench and fill operation (Naval Energy and Environmental Support Activity (NEESA), 1985)).

The operation of this landfill coincided with the storage of herbicide orange at Site 8 and reports indicate that drums of 1,1,1-Trichloro-2,2-bis(p-chlorophenyl)ethane (DDT) and other liquid wastes were disposed of in the Site 5 landfill. An estimated 6000 cubic yards of solid waste and an unknown quantity of liquid wastes were disposed of at Site 5 by a trench and fill operation, typically accompanied by incineration prior to backfilling. Solid wastes disposed of in this landfill include solid dumpster waste and approximately 12 pounds of powder DDT. Liquid wastes included 50 to 100 55-gallon drums of liquid DDT, fuels, oils, solvents (MEK, Toluene, and xylene), paints, and paint thinners. Following operations, the site was covered with four to six feet of fine to medium grained sand. Figure 2-3 represents a conceptual site model for Site 5.

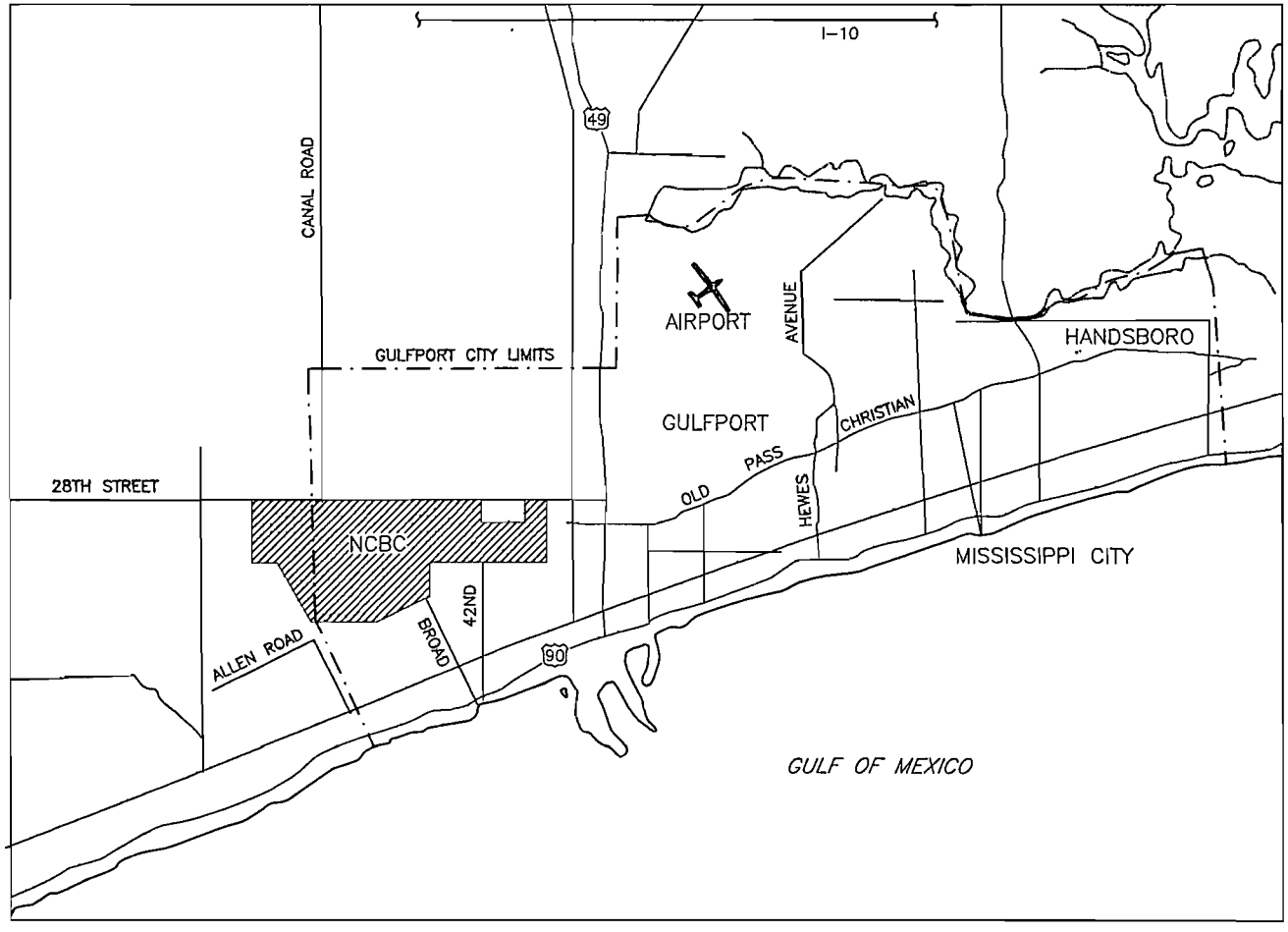

FIGURE 2-1

VICINITY MAP

REMEDIAL INVESTIGATION
WORK PLAN

NAVAL CONSTRUCTION
BATALLION CENTER
GULFPORT, MISSISSIPPI

NOT TO SCALE

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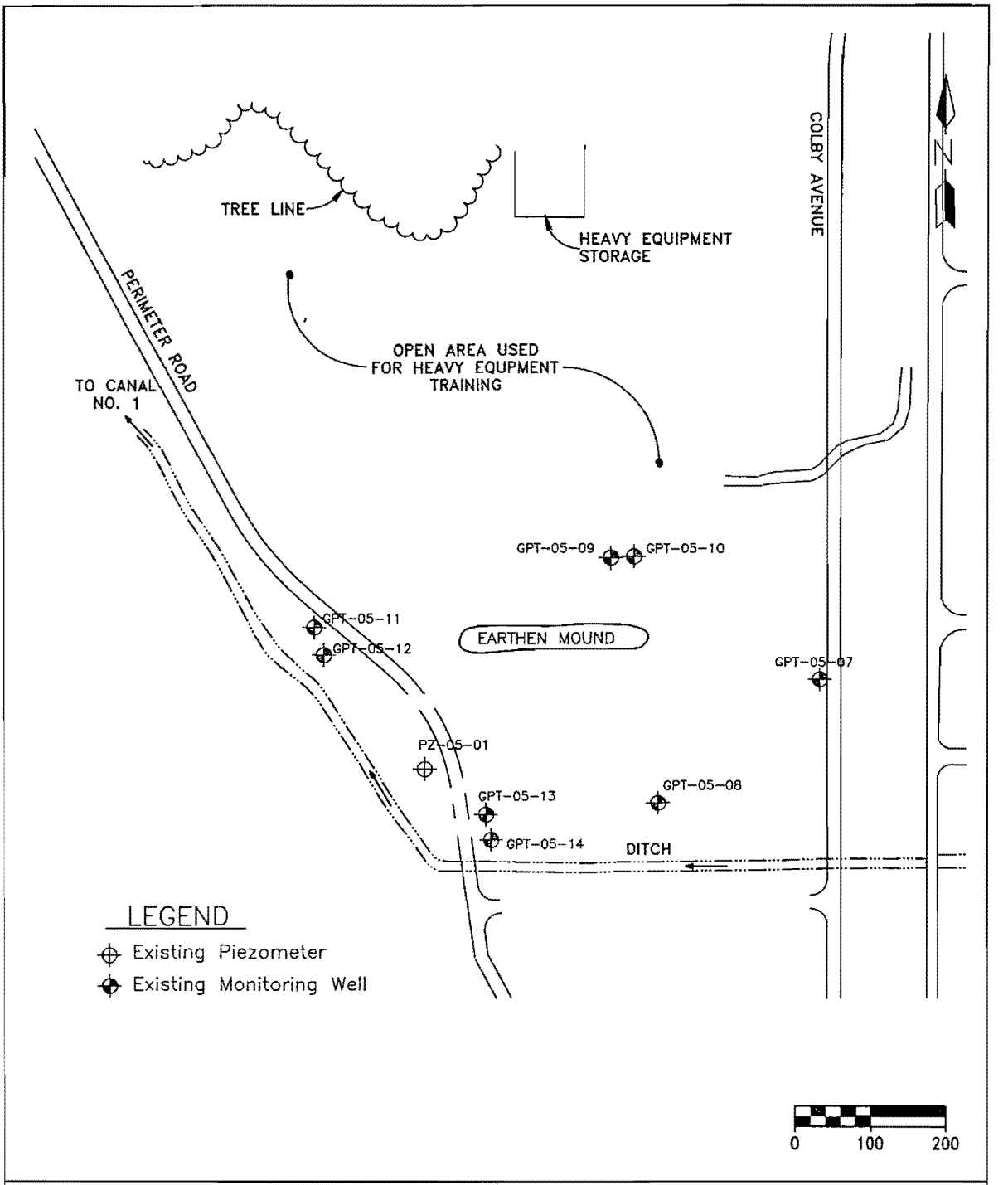

FIGURE 2-2

SITE 5
HEAVY EQUIPMENT TRAINING AREA

REMEDIAL INVESTIGATION WORK PLAN

NAVAL CONSTRUCTION BATALLION CENTER
GULFPORT, MISSISSIPPI

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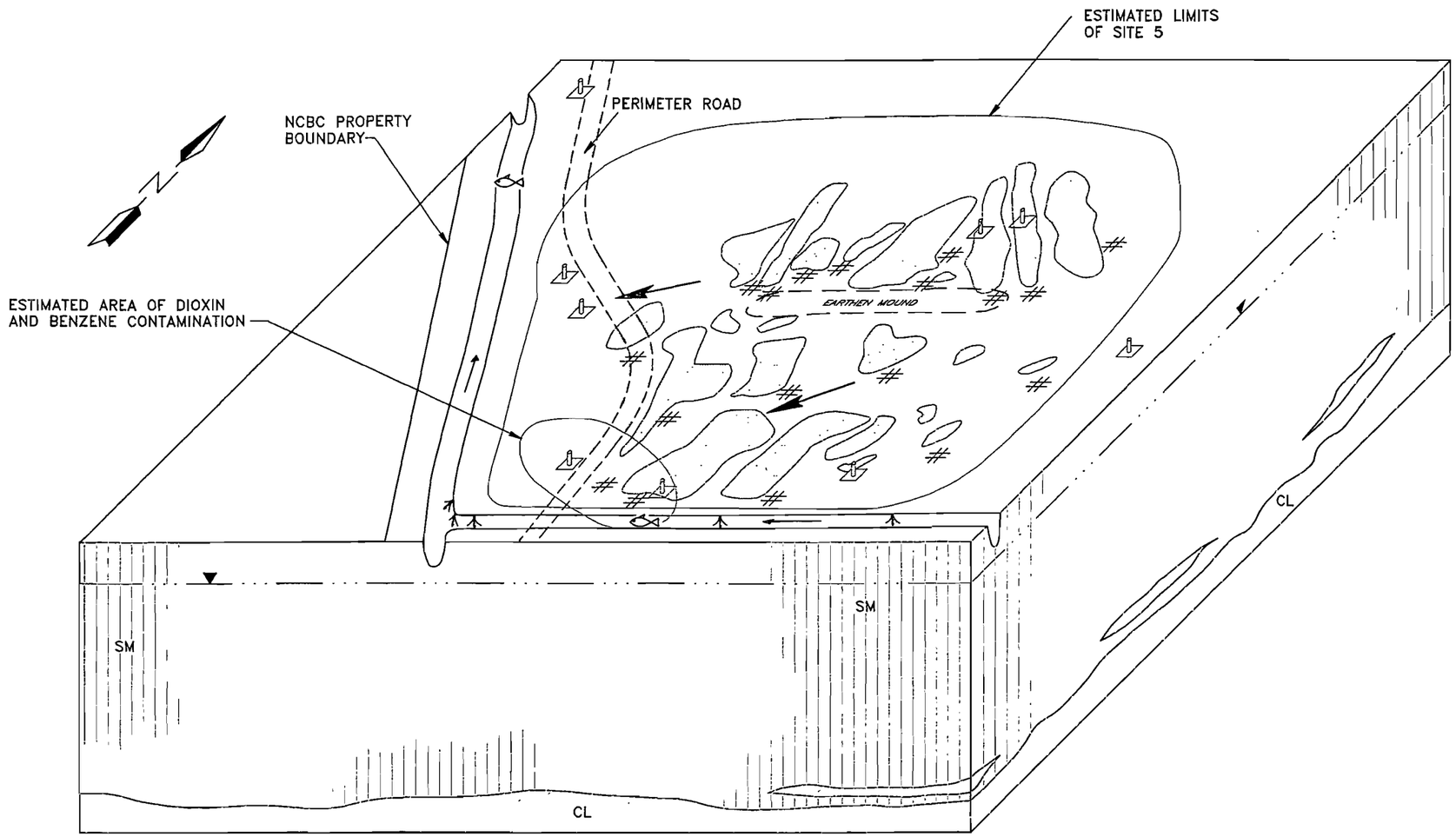

EXPLANATION

- MONITORING WELLS
- SURFACE WATER FLOW DIRECTIONS
- GROUNDWATER FLOW DIRECTION
- GROUNDWATER LEVEL
- CL — INORGANIC CLAY OF LOW TO MEDIUM PLASTICITY WITH VARYING AMOUNTS OF SAND AND SILT
- SM — FINE AND MEDIUM SAND WITH SOME SILT
- ELECTROMAGNETIC (EM) ANOMALIES
- BIOTA
- DEBRIS

NOTE: GENERALIZED SOIL PROFILE NOT TO SCALE

SOURCES AND POTENTIAL RELEASE

* SOME BASE SOLID WASTE, 12 LBS. OF POWDERED DDT
* LIQUID WASTES (DRUMMED AND UNDRUMMED)
  - FUELS, OILS, SOLVENTS (MEK, TOLUENE, XYLENE), PAINTS, AND PAINT THINNERS
  - 50 TO 100 55-GALLON DRUMS OF DDT
  - REPORTEDLY 55-GALLON DRUMS OF HERBICIDE ORANGE

CONTAMINANT MIGRATION PATHWAYS

* POTENTIALLY CONTAMINATED GROUNDWATER FLOWING TO THE WEST-SOUTHWEST
* SEEPS AT THE EDGE OF THE LANDFILL FLOWING INTO CANAL NO. 1
* SURFACE WATER AND SEDIMENT IN DITCHES FLOWING NORTH INTO CANAL NO. 1

RECEPTORS (PHYSICAL AND BIOLOGICAL)

* SOIL AND GROUNDWATER AT SITE 4
* SURFACE WATER AND SEDIMENT IN DITCHES LEADING AWAY FROM SITE
* ORGANISMS THAT LIVE OR FEED IN THE DITCHES

FIGURE 2-3

SITE CONCEPTUAL MODEL
SITE 5

REMEDIAL INVESTIGATION WORK PLAN

NAVAL CONSTRUCTION BATALLION CENTER
GULFPORT, MISSISSIPPI

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3.0 PREVIOUS INVESTIGATIONS

The following is a presentation of the previous investigations that have taken place at Site 5 from the Initial Assessment Study through the latest investigation, Groundwater Monitoring.

1985 NEESA - *Initial Assessment Study of NCBC Gulfport* - Identified and assessed sites posing a potential threat to human health and the environment. They conducted,

1. A records search
2. On-site survey, including geophysics to define site boundaries
3. Site ranking
4. Outline for Confirmation Study

1987 Harding Lawson Associates, *Confirmation Study* - Collected surface water, groundwater, and soil samples at locations on the south and west sides of Site 5, under the assumption that surface water and groundwater flowed south. This assumption was incorrect, resulting in up- or cross-gradient groundwater samples that yielded no contaminants above action levels at that time.

1995 ABB-ES, *Surface Water and Sediment Delineation Study* - Surface water, sediment, seep, and groundwater samples were collected from the ditches in and around the site. Dioxins were detected at concentration ranging from 39.1 parts per quadrillion (ppq) up to 42 ppq in water samples as well as several volatile organic compounds (VOC) and semivolatile organic compounds (SVOCs) at levels below maximum contamination levels (MCLs) or RBCVs (risk based concentration values). Groundwater potentiometric surface maps confirmed that groundwater generally flowed to the northwest, and not to the south as had been previously assumed.

1997 Morrison-Knudsen – conducted direct push sampling of soil and groundwater near magnetic anomalies identified during a geophysical investigation. The study found levels of arsenic above Tier 1 Risk Screening levels for soil, and low levels of dioxins and furans but no TCDD.

1998 Harding Lawson Associates - *Groundwater Monitoring Report* - A more in depth study of groundwater conditions at Site 5, with a focus on the potential for dioxins and furans. Dioxin levels at the southern end of the site were as high as 80 ppq; well above the MCL of 30 ppq. Several other groundwater samples from monitoring wells in the area were above the MCL as well, and it was recommended that a complete delineation of the dioxin plume be completed. Additionally, in one groundwater sample, benzene (6 ppb) was detected at a concentration above the MCL and two other chemicals, 1,4-dichlorobenzene (1 part per billion (ppb)) and total naphthalene (20 ppb), were detected above the USEPA Region III RBCVs (USEPA, 1999).

4.0 WORK PLAN RATIONALE

The following sections will discuss the objectives of the RI and the approach that will be taken to realize these objectives.

4.1 DATA QUALITY OBJECTIVES

The Data Quality Objectives (DQOs) are selected based on the purpose for which the data generated from the sampling effort is to serve. DQO selection will then be the main factor in the determination of what types of samples are to be collected, the types of equipment to be used and the analytical requirements (USEPA EISOPQAM 1997). The DQOs for Site 5 are presented in Section 4.0 of the Quality Assurance Project Plan (QAPP) for the Site (Appendix B).

4.2 WORK PLAN APPROACH

The goal of this RI is to collect the data needed to fill data gaps left by the previous investigations in order to more fully define the nature and extent of any contaminants at Site 5. A geophysical survey using ground-penetrating radar (GPR) will be conducted to further investigate electromagnetic (EM) anomalies identified during previous investigations. It is believed that one or more of these anomalies might represent the 50 to 100 drums of DDT that were reportedly buried there. A geophysical survey will also be conducted in the southwest corner of the site to assess the potential sources of the dioxin plume previously identified in that area, and to identify the extent of dioxin contaminated groundwater. The direct push sample locations will be iteratively determined based on the results of this geophysical survey. These locations will be placed around the anomalies with the highest potential for representing the buried drums. The results from the direct push sampling will then be used to aid in finalizing the locations of the monitoring wells.

5.0 FIELD INVESTIGATION

The following sections describe the activities associated with the proposed field investigation for the RI at Site 5.

5.1 MOBILIZATION

Field mobilization activities will take place over a four-day period and will include travel and onsite preparatory activities. These activities will include the marking of sample locations; the receiving, storage and testing of field equipment; initiation of the field data management system (computer database and filing system); and the marking of the primary magnetic anomalies at Site 5.

5.2 FIELD DOCUMENTATION

Field Logbooks

Dedicated field logbooks will be used to record pertinent field activities. The project manager's name, the FOL's name, the project name and location, and the project number will be recorded on the inside front cover of all logbooks. Entries will be recorded with waterproof, non-erasable ink. Each page of the logbook will be numbered, dated, and signed. All entries must be legible and contain accurate and complete information about 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 other inappropriate language. Corrections should be made by drawing a single line through the error and entering the correct data. All corrections will be initialed and dated.

Sample labels

Sample labels will be completed with waterproof, non-erasable ink and will contain the following information:

- Project number
- Sample ID
- Date and time of sample collection
- Designation of sample as a grab or composite

- Sample type (soil, groundwater, etc.)
- The signature of the sampler(s)
- Indicate whether sample is preserved or unpreserved
- Analyses to be performed

Once completed the label will be placed on the appropriate sample container and covered with clear packing tape to help protect the label.

Location/Sample Nomenclatures

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 location type (i.e., DP – direct push, MW – monitoring well). The next two will indicate the Site, 05 for Site 5 and the final two digits will simply be a sequential number, a 01 would indicate that the location was the first of that type installed during the investigation. The only exception to this will be for co-located surface water/sediment sample locations. Because these locations, for all intents and purposes, will have the exact same coordinates, and because the database will not allow two locations with the same coordinates, one location ID will be assigned for the two locations.

Examples:

DP-05-02 would indicate

- A direct push location
- At Site 5
- The second direct push location drilled

MW-05-01 would indicate

- A monitoring well location
- At Site 5
- The first monitoring well location drilled

SWD-01-03 would indicate

- A co-located surface water/sediment location
- At Site 5
- The third location sampled

Sample IDs will consist of nine alphanumeric characters. The first six will represent the location ID without the dashes. The next one will represent the sample matrix as shown in Table 5-1. The last two will be a sequential number representing the sequence of collection for a particular matrix from a particular location. As mentioned above, the only exception to this will be for co-located surface water/sediment sample locations.

TABLE 5-1

SAMPLE MATRIX CODES

Matrix	Code
Groundwater	G
Surface Water	W
Seep	P
Subsurface Soil	S
Surface Soil	C
Sediment	D

Examples:

DP0501G01 will indicate

- The sample was collected from DP-05-01
- This is a groundwater sample (G)
- This was the first groundwater sample collected from this location (01)

MW0502S02 will indicate

- The sample was collected from MW-05-02
- This is a subsurface soil sample (S)
- This was the second subsurface soil sample collected from this location (02)

SWD0503D01 will indicate

- The sample was collected from SWD-05-03
- This is a sediment sample (D)
- This was the first sediment sample collected from this location (01)

5.3 UTILITY CLEARANCE

Base personnel will conduct utility clearance at all required locations. All intrusive sample locations will be cleared by reviewing existing records and with magnetic location devices. Once cleared, each location will be clearly marked (i.e., wooden stake, pin flag, etc) indicating that the location has been cleared for underground utilities. The Field Operations Lead (FOL) will accompany the Base utility clearance personnel to the Site to review any restrictions to drilling and monitoring well installation activities.

5.4 GEOPHYSICAL SURVEY

Ground penetrating radar (GPR) will be used to investigate the possible presence of buried drums at Site 5 – Heavy Equipment Training Area at the Naval Construction Battalion Center, Gulfport, Mississippi. Historical information suggests that drums containing solid and liquid waste may be buried at this site. The area was previously investigated using geophysical EM methods (Geosphere Midwest, 1995). EM31, EM34, and EM61 instruments were used to survey the site and the investigation identified several anomalous areas that could contain buried drums. The targets of interest are assumed to be relatively large numbers of drums (50 to 100) buried near the surface in close proximity to one another.

GPR will be used to further investigate the EM anomalies previously identified. In addition, this method will be used to investigate possible buried sources of a known dioxin plume in shallow groundwater.

GPR uses remote sensing methods that rely on the presence of contrasts in the physical characteristics of the target and the surrounding material. The GPR devices can only detect targets such as buried drums, where significant contrasts in the electrical properties of these targets (signal) and the surrounding soil or fill (noise) exist. Fill materials that contain metallic debris, such as steel reinforced concrete, may have similar electrical properties to the target resulting in an inability to identify the possible presence of buried targets. The presence of metal buildings, existing fences, pumps, and metal objects may mask the presence of drums located near them. The electromagnetic field surrounding overhead and buried power lines may also produce significant noise that could potentially mask the presence of buried targets.

The first task of the survey will involve laying out the field grid for data collection. 25-foot line spacing will be used for the GPR traverses. GPR data will be collected along traverses oriented parallel and perpendicular to the long axes of the EM anomalies and the dioxin plume. The grid locations, marked with polyvinyl chloride (PVC) pin flags, will be positioned over the site using compass and tape measure. The previously identified EM anomalies and the dioxin plume will be located in the field during mobilization.

A Trimble PRO XR or XRS global positioning system (GPS) unit will be used to determine the grid locations and any other locations determined to be important in the field (e.g., control points or GPR anomalies).

A GSSI System 2 GPR equipped with both 300 and 400 megahertz (MHz) transducers will be used to investigate the previously identified EM anomalies. GPR techniques are based upon the rapid and repetitive transmission of EM signals (pulses) generated from the device's transducer and propagated into the subsurface. The transmitted EM signal travels through the subsurface and is reflected at interfaces where contrasts in the dielectric permittivity (a function of electrical conductivity) of the media are present. Interfaces where GPR reflections occur include changes in soil mineralogy, soil texture, moisture content, or the presence of a buried man-made feature such as a utility, pipe, or drum. The reflected portion of the transmitted EM signal is received by the device's transducer. The two-way travel time and reflected signal amplitude versus the horizontal distance the instrument traveled are displayed on the output of the instrument.

The time it takes a GPR signal to travel from the transducer, reflect off of a target, and return to the transducer is called the two-way reflection time. Two-way reflection times are displayed in units of nano-seconds and vary depending on the electrical properties of the subsurface materials. As the subsurface material's permittivity increases, the two-way travel time increases and the velocity of the GPR signal decreases. Areas of clayey soils, fill, shales, or saline groundwater have high dielectric permittivities, relatively long two-way reflection times, and slow velocities. GPR signals in these materials also attenuate rapidly, limiting the depths of investigation. Conversely, dry sandy soils have low dielectric permittivities that result in relatively short two-way reflection times and fast GPR signal velocities. The depth of investigation is often much greater in dry sandy soils relative to clayey soils.

GPR data will be collected by dragging the transducer across the area of interest at a slow walking pace or towing the transducer behind a vehicle such as a minivan. The color display will be continuously monitored during data collection so that anomalously high amplitude reflections can be delineated. Anomalies will be marked with pin flags and/or marker paint. In addition, data will be stored digitally for subsequent interpretation and presentation. Some areas may require additional data coverage to further investigate the site features.

GPR equipment can not be used in the rain. Therefore, fieldwork will be delayed in the event of rainy weather. Because saturated surface soils will also tend to attenuate the radar signal, thereby reducing the depth of penetration, fieldwork may be delayed immediately after significant rainfall events.

5.5 DIRECT PUSH SAMPLING

Approximately 20 direct push borings will be installed at the Site to a total depth of 18 feet below land surface (BLS) for the collection of sub-surface soil and groundwater samples. The approximate locations are shown on Figure 5-1 and will be finalized in the field by the FOL based on the results of the geophysical survey, site conditions and the results of the utility clearance. The following sections describe the methods to be used for the collection of these samples.

5.5.1 Subsurface Soil Sampling

A total of 20 sub-surface soil samples will be collected from direct push locations. Approximately 16 sub-surface soil samples will be collected and analyzed for the parameters listed in Table 5-2. Approximately four sub-surface soil samples will be collected from within a previously identified area of dioxin contamination in the southwest corner of the site for analysis of the parameters listed in Table 5-2. Soil samples collected from outside this area of dioxin contamination will be located adjacent to the primary EM anomalies on the site. Soil samples will be collected continuously at select locations from ground surface to the top of the water table. Samples will be collected in acetate sleeves approximately 12-inches in length. Once at the surface, three inches of the tube will be cut off and the sample extruded into a plastic baggie and sealed. The baggie will be labeled with the boring identification, the sample depth and the time of collection. This portion of the sample will be set aside and allowed to sit for approximately 20 minutes. A headspace measurement will then be collected by inserting the tip of the PID or FID probe into the baggie and recording the reading (USEPA Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM), 1997). The remaining portion of the sample will be capped and labeled with the boring identification, date and time of collection, and sample depth. The sample will then be placed in a plastic bag, sealed and placed in a cooler on ice. The sample from the vadose zone exhibiting the highest headspace reading will be placed in sample containers and sent to a fixed base laboratory for analysis. The unused samples will be placed in a container with any other IDW generated at that location. The subsurface soil samples will be analyzed for the full suite of parameters listed in Table 5-2.

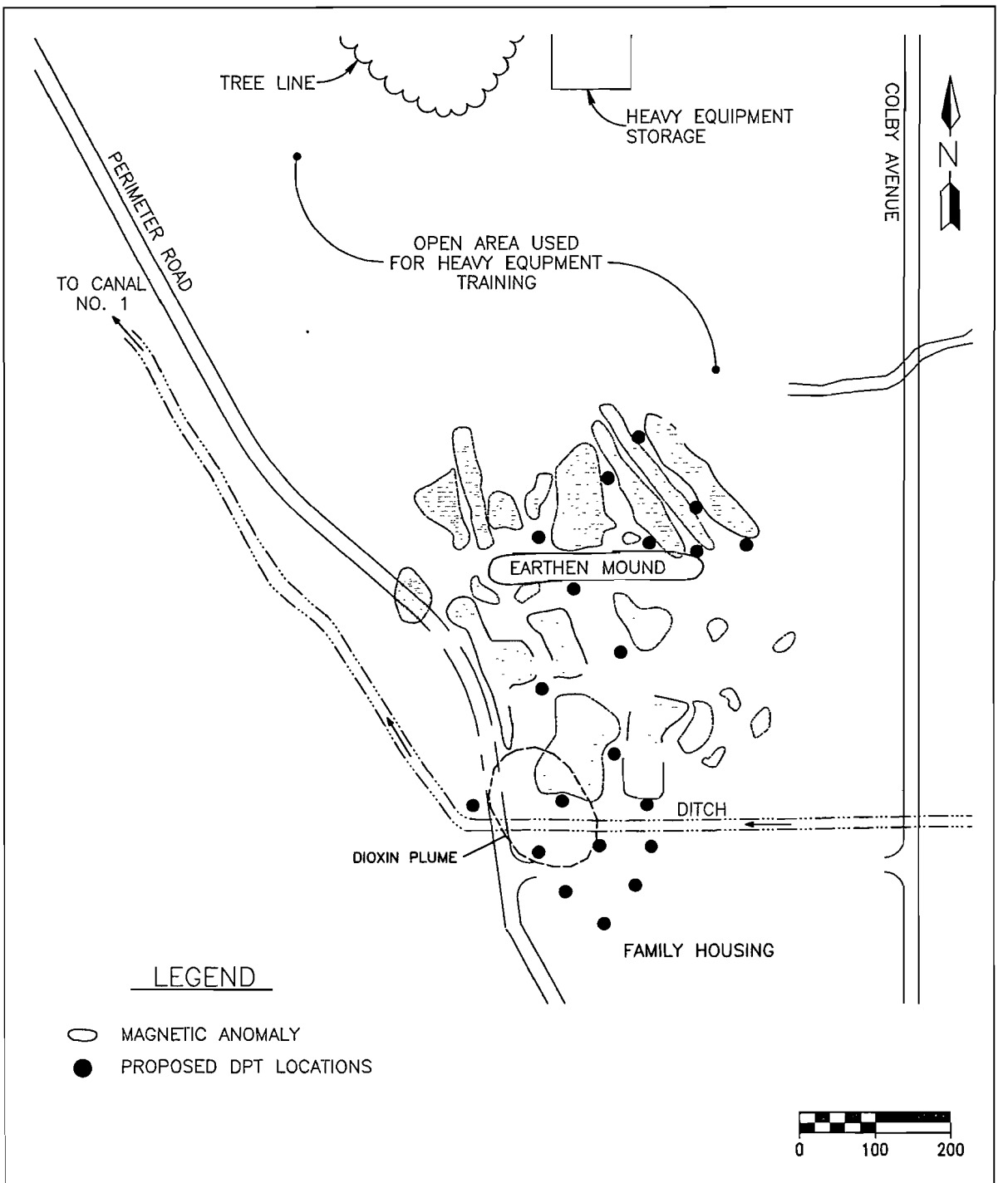

FIGURE 5-1

PROPOSED DPT SAMPLE LOCATIONS
SITE 5

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REMEDIAL INVESTIGATION WORK PLAN

NAVAL CONSTRUCTION BATALLION CENTER
GULFPORT, MISSISSIPPI

5.5.2 Groundwater Sampling

Groundwater samples will be collected at each direct push location. Once the drill rods have been pushed to the desired depth, just below the water table, a screen will be exposed allowing groundwater to flow into the rods. A length of Teflon tubing with a stainless steel check valve inserted into the end will be lowered down inside the drill rods to approximately the midpoint of the screened interval. The sampler will then move the tubing with a rapid up and down motion forcing water up the tubing and to the surface. Prior to the collection of the groundwater samples, an attempt will be made to ensure that fresh formation water is present in the drill rods. This will be accomplished by removing a volume of water sufficient to stabilize the following water quality parameters: pH, specific conductance, temperature and turbidity. Once these parameters have stabilized, as described in Section 5.7.4, the sample will be collected. The groundwater samples will be analyzed for the full suite of parameters listed in Table 5-2.

TABLE 5-2

DPT SAMPLE ANALYSES

Soil	Groundwater
TAL Metals	TAL Metals
TCL VOCs	TCL VOCs
TCL SVOCs	TCL SVOCs
TCL Pesticides	TCL Pesticides
TCL PCBs	TCL PCBs
Dioxin/Furans	Dioxin/Furans
Cyanide	Cyanide
Appendix IX Herbicides	Appendix IX Herbicides
	Appendix IX Organophosphorous Pesticides

5.6 ADDITIONAL MEDIA SAMPLING

The following sections discuss the collection of samples from additional media including surface water/sediment, surface soil, and seeps.

5.6.1 Surface Water/Sediment Sampling

Five co-located surface water/sediment samples will be collected from the drainage ditch that bounds the southern and western extent of the site (see Figure 5-2). The surface water samples will be collected prior to the collection of the sediment sample at each location. If possible, the sampler will wade out into the stream, minimizing the disturbance of sediments, face upstream, and collect the sample directly into the sample bottles. Care should be taken not to displace the preservative from any pre-preserved sample containers during sample collection. A sample should also be collected for measurement of water quality parameters such as pH, specific conductance, temperature and turbidity (USEPA EISOPQAM, 1997). The sample containers will then be properly labeled, placed in a sealed plastic bag and packed in a cooler on ice. The surface water samples will be analyzed for the parameters listed in Table 5-3.

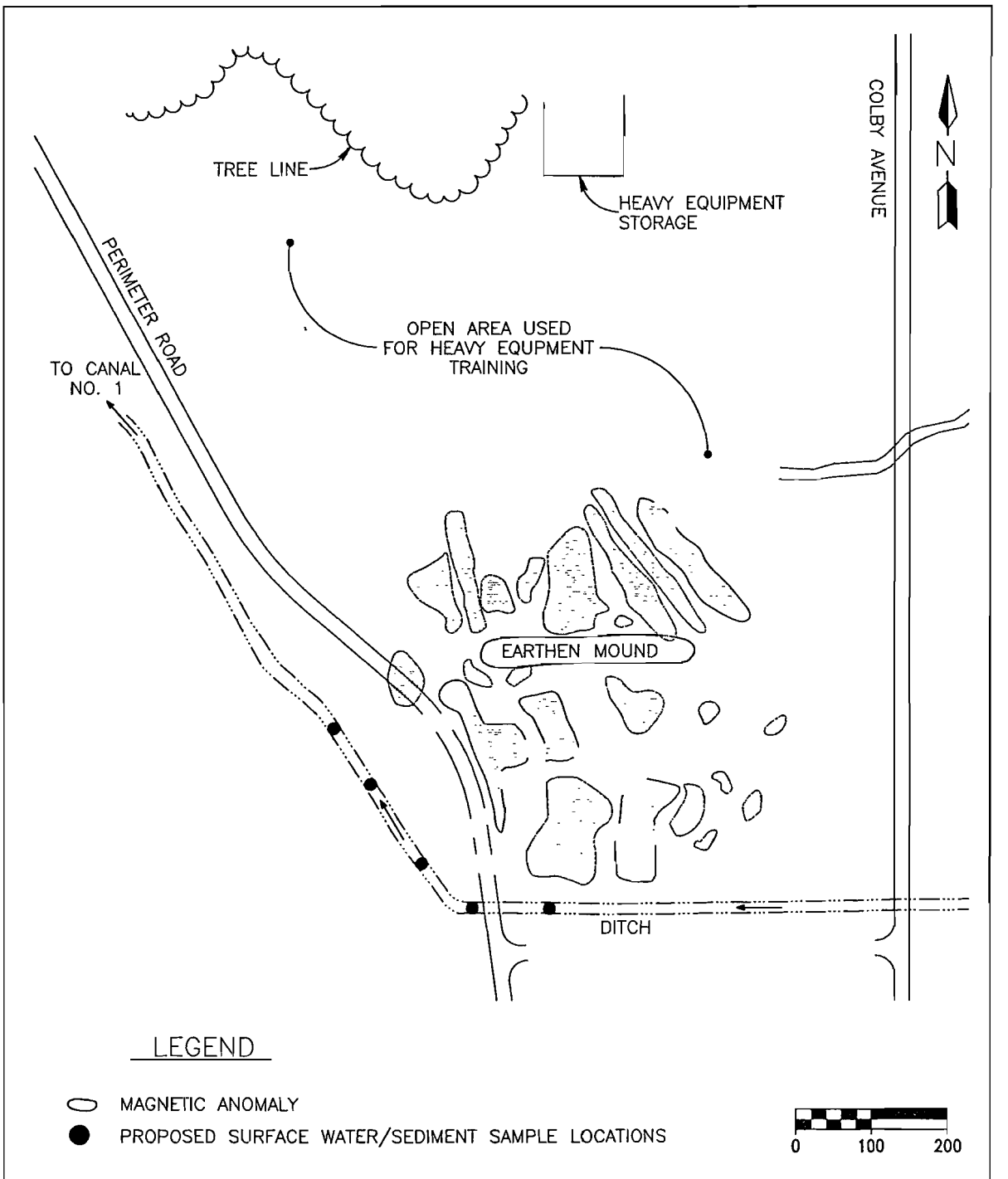

FIGURE 5-2

PROPOSED SURFACE WATER/SEDIMENT SAMPLE LOCATIONS
SITE 5

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REMEDIAL INVESTIGATION WORK PLAN

NAVAL CONSTRUCTION BATALLION CENTER
GULFPORT, MISSISSIPPI

TABLE 5-3

ADDITIONAL MEDIA ANALYSES

Surface Water	Sediment/Surface Soil
TAL Metals	TAL Metals
TCL VOCs	TCL VOCs
TCL SVOCs	TCL SVOCs
TCL Pesticides	TCL Pesticides
TCL PCBs	TCL PCBs
Dioxin/Furans	Dioxin/Furans
Cyanide	Cyanide
Appendix IX Herbicides	Appendix IX Herbicides
Appendix IX Organophosphorous Pesticides	

The sediment sample will then be collected from approximately the same location as the surface water sample. Sediment samples will be collected using a clean stainless steel hand auger. Due to the correlation between total organic carbon (TOC) and the presence of TCDD (ABB-ES, 1997) the sampler will attempt to collect the sample from the area demonstrating the highest apparent organic content. The sample will then be extruded from the hand auger into a glass bowl for mixing. To ensure adequate mixing the material should be stirred in a circular fashion, reversing direction, and occasionally turning the material over. Once thoroughly mixed, the sample will be placed into the appropriate sample containers, which will then be labeled, placed in a sealed plastic bag and placed in a cooler on ice. The only exception to this will be for the volatile sample, which will be placed in the sample container immediately after being extruded from the hand auger and prior to mixing. The sediment samples will be analyzed for the parameters listed in Table 5-3.

5.6.2 Surface Soil Sampling

Two composite surface soil samples will be collected from the fill material at Site 5. These samples will be composited from five samples collected from locations laid out in an "X" pattern with approximately 50 feet from corner to corner. The material will then be placed in a glass bowl and will be mixed as described above. Once mixed the sample will be placed into the appropriate sample containers, which will then be labeled, placed in a sealed plastic bag and placed in a cooler on ice. The surface soil samples will be analyzed for the parameters listed in Table 5-3.

5.7 MONITORING WELLS

The following sections discuss the installation, development and sampling of the six new monitoring wells to be installed at Site 5. Figure 5-3 shows the proposed locations for the new monitoring wells. These locations will be verified in the field by the FOL and will be adjusted as necessary based on the results of the direct push sampling, site conditions and the results of the utility clearance.

5.7.1 Drilling and Installation

Six shallow water table monitoring wells will be installed at Site 5. The wells will be installed using the hollow stem auger drilling method. The borings will be a minimum of 6 ½-inches in diameter and will be advanced to a depth of approximately 20 feet BLS. Due to the likelihood of collapse and encountering running sands, 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 ID, schedule 40 PVC. The well screen will be 0.010 slot, and will be 10 foot in length. A minimum of six inches of filter pack material will be placed below the well screen to provide a firm footing 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 two feet above the top of the screen. A two-foot thick bentonite seal will then be placed on top of the filter pack and hydrated with potable water. The seal should consist of 30% solids bentonite pellets (USEPA EISOPQAM, 1997). Care should be taken during placement of the bentonite pellets to ensure that bridging of the pellets inside the augers does not occur. The seal will then be allowed to hydrate for a minimum of eight hours. Once the bentonite seal has hydrated, the remaining annulus will be filled with a cement/bentonite grout to within two feet of the ground surface. The grout will then be allowed to cure for 24 hours prior to beginning surface completion activities.

Where possible, the wells will be constructed with above ground surface completions. In areas where this might conflict with traffic or training activities, a flush mount completion will be used. For wells complete above ground the well casing should extend at least 2.5 feet above the ground. An outer steel protective casing, 4-inches square by 5 feet long, with a hinged locking cap will be installed. A 3-ft x 3-ft x 6-inch concrete pad will be installed around each well. A minimum of two ¼-inch diameter weep holes will be drilled in the protective casing just above the top of the concrete pad. Four steel guard posts 3 to 4 inches in diameter and a minimum of 5 feet in length will be placed approximately 6 inches off the corners of the pad. The posts will be set at least 2 feet into the ground in a concrete footing and extend at least three feet above ground surface. The posts will also be filled with concrete for additional strength (NFESC, 1999). The surface casing and guard posts will be painted traffic yellow. A vented, PVC slip on cap will also be placed at the top of the well to permit pressure equalization.

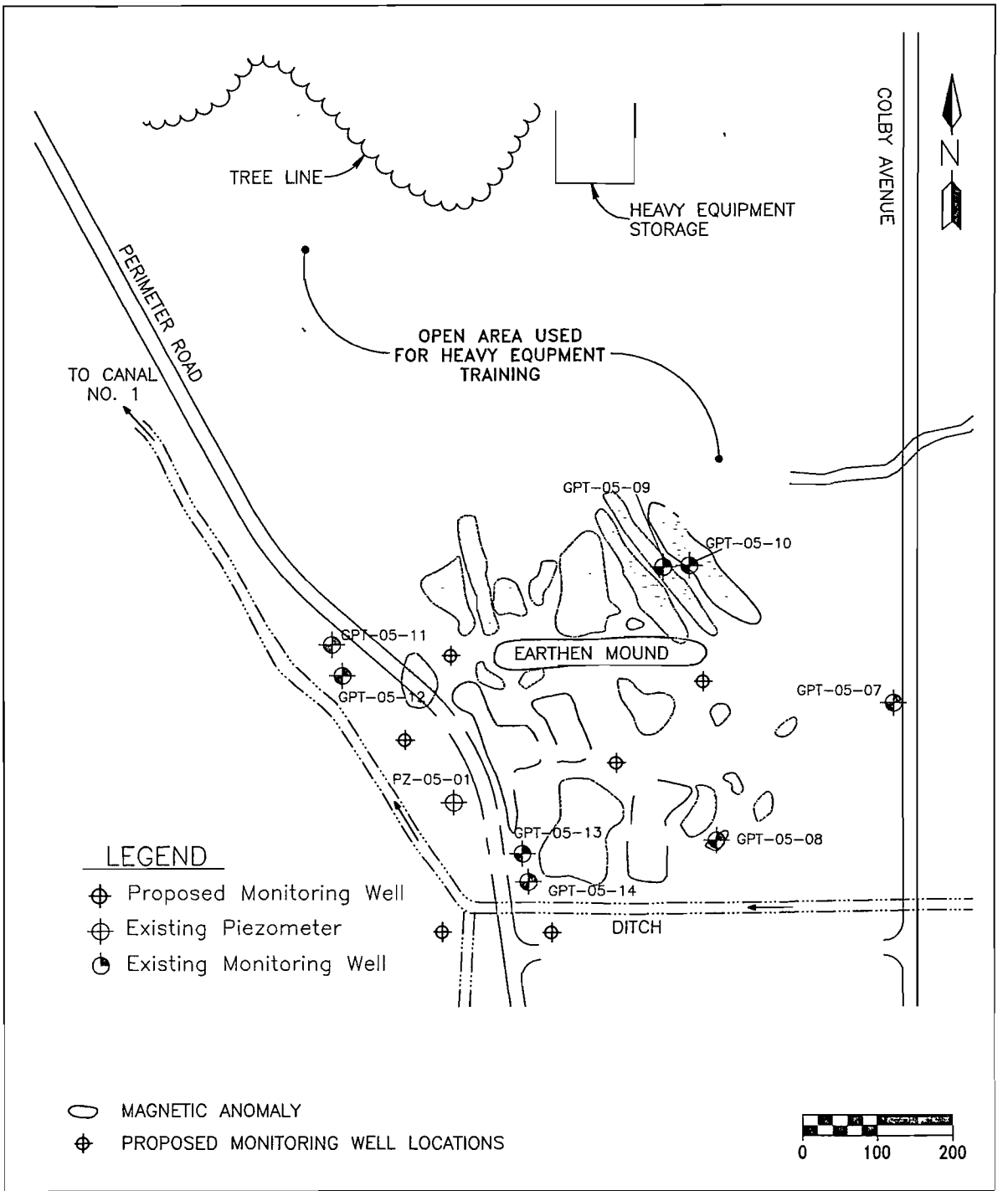


FIGURE 5-3

PROPOSED MONITORING WELL LOCATIONS
SITE 5

C:\DWG\TtNUS\N3954\5-3

REMEDIAL INVESTIGATION
WORK PLAN

NAVAL CONSTRUCTION
BATALLION CENTER
GULFPORT, MISSISSIPPI

Wells requiring a flush mount surface completion will be constructed with a 2-ft x 2-ft x 6-inch concrete pad with a bolt down, water tight well vault approximately six inches in diameter. A water tight, expandable locking cap will also be placed at the top of the well.

5.7.2 Monitoring Well Development

Following MDEQ requirements, a mandatory seven-day waiting period between well completion and development will be observed (MDEQ, 2000). All newly installed wells will be developed with a mechanical pump to ensure that the resulting groundwater samples are representative of site conditions. Additionally, two existing deep and five existing shallow wells at Site 5 will be redeveloped prior to sampling. Well development will involve surging and the removal of a minimum of three and a maximum of five well volumes. Water quality parameters will be monitored during development with a reading taken every volume. The parameters to be measured will include pH, specific conductance, temperature and turbidity. Development will continue until the water in the well is free of visible sediment and the parameters have stabilized as described in Section 5.7.4. All development water will be containerized in 55-gallon drums and appropriately labeled as to the contents and the source.

5.7.3 Groundwater Sampling

A total of 11 (six new and five existing) shallow monitoring wells, two existing deep monitoring wells, and one existing piezometer will be sampled. The existing wells will be resampled for additional analyses not collected in 1998. Prior to sampling all wells will be purged of approximately three to five well volumes. The well volume (volume of water within the well) will be calculated prior to initiating the purge. This will be done by determining the inside diameter of the well and by 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 from Table 5-4 to obtain the amount of water, in gallons, within the well. 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 below 10 nephelometric turbidity units (NTUs). Stabilization occurs when the pH measurements remain constant within 0.1 standard units (SUs), specific conductance varies no more than 10 percent, and the temperature remains constant for three consecutive readings (USEPA EISOPQAM, 1997). If after removing five well volumes from the well the parameters have still not stabilized, it will be the discretion of the FOL whether to sample or to continue purging.

TABLE 5-4

WELL CASING VOLUME VS. DIAMETER

Casing Inside Diameter (inches)	Gallons/Foot of Water
1	0.041
2	0.163
4	0.653

Sampling should be conducted as soon after the purging process that there is a sufficient volume of water in the well. Samples will be collected using disposable Teflon bailers. New plastic sheeting will be placed around the well to provide a clean work area. Clean nylon rope will be attached to the bailer and the bailer will be gently lowered into the water column until just submerged. Once filled, the bailer will be carefully removed and the contents emptied into the appropriate sample containers. The sample containers will then be labeled, placed in a sealed plastic bag and placed in a cooler on ice. If analyzing for volatiles, these samples should be collected first to minimize contaminant losses due to volatilization. Sample containers for all samples requiring preservation will be pre-preserved by the lab. The groundwater samples will be analyzed for the parameters listed in Table 5-5.

TABLE 5-5

BORING/MONITORING WELL SAMPLE ANALYSES

Groundwater	
Monitoring Wells	**Piezometer**
TAL Metals	Appendix IX VOCs
TCL VOCs	Appendix IX SVOCs
TCL SVOCs	Appendix IX Pesticides
TCL Pesticides	Appendix IX PCBs
TCL PCBs	Appendix IX Herbicides
Appendix IX Herbicides	Appendix IX Organophos. Pest.
Appendix IX Organophosphorous Pesticides	Methane, Ethane, Ethene
Dioxin/Furans	
Cyanide	

5.8 DECONTAMINATION PROCEDURES

All sampling and downhole drilling equipment must be cleaned prior to use and after each subsequent use. A decon 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 excessively. 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 decon process and the decon procedures to be used for the specific types of equipment (USEPA EISOPQAM, 1997).

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 used from any municipal water system.
- Analyte Free Water - deionized (DI) water, should contain no detectable heavy metals or other inorganic compounds.

Procedures:

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 decon 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.

Water Level Meter:

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

Redi-Flo2® Pump:

CAUTION - the pump should be unplugged prior to cleaning.

1. The exterior of the pump, the electrical cord and garden 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 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.

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 decon 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.

5.9 AQUIFER TESTING

Rising- and falling-head slug tests will be conducted at four wells to estimate the characteristics of the surficial aquifer. The falling-head slug test will be performed by adding a slug of known volume to the well, causing a rise in the water level. The decline of the water level to static will then be measured at frequent intervals with a Hermit data logger. The rising-head slug test will be performed by removing a slug of known volume from the well causing a drop in the water level. The recovery of the water level to static will then be recorded at frequent intervals with a Hermit data logger. The data will then be analyzed using the Bouwer-Rice method to estimate the transmissivity and hydraulic conductivity of the aquifer.

5.10 WATER LEVEL MEASUREMENTS

Two rounds of water level measurements will be collected from 20 new and existing wells on and around Site 5. These data will be used to determine the hydraulic gradient of the surficial aquifer and will be presented as the 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 the well casing. Measurements should be made and recorded to the nearest 0.01 foot.

5.11 LAND SURVEYING

The horizontal location and the top of casing elevation of each permanent monitoring well and piezometer will be surveyed by a TtNUS subcontracted, state licensed land surveyor. The horizontal location and ground surface elevation of all sample locations will also be surveyed. All locations will be reference to site features such as building corners, roads, etc. It is assumed that sufficient survey control is present within one mile of the site.

5.12 INVESTIGATION DERIVED WASTE MANAGEMENT

TtNUS estimates that approximately 20 drums of investigation derived waste (IDW) will be generated during the field investigation. IDW management includes labeling, record keeping, and staging of materials. All drums will be labeled with the following information. PPE will be double bagged and placed in facility dumpsters.

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

NCBC Gulfport will be responsible for disposal costs and manifests associated with the disposal of all IDW.

5.13 DEMOBILIZATION

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

6.0 LABORATORY ANALYSES

This section identifies the number of samples to be collected per sampling method per matrix, the analyses and analytical methods to be used and the total number of samples per analysis, including QA/QC samples.

TABLE 6-1

NUMBERS OF SAMPLES

Method	Media	No. of Samples	QA/QC			
			Duplicates	Rinsates	MS/MSD	Trip
DPT:						
	Subsurface Soil	20	2	2	1	0
	Groundwater	20	2	2	1	3
Monitoring Wells:						
	Groundwater	13	2	2	1	3
	Piezometer	1				
Additional Media:						
	Surface Water	4	1	1	1	1
	Sediment	4	1	1	1	0
	Surface Soil	2	1	1	1	0
	Seep	2	1	1	1	1

TABLE 6-2

ANALYTICAL PARAMETERS AND METHODS

Parameter	Method (aqueous/soil)	No. Soil	No. Aqueous
TAL Metals	SW-846 6010B/7000A series	36	59
TCL VOCs	SW-846 8260B	40	59
TCL SVOCs	SW-846 8270C	36	59
TCL Pesticides	SW-846 8081A	36	59
TCL PCBs	SW-846 8082	36	59
Appendix IX VOCs	SW-846 8260B	0	1
Appendix IX SVOCs	SW-846 8270C	0	1
Appendix IX Pesticides	SW-846 8081A	0	1
Appendix IX PCBs	SW-846 8082	0	1
Appendix IX Herbicides	SW-846 8151A	0	59
Appendix IX Organophos. Pest.	SW-846 8141A	0	59
Dioxin/Furans	SW-846 8290	40	59
Cyanide	SW-846 910B/9012A	36	59
Methane, Ethane, Ethene	RISK SOPS 147 and 175	0	1

7.0 DATA MANAGEMENT

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

7.1 ONSITE DATA MANAGEMENT

Onsite data management involves the day-to-day recording of all sampling and field activities in the field. A project database will be initiated in the field to promote the proper collection, storage, and documentation of field activities. The following data will be entered into the project database in the field:

- Sample information (i.e., 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 non-dioxin 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 (June 1991), the Laboratory Data Validation Functional Guidelines for Evaluation of Inorganic Analysis (June 1988), and TtNUS Standard Operating Procedures. All dioxin data will be subject to full validation conducted by an independent validation subcontractor.

8.0 RISK ASSESSMENT

8.1 HUMAN HEALTH/ECOLOGICAL

The site will not be subdivided into more than two areas of concern for the purposes of the risk assessments. These assessments will evaluate typical exposure pathways only. A typical exposure pathways involving food chain modeling or complex computer modeling will not be evaluated. Media to be evaluated includes soil, groundwater, surface water, sediment and seeps. Draft and final versions of the Risk Assessment reports will be incorporated into the RI report.

9.0 COSTS AND KEY ASSUMPTIONS

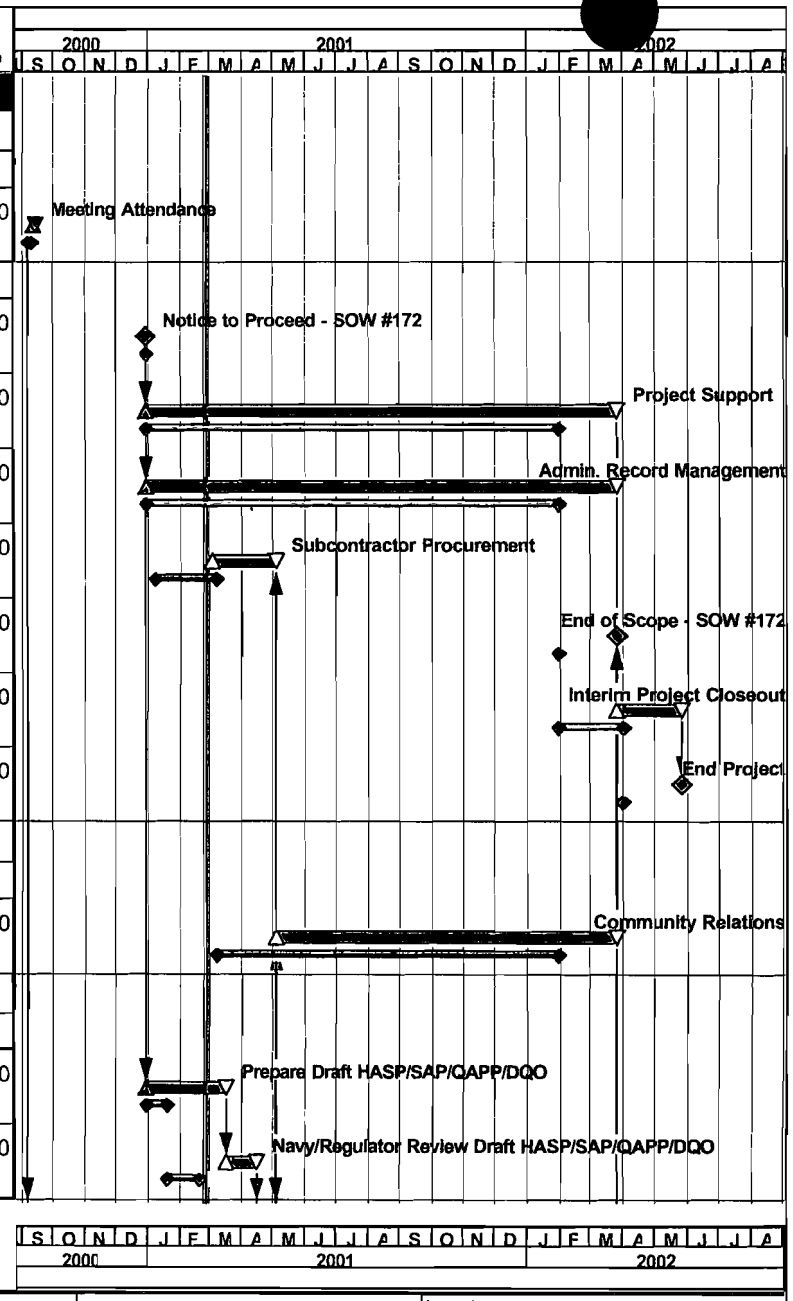
Costs and key assumptions developed for the scope of this RI are contained in Section 4.0 of this report and in the Plan of Action (dated 05 October 00).

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

Any changes or deviations that result in a change of scope can not 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).

10.0 SCHEDULE

Activity ID	Activity description	Cal ID	Early Start	Early Finish	Dur	Rem Dur	% Comp
CTO 156 NCBC GULFPORT - RI @ SITE 5							
PROJECT MANAGEMENT							
MOD 00							
HR0010108	Meeting Attendance	1	11SEP00A	12SEP00A	2	0	100
MOD 01							
HR0010100	Notice to Proceed - SOW #172	1	29DEC00A		0	0	100
HR0010105	Project Support	1	29DEC00A	26MAR02	450*	392*	0
HR0010115	Admin. Record Management	1	29DEC00A	26MAR02	450*	392*	0
HR0010130	Subcontractor Procurement	1	05MAR01	03MAY01	60	60	0
HR0010225	End of Scope - SOW #172	1		26MAR02	0	0	0
HR0010230	Interim Project Closeout	1	27MAR02	25MAY02	60	60	0
HR0010233	End Project	1		25MAY02	0	0	0
COMMUNITY RELATIONS							
MOD 01							
HR0020100	Community Relations	1	04MAY01	26MAR02	325	325	0
WORK PLANS							
MOD 01							
HR0040120	Prepare Draft HASP/SAP/QAPP/DQO	2	29DEC00A	16MAR01	15	15	20
HR0040130	Navy/Regulator Review Draft HASP/SAP/QAPP/DQO	1	17MAR01	15APR01	30	30	0



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Finish Date	25MAY02
Data Date	26FEB01
Run Date	16FEB01 13:30

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Critical Activity

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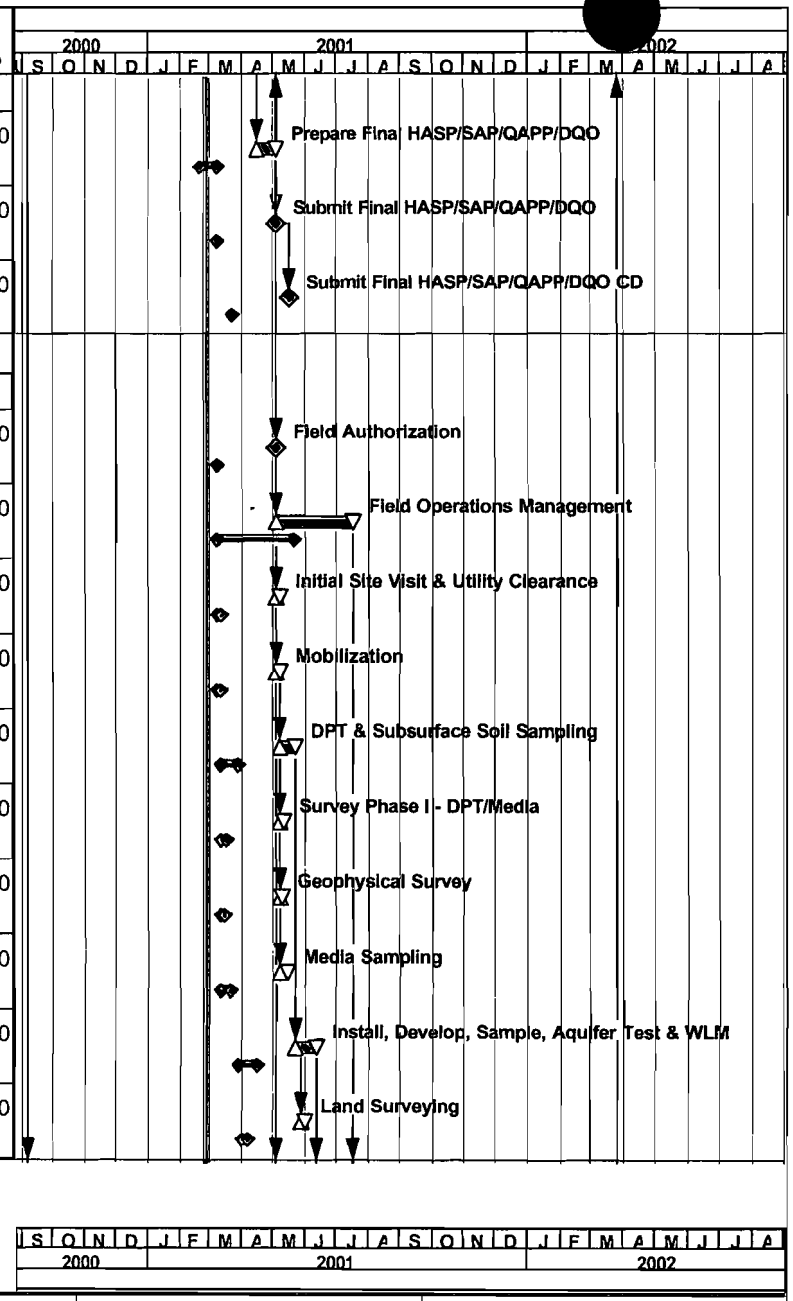
Layout:
LT-11: TOM Schedule Turnarounds (TASK)

Filter:
FL-22: TOM Schedules (STD TASK Layout)

Activity ID	Activity description	Cal ID	Early Start	Early Finish	Dur	Rem Dur	% Comp
MOD 01							
HR0040145	Prepare Final HASP/SAP/QAPP/DQO	2	16APR01	03MAY01	14	14	0
HR0040147	Submit Final HASP/SAP/QAPP/DQO	2		03MAY01	0	0	0
HR0040149	Submit Final HASP/SAP/QAPP/DQO CD	2		17MAY01	0	0	0
FIELD INVESTIGATION							
MOD 01							
HR0050103	Field Authorization	1	04MAY01		0	0	0
HR0050105	Field Operations Management	1	04MAY01	16JUL01	73*	73*	0
HR0050110	Initial Site Visit & Utility Clearance	1	04MAY01	07MAY01	4	4	0
HR0050115	Mobilization	1	04MAY01	07MAY01	4	4	0
HR0050120	DPT & Subsurface Soil Sampling	1	08MAY01	22MAY01	15	15	0
HR0050125	Survey Phase I - DPT/Media	1	08MAY01	12MAY01	5	5	0
HR0050140	Geophysical Survey	1	08MAY01	10MAY01	3	3	0
HR0050145	Media Sampling	1	08MAY01	15MAY01	8	8	0
HR0050160	Install, Develop, Sample, Aquifer Test & WLM	1	23MAY01	11JUN01	20	20	0
HR0050165	Land Surveying	1	28MAY01	01JUN01	5	5	0



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Activity ID	Activity description	Cal ID	Early Start	Early Finish	Dur	Rem Dur	% Comp
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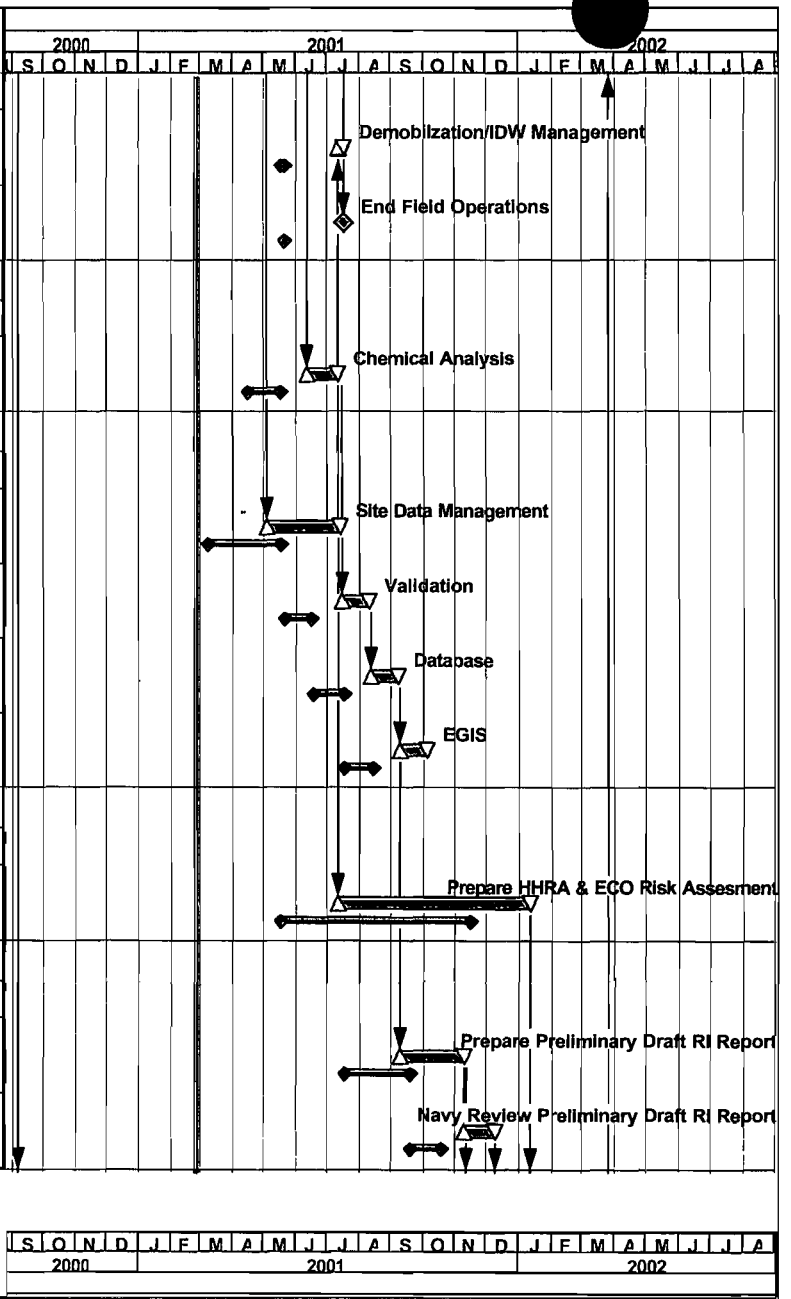
HR0050200	Demobilzation/IDW Management	1	13JUL01	16JUL01	4	4	0
HR0050222	End Field Operations	1		16JUL01	0	0	0
LABORATORY ANALYSES							
MOD 01							
HR0060110	Chemical Analysis	1	12JUN01	12JUL01	30	30	0
DATA MANAGEMENT							
MOD 01							
HR0070110	Site Data Management	2	04MAY01	13JUL01	50	50	0
HR0070120	Validation	2	16JUL01	10AUG01	20	20	0
HR0070130	Database	2	13AUG01	07SEP01	20	20	0
HR0070145	EGIS	2	10SEP01	05OCT01	20	20	0
RISK ASSESSMENT REPORT							
MOD 01							
HR0080100	Prepare HHRA & ECO Risk Assesment	2	13JUL01	10JAN02	128	128	0
RI / RFI REPORT							
MOD 01							
HR0090105	Prepare Preliminary Draft RI Report	2	10SEP01	09NOV01	45	45	0
HR0090110	Navy Review Preliminary Draft RI Report	1	10NOV01	09DEC01	30	30	0



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Data Date	26FEB01
Run Date	16FEB01 13:30

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Progress Bar
Critical Activity

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NAVA - CV56 **Sheet 3 of 4**

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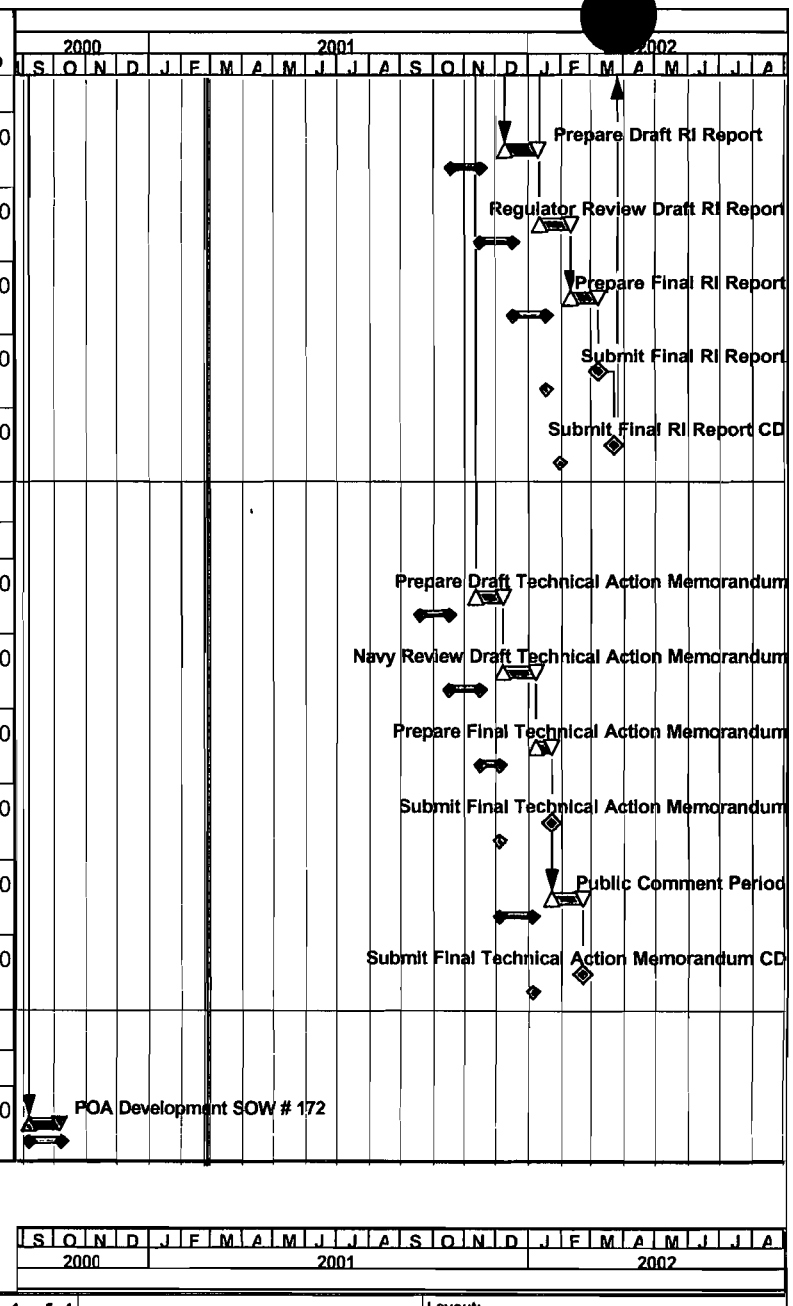
LT-11: TOM Schedule Turnarounds (TASK)

Filter:
FL-22: TOM Schedules (STD TASK Layout)

Activity ID	Activity description	Cal ID	Early Start	Early Finish	Dur	Rem Dur	% Comp
MOD 01							
HR0090115	Prepare Draft RI Report	2	10DEC01	08JAN02	20	20	0
HR0090120	Regulator Review Draft RI Report	1	11JAN02	09FEB02	30	30	0
HR0090150	Prepare Final RI Report	2	11FEB02	08MAR02	20	20	0
HR0090152	Submit Final RI Report	2		08MAR02	0	0	0
HR0090154	Submit Final RI Report CD	2		22MAR02	0	0	0
MISCELLANEOUS							
MOD 01							
HR0370100	Prepare Draft Technical Action Memorandum	2	12NOV01	07DEC01	20	20	0
HR0370105	Navy Review Draft Technical Action Memorandum	1	08DEC01	07JAN02	30	30	0
HR0370110	Prepare Final Technical Action Memorandum	2	08JAN02	21JAN02	10	10	0
HR0370112	Submit Final Technical Action Memorandum	2		21JAN02	0	0	0
HR0370115	Public Comment Period	1	22JAN02	20FEB02	30	30	0
HR0370117	Submit Final Technical Action Memorandum CD	2		20FEB02	0	0	0
PLANS OF ACTION (POA)							
MOD 00							
HR024HR01	POA Development SOW # 172	1	07SEP00A	05OCT00A	30	0	100



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Run Date	16FEB01 13:30	Critical Activity	

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FL-22: TOM Schedules (STD TASK Layout)

11.0 PROJECT MANAGEMENT

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

11.1 STAFFING

The Task Order Manager (TOM) for this project is Robert Fisher, PG. Mr. Fisher can be reached in the Tallahassee, Florida office by phone at (850) 385-9899, by facsimile at (850) 385-9860, and by email at fisherr@ttnus.com.

The Technical Lead and Field Operations Leader (FOL) for the Site 5 RI will be David Hickey, PG. Mr. Hickey is available at the Oak Ridge, Tennessee office by phone at (865) 483-9000, by facsimile at (865) 483-8454, and by email at hickeyd@ttnus.com.

11.2 COORDINATION

The 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).

12.0 REFERENCES

ABB Environmental Services, Inc: (ABB-ES), *Surface Water and Sediment Dioxin Delineation Report, NCBC, Gulfport, Mississippi*, May 1997.

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United States Environmental Protection Agency (USEPA), *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*, May 1996 with 1997 revisions.

USEPA, *Risk-Based Concentration Table*, USEPA Region III, Philadelphia, PA, April 1999.

APPENDIX A

DATA MANAGEMENT PLAN

Rev. 0
06/15/01

Data Management Plan

Southern Division
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ACRONYMS AND ABBREVIATIONS

CADD	Cómputer Automated Drafting and Design
COC	Chain-of-Custody
DOQQ	Digital Ortho Quarter Quads
DQO	Data Quality Objective
DVC	Data Validation Coordinator
EDD	Electronic Data Deliverable
EGIS	Environmental Geographic Information System
FOL	Field Operations Leader
GIS	Geographic Information System
HHRA	Human Health Risk Assessment
IMS	Information Management System
IR	Installation Restoration
LAN	Local Area Network
LIMS	Laboratory Information Management System
NAD	North American Datum
NGVD	National Geodetic Vertical Datum
RPM	Remedial Project Manager
SDG	Sample Delivery Group
SMC	Sample Management Coordinator
SOUTHDIV	Southern Division Naval Facilities Engineering Command
TOM	Task Order Manager
TSSDS	Tri-Service Spatial Data Standards
USGS	United States Geological Survey

1.0 INTRODUCTION

This document presents the Data Management Plan (DMP) for NCBC Gulfport. The DMP describes the project-specific Information Management System (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 Task Order Manager (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 Field Operations Leader (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 leads may prepare a Needs Assessment and Data Quality Objectives (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 describes who the decision maker 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 (SPCS) - North American Datum 1983 (NAD83) for the horizontal and National Geodetic Vertical Datum 1988 (NGVD88) 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 DVC 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 DVC. The DVC 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 DVC 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 data management lead 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 data management lead 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 this 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 data management lead 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 has been entered and checked for accuracy.

The data management lead 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 this 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 CADD mapping, Digital Ortho Quarter Quads (DOQQs), Aerial Photography, and 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 Environmental GIS (EGIS) application to facilitate decision-making by non-GIS staff.

8.0 ASSIMILATION OF DATA FROM OUTSIDE SOURCES

When environmental data is collected by a contractor other than TtNUS, it is the responsibility of the SOUTHDIV Remedial Project Manager (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 Gulfport project:

- Data Management - Microsoft Access, Visual FoxPro, and SQL Server 7.0
- GIS - ArcView 3.2, ArcInfo, and ArcIMS
- Geophysical 2-D Kriging - 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

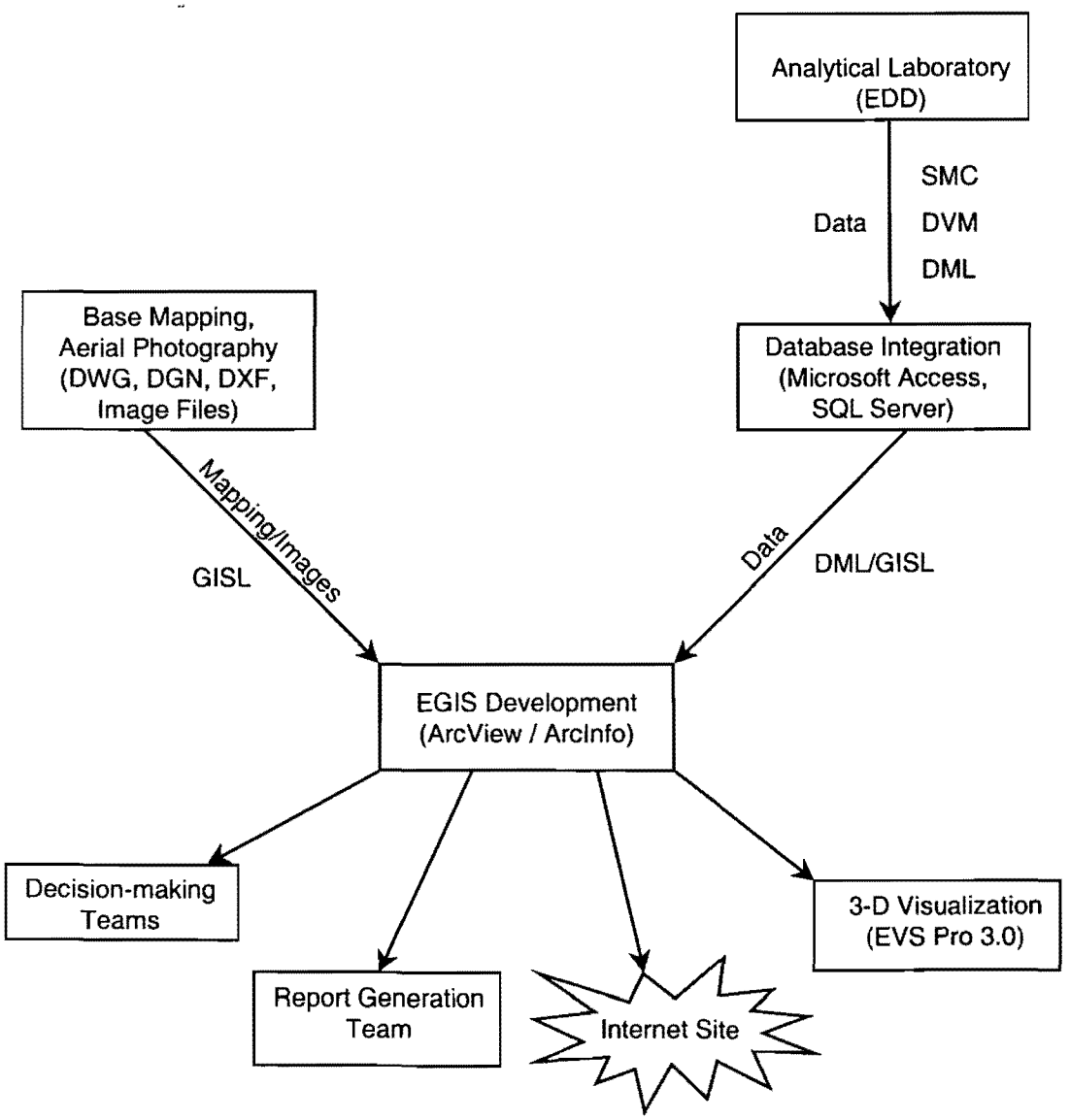
10.0 STORAGE OF DATA

TtNUS utilizes NT 4.0 for Networks as its network management system. The NT 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 Local Area Network (LAN).

ATTACHMENT 1

DATA FLOW PROCESS

THE DATA FLOW PROCESS



Notes:

SMC = Sample Management Coordinator
DVM = Data Validation Manager
DML = Data Management Leader
GISL - GIS Leader

ATTACHMENT 2

DATABASE CHECKLIST

DATABASE PLANNING CHECKLIST

PROJECT NAME _____ ***PROJECT NUMBER*** _____

PROJECT MANAGER _____ ***PLANNING DATE*** _____

1. Provide a general description of the project (regulatory authority, media to be samples, approximate number of samples by media, analyses by media, data evaluation tasks required):

_____

_____

_____

_____

_____

2. Provide a general description of the sample nomenclature that will be used for samples collected by Tetra Tech NUS:

_____

_____

_____

_____

3. Will historical data be entered in the database? Yes No

4. Will historical data be used to define the nature and extent of contamination? Yes No

5. Will historical data be used for risk assessment purposes? Yes No

6. How much historical data exists (i.e., number of samples by matrix, analysis by matrix)?

_____

_____

_____

_____

7. In what format will the historical data be provided? Hardcopy Electronic

8. If historical data are in electronic form, what software was used and what is the format?

9. If historical data are in hardcopy form, will Form I's, summary tables, or reports be provided? Copies of historical data will be necessary to generate a budget estimate.

_____

_____

_____

10. Will Quality Assurance review of historical data be necessary? Yes No

11. If Quality Assurance review of historical data is necessary, describe the scope of the Quality Assurance review:

12. Will a GIS database be necessary for the project. Yes No
If so, the GIS Group should be consulted for a budget estimate.

13. What nomenclature has been (will be) used to identify field duplicate samples?

14. Will field duplicate results be averaged and presented as one result in the database? Will they be presented as distinct results, or will both the average and the distinct results be presented?

15. How will the average value for duplicate samples be determined on a matrix-specific basis?

16. Are any unvalidated data to be included in the database? Yes No

17. Will unvalidated data be used for defining the nature and extent of contamination?
Yes No

18. Will unvalidated data be used for risk assessment purposes? Yes No

19. Are any field screening data to be included in the database? Yes No

20. Will field screening data be used for defining the nature and extent of contamination? Yes No

21. Will field screening data be used for risk assessment purposes? Yes No

22. Will statistical correlation of laboratory and field screening data be necessary? Yes No

23. If a correlation exists between field screening and laboratory data, will the results of regression analysis be used to define nature and extent? Yes No

24. If a correlation exists between field screening and laboratory data, will the results of regression analysis be used to support the risk assessment? Yes No

25. Will field parameters be included in the database (e.g., pH, conductance, temperature)? Yes No

26. Will statistical correlations be necessary for TCLP versus RASISA6 data? Yes No

27. Will statistical correlations be necessary for filtered versus unfiltered samples? Yes No

28. Will any other statistical correlations be necessary? Yes No

29. Are there wells that have been screened in different aquifers? Yes No

30. Will data for various aquifers be segregated by depth? Yes No

31. Can the sample nomenclature system be used to identify wells in different aquifers? Yes No

32. Will samples from other matrices (soil, sediment, or surface water) be segregated by depth? Yes No

33. Can the sample nomenclature system be used to identify depth-specificity? Yes No

34. Have any removal actions be performed at the site? Yes No

If removal actions have been performed, plan and cross-sectional views reflecting the extent of the removal action must be provided.

35. Will any composite sample results be included in the database? Yes No

36. If composite samples are Included how will they be used for the nature and extent of contamination?

_____

_____

_____

37 If composite samples are included how will they be used for the risk assessment?

_____

_____

_____

38. Will the site be segregated into Areas of Concern, Solid Waste Management Units, etc? Yes No

39. Is the sample nomenclature adequate for such segregation? Yes No

If the sample nomenclature is inadequate for assigning samples to an AOC or SWMU, the Project Manager or designee must provide a base map of tabular summary clearly delineating the relationship between each sample and each AOC/SWMU.

40. Were any temporal samples collected (e.g., quarterly sampling of wells)? Yes No

41. If temporal samples were collected, how will they be used to define the nature and extent of

contamination?

42. If temporal samples were collected, how will they be used to support the risk assessment?

43. Are State, Federal, or Regional criteria to be included in data summary tables? Yes No

44. Identify the criteria that must be presented in the summary tables.

45. Will State, Federal, or Regional criteria be used to select COPCs? Yes No

46. Identify the criteria to be used as COPO selection tools.

47. Are filtered and unfiltered surface water samples differentiated? Yes No

48. If such samples are differentiated, how?

49. Which of these samples will be used for the human health risk assessment?
Surface Water Filtered Unfiltered
Groundwater Filtered Unfiltered

50. Which of these samples will be used for the ecological assessment?

Surface Water Filtered Unfiltered
Groundwater Filtered Unfiltered

51 Will background data be included in the database? Yes No

52. How are background samples identified?

53. Will background results be used to support selection of COPCs? Yes No

53. What statistical analyses will be required for the background data?

54. Will background data be segregated by depth? Yes No

55. What background matrices must be segregated by depth?

56. What format will be used for data presentation (e.g., appendices and summary tables, comprehensive text tables, tag maps, isoconcentration contours, etc.)?

ATTACHMENT 3

ELECTRONIC DATA DELIVERABLE (EDD) REQUIREMENTS FOR ANALYTICAL LABORATORIES

1.0 INTRODUCTION

The laboratory is to provide 3.5" high density diskette(s) containing separate database (DBF) files in the format specified in this Attachment. The electronic deliverable includes all environmental samples, sample dilutions, sample reanalyses, 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.** 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 diskette 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 .dbf file shall be made for each analytical fraction (by method) and each sample delivery group (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 BR001 should be named V_BR001.DBF. Additionally, the laboratory must provide a hardcopy listing all electronic files saved to the diskette, 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 (_____)_____if there are any questions or problems with the enclosed electronic deliverables.

Signature:_____ Title:_____ Date:_____

The analytical data shall be delivered electronically in a Dbase III file format (filename.dbf). 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 Dbase III 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 and matrix spike results in which a RE or MS suffix will be added to the sample number respectively.
TRUNCATE	C	15	If the field sample ID listed on the Chain of Custody is truncated by the laboratory for use with the laboratory software, the truncated sample ID should appear in this field.
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	15	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".
SAMP_DATE	D	8	Date of sample collection as indicated on the Chain of Custody. Example: 11/07/93.
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.
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 CLEAN 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 (e.g. Hutson, D).

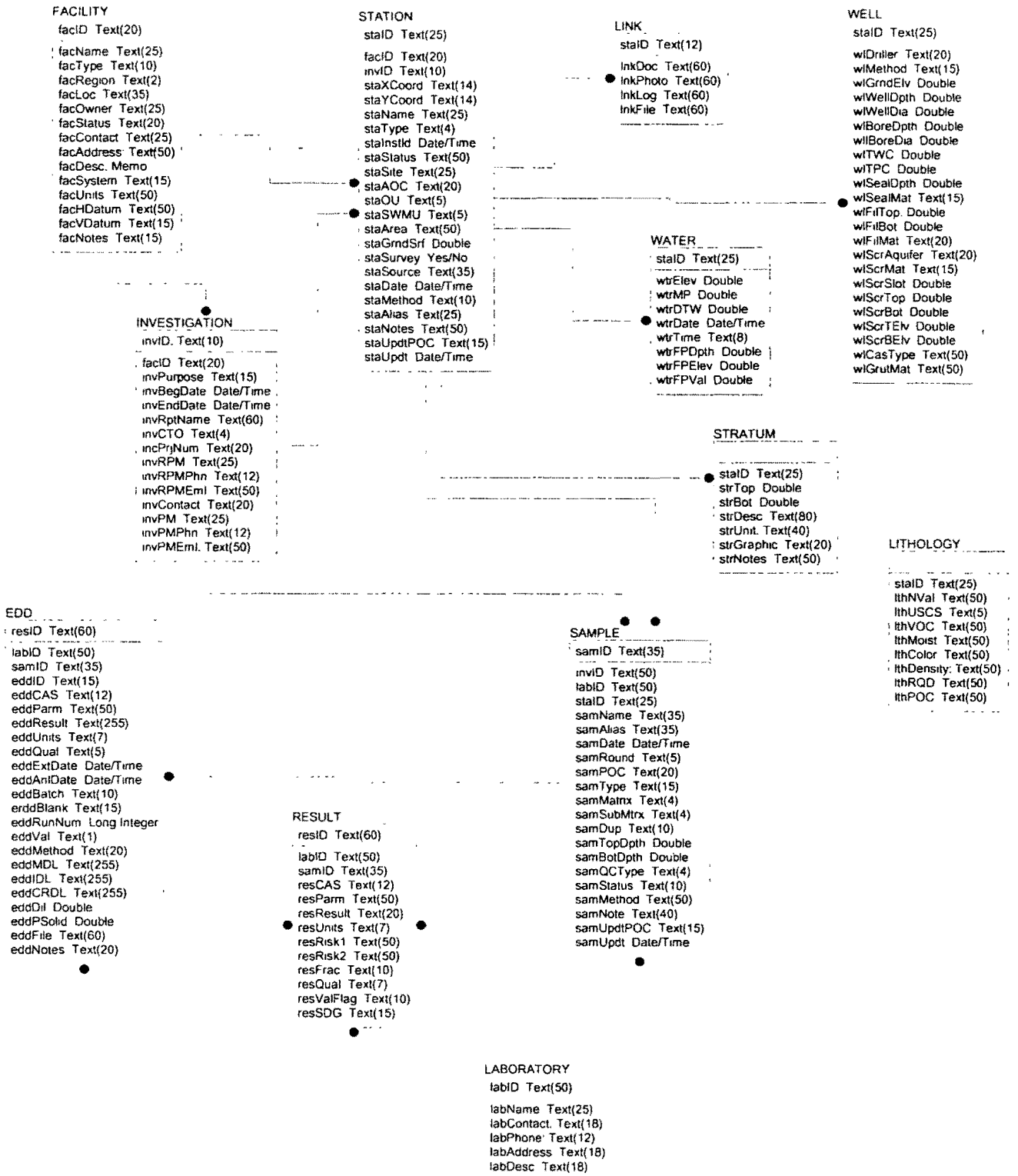
DATA FIELD	DATA TYPE	FIELD WIDTH	DATA FIELD DESCRIPTION
PARAMETER	C	45	Chemical or analyte name exactly as reported on Form I.
CAS_NO	C	10	Chemical Abstract Service number for the parameter listed. The CAS number should be reported exactly as it is listed in publications such as the Merck Index. This field should be left blank for those parameters not having CAS numbers (e.g. Total Organic Carbon).
FRACTION	C	5	Metals = 'M', Volatiles = 'OV', Semivolatiles/BNAs = 'OS', Pesticides = 'PEST', Herbicides = 'HERB', Polychlorinated Biphenyls = 'PCB', Explosives = 'EXP', Any petroleum hydrocarbon or fuel = 'TPH', Wet Chemistry = 'WET', Radionuclide = 'RAD', Miscellaneous = 'MISC'
METHOD	C	20	Analytical method used to quantitate parameter concentrations as listed in the laboratory technical specification (e.g. '8270A' for SW-846 Method 8270A.
LAB_RESULT	N	20 (6)	Reported value in units specified in the UNITS field containing the proper number of significant digits. The % Recovery shall be placed in this field for matrix spike and laboratory control sample results.
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.
DIL_FACTOR	N	6 (1)	Dilution factor.
PCT_MOIST	N	5 (1)	Percent moisture for soil samples; blank for water samples.
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: 05/25/97)

ATTACHMENT 4

DATABASE STRUCTURE

SQL DATA MODEL – Display1 / <Main Subject Area>



Entity Name: EDD

Column Name	Column Datatype	Entity Attribute Column Comment
resID	Text(60)	Primary Key used to identify each distinct result record.
labID	Text(50)	Foriegn Key used to identify a laboratory.
samID	Text(35)	Unique identification number for each distinct sample collected in the field, for a specific sampling day or episode
eddID	Text(15)	Primary Key used to identify each distinct result record. Foreign Key used to relate results
eddCAS	Text(12)	Chemical Abstracts Service Number as received by the laboratory
eddParm	Text(50)	Name of the parameter or chemical name as received by the laboratory
eddResult	Text(255)	Analytical result as reported by the laboratory
eddUnits	Text(7)	Units of measure for the eddResult field as received by the laboratory
eddQual	Text(5)	Qualifier as reported by the laboratory
eddExtDate	Date/Time	Extraction date
eddAnlDate	Date/Time	Analysis date
eddBatch	Text(10)	Analytical batch number
erddBlank	Text(15)	Associated blank
eddRunNum	Long Integer	Sequential analytical run number
eddVal	Text(1)	Validation designation ("Y" = full validation, "N" = no validation, "L" = limited review, "C" = cursory review, "X" = validated by another contractor, "U" = unknown)
eddMethod	Text(20)	Analytical method
eddMDL	Text(255)	Method Detection Limit. If entering data in this field for a common parameter and there is no applicable MDL, enter "N/A"
eddIDL	Text(255)	Instrument Detection Limit. If entering data in this field for a common parameter and there is no applicable MDL, enter "N/A"
eddCRDL	Text(255)	The value of the PQL, CRQL, CRDL, etc. If entering data in this field for a common parameter and there is no applicable quantitation level, enter "N/A".
eddDil	Double	Dilution factor
eddPSolid	Double	Percent solid
eddFile	Text(60)	Name of the file sent to the database lead used to upload analytical data into the database
eddNotes	Text(20)	Comments from laboratory analyst

Entity Name: FACILITY

Column Name	Column Datatype	Entity Attribute Column Comment
facID	Text(20)	Primary Key used to identify a facility.
facName	Text(25)	Commomly used name of the facility
facType	Text(10)	Type of facility.
facRegion	Text(2)	US EPA region which the facility resides.
facLoc	Text(35)	Facility location.
facOwner	Text(25)	Owner of the facilty.
facStatus	Text(20)	Current status of the facility.
facContact	Text(25)	Primary contact for the facility.
facAddress	Text(50)	Address of the facility
facDesc	Memo	Addiotional remarks associated to the facility.
facSystem	Text(15)	Projection/Coordinate system of the x,y coordinates respresented in the Station Table
facUnits	Text(50)	Unit of mesaurement of the coordinates respresented in the Station Table
facHDatum	Text(50)	Datum in which the horizontal coordinates were derived
facVDatum	Text(15)	Datum in which the vertical coordinates were derived
facNotes	Text(15)	May be used to further explain additional spatial aspects.

Entity Name: INVESTIGATION

Column Name	Column Datatype	Entity Attribute Column Comment
invID	Text(10)	Primary Key used to identify an investigation.
facID	Text(20)	Foreign Key used to identify a facility.
invPurpose	Text(15)	Purpose of investigation
invBegDate	Date/Time	Date the investigation began
invEndDate	Date/Time	Date the investidation was completed
invRptName	Text(60)	Name and location of final report
invCTO	Text(4)	Contract Task Order
incPrjNum	Text(20)	Project number for this phase of the investigation
invRPM	Text(25)	Name of Remedial Project Manager
invRPMPhn	Text(12)	Remedial Project Manager phone number
invRPMEml	Text(50)	Remedial Project Manager email address
invContact	Text(20)	Primary consultant tasked with the investigation
invPM	Text(25)	Consultants principal Project Manager
invPMPhn	Text(12)	Project Manager phone number
invPMEml	Text(50)	Project Manager email address

Entity Name: LABORATORY

Column Name	Column Datatype	Entity Attribute Column Comment
labID	Text(50)	Primary Key used to identify a laboratory.
labName	Text(25)	Name of the laboratory use to do conduct the analysis.
labContact	Text(18)	Laboratory's primary contact
labPhone	Text(12)	Laboratory's phone number
labAddress	Text(18)	Laboratory's mailing address
labDesc	Text(18)	Addiotional remarks associated with the laboratory.

Entity Name: LINK

Column Name	Column Datatype	Entity Attribute Column Comment
staID	Text(12)	The LocID is the commomly used identification of the sample location. For example, monitor well 1 may be identified as MW-1; soil sample 3 may be identified as SS-3. It is suggested that abbreviations correspond to the Sample Types field.
lnkDoc	Text(60)	The path and file desciption used to link to a document file assciated with the staID.
lnkPhoto	Text(60)	The path and file desciption used to link to a photograph file associated with the staID.
lnkLog	Text(60)	The path and file desciption used to link to a boring log associated with the staID.
lnkFile	Text(60)	The path and file desciption used to link to a file associated with the staID.

Entity Name: LITHOLOGY

Column Name	Column Datatype	Entity Attribute Column Comment
staID	Text(25)	Foreign Key used to identify a sampling location.
lthNVal	Text(50)	
lthUSCS	Text(5)	Unified Soil Classification Service Code for lithology type
lthVOC	Text(50)	
lthMoist	Text(50)	
lthColor	Text(50)	
lthDensity	Text(50)	
lthRQD	Text(50)	
lthPOC	Text(50)	

Entity Name: RESULT

Column Name	Column Datatype	Entity Attribute Column Comment
resID	Text(60)	Primary Key used to identify each distinct result record.
labID	Text(50)	Foreign Key used to identify a laboratory.
samID	Text(35)	Unique identification number for each distinct sample collected in the field, for a specific sampling day or episode
resCAS	Text(12)	Chemical Abstract Service number.
resParm	Text(50)	Parameter, Analyte or Compound for which results are being presented.
resResult	Text(20)	Result, concentration, or value of the analyte, parameter or compound in a text data format.
resUnits	Text(7)	Result units. If entering the value for a parameter, enter the appropriate units for that parameter, or N/A if not appropriate
resRisk1	Text(50)	Primary calculated result, concentration, or value of the analyte, parameter or compound used for Risk Assestment
resRisk2	Text(50)	Secondary calculated result, concentration, or value of the analyte, parameter or compound used for Risk Assestment
resFrac	Text(10)	Chemical Fraction or Class (type)
resQual	Text(7)	Quality Assurance qualifiers. The field is not restricted to one qualifier.
resValFlag	Text(10)	Validation flag used to define the quality control noncompliance
resSDG	Text(15)	Sample delivery group

Entity Name: SAMPLE

Column Name	Column Datatype	Entity Attribute Column Comment
samID	Text(35)	Unique identification number for each distinct sample collected in the field, for a specific sampling day or episode
invID	Text(50)	Foreing Key used to identify an investigation.
labID	Text(50)	Foreing Key used to identify a laboratory.
staID	Text(25)	Foreign Key used to identify a sampling location.
samName	Text(35)	Identification for each sample as designated on the Chain-of-Custody
samAlias	Text(35)	An alternative identification for samID. This may be the name as derived from original source document
samDate	Date/Time	The date the sample was collected in the field.
samRound	Text(5)	Interval description of sample data collected within a finite period of time.
samPOC	Text(20)	The responsible party/person associated with collecting the sample.
samType	Text(15)	Type of sample collected. (i.e. Air Stripper, Backround, Blank, Building Floor, Building Wall, Debri, Drum, etc.)
samMatrix	Text(4)	Matrix represented by the sample.
samSubMtrx	Text(4)	A further delineated description of the matrix
samDup	Text(10)	Indicate if this is a duplicate sample.
samTopDpth	Double	Depth to the top of the sample, measured from ground surface.
samBotDpth	Double	Depth to the bottom of the sample, measured from the ground

		surface.
samQCType	Text(4)	Quality control type
samStatus	Text(10)	Status of sample location - Normal or excavated
samMethod	Text(50)	Sampling method or instrument by which the sample was physically obtained (i.e. hand auger, split spoon, etc.)
samNote	Text(40)	To be used for explanation of "Other" in the Sample Matrix and Sample Type fields. May also be used to futher explain Sample Method.
samUpdtPOC	Text(15)	Point of Contact or responsibale party for updating and/or revising the data to the database
samUpdt	Date/Time	Date that the data was upload and/or revised in the database

Entity Name: STATION

Column Name	Column Datatype	Entity Attribute Column Comment
staID	Text(25)	Primary Key used to identify a sampling location. It is suggested that abbreviations correspond to the Sample Types field.
facID	Text(20)	Foreign Key used to identify a facility.
invID	Text(10)	Foreign Key used to identify an investigation.
staXCoord	Text(14)	X (Easting, Longitude) coordinate value for each location point.
staYCoord	Text(14)	Y (Northing, Latitude) coordinate value for each location point.
staName	Text(25)	An alternative identification for staID. This may be the name as derived from original source document or a holder to use for posting labels to a map
staType	Text(4)	Current type of location
staInstId	Date/Time	Date the location was installed or suveyed.
staStatus	Text(50)	Current status or the location (i.e. Active, Abandoned, etc.)
staSite	Text(25)	The designated site number that the staID is included within
staAOC	Text(20)	Description of the area of concern that the staID is associated with.
staOU	Text(5)	Operable Unit number that the staID encompasses.
staSWMU	Text(5)	Solid Waste Management Unit number associated with the staID.
staArea	Text(50)	May be used to further explain and area asscoiated with the staID
staGrndSrf	Double	Ground surface elevation with reference to mean sea level in vertical datum
staSurvey	Yes/No	Indicates whether the location was suveryed or not
staSource	Text(35)	Responsible party that conducted the survey
staDate	Date/Time	Date which the coorinates where surveyed
staMethod	Text(10)	Method used to obtain coordinates
staAlias	Text(25)	A secondary alternative identification for staID. This may be the name as derived from original source document or a holder to use for posting labels to a map
staNotes	Text(50)	Addiotional remarks associated to the location
staUpdtPOC	Text(15)	Responsibale party for updating and/or revising the data to the database
staUpdt	Date/Time	Date that the data was upload and/or revised in the database

Entity Name: STRATUM

Column Name	Column Datatype	Entity Attribute Column Comment
staID	Text(25)	Foreign Key used to identify a sampling location.
strTop.	Double	Depth in feet below ground surface to the top of lithologic unit
strBot	Double	Depth in feet below ground surface to the bottom of lithologic unit
strDesc	Text(80)	Geologist's description of lithology
strUnit	Text(40)	A stratigraphic unit. A stratum recongnized as a unit for descrption mapping or correlation.
strGraphic	Text(20)	Description of graphics used to display each layer.
strNotes	Text(50)	Geologist's comments.

Entity Name: WATER

Column Name	Column Datatype	Entity Attribute Column Comment
staID	Text(25)	
wtrElev	Double	Elevation of water level
wtrMP	Double	Measuring point elevation
wtrDTW	Double	Depth below ground surface to water table (in feet)
wtrDate	Date/Time	Date measurement was taken
wtrTime	Text(8)	Time on which groundwater elevation was collected. The required format is HH:MM:SS.
wtrFPDpth	Double	Depth below ground surface to free product (in feet)
wtrFPElev	Double	Elevation of free product
wtrFPVal	Double	Product thickness in feet

Entity Name: WELL

Column Name	Column Datatype	Entity Attribute Column Comment
staID	Text(25)	Foreign Key used to identify a sampling location.
wlDriller	Text(20)	Drilling contractor
wlMethod	Text(15)	Drilling method for well installation
wlGrndElv	Double	Elevation (MSL) of ground-level.
wlWellDpth	Double	Total depth of the well.
wlWellDia	Double	Diameter of the drilled hole in inches
wlBoreDpth	Double	Total depth of the boring.
wlBoreDia	Double	Diameter of the boring in inches
wlTWC	Double	Top of well casing (TOC)
wlTPC	Double	Top of protective casing
wlSealDpth	Double	Depth below ground surface to seal (in feet)
wlSealMat	Text(15)	Type of material in which the seal is constructed from
wlFilTop	Double	Depth below ground surface to the top of fill material (in feet)
wlFilBot	Double	Depth below ground surface to the bottom of fill material (in feet).
wlFilMat	Text(20)	Type of material used for fill.
wlScrAquifer	Text(20)	Aquifer name in which the screen resides
wlScrMat	Text(15)	Type of material in which the screen is constructed from
wlScrSlot	Double	Screen slot size in thousandths of an inch
wlScrTop	Double	Depth below ground surface to the top of the screen (in feet)
wlScrBot	Double	Depth below ground surface to the bottom of the screen
wlScrTElv	Double	Elevation the top of the screen in vertical datum found in VERT_DATUM in the well table.
wlScrBElv	Double	Elevation the top of the screen in vertical datum found in VERT_DATUM in the well table
wlCasType	Text(50)	Type of casing material in which the casing is constructed from
wlGrutMat	Text(50)	

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 Tetra Tech NUS, Inc. (TtNUS) to combine the power and versatility of a relational database management system and a user-friendly Geographic Information System (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
PrjNo	Character (25)	Unique facility number assigned to each facility
Facility	Character (25)	The name of the facility the data is associated with
Path	Character (25)	Directory storing all data related to the facility
PIC	Character (25)	Internal principle in charge or project manager
Phone	Character (15)	Phone number of PIC
Email	Character (35)	Email address of PIC
Projection	Character (40)	Coordinate system used for all spatial data
Datum	Character (15)	Datum used by the projection
SubmitDate	Date	Date the project was submitted

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
LocName	Character (25)	The commonly used name 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
InstlDate	Date	Installation date of LocID
Type	Character (4)	Indicates the type of location by the LocID
OU	Character (5)	Operable Unit number
SWMU	Character (5)	Solid Waste Management Unit number
AOC	Character (20)	Area of concern
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.
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.
Unit	Character (5)	Unit of measurement for the Result.
Qualifier	Character (3)	Validation qualifier
Fraction	Character (10)	Chemical class or fraction type.
Matrix	Character (4)	Indicates the matrix represented by the sample.
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.
SampleDate	Date	The date the sample was collected in the field
Round	Character (5)	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)
Duplicate	Character (10)	Code for reference to field duplicates.

APPENDIX B

QUALITY ASSURANCE PROJECT PLAN (QAPP)

QUALITY ASSURANCE PROJECT PLAN

REMEDIAL INVESTIGATION
FOR SITE 5
NAVAL CONSTRUCTION BATTALION CENTER GULFPORT
GULFPORT, MISSISSIPPI

Submitted to:
Southern Division
Naval Facilities Engineering Command
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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 N62467-94-D-0888
CONTRACT TASK ORDER 156

March 2001

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ACRONYMS AND ABBREVIATIONS

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
FOL	Field Operations Leader
FTMR	Field Task Modification Request
GC	Gas Chromatograph
GFAA	Graphite Furnace Atomic Absorption
HASP	Health & Safety Plan
HR	High Resolution
HPLC	High Performance Liquid Chromatograph
HSM	Health and Safety Manager
ICP	Inductively-Coupled Plasma Atomic-Emission Spectrometer
IDL	Instrument Detection Limit
LCS	Laboratory Control Sample
MCL	Maximum Contamination Level
MDEQ	Mississippi Department of Environmental Quality
MDL	Method Detection Limit
MS	Mass Spectrometer
MS/MSD	Matrix Spike/Matrix Spike Duplicate

NA	Not Applicable
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	Polycyclic Aromatic Hydrocarbon
PARCC	Precision, Accuracy, Representativeness, Comparability, Completeness
PCB	Polychlorinated Biphenyl
PM	Program Manager
PQL	Practical Quantitation Limit
RBC	Risk-Based Concentration
QA	Quality Assurance
QAM	Quality Assurance Manager
QAO	Quality Assurance Officer
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
TOM	Task Order Manager
TtNUS	Tetra Tech NUS, Inc.
uMhos/cm	millimohs 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
ppt	parts per trillion

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 Southern Division Naval Facilities Engineering Command and the Naval Construction Battalion Center (NCBC) Gulfport, Gulfport, Mississippi, under the Comprehensive Long-Term Environmental Action Navy (CLEAN III) Contract Number N62467-94-D-0888, Contract Task Order (CTO) 156. The QAPP and other associated documents, including the United States Environmental Protection Agency (USEPA) Region IV Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM), Remedial Investigation (RI) Workplan (WP), prepared by TtNUS, dated March 2001, and the Health and Safety Plan (HASP), constitute the project planning documents for the remedial investigation sampling program to be performed at Site 5 located at NCBC Gulfport, Gulfport, Mississippi.

This QAPP presents the organization, objectives, planned activities, and specific Quality Assurance/Quality Control (QA/QC) procedures associated with the sampling program. Specific protocols for sampling, sample handling and storage, chain-of-custody, and laboratory and field analyses are described within this document. All QA/QC procedures 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 MDEQ requirements, regulations, guidances, and technical standards.

1.2 FACILITY DESCRIPTION

A description of Site 5 at 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 Section 2.0 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 primary objectives of the work will be to collect data needed to fill data gaps from previous investigations. The secondary objective of the work will be to fully define the nature and extent of contaminations present at the Site. 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. All field measurements will be completed using simple field instrumentation.

Field parameters including specific conductance, pH, turbidity, temperature, oxidation-reduction potential (ORP), will be completed for all groundwater samples. Specific conductance, pH, turbidity and temperature will be used to support monitoring well purging of stagnant water from well casings. Specific conductance and pH will also be used as general indicators of water quality. Specific conductance, pH, turbidity, and temperature will be measured using field water-quality meters. ORP will be measured using an ORP meter. Further details regarding field-sampling methods are provided in Section16 of the USEPA EISOPQAM.

1.4.2.2 Laboratory Parameters

The analytical methods to be used for analysis of the NCBC Gulfport Site 5 groundwater, surface water, soil, sediment, and seep samples have been selected based on existing analytical data from previous investigations. The analytical data will be used to fill data gaps and determine the nature of the contamination. The suite of analyses for the NCBC Gulfport groundwater, surface water, and seep investigation includes Target Compound List (TCL; as defined by the Contract Laboratory Program Statement of Work OLM04.2) and Appendix IX (as defined in 40 CFR, Part 122, Appendix IX) Volatile Organic Carbons (VOCs), TCL and Appendix IX Semi-Volatile Organic Carbons (SVOCs), TCL and Appendix IX Polycyclic Aromatic Hydrocarbons (PAHs), TCL and Appendix IX Pesticides/PCBs, Appendix IX Herbicides, Appendix IX Organophosphorous Pesticides, Dioxins/Furans, cyanide, Target Analyte List

(TAL; as defined by the Contract Laboratory Program Statement of Work ILM04.2) metals, and Dissolved Gases (methane, ethane, ethane). With the exception of Dissolved Gases, these parameters will be used to quantify the concentration of the contaminants of concern (COCs). Dissolved Gases will be used to determine non-petroleum background carbon concentration. Dissolved Gases will also be used to determine if background carbon sources are present. Tables 1-1 through 1-9 provide a summary of all target compounds, analytes, and associated Required Quantitation Limits/ Required Detection Limits (RQLs/RDLs) for VOCs, SVOCs, PAHs, Pesticides/PCBs, Herbicides, Organophosphorous Pesticides, Dioxins/Furans, metals, and cyanide. 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 any compound or analyte, then the USEPA Region III Risk-Based Concentrations (RBCs) are used for comparison. Table 1-10 provides the compound list and Reporting Limits (RLs) for Dissolved Gases. There are no specific RLs listed because the reporting limits for these analyses are dependent on the laboratory, and there are no MCLs or RBCs associated with these compounds.

The suite of analyses for the NCBC Gulfport soil and sediment investigation includes Target Compound List and VOCs, TCL SVOCs, TCL PAHs, TCL Pesticides/PCBs, Dioxins/Furans, cyanide, and TAL metals. These parameters will be used to quantify the concentration of the COCs. Tables 1-1 through 1-9 provide a summary of all target compounds, analytes, and associated Required Quantitation Limits/ Required Detection Limits (RQLs/RDLs) for VOCs, SVOCs, PAHs, Pesticides/PCBs, Dioxins/Furans, metals, and cyanide. The RQLs listed in the tables meet the required MCLs. Analytical methods are further discussed in Section 8.0 of this QAPP.

1.5 SAMPLE NETWORK DESIGN AND RATIONALE

The sample network design and rationale is discussed in **Section 5.0** 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 in the **Appendix B** of the WP.

TABLE 1-1

SW-846 8260B ANALYTICAL QUANTITATION LIMITS TCL* AND APPENDIX IX VOCS NCBC GULFPORT SITE 5**

Page 1 of 3

Parameter	RQL[1]	
	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
trans-1,2-Dichloroethene	NA	1

TABLE 1-1

SW-846 8260B AND 504.1 ANALYTICAL QUANTITATION LIMITS
TCL* AND APPENDIX IX VOCS**
NCBC GULFPORT SITE 5
Page 2 of 3

Parameter	RQL[1]	
	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
2-chloroethylvinyl ether	NA	1
Acrolein	NA	1
Acrylonitrile	NA	1
Chloroprene	NA	1
3-Chloroprene	NA	1
Dibromomethane	NA	1
Ethyl Methacrylate	NA	1
Iodomethane	NA	1

TABLE 1-1

SW-846 8260B AND 504.1 ANALYTICAL QUANTITATION LIMITS TCL* AND APPENDIX IX** VOCs NCBC GULFPORT SITE 5

Parameter	RQL[1]	
	Solid Samples	Aqueous Samples
Volatile Organic Compounds	µg/kg	µg/L
Methyl methacrylate	NA	1
Vinyl acetate	NA	1
Trans-1,4-dichloro-2-butene	NA	1
Dichlorodifluoromethane	NA	1
Pentachloroethane	NA	1
Isobutyl alcohol	NA	PQL [2]
Propionitrile	NA	PQL
Acetonitrile	NA	PQL
1,1,1,2-Tetrachloroethane	NA	1
1,2,3-Trichloropropane	NA	1
Methacrylonitrile	NA	1

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

** Appendix IX List as defined in 40 CFR, Part 264, Appendix IX Groundwater Monitoring List

(1) RQL Required Quantitation Limit

(2) PQL Practical Quantitation Limit, determined by the laboratory.

TABLE 1-2

SW-846 8270C ANALYTICAL QUANTITATION LIMITS
TCL* AND APPENDIX IX** SVOCS
NCBC GULFPORT SITE 5

PAGE 1 OF 4

Parameter	RQL[1]	
	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
1,2-Dichlorobenzene	330	10

TABLE 1-2

SW-846 8270C ANALYTICAL QUANTITATION LIMITS
TCL* and APPENDIX IX** SVOCs
NCBC GULFPORT SITE 5

PAGE 2 OF 4

Parameter	RQL[1]	
	Solid Samples	Aqueous Samples
Semivolatile Organic Compounds	µg/kg	µg/L
1,3-Dichlorobenzene	330	10
1,4-Dichlorobenzene	330	10
2,4-Dichlorophenol	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 1-2

SW-846 8270C ANALYTICAL QUANTITATION LIMITS
TCL* and APPENDIX IX** SVOCs
NCBC GULFPORT SITE 5

PAGE 3 OF 4

Parameter	RQL[1]	
	Solid Samples	Aqueous Samples
Semivolatile Organic Compounds	µg/kg	µg/L
Phenol	330	10
Pyrene	330	10
1,2,4-Trichlorobenzene	330	10
2,4,5-Trichlorophenol	830	25
2,4,6-Trichlorophenol	330	10
2,3,4,6-Tetrrachlorophenol	NA	10
2,6-Dichlorophenol	NA	10
n-Nitrosodimethylamine	NA	10
2-Picoline	NA	10
Diphenylamine	NA	10
Benzyl alcohol	NA	10
n-Nitrosomethylethylamine	NA	10
p-Phenylenediamine	NA	10
3-Methylphenol	NA	10
4-Methylphenol	NA	10
Pyridine	NA	10
3,3'-Dimethoxybenzidine	NA	10
Isosafrole	NA	10
1,4-Napthoquinone	NA	10
1-Napthylamine	NA	10
Aramite	NA	10
Hexachloropropene	NA	10
Pronamide	NA	10
2-Acetylaminofluorene	NA	10
n-Nitrosodiethylamine	NA	10
3-Methylchoranthrene	NA	10
4-Nitroquinoline-1-oxide	NA	10
7,12-Dimethylbenz(a)axobenzene	NA	10
n-Nitrosomorpholine	NA	10
p-(Dimethylamino)azobenzene	NA	10

TABLE 1-2

SW-846 8270C ANALYTICAL QUANTITATION LIMITS
TCL* and APPENDIX IX** SVOCs
NCBC GULFPORT SITE 5

Parameter	RQL[1]	
	Solid Samples	Aqueous Samples
Semivolatile Organic Compounds	µg/kg	µg/L
Phenol	330	10
Pyrene	330	10
1,2,4-Trichlorobenzene	330	10
2,4,5-Trichlorophenol	830	25
2,4,6-Trichlorophenol	330	10
2,3,4,6-Tetrrachlorophenol	NA	10
2,6-Dichlorophenol	NA	10
n-Nitrosodimethylamine	NA	10
2-Picoline	NA	10
Diphenylamine	NA	10
Benzyl alcohol	NA	10
n-Nitrosomethylethylamine	NA	10
p-Phenylenediamine	NA	10
3-Methylphenol	NA	10
4-Methylphenol	NA	10
Pyridine	NA	10
3,3'-Dimethoxybenzidine	NA	10
Isosafrole	NA	10
1,4-Napthoquinone	NA	10
1-Napthylamine	NA	10
Aramite	NA	10
Hexachloropropene	NA	10
Pronamide	NA	10
2-Acetylaminofluorene	NA	10
n-Nitrosodiethylamine	NA	10
3-Methylchoranthrene	NA	10
4-Nitroquinoline-1-oxide	NA	10
7,12-Dimethylbenz(a)axobenzene	NA	10
n-Nitrosomorpholine	NA	10
p-(Dimethylamino)azobenzene	NA	10

* TCL Target Compound List from the Contract Laboratory Program, Organic Analytical Statement of Work (OLM04.2, USEPA)
** Appendix IX List as defined in 40 CFR, Part 264, Appendix IX Groundwater Monitoring List
(1) RQL Required Quantitation Limit
NA Not Applicable

TABLE 1-3

SW-846 8310 ANALYTICAL QUANTITATION LIMITS TCL* AND APPENDIX IX** PAHS NCBC GULFPORT SITE 5

Parameter	RQL[1]	
	Solid Samples	Aqueous Samples
Polycyclic Aromatic Hydrocarbons	µg/kg	µg/L
Acenaphthylene	330	10
Acenaphthene	330	10
Anthracene	330	10
Benzo(a)anthracene	330	10
Benzo(b)fluoranthene	330	10
Benzo(a)pyrene	330	10
Benzo(g,h,I)perylene	330	10
Chrysene	330	10
Dibenzo(a,h)anthracene	330	10
Fluoranthene	330	10
Flourene	330	10
Indeno(1,2,3-cd)pyrene	330	10
2-methylnaphthalene	330	10
Naphthalene	330	10
Phenanthrene	330	10
• yrene	330	10

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

** Appendix IX List as defined in 40 CFR, Part 264, Appendix IX Groundwater Monitoring List

(1) RQL Required Quantitation Limit

TABLE 1-4

SW-846 8081A ANALYTICAL QUANTITATION LIMITS
TCL* AND APPENDIX IX** PESTICIDES
NCBC GULFPORT SITE 5

Parameter	RQL[1]	
	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

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

** Appendix IX List as defined in 40 CFR, Part 264, Appendix IX Groundwater Monitoring List

(1) RQL Required Quantitation Limit

TABLE 1-5

SW-846 8082A ANALYTICAL DETECTION LIMITS TCL* AND APPENDIX IX** PCBS NCBC GULFPORT SITE 5

Parameter	RQL[1]	
	Solid Samples	Aqueous Samples
Pesticides	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

* TCL Target Compound List from the Contract Laboratory Program, Organic Analytical Statement of Work (OLM04.2, USEPA)
** Appendix IX List as defined in 40 CFR, Part 264, Appendix IX Groundwater Monitoring List
(1) RQL Required Quantitation Limit
(2) PQL Practical Quantitation Limit, determined by the laboratory

TABLE 1-6

SW-846 8141A ANALYTICAL DETECTION LIMITS APPENDIX IX** PESTICIDES LIST NCBC GULFPORT SITE 5

Parameter	RDL[1]
	Aqueous Samples
Target Compound List	µg/L
Dimethoate	PQL[2]
Disulfoton	PQL
Famphur	PQL
Parathion, methyl	PQL
Phorate	PQL

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

TABLE 1-7
SW-846 8151A ANALYTICAL DETECTION LIMITS APPENDIX IX** HERBICIDES LIST
NCBC GULFPORT SITE 5

Parameter	RDL(1)
	Aqueous Samples
Target Compound List	µg/L
2,4-Dichlorophenoxyacid[2,4-D]	PQL (2)
Dinoseb	PQL
-[2,4,5-Trichlorophenoxyl] propionic acid[2,4,5-TP][Silvex]	PQL
2, 4, 5-T	PQL

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

TABLE 1-8

SW-846 8290 ANALYTICAL DETECTION LIMITS DIOXIN/FURAN LIST
NCBC GULFPORT SITE 5

Parameter	RQL[1]	
	Solid Samples	Aqueous Samples
Dioxins/Furans	part per trillion (ppt)	part per trillion (ppt)
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1.0	0.01
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	1.0	0.01
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	2.5	0.025
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	2.5	0.025
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	2.5	0.025
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HPCDD)	2.5	0.025
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	5.0	0.05
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	1.0	0.01
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	1.0	0.01
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	1.0	0.01
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	2.5	0.025
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	2.5	0.025
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	2.5	0.025

TABLE 1-8

SW-846 8290 ANALYTICAL DETECTION LIMITS DIOXIN/FURAN LIST
NCBC GULFPORT SITE 5

Parameter	RQL[1]	
	Solid Samples	Aqueous Samples
Dioxins/Furans	part per trillion (ppt)	part per trillion (ppt)
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	2.5	0.025
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	2.5	0.025
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	2.5	0.025
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	5.0	0.05

[1] RQL Required Quantitation Limit

TABLE 1-9

SW-846 6010B, 9010B, 7140 ANALYTICAL DETECTION LIMITS
TAL INORGANICS AND CYANIDE
NCBC GULFPORT SITE 5

Parameter	RDL [1]	
	Soil Samples	Aqueous Samples
Inorganics	µg /kg	µg/L
Aluminum	IDL [2]	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

(1) RDL Required Detection Limit. Detection Limit for soil adjusted for the amount of sample analyzed and percent moisture.
(2) IDL Instrument Detection Limit

TABLE 1-10

RSK 147 AND 175 ANALYTICAL DETECTION LIMITS DISSOLVED GASES NCBC GULFPORT SITE 5

Parameter	RDL [1]	
	Soil Samples	Aqueous Samples
Inorganics	**µg /kg**	**µg/L**
Methane	NA	PQL [2]
Ethane	NA	PQL
Ethene	NA	PQL

[1] RDL Required Detection Limit.
[2] PQL Practical Quantitation Limit, determined by the laboratory.

2.0 PROJECT ORGANIZATION

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 responsible for the execution of all contractual obligations. He/she serves as the primary Program point of contact for the client and provides an interface between the Navy and the project staff. The TtNUS CLEAN Program Manager is Ms. Debbie Wroblewski.

CLEAN Task Order Manager - The Task Order Manager (TOM) is responsible for project performance, budget, and schedule, and for ensuring the availability of necessary personnel, equipment, subcontractors, and services. He/she will direct the development of the field program, evaluation of findings, determination of conclusions and recommendations, and preparation of technical reports. The TtNUS TOM for CTO No. 156 is Mr. Robert Fisher.

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 Health and Safety Plan. In addition, the FOL will coordinate the schedule of field sampling activities with the schedule and capacity requirements of the selected analytical laboratories. 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. 156 is Mr. David Hickey.

Health and Safety Manager - The Program Health and Safety Manager (HSM) will review and internally approve the Health and Safety Plan 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 Task Order Manager, 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.

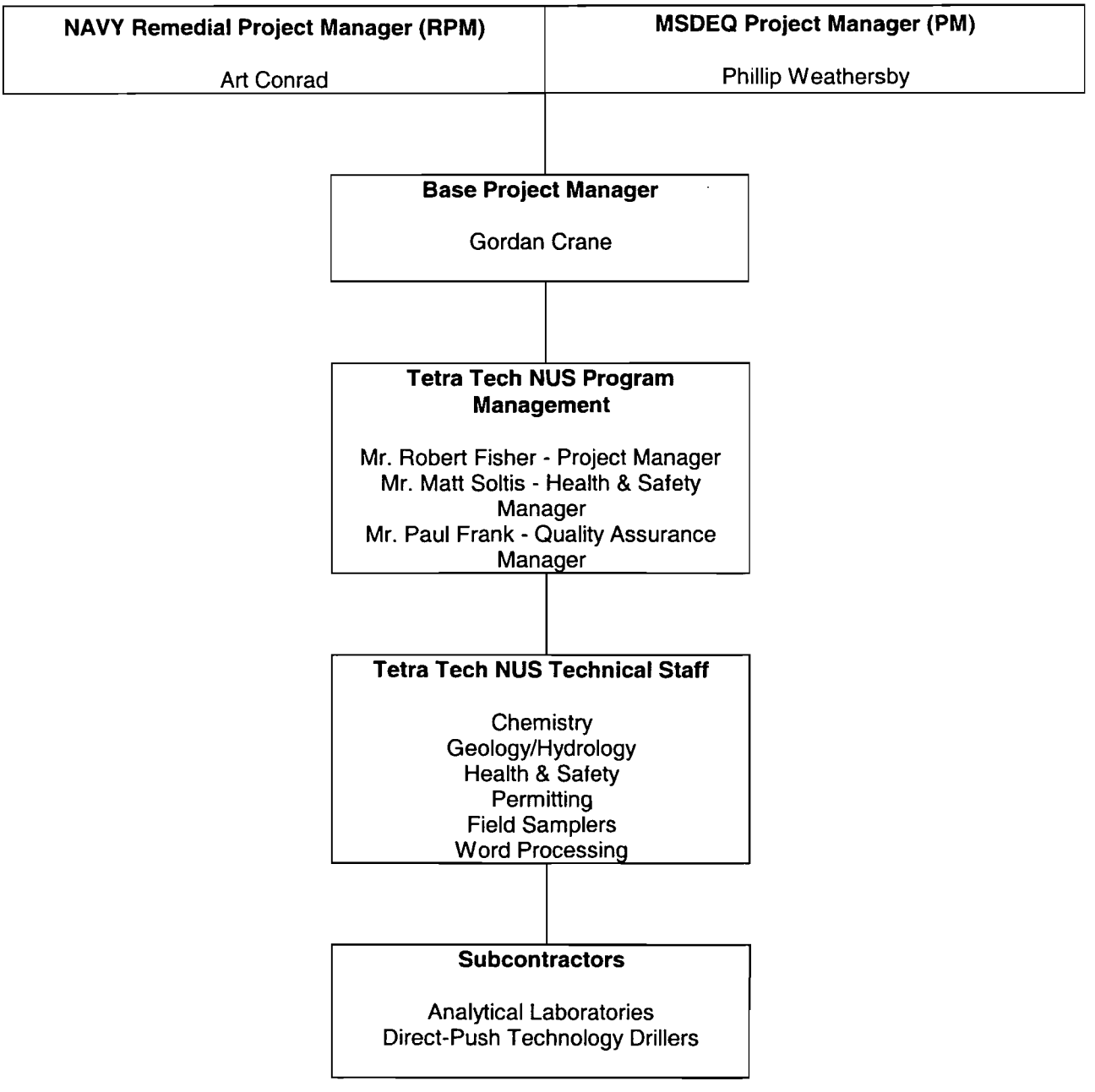
Quality Assurance Manager - The TtNUS Quality Assurance Manager (QAM) for this study is Mr. Paul Frank. The QAM operates independently of the TOM and is responsible for all Program-wide, quality

assurance issues and the development of the Quality Assurance Project Plan (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. 156 is Mr. W. Howard Engle.

Project Laboratories – 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.

FIGURE 2-1

PROJECT ORGANIZATION
NCBC GULFPORT, GULFPORT, MISSISSIPPI



3.0 PREVIOUS INVESTIGATIONS

The overall QA objective for this project is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting that will provide results, which support the attainment of project objectives. 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 quality control, audits, preventive maintenance of field and laboratory equipment, and corrective action are described in other sections of this QAPP.

The PARCC parameters (precision, accuracy, representativeness, comparability, and completeness) 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 13.0.

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 determining precision is provided in Section 13.2.

3.1.1 Field Precision Objectives

Duplicate field measurements for aqueous matrix samples will not be required. In lieu of using matrix spikes and using independent QC check standards, more 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 quality control sample per 20 environmental samples). Laboratory precision is measured via comparison of calculated Relative Percent Difference (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. 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 6.0.) Table 3-1 presents precision control limits for MS/MSD RPDs for organic analyses.

Precision for metals analyses will be measured via the RPDs for duplicate sample analyses. Table 3-1 presents precision control limits for duplicate sample RPDs.

Precision for the remaining miscellaneous parameters will typically be measured via the RPD results for laboratory duplicate samples. Internal laboratory control limits for precision, which are typically set at three times the standard deviation of a series of RPDs, will be used for evaluation of precision for these parameters.

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 13.1.

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, more 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. Surrogate and MS analyses also measure the accuracy of laboratory operations, but as affected by the 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

TABLE 3-1

PRECISION CONTROL LIMITS (RPDS)[1]
MATRIX SPIKE/MATRIX SPIKE (ORGANICS) AND DUPLICATE (METALS) SAMPLES
NCBC GULFPORT SITE 5, GULFPORT, MISSISSIPPI

Chemical	Aqueous Samples	Soil Samples
VOLATILE ORGANICS [2]	**RPD**	**RPD**
1,1-Dichloroethene	22	35
Trichloroethene	24	35
Benzene	21	35
Toluene	21	35
Chlorobenzene	21	35
SEMI-VOLATILE ORGANICS [3]	**RPD**	**RPD**
Phenol	42	12
2-Chlorophenol	40	10
N-Nitroso-di-n-propylamine	38	15
4-Chloro-3-Methylphenol	42	8
4-Nitropenol	50	25
2,4-Dinitrotoluene	38	10
Pentachlorophenol	50	10
PAHs [4]	**RPD**	**RPD**
Acenaphthene	31	19
Acenaphthylene	25	25
Anthracene	25	25
Benzo(a)anthracene	25	25
Benzo(a)pyrene	25	25
Benzo(b)fluoranthene	25	25
Benzo(g,h,i)perylene	25	25
Benzo(k)fluoranthene	25	25
Chrysene	25	25
Dibenzo(a,h)anthracene	25	25
Fluoranthene	25	25
Indeno(12,3,-cd)pyrene	25	25
Naphthalene	25	25
Phenanthrene	25	25
Pyrene	31	36

TABLE 3-1

PRECISION CONTROL LIMITS (RPDS)[1]
MATRIX SPIKE/MATRIX SPIKE (ORGANICS) AND DUPLICATE (METALS) SAMPLES
NCBC GULFPORT SITE 5, GULFPORT, MISSISSIPPI

Chemical	Aqueous Samples	Soil Samples
Pesticides [5]	RPD	RPD
All pesticides	25	25
PCBs [6]	RPD	RPD
Aroclor 1254	20	20
Aroclor 1260	20	20
Organophos. Pesticides [7]	RPD	RPD
All pesticides	20	NA
Herbicides [8]	RPD	RPD
All herbicides	20	NA
Dioxins/Furans [9]	RPD	RPD
All dioxins/furans	25	25
Metals [10]	RPD	RPD
• ll analytes	20	20

(1) RPD Relative Percent Difference as described in Section 13.0.
(2) USEPA Method SW-846 8260B.
(3) USEPA Method SW-846 8270C
(4) USEPA Method SW-846 8310.
(5) USEPA Method SW-846 8081A.
(6) USEPA Method SW-846 8082.
(7) USEPA Method SW-846 8151.
(8) USEPA Method SW-846 8141.
(9) USEPA Method SW-846 8092.
(10) USEPA Method SW-846 6010B and 7471.
NA Not Applicable

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 organic analyses will be measured via the %Rs for surrogate spikes and MS/MSDs. Table 3-2 presents control limits for LCS spike recoveries for VOCs, SVOCs, PAHs, Pesticides/PCBs, Herbicides, Organophosphorous Pesticides, Dioxin/Furan. Tables 3-3 and 3-4 present control limits for matrix and surrogate spike recoveries, respectively, for VOCs, SVOCs, PAHs, Pesticides/PCBs, Herbicides, Organophosphorous Pesticides, Dioxin/Furan.

Accuracy for inorganic (metals) analyses will be measured via the %R for LCS and MS analyses. Table 3-2 presents accuracy control limits.

Accuracy for the remaining parameters will typically be measured via %Rs for MSs and/or LCSs. Internal laboratory control limits for accuracy, which are typically set at three times the standard deviation of a series of %R values, 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 typically expressed as a percentage. The equation for completeness is presented in Section 13.3.

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 QC criteria. 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.

As further discussed in Section 11.2.2, one hundred percent of the laboratory data for the NCBC Gulfport 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.

TABLE 3-2

ACCURACY CONTROL LIMITS (%R)[1]
LABORATORY CONTROL SAMPLE ORGANIC AND METAL ANALYSIS
NCBC GULFPORT SITE 5, GULFPORT, MISSISSIPPI

Chemical	Aqueous Samples	Soil Samples
VOLATILE ORGANICS[2]	%R	%R
Trichloroethene	61 – 145	82 – 118
Benzene	71 – 120	80 – 120
1,1-Dichloroethene	76 – 127	75 – 125
Toluene	76 – 125	82 – 118
Chlorobenzene	75 - 130	85 - 115
SEMI-VOLATILE ORGANICS[3]	%R	%R
Phenol	12 – 110	12 – 110
2-Chlorophenol	27 – 123	27 – 123
N-Nitroso-di-n-propylamine	41 – 116	41 – 116
4-Chloro-3-Methylphenol	23 – 97	23 – 97
4-Nitrophenol	10 – 80	10 – 80
2,4-Dinitroluene	24 – 96	24 – 96
Pentachlorophenol	9 - 103	9 - 103
PAHs[4]	%R	%R
Acenaphthene	46 - 118	31 - 137
Acenaphthylene	33 – 145	33 – 145
Anthracene	27 – 133	27 – 133
Benzo(a)anthracene	33 – 143	33 – 143
Benzo(a)pyrene	17 – 163	17 – 163
Benzo(b)fluoranthene	24 – 159	24 – 159
Benzo(g,h,i)perylene	50 – 130	50 – 130
Benzo(k)fluoranthene	11 – 162	11 – 162
Chrysene	17 – 168	17 – 168
Dibenzo(a,h)anthracene	17 – 130	17 – 130
Fluoranthene	26 – 137	26 – 137
Indeno(12,3,-cd)pyrene	50 - 130	50 - 130
Naphthalene	21 – 133	21 – 133
Phenanthrene	54 – 120	54 – 120
Pyrene	26 - 127	35 - 142

TABLE 3-2

ACCURACY CONTROL LIMITS (%R)[1]
LABORATORY CONTROL SAMPLE ORGANIC and METAL ANALYSIS
NCBC GULFPORT SITE 5, GULFPORT, MISSISSIPPI

Chemical	Aqueous Samples	Soil Samples
Pesticides[5]	%R	%R
All pesticides	75 - 125	50 - 140
PCBs[6]	%R	%R
Aroclor 1254	85 - 115	84 – 116
Aroclor 1260	80 – 120	78 - 122
Organophos. Pesticides[7]	%R	%R
All pesticides	75 – 125	NA
Herbicides[8]	%R	%R
All herbicides	75 – 125	NA
Dioxins/Furans[9]	%R	%R
All dioxins/furans	70 - 130	25
Metals[10]	%R	%R
All analytes	80 - 120	80 - 120

(1) %R Percent Recovery
(2) USEPA Method SW-846 8260B.
(3) USEPA Method SW-846 8270C.
(4) USEPA Method SW-846 8310.
(5) USEPA Method SW-846 8081A.
(6) USEPA Method SW-846 8082.
(7) USEPA Method SW-846 8151.
(8) USEPA Method SW-846 8141.
(9) USEPA Method SW-846 8092.
(10) USEPA Method SW-846 6010B and 7471.
NA Not Applicable

TABLE 3-3

ACCURACY CONTROL LIMITS (%R)[1]
MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLES
ORGANIC AND METAL ANALYSES
NCBC GULFPORT SITE 5, GULFPORT, MISSISSIPPI

Chemical	Aqueous Samples	Soil Samples
VOLATILE ORGANICS[2]	%R	%R
1,1-Dichloroethene	61 – 145	NA
Trichloroethene	71 – 120	NA
Benzene	76 – 127	NA
Toluene	76 – 125	NA
Chlorobenzene	75 - 130	NA
SEMI-VOLATILE ORGANICS[3]	%R	%R
Phenol	12 – 110	NA
2-Chlorophenol	27 – 123	NA
N-Nitroso-di-n-propylamine	41 – 116	NA
4-Chloro-3-Methylphenol	23 – 97	NA
4-Nitrophenol	10 – 80	NA
2,4-Dinitroluene	24 – 96	NA
Pentachlorophenol	9 - 103	NA
PAHs[4]	%R	%R
Acenaphthene	46 - 118	31 - 137
Acenaphthylene	33 – 145	33 – 145
Anthracene	27 – 133	27 – 133
Benzo(a)anthracene	33 – 143	33 – 143
Benzo(a)pyrene	17 – 163	17 – 163
Benzo(b)fluoranthene	24 – 159	24 – 159
Benzo(g,h,i)perylene	50 – 130	50 – 130
Benzo(k)fluoranthene	11 – 162	11 – 162
Chrysene	17 – 168	17 – 168
Dibenzo(a,h)anthracene	17 – 130	17 – 130
Fluoranthene	26 – 137	26 – 137
Indeno(12,3,-cd)pyrene	50 - 130	50 - 130
Naphthalene	21 – 133	21 – 133
Phenanthrene	54 – 120	54 – 120
Pyrene	26 - 127	35 - 142

TABLE 3-3

ACCURACY CONTROL LIMITS (%R)[1]
MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLES ORGANIC and METAL ANALYSES
NCBC GULFPORT SITE 5, GULFPORT, MISSISSIPPI

NCBC GULFPORT SITE 5, GULFPORT, MISSISSIPPI

Chemical	Aqueous Samples	Sediment Samples
Pesticides [5]	%R	%R
All pesticides	75 - 125	50 - 140
PCBs [6]	%R	%R
Aroclor 1254	85 - 115	84 – 116
Aroclor 1260	80 – 120	78 - 122
Organophos. Pesticides [7]	%R	%R
All pesticides	75 – 125	NA
Herbicides [8]	%R	%R
All herbicides	75 – 125	NA
Dioxins/Furans [9]	%R	%R
All dioxins/furans	70 - 130	25
Metals [10]	%R	%R
All analytes	75 - 125	75 - 125

(1) %R Percent Recovery.
(2) USEPA Method SW-846 8260B.
(3) USEPA Method SW-846 8270C.
(4) USEPA Method SW-846 8310.
(5) USEPA Method SW-846 8081A.
(6) USEPA Method SW-846 8082.
(7) USEPA Method SW-846 8151.
(8) USEPA Method SW-846 8141.
(9) USEPA Method SW-846 8092.
(10) USEPA Method SW-846 6010B and 7471.
NA Not Applicable

TABLE 3-4

ACCURACY CONTROL LIMITS (%R)[1]
SURROGATE SPIKES ORGANIC ANALYSES
NCBC GULFPORT SITE 5, GULFPORT, MISSISSIPPI

Chemical	Aqueous Samples	Soil Samples
VOLATILE ORGANICS[2]	%R	%R
Toluene-d_8	88 – 110	81 – 117
Bromofluorobenzene	86 – 115	74 – 121
1,2-Dichloroethane-d4	76 - 114	80 - 120
SEMI-VOLATILE ORGANICS[3]	%R	%R
Nitrobenzene-d5	35 – 114	35 – 114
2-Fluorobiphenyl	43 – 116	43 – 116
Terphenyl-d14	33 – 141	33 – 141
Phenol-d5	10 – 110	10 – 110
2-Fluorophenol	21 – 110	21 – 110
2,4,6-Tribromophenol	10 – 123	10 – 123
PAHs[4]	%R	%R
o-Terphenyl	30 – 130	30 – 130
p-Terphenyl	30 - 130	30 - 130
Pesticides[5]	%R	%R
decachlorobiphenyl	40 – 140	40 – 140
Tetrachloro-m-xylene	50 - 125	50 - 125
PCBs[6]	%R	%R
decachlorobiphenyl	40 – 140	40 – 140
Organophos. Pesticides [7]	%R	%R
Tributyl phosphate	50 - 150	NA
Herbicides[8]	%R	%R
2,4-dichlorophenylacetic Acid	50 - 150	NA
Dioxins/Furans[9]	%R	%R
1,2,3,4-TCDD	75 - 125	75 - 125
1,2,3,7,8,9-HxCDD	75 - 125	75 - 125

(1) %R Percent Recovery
(2) USEPA Method SW-846 8260B.
(3) USEPA Method SW-846 8270C.
(4) USEPA Method SW-846 8310.
(5) USEPA Method SW-846 8081A.
(6) USEPA Method SW-846 8082.
(7) USEPA Method SW-846 8151.
(8) USEPA Method SW-846 8141.
(9) USEPA Method SW-846 8092.
NA Not Applicable

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. 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 is followed and that proper sampling techniques are used. The sampling network for the NCBC Gulfport Site 5 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 duplicate 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). 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. Field measurement units are further discussed in Section 10.1.1.

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. Laboratory measurement units are further discussed in Section 10.1.2.

3.6 LEVEL OF QUALITY CONTROL EFFORT

Trip blank, rinsate blank, method blank, field and laboratory duplicate, laboratory control, and matrix spike 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 undergo the same preservation, analysis, and reporting procedures as the related environmental samples. Each type of field quality control 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 5 to 9 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 data resulting from the field-sampling program. Trip blanks only pertain to samples collected for VOC analysis. Trip blanks are used to assess the potential for contamination of samples to be analyzed for VOCs by contaminant 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. Trip blanks are further discussed in Sections 5.2 and 5.13.10 of the EISOPQAM.

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. Equipment blanks are further discussed in Section 5.2 and 5.13.10 of the EISOPQAM.

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 10.2 of this QAPP.

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, as specified in Tables 8-1.

4.0 DATA QUALITY OBJECTIVES

4.1 INTRODUCTION

The Data Quality Objective (DQO) Process is a planning approach used to determine the appropriate environmental data collection activities for a specific project. The Data Quality Objectives (DQOs), generated by the DQO Process, define the criteria that a data collection design should satisfy: purpose of the data collection; what the data should represent; the requirements for the quality of the data; when, where, and how to collect samples or measurement. 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 5. Section 4 of this QAPP will address the DQOs that were generated through the informal DQO Process.

4.2 PROJECT OBJECTIVE

There are several objectives of the project:

- to more specifically identify underground anomalies to determine if the anomalies are in fact buried drums. Ground-penetrating radar will be used to identify the anomalies.
- to determine the extent of the contamination in the soil by using Direct-Push Technology (DPT) sampling around anomalies that have the highest potential for being buried drums.
- to determine the extent of the contamination plume in the groundwater by installing monitoring wells in areas where groundwater is most likely to be impacted by contamination.
- to determine the nature of the contamination by analyzing the environmental samples TCL, TAL, and Appendix IX compounds and analytes.

4.3 DATA OBJECTIVE

Soil, sediment, groundwater, and seep samples will be collected to determine the nature and extent of the contamination. The data from the samples will also be used to determine the impact one media has on another.

4.3.1 Soil Data

Soil samples will be collected from areas containing anomalies with a high probability of being a buried drum. Sub-surface soil samples will be collected continuously from the groundwater table to the surface. This will provide data detailing the depth of the contamination and the lithology of the subsurface soil.

Combining the data from each boring around an anomaly will provide a 3-Dimensional picture of the contamination in relation to the anomaly. The soil sample data will be compared to groundwater sample data to determine if the subsurface soil is impacting the groundwater.

Surface soil samples will be collected from fill material at Site 5. The data from the surface soil samples will provide information that can be used to determine if human health risk is an immediate concern.

4.3.2 Sediment/Surface Water Data

Sediment and surface water samples will be collected from a drainage ditch located on the southern and western boundaries of the Site. The data from the sediment samples will be used in conjunction with the surface water samples to determine if contamination from the soil is being directly transferred from the site by sediment and indirectly transferred by the surface water; or if the contamination is being directly transferred by the surface water, alone.

Sediment sample data will also be compared to surface soil data. It is likely that the sediment in the ditch is originally from the surface soil at Site 5. Based on the surface soil data results, sediment contamination will be attributed to the surface soil or to the surface water. Contamination from the surface water will be due to absorption.

Surface water sample data will be compared to groundwater samples to determine if surface water contamination is due to groundwater contamination. Seeps exist at the site allowing groundwater to seep from the subsurface soil to surface soil, thus becoming surface water.

4.3.3 Groundwater Data

Groundwater samples will be collected from monitoring wells strategically located throughout Site 5. The monitoring wells will be situated with relation to the anomalies and the groundwater flow at Site 5. Groundwater sample data will be compared to subsurface soil and surface water data. Based on the comparisons, it will be determined if subsurface soil is impacting the groundwater, and if groundwater is impacting the surface water. The groundwater data will also be used to delineate the contamination plume(s) at Site 5.

4.4 ANALYTICAL OBJECTIVE

Analytical parameters were chosen based on the waste believed to have been dumped at the Site. A wide range of wastes (DDT, fuels, oils, solvents, paints, and paint thinners) were dumped at the site, and as a result, it was determined that a "full analytical suite" be conducted on the environmental samples. TCL and Appendix IX VOCs, SVOCs, Pesticides/PCBs; TAL Inorganics and Cyanide, Appendix IX Herbicides, Appendix IX Organophosphorous Pesticides, Dioxin/Furan, and Dissolved Gases will be analyzed. This will provide a very extensive analysis of the samples, that will detail the exact nature of the contamination.

4.5 DATA QUALITY OBJECTIVE

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.

4.6 SAMPLING AND MEASUREMENT PROCEDURES

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

5.0 FIELD INVESTIGATION

The specific types of field sampling for the NCBC Gulfport Site 5 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 15.8, EISOPQAM; Section 5.9, RI WP
- Monitoring well purging - Section 7.2, EISOPQAM
- Sample containers, preservatives, and volume requirements – Appendix A, EISOPQAM
- Field measurements – Section 16, EISOPQAM
- Decontamination procedures – Appendix B, EISOPQAM; Section 5.7, RI WP
- Investigation derived waste – Section 5.15, EISOPQAM; Section 5.11 RI WP
- Sample identification system - Section 5, Subsection 5.3.2TtNUS CompQAP
- Sample packaging and shipping procedures – Appendix D, EISOPQAM
- Recordkeeping – TtNUS Corporate SOP SA-6.3 (Appendix B)

6.0 LABORATORY ANALYSES

Custody is one of several factors, which is necessary for 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. A sample or evidence file is 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, airbill 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 quality control samples obtained as part of the data collection system.

6.1 FIELD CUSTODY PROCEDURES

The Field Operations Leader (FOL; or designee) is responsible for the care and custody of the samples collected until they are relinquished to the analyzing laboratory or entrusted to a commercial overnight courier. 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 (chain-of-custody forms, airbills, 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

All 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 Section 16 of the USEPA EISOPQAM.

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 GC/MS Volatile Organic Compound Analyses

For volatile organic compounds, 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 semi-volatile organic compounds, the gas chromatograph/mass spectrometer (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 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 HRGC/HRMS Dioxin/Furan Analyses

For Dioxin/Furan compounds, the high resolution gas chromatograph/high resolution mass spectrometer (HRGC/HRMS) system will be tuned and calibrated in accordance with the appropriate analytical method. A PFK 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 PFK 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.

7.2.4 HPLC Polycyclic Aromatic Hydrocarbon Organic Compound Analyses

For polycyclic aromatic hydrocarbon organic compounds, the high performance liquid chromatograph (HPLC) 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.

7.2.5 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 calibraion 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.

7.2.6 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.

7.2.7 Atomic-Absorption Mercury Analysis

For mercury, the atomic absorption spectrophotometer (AA) 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.

7.2.8 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, turbidity. Measurement of field parameters and calibration of field instruments are discussed in Section 16 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 for the contracted laboratory.

All environmental samples for VOC, SVOC, Pesticide/PCB, Herbicide, Dioxin/Furan, Organophosphorous Pesticide, inorganic analysis will be analyzed in accordance with current SW-846 methods. All groundwater samples for miscellaneous parameter analyses will be analyzed in accordance with current EPA approved methods. Table 7-1 provides a summary of the laboratory analytical methods for the NCBC Gulfport Site 5 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). All 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 detection limit with adjustments made to ensure that the precision and accuracy requirements of the method are attainable at the RL. 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.

TABLE 8-1

SUMMARY OF ORGANIC, INORGANIC, AND MISCELLANEOUS ANALYTICAL PROCEDURES NCBC GULFPORT SITE 5, GULFPORT, MISSISSIPPI

Analytical Parameter	Analytical Method
TCL* and Appendix IX** Volatile Organics	SW-846 8260B (25mL purge)
TCL and Appendix IX Semi-Volatile Organics	SW-846 8270C
TCL and Appendix IX Polycyclic Aromatic Hydrocarbon Organics	SW-846 8310
TCL and Appendix IX Pesticides	SW-846 8081A
TCL and Appendix IX PCBs	SW-846 8082
Appendix IX Herbicides	SW-846 8151
Appendix IX Organophos. Pesticides	SW-846 8141
Dioxins/Furans	SW-846 8290
Cyanide	SW-846 9010B
Metals	SW-846 6010, 7470A, and 7471A
Dissolved Gases	RSK SOP 147 & 175

* TCL – Target Compound List (Contract Laboratory Program, Organic Laboratory Statement of Work, OLM03.2)

** Appendix IX List as defined in 40 CFR, Part 264, Appendix IX Groundwater Monitoring List

9.0 PREVENTIVE MAINTENANCE PROCEDURES

Measuring equipment used in environmental monitoring or analysis for the NCBC Gulfport Site 5 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 Section 16 of the USEPA EISOPQAM 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 INSTRUMENT PREVENTIVE MAINTENANCE

Proper maintenance of laboratory instruments and equipment is essential to ensuring their readiness when needed. Dependent on 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 gas chromatographs 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 discrepancy 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 5, 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.
HPLC	Change Filter frit in mixer, change column pre-filter, change pump seals. Rinse water pump with methanol, filter water, sonicate water intake filter frit	As required. Weekly.
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, chlean torch, manual profile, and automatic profile optics.	As required.
CVAA	Change sample introduction tubing, change drying cell, re-zero detector	As required
GFAA	Clean contact cylinders, replace/clean tube, check lamg alignment	As required

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 quality control 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 will have a QC program that ensures the reliability and validity of the analyses performed at the laboratory. Internal quality control 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) detected, method blanks must not contain 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 analysis for organic fraction analyses is performed in duplicate as a measure of laboratory precision. For inorganic (metals) analyses, one matrix spike analysis and one **laboratory duplicate** analysis are performed for every 20 environmental sample analyses of like matrix. With the exception of VOC 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 quality control analyses, as required. As discussed in Section 3.0 of this QAPP, control limits for MS and laboratory duplicate analyses are listed in tables 3-1 through 3-4.

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. Laboratory control sample analysis will be performed for volatiles and as required by the applicable analytical. 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 and HPLC 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 5 sampling program. All data generated during the course of the investigation will be maintained in hardcopy format by TtNUS in the Naval Facilities Engineering Command Southern Division designated central files located in TtNUS' Pittsburgh, Pennsylvania office.

In addition to the central files, photocopies of all hardcopy data (as well as electronic data) will be maintained in the Chemistry/Toxicology/Risk Assessment Department database records files located in TtNUS' Pittsburgh, Pennsylvania office. Upon completion of the contract, all 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 data will be generated through on-site water quality testing for general indicator parameters including pH, specific conductance, turbidity, temperature.

The field parameters will be recorded in the site logbook or on sample logsheets immediately after the measurements are taken and later encoded in the NCBC Gulfport database for presentation in the 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 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 measurements will be recorded and reported in the following units:

- Hydronium ion concentration (standard pH units)
- Temperature (degrees Celsius)

- Specific Conductance (uMhos/cm)
- Turbidity (Nephelometric turbidity units, NTUs)

Standard pH units as specified above are the negative logarithm (base 10) of the hydronium ion concentration in moles/liter.

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 for the classes of chemicals under consideration are as follows:

Groundwater samples:

- Volatile organics - µg/L
- Semi-Volatile organics - µg/L
- Pesticides - µg/L
- PCBs – µg/L
- Polycyclic Aromatic Hydrocarbon organics - µg/L
- Herbicides – µg/L
- Inorganics (metals) – mg/L
- Dioxins/Furans – pg/µL
- Dissolved Gases – mg/L

Soil Samples:

- Volatile organics - µg/kg
- Semi-Volatile organics - µg/kg
- Polycyclic Aromatic Hydrocarbon organics - µg/kg
- Pesticides – µg/kg
- PCBs - µg/kg
- Dioxins/Furans – pg/kg
- Inorganics (metals) – mg/kg

Field Quality Control sample results will be included in the database for the NCBC Gulfport Site 5 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. 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 logsheets. 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. As described in Section 11.1.1, all field data entered into the electronic database will be independently reviewed for transcription errors. A comparison will be made of samples collected relative to samples planned for collection to ensure that all 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 evaluates the following items, but not limited too: sample holding times, method blank analyses, initial and continuing calibration standards, data completeness, reported detection limits, lab control sample analysis, matrix spike/ matrix spike duplicate 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 guidances 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 logsheets 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.

All records regarding field measurements (i.e., field logbooks, sampling logbooks, and sample logsheets) will be placed in TtNUS' Southern Division 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 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 Statement of Work 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).

All environmental and field QC sample results (trip blanks, field duplicates, rinsate blanks) will be included in the 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 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' Southern Division 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 exceedences, 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 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:

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

12.2 PRECISION ASSESSMENT

Duplicate samples and MS/MSD samples are prepared and analyzed 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:

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

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:

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

The results of the data validation process and the completeness assessment will be summarized in the 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.

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

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 if also performed. The data must meet a 95% complete (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 guidances 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 Work Plan and without prior approval from the TOM will be rejected.
- If the completeness assessment returns a less than 95% complete, all data will be rejected.
- 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 assessments the following tests will be implemented:

  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 exceedence of MCLs, the result will be accepted and included.
     - If a biased high contamination result will result in no exceedence of MCLs, the result will be accepted and included.
     - If a biased low contamination result will result in no exceedence of MCLs, the result will be accepted and included.
     - If a biased low contamination result will result in the exceedence 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 objective is maintained. Maintaining the project objective will ensure 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 Quality Assurance Manager (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 (in conjunction with USEPA Region IV and FDEP) approvals 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 deviances 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 5 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 Report.

15.1 CONTENTS OF PROJECT QUALITY ASSURANCE REPORTS

The contents of the specific QA reports are as follows. The data review 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 exceedences 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 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.

HEALTH AND SAFETY PLAN
For
REMEDIAL INVESTIGATION
At the
NAVAL CONSTRUCTION BATTALION CENTER
GULFPORT
GULFPORT, MISSISSIPPI

Southern Division
Naval Facilities Engineering Command

Contract Number N62467-94-D-0888

Contract Task Order 0156

MARCH 2001

HEALTH AND SAFETY PLAN
FOR
REMEDIAL INVESTIGATION
AT THE
NAVAL CONSTRUCTION BATTALION CENTER GULFPORT
GULFPORT, MISSISSIPPI

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

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

Submitted by:

TETRA TECH NUS

661 Andersen Drive Foster Plaza 7

Pittsburgh, Pennsylvania 15220

CONTRACT NUMBER N62467-94-D-0888

CONTRACT TASK ORDER 0156

MARCH 2001

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1.0 INTRODUCTION

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

Comprehensive Long-Term Environmental Action Navy (CLEAN III)

ımber: N62467-94-D-0888

sk Order: 0156

f Work: – Remedial Investigation for Site 5, Former Landfill at Naval Construction ıter, Gulfport, Mississippi. This activity will determine the extent of contamination (horizontal to surface and subsurface soils, surface and groundwater, and sediments.

ates of Work: February 2001 to completion

This Health and Safety Plan (HASP) has been written to encompass site activities that are to d at the Naval Construction Battalion Center (NCBC) located in Gulfport, Mississippi. e conducted as per this HASP are defined in detail in Section 4.0.

The elements of this HASP are intended to be in compliance with the requirements y:

CFR 1910.120, "Hazardous Waste Operations and Emergency Response" (HAZWOPER)
sections of 29 CFR 1926 "Safety and Health Regulations For Construction."
ı NUS Health and Safety Program

ıust be accompanied by the Tetra Tech NUS, Inc. Health and Safety Guidance Manual M). The Guidance Manual provides additional information on program support, standard edures, and safe work practices.

/Changes: The following conditions are considered sufficient basis review and ges to this document

n or modification of activities outside of those specified in Section 4.0, Scope of Work.
ation becomes available through the course of the investigation or from outside sources.

- 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 SSO supports site activities by advising the FOL on all aspects of health and safety on-site. In this capacity the SSO:

  i. Coordinates all 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, 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 all on-site personnel.
  ix. Investigates all 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 as 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, at NCBC Gulfport 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 **Address:** Gulfport, Mississippi

Navy Engineer-in-Charge (EIC): Mr. Arthur Conrad **Phone Number:** (843) 820-5520

Facility Contact: Mr. Gordon Crane **Phone Number:** (228) 871-2485
Pager Number: 1(800) 343-3472

Purpose of Site Visit: This activity is divided into a multi-task operation (see Section 3.0).

Project Team:

TtNUS Personnel:	Discipline/Tasks Assigned:	Phone Number:
Robert Fisher	Task Order Manager (TOM)	850/510-2743
Matthew M. Soltis, CIH, CSP	CLEAN Health and Safety Manager (HSM)	412/921-8912
James K. Laffey	Project Health and Safety Officer (PHSO)	412/921-8678
David A. Hickey	Field Operations Leader (FOL)	865/220-4778
TBD	Site Safety Officer (SSO)	
Tom Patton	Equipment Manager	412/859-4670

NCBC Gulfport
Tetra Tech NUS, Inc.
Project Support Staff

Debbie Wroblewski Program Manager Tetra Tech NUS	Tetra Tech NUS 661 Andersen Drive Pittsburgh, PA 15220-2745	(412) 921-8968 FAX: (412) 921-4040
Joseph Samchuck Data Validation Manager Tetra Tech NUS	Tetra Tech NUS 661 Anderson Drive Pittsburgh, PA 15220	(412) 921-8510 FAX: (412) 921-4040
Brian Lewis Statistician Tetra Tech NUS	Tetra Tech NUS 661 Anderson Drive Pittsburgh, PA 15220	(412) 921-7105 FAX: (412) 921-4040

Non-TtNUS Personnel	Affiliation/Discipline/Tasks Assigned	
TBD	Analytical (Chemical) Laboratory	
TBD	Drilling Contractor	
FedEx	Parcel/Sample Shipment	1(800)463-3339

Hazard Assessments (for purposes of 29 CFR 1910.132) and HASP preparation conducted by:
James K. Laffey
TBD - To Be Determined

Shipping Address at NCBC Gulfport:

NCBC Gulfport
Building 320, Shipping and Receiving Warehouse
Attention: Mr. Gordon Crane/Tetra Tech NUS, Inc.
5200 CBC 2nd Street
Gulfport, Mississippi 39501-5000

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 incidental or emergency release or occurrence. Tetra Tech NUS will, through necessary services, include incidental response measures for incidents such as:

- Initial stage fire fighting support and prevention
- Initial spill control and containment measures and prevention
- Removal of personnel from emergency situations
- Provide initial medical support for injuries or illnesses requiring only first-aid level support
- Provide site control and security measures as necessary

Incidental response measures will only be provided to the capabilities of on-site personnel and available resources. Incidental response measures are not considered an emergency response as per 29 CFR 1910.120 (b). Incidents and situations that are deemed to be an emergency response as defined by 29 CFR 1910.120 (b) will be handled by outside resources. It has been determined that these off-site response agencies are capable of providing the most effective response and will be designated as the primary responders. These agencies are located within a reasonable distance from the area of site operations, which ensures adequate emergency response time. These agencies will be contacted through NCBC Gulfport Emergency Dispatch. This Emergency Action Plan conforms to the requirements of 29 CFR 1910.38(a), as allowed in 29 CFR 1910.120(l)(1)(ii).

2.2 EMERGENCY PLANNING

Based on planned activities, the potential for field personnel to encounter significant emergency situations is minimal. However, based on the initial hazard/risk assessment effort, some potential exists for injuries or illnesses resulting from exposure to chemical and/or physical hazards or fire could be encountered during site activities. To minimize and eliminate these potential emergency situations, emergency planning activities associated with this project, the following responsibilities are assigned to the FOL and/or the SSO:

- Coordinating response actions with NCBC Gulfport Emergency Services personnel to ensure that TtNUS emergency action activities are compatible with facility emergency response procedures. This will serve as the initial review of the Emergency Action Plan.

- Establishing and maintaining information at the project staging area (Support Zone) for easy access in the event of an emergency. This information includes 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 all site vehicles

Note: It is the responsibility of the TtNUS FOL and/or the SSO to ensure that this information is available and present at the site.

- Identifying a chain of command for emergency action.
- Educating site workers to the hazards and control measures associated with planned activities at the site, and providing early recognition and prevention, where possible.
- Preview work areas to remove physical hazards where identified.

2.3 EMERGENCY RECOGNITION AND PREVENTION

The primary focus of this section is the ability to recognize and control factors, which could contribute to an emergency situation/condition. The FOL, and/or the SSO will preview all site work location prior to committing personnel or resources. Their actions will be as follows:

- Identify, remove, and/or barricade physical hazards within the estimated work area.
  - Ensure that approach paths to monitoring wells are maintained (cleared, mowed, etc.)
  - Inspect monitoring well protective casings are cleared of spider and insect nests.
  - Inspect remote sample locations for signs of natural hazards (i.e., heavy brush – ticks; snakes, etc.)

- Provide the necessary equipment to control potential emergencies (i.e., safety cans for flammable liquid storage, spill containment equipment, PPE, and emergency equipment such as portable fire extinguishers).

- Evaluate operations to ensure that necessary measures are taken to control and/or minimize the impact of emergency situations/conditions. This includes actions such as, but not limited to, securing the necessary permits and clearances such as Utility and Excavation Clearances provided by the Base and Mississippi One Call Systems; Ensuring equipment and resources are at the ready for response to incidental measures; All personnel are adequately trained in the provisions of this HASP and this Emergency Action Plan.

- Complete site characterization for all predetermined work contaminated areas to quantify and qualify the hazards associated with those areas. Based on the results obtained the areas will be demarcated and restricted to only approved personnel.

Field Crew shall:

- Identify, remove, or barricade physical hazards within the estimated work area identified by the FOL and/or the SSO.
- Follow the guidelines for control of emergency conditions
- Report any potential emergency situation to the FOL and/or the SSO.

2.4 SAFE DISTANCES AND PLACES OF REFUGE

Upon activation of the on-site emergency alarm system the following actions will occur:

- All operations will cease.
- Field personnel will note the direction of the wind based on the position of wind socks or other wind direction indicator placed at the top of the mast or excavation equipment or other elevated points within the work area (i.e., streamer, flag, etc.).
- Based on the wind direction, personnel will move cross and up wind to either the primary or secondary safe place of refuge as identified in Figure 2-1(To be determined in the field by the FOL and/or the SSO).
- All personnel will remain at this location until directed otherwise by the FOL and/or the SSO.

2.4.1 Safe Place of Refuge Selection

The FOL and/or the SSO shall identify a safe place of refuge (in the event of an emergency) on the Safe Work Permit (Example – See Section 10.2). This location will be selected and conveyed to the Field Crew as part of issuing the Safe Work Permit at the beginning of each field task. Selection will be based on the following considerations:

- A location providing telephone communications and or shelter.
- A location from which the field crews can provide site security restricting access to the emergency area, however, a point from which the field crew may direct emergency crews (i.e., intersection or gate, etc.).

This location should be positioned a safe distance from the operation so not to be impacted by the emergency. This distance is impacted by a number of conditions (i.e., tasks being conducted; chemical, physical, and toxicological properties; potential for fire and explosion; meteorological conditions; terrain).

2.4.2 Critical Operations

There are no operations being conducted under this scope of work that are considered critical and would require and individual or individuals to man during an emergency. Therefore in the event of an emergency all personnel will cease all operations and report to the safe place of refuge.

2.5 DECONTAMINATION PROCEDURES/EMERGENCY MEDICAL TREATMENT

During an evacuation, decontamination procedures will be performed only if doing so does not further jeopardize the welfare of site workers. However, it is unlikely that an emergency would occur which would require workers to evacuate the site without first performing decontamination procedures. Decontamination of medical emergencies will proceed in the following manner.

2.5.1 Non-Life Threatening Medical Incident (Bruises, Cuts, Scrapes, Etc.)

The area of clothing or suit penetration will be isolated from the decontamination procedure by removing the protective garments or clothing surrounding the area of the injury and applying a light gauze wrap and plastic cover. Decontamination for unaffected areas will proceed as per Table 5-1 of this HASP.

2.5.2 Life Threatening

- Notify off-site response agencies.
- If it will not endanger the injured individual (i.e., spinal cord injury, etc.) remove any outer PPE. Removal may require the use of bandage scissors to remove the outer garments.
- Begin life saving techniques as appropriate (CPR, cooling or warming regimens, etc.).
- Wrap the injured in a blanket for transport to the hospital.
- Engage Emergency Notification Sequence
- Follow instructions provided in Figure 2-2.

Note: One person from the field team will accompany the injured to the hospital with his/her medical data sheet, appropriate MSDSs, a copy of this HASP, and the incident forms. This person will collect as much information as possible and transfer that information to the HSM and Work Care as per the Incident Response Protocol provided in Figure 2-2. All other personnel will engage site control/site security measures.

The SSO upon insuring care for the injured party will engage an investigation of the incident to gather as much information as possible. This includes as a minimum Who? What? Where? When? Why? And How?. This information will then be communicated to the TOM and the HSM.

2.5.3 Emergency Medical Treatment

Tetra Tech NUS and subcontractor personnel are only permitted to provide treatment to the level of their First-Aid Training.

Emergency medical treatment will be initiated under the following guarded restrictions:

- Notify the FOL and/or the SSO of the incident.
- Take the necessary precautions to prevent direct contamination with the injured person's body fluids.
  - Use surgeons gloves when handling cuts, abrasions, bites, punctures, etc. or any part of the injured person. The use of safety glasses and surgeons masks maybe necessary, if there is the potential for uncontrolled spread of body fluids.
  - Should Cardio-Pulmonary Resuscitation (CPR) be required, use a CPR Micro-Shield mouthpiece when administering CPR.

2.6 EMERGENCY ALERTING AND ACTION/RESPONSE PROCEDURES

If an emergency occurs on Base, the following procedures are to be initiated:

- Initiate an emergency notification by hand signals, voice commands, air horn, or two-way radios to the FOL/SSO. Describe to the SSO (who will serve as the Incident Coordinator) what has occurred and provide as many details as possible.

- Evacuate non-essential persons from the incident scene, engage initial response measures given the emergency type (i.e., spill response, fire extinguisher, first-aid, site control and security).

In the event that site personnel cannot control the incident through offensive and defensive measures, the FOL and/or SSO will enact the emergency notification procedures to secure additional outside assistance in the following manner:

- Call NCBC Gulfport Emergency Number
- Give the emergency operator the location of the emergency and a brief description of what has occurred.
- Stay on the phone and follow the instructions given by the operator
- The appropriate agency will be notified and dispatched

- Call Navy On-Site Representative
- Call the TOM and the HSM

If an incident occurs at outside of our designated operating areas impacting field personnel, the following procedures are to be initiated:

- Initiate an evacuation (if needed) by voice commands, hand signals, air horns, or two-way radio.
- Call Navy On-Site Representative
- Proceed to the assembly points as directed by NCBC Gulfport or other Navy personnel.

2.7 PPE AND EMERGENCY EQUIPMENT

A first aid kit, eye wash units (as necessary), stretcher, and fire extinguishers will be maintained on-site at an easily accessible location and shall be immediately available for use in the event of an emergency. Based on the hazards anticipated, these incident response abatement items may be maintained at the exclusion zone of on-going operations as determine and communicated to the field crew through the Safe Work Permit. This will be at the discretion of the SSO.

The FOL and/or the SSO should ensure the First-Aid Kits are provided stocked with the necessary equipment. All first-aid kits purchased for the job-site shall be American National Standards Institute (ANSI) approved for industrial applications. Additional provisions, if not included in the First-Aid Kit such as a Micro-Shield CPR mask identified within this plan will have to be secured in addition to the kit. The SSO will determine the number of kits necessary based on the number of personnel and the number of remote operations being conducted under the scope of work. It is the SSO's responsibility to assess work site applications for specific first-aid needs based on operations being conducted.

PPE levels to be used in an emergency will not exceed those items used in the completion of identified tasks.

2.7.1 PPE Requirements - Incidental Spill of Investigative Derived Wastes (IDW)

- PVC Rain-Suits or Tyvek based on the potential for soiling work clothes during clean-up
- PVC or Neoprene-Over-boots (Pant legs on the outside of the over-boots)
- Nitrile inner surgeons gloves with Nitrile outer gloves over top
- Hard hat as conditions or overhead hazards exist
- Safety Glasses
- Splash Shields as necessary

The determination to tape seams (pant legs and sleeves to boots and gloves will be decided based on existing environmental conditions (external temperatures) and the potential for heat stress. Spill equipment (identified in Section 9.0) will be maintained in the investigative derived waste storage area to support rapid response.

2.7.2 Fire Fighting

Standard field attire will be used to combat incipient fires, from a sufficient distance as not to endanger field personnel. All personnel will be trained to use the fire extinguishers on-site as part of site-specific training. Fire extinguishers will be maintained at the following locations:

- Support trailer
- On each drill rig
- At all locations which store, dispense or otherwise handle flammable or combustible liquids.

All personnel will be trained in the proper use and maintenance of the fire extinguishers provided by their employer for use. The training information to be provided during site-specific training may be found in Attachment VII of this document.

2.8 EMERGENCY CONTACTS

Prior to performing work at the site, all 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 all site personnel.

2.9 INJURY/ILLNESS REPORTING

In addition, TtNUS personnel who are injured or become ill on the job must notify appropriate company representatives. Figure 2-2 and Attachment I presents the procedure for reporting an injury/illness, and the form to use for this purpose. **If the emergency involves personnel exposures to chemicals, follow the steps in Figure 2-2.**

TABLE 2-1
EMERGENCY REFERENCE
NCBC Gulfport

Priority	AGENCY	TELEPHONE
1	**EMERGENCY** Police Fire/Hazardous Materials Release Ambulance Services	 (228) 871-2222 (228) 871-2333 (228) 871-2444
2	Base Contact Mr. Gordon Crane	(228) 871-2485 Pager 1(800) 343-3472
3	Memorial Hospital at Gulfport 4500 13th Street Gulfport, Mississippi 39501-2569	(228) 867-4000
4	Task Order Manager Robert Fisher	(850) 510-2743
5	CLEAN Health and Safety Manager Matthew Soltis, CIH, CSP	(412) 921-8912
-	Project Health and Safety Officer James K. Laffey	(412) 921-8678
*	Utilities (On Base) (Utility Clearances and Emergencies) Public Works Maintenance Division	(228) 871-2244
-	Utilities (Public Utility Locating Service) Mississippi One Call System Inc.	1(800) 227-6477
-	Chemtrec National Response Center Mississippi Regional Poison Control Center	(800) 424-9300 (800) 424-8802 (601) 354-7660
-	Tetra Tech NUS, Tallahassee Office	(850) 359-9899
-	Tetra Tech NUS, Pittsburgh Office	(412) 921-7090

* - The prioritization of the calling sequence has been provided in column 1. This applies to all injuries and incidents determined to be an emergency. The priority will be altered if a utility is struck and it is necessary to contact Public Works Maintenance Division. They then would be the first party contacted followed by Mr. Gordon Crane and so on as indicated on the list.

2.10 EMERGENCY ROUTE TO HOSPITAL

Directions from NCBC Gulfport:

From Site 5 at the intersection of 4th Street and Colby Avenue go south on Colby.

Start at:

Turn Left on Engram Drive.

Turn Right on Broad Avenue.

Turn Left on 13th Street

End at:

Memorial Hospital at Gulfport

4500 13th Street
Gulfport, Mississippi 39501-2569

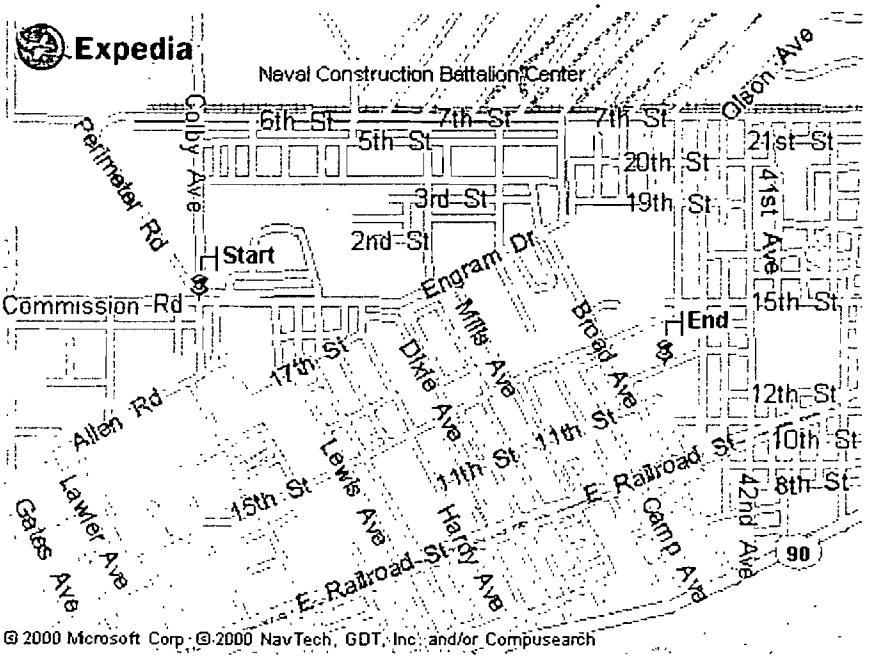


Figure 2-1

Route to Hospital

FIGURE 2-2

EMERGENCY RESPONSE PROTOCOL

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

- Rescue, when necessary, employing proper equipment and methods.
- Give attention to emergency health problems -- breathing, cardiac function, bleeding, and shock.
- Transfer the victim to the medical facility designated in this HASP by suitable and appropriate conveyance (i.e. ambulance for serious events)
- Obtain as much exposure history as possible (a Potential Exposure report is attached).
- If the injured person is a Tetra Tech NUS employee, call the medical facility and advise them that the patient(s) is/are being sent and that they can anticipate a call from the WorkCare physician. WorkCare will contact the medical facility and request specific testing which may be appropriate. WorkCare physicians will monitor the care of the victim. Site officers and personnel should not attempt to get this information, as this activity leads to confusion and misunderstanding.
- Call WorkCare at 1-800-455-6155 and enter Extension 109, or follow the voice prompt for after hours and weekend notification and 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) at 1-800-245-2730.
- As data is gathered and the scenario becomes more clearly defined, this information should be forwarded to WorkCare.

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

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

FIGURE 2-2 (continued)

WORKCARE

POTENTIAL EXPOSURE REPORT

Name: _____ Date of Exposure: _____

Social Security No.: _____ Age: _____ Sex: _____

Client Contact: _____ Phone No.: _____

Company Name: _____

I. **Exposing Agent**
Name of Product or Chemicals (if known): _____
_____
Characteristics (if the name is not known)
Solid Liquid Gas Fume Mist Vapor

II. **Dose Determinants**
What was individual doing? _____
How long did individual work in area before signs/symptoms developed? _____
Was protective gear being used? If yes, what was the PPE? _____
Was their skin contact? _____
Was the exposing agent inhaled? _____
Were other persons exposed? If yes, did they experience symptoms? _____

III. **Signs and Symptoms** (check off appropriate symptoms)

Immediately With Exposure:

Burning of eyes, nose, or throat
Tearing
Headache
Cough
Shortness of Breath
Chest Tightness / Pressure
Nausea / Vomiting
Dizziness
Weakness

Delayed Symptoms:

Weakness
Nausea / Vomiting
Shortness of Breath
Cough
Loss of Appetite
Abdominal Pain
Headache
Numbness / Tingling

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

Burning of eyes, nose, or throat
Tearing
Headache
Cough
Shortness of Breath
Chest Tightness / Pressure
Cyanosis
Nausea / Vomiting
Dizziness
Weakness
Loss of Appetite
Abdominal Pain
Numbness / Tingling

Have symptoms: (please check off appropriate response and give duration of symptoms)
Improved: _____ Worsened: _____ Remained Unchanged: _____

V. **Treatment of Symptoms** (check off appropriate response)
None: _____ Self-Medicated: _____ Physician Treated: _____

3.0 SITE BACKGROUND

3.1 SITE DESCRIPTION

The Naval Construction Battalion Center (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 (NMCB) are based at Gulfport.

3.2 SITE HISTORY

Site 5 is a former 8.5 acre landfill located approximately 200 feet west of the intersection of 4th Street and Colby Avenue, in an area currently used for heavy equipment training. The landfill was operated from 1972 until 1976 and was the only operating landfill on the base at that time. However, at this time, a private contractor was disposing of most solid waste being generated at the base at an off base landfill. The landfill was a trench and fill operation.

The operation of this landfill coincided with the storage of Herbicide Orange at Site 8 and reports indicate that drums of DDT and other liquid wastes were disposed of in this landfill. An estimated 6000 cubic yards of solid waste and an unknown quantity of liquid wastes were disposed of by a trench and fill operation, typically accompanied by incineration prior to backfilling. Solid wastes disposed of in this landfill include solid dumpster waste and approximately 12 pounds of powder DDT. Liquid wastes included 50 to 100 55-gallon drums of liquid DDT, fuels, oils, solvents (MEK, Toluene, and xylene), paints, and paint thinners. Following operations, the site was covered with four to six feet of fine to medium grained sand.

4.0 SCOPE OF WORK

The following subsections discuss the specific tasks that are to be conducted as part of this scope of work as identified by CTO 0143 and Statement of Work # 160. These tasks as identified by the scope of work 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 all 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 boring including Direct Push Technology (DPT) and Hollow Stem Augering
- Monitoring well installation and development
- Multi-media Sampling
  - Groundwater sampling
  - Soil sampling – Surface and Subsurface
  - Sediment sampling
  - Surface water sampling
- Aquifer Testing
- Decontamination of heavy construction and sampling equipment
- Geophysical and Geographic Surveying
- IDW Management

Investigation-derived waste (IDW) generated during sampling activities will be containerized in United Nations (UN1A2) approved 55-gallon drums.

4.1 MOBILIZATION/DEMOBILIZATION

This task includes, but not limited to, the following:

- The procurement and shipping of equipment, and materials for the field investigation.
- Review of planning documents (i.e., HASP, Sampling and Analysis Plan, Work Plan, Quality Assurance Plan, etc.)
- Site Reconnaissance to include site characterization, site preparation, the layout of sampling, bench and pilot scale locations as well as excavation materials testing locations, and to secure the necessary utility clearances and isolate physical hazards, where applicable. It should be noted

that the Public Works Maintenance Division handles all on-Base utility clearances for ALL utilities. Utility clearances will require 10-day advance notification. All utility clearances off-Base will proceed through Mississippi One Call System, Inc. A 2-working day advance notification is required. Once obtained the ticket is good for a period of 10-days.

- Secure, construct, or equip decontamination facilities to support the field investigations.
- Secure, construct, or equip IDW storage facilities to support the field investigations.

Primary hazards associated with this activity includes those of a physical nature such as lifting, strains/sprains, lacerations achieved during unpacking of equipment and during site preparation (i.e., cutting open boxes, lifting equipment, locating sample points, cutting paths to sample locations)

4.2 MONITORING WELL DEVELOPMENT/REDEVELOPMENT

The steps to develop or redevelop the new and existing monitoring wells are as follows:

- The depth to water and total depth of the well is measured using an M-scope or other electronic water level indicator.

- A surge block or submersible pump is lowered into the screened section of the well. The surge block or submersible pump is rapidly lowered and raised in the well causing groundwater to flow in and out of the well screen thus flushing fine sediment and debris out of the sandpack.

- A submersible pump or airlift hose is lowered into the well. The monitoring wells are pumped using a submersible pump, or by airlift. The pumping will continue until well stabilization parameters (pH, temperature, specific conductance, etc.) have stabilized or the amount of water extracted from the well has reached a predetermined volume.

The primary hazards during this activity are chemical contaminant exposure that can occur by aerolization of the contaminated media during pumping into the drum. This activity agitates the contaminated media increasing the potential for release. Secondary to the chemical exposure, however, resulting in more reported incidents are the material handling hazards. Site personnel trying to move full drums resulting in back injuries, smashed fingers (between drums), etc.

4.3 MONITORING WELL SAMPLING

The monitoring wells will be sampled using low-flow purging and sampling techniques. Peristaltic pumps will be used to purge and to collect the samples. Field measurements of pH, temperature, specific conductance, and turbidity will be made during purging. These measurements will be taken at the start of

purging and every 3 to 5 minutes until the parameters have stabilized. The wells will be purged until a sufficient predetermined amount of water has been removed and the water quality measurements are acceptable. All tubing used for sampling will be dedicated and disposed of after the sample has been collected.

See primary hazards for monitoring well development.

4.3.1 Aquifer Testing

This involves conducting a rising and falling head slug test at four wells. Potential chemical exposure exists in this situation through direct contact with the contaminated water level measurement device. In addition to this hazard, but more predominant in remotely located wells are the potential for insect (bees) and spiders nest in the wells protective casing.

4.4 MULTI-MEDIA SAMPLING

4.4.1 Surface and Subsurface Soil Samples

Surface and Subsurface soil samples will be collected utilizing a variety of techniques. Surface and Subsurface soil sample acquisition from mechanized equipment will use split spoon, shelby tube, macro-core sampler by inserting them into either the borehole or annulus to extract a sample from a desired depth. The sample is removed from the device, scanned with the direct reading instrumentation, then transferred into the appropriate sample container.

4.4.1.1 Hand Augers

The hand auger borings will be advanced to the desired depth utilizing stainless steel hand auger stems with an over size bucket. Once at the desired depth, the oversize bucket will be exchanged for a smaller diameter bucket to grab the sample. The sample is extracted from the bucket and is placed in a stainless steel bowl, scanned with a direct reading instrument, then transferred into the appropriate glass container using a stainless steel trowel.

Hazards include direct chemical contaminant exposure, strain and sprain, and pinches and compressions when attempting to separate auger flights and buckets. Natural hazards, foot and vehicular traffic hazards also must be addressed relative to the location of the sampling point.

Drill Rigs Hollow-Stem Auger

u[illegible]nt Hollow-Stem Auger Drilling

ıod of drilling consists of rotating augers with a hollow stem into the ground. Cuttings are brought face by the rotating action of the auger. Advantages of this type of drilling include:

;amples can be obtained while augers remain in the ground. Sampling requires the use of split-›arrel or thin-wall tube samplers advanced through the hollow core of the auger.
Ɲo drilling fluids are required.
A well can be installed inside the auger stem and back-filled as the augers are withdrawn.

physical hazards associated with this activity include lifting, rotating equipment, caught /pinches and compressions, slips, trips and falls in and around rotating equipment, noise, ›und or overhead energized sources, overhead hazards, and equipment failure. Bringing ıation to the surface through the drilling action the potential now also exists for chemical ;nant exposure.

.ards in monitoring well installation above.

[illegible]ct-Push Technology

ɜthod uses hydraulic pressure and percussion hammer to advance tooling into the ground. For soil ıg a Macro-core sampler is advanced in 2-foot intervals for soil sample extraction.

zards in monitoring well installation above.

Surface Water and Sediments

llection of these environmental media will proceed as follows:

Selection of location
Direct-Reading monitoring instrument sweep.
Transfer the selected environmental media into the containers to be sent to the analytical laboratory using direct pour, peristaltic pumps, or for sediments using stainless steel or disposable trowels

Hazards associated with activities of this nature include the potential for direct contact with contaminated media that in many cases is diluted or washed over. Natural hazards play a greater role in these locations because many species utilize streams and bodies of water for nesting or sustenance. This increases the potential for direct contact.

4.5 GEOGRAPHICAL/GEOPHYSICAL SURVEYING

This activity is generally non-intrusive in nature, however limited brush removal may be required. The brush removal will facilitate lines of sight and passage routes for the equipment during the survey. Given the activities that are to take place only limited samples remotely situated from Site 8, removal of vegetation for this purpose is not anticipated to any great extent.

Hazards associated with this activity are generally physical or natural hazards including lacerations (clearing brush), slips trips and falls, traffic hazards, insect (spiders, ticks, bees, etc.) and animal bites.

4.6 DECONTAMINATION

The equipment involved in the field activities for this investigation will be decontaminated prior to, during and after the completion of field activities. Decontamination of heavy equipment shall occur using pressure or steam cleaning apparatus.

4.6.1 Sampling Equipment

All non-dedicated sampling equipment (i.e. stainless-steel hand augers, trowels, bowls) will be decontaminated prior to the initiation of field sampling, between sample locations, and at the completion of the field activities. The following decontamination steps will be taken.

- Potable water rinse
- Alconox or Liquinox detergent wash
- Deionized (DI) water rinse
- Solvent rinse (Isopropanol)
- DI water rinse
- Air dry

All dedicated sampling and PPE equipment will be rinse to remove gross contamination. Then pending the sampling results be disposed of accordingly.

The primary hazards associated with this activity include direct contact with contaminated tooling or media as well as contact with cleaning solvents. Other associated hazards include noise (pressure washers and steam cleaners), high-pressure water (potential for water lacerations), flying projectiles, and material handling hazards (handling and stacking heavy auger flights).

4.7 IDW MANAGEMENT

This task includes the containerization, labeling, staging, monitoring, and final deposition of Investigation Derived Wastes (IDW). These are as follows:

Containerization – Materials generated including soils; development, decontamination, and purge waters (Any and all materials that cannot be cleaned which may have direct contact with contaminated media). Containerization may utilize bulk storage (i.e., roll-off boxes or frac-tanks) or smaller United Nations approved 55-gallon drums (UN 1A2).

Labeling – All containers will be labeled as to their contents. The labels will include the following information:

- Site Name
- Job Number
- Location (SWMU)
- Date – To be completed upon filling the container or when no more material is to be added
- Drum # - Assign an inventory number to be added to a comprehensive log
- Contents – Description
- Volume – Final volume
- Contact – This person should be available on base. To this end an up-dated inventory should be provided at the close of each shift to this person.
- Emergency Number – Contact person provided above

Staging – All drums will be staged on pallets (4 to a pallet) with lid retention ring bolt accessible on the outside as well as the label. Pallet rows will maintain a minimum of 3 feet between rows for access and monitoring for leaks.

Monitoring – During staging site personnel will examine containers to ensure they are not leaking.

Final Deposition – IDW materials will be separated as determined through sampling and disposed of through pre-determined routes.

For more detailed description of the associated tasks, refer to the Pilot and Bench Scale Work Plans. Any tasks to be conducted outside of the elements listed here will be considered a change in scope requiring modification of this HASP. The PHSO or a designated representative will submit all requested modifications to this document to the HSM.

5.0 TASKS/HAZARDS/ASSOCIATED CONTROL MEASURES SUMMARIZATION

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 personal protective equipment (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 not meant to be stand alone documents and must be accompanied by the TtNUS Health and Safety Guidance Manual. This manual is designed to further explain supporting elements for any site specific operations as required by 29 CFR 1910.120. The Guidance Manual should be referenced for additional information regarding air monitoring instrumentation, decontamination activities, emergency response, hazard assessments, hazard communication and hearing conservation programs, medical surveillance, PPE, respiratory protection, site control measures, standard work practices, and training requirements. Many of TtNUS's SOPs are also provided in the Guidance Manual.

Safe Work Permits will be issued for all 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 (SWP) 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 is not all inclusive and may be amended as necessary.

- NO eating, drinking, chewing gum or tobacco, taking medication, or smoking in contaminated or potentially contaminated areas or where the possibility for the transfer of contamination exists.
- Wash hands and face thoroughly upon leaving a contaminated or suspected contaminated area. A thorough shower and washing must be conducted as soon as possible if excessive skin contamination occurs.

- Avoid contact with potentially contaminated substances. Avoid puddles, pools, mud, or other such areas. Avoid, whenever possible, kneeling on the ground or leaning or sitting on equipment. Keep monitoring equipment away from potentially contaminated surfaces.
- Obey all instructions in the site-specific HASP.
- Take note of the location of the nearest telephone and all emergency telephone numbers. See Section 2.0, Table 2-1.
- Attend briefings on anticipated hazards, equipment requirements, safe work permits, emergency procedures, and communication methods before going on site.
- Plan and mark entrance, exit, and emergency escape routes. See Section 2.0.
- Rehearse unfamiliar operations prior to implementation.
- 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 including Support, Contamination Reduction, and Exclusion Zones.
- Minimize the number of personnel and equipment in contaminated areas (such as the Exclusion Zone). Non-essential vehicles and equipment should remain within the Support Zone.
- Establish appropriate decontamination procedures for leaving the site.
- Immediately report all injuries, illnesses, and unsafe conditions, practices, and equipment to the Site Safety Officer (SSO).
- Matches and lighters are restricted from entering in the Exclusion Zone or Contamination Reduction Zone.
- Observe coworkers for signs of toxic exposure and heat or cold stress.
- Inform co-workers of potential symptoms of illness, such as headaches, dizziness, nausea, or blurred vision.

5.2 DRILLING OPERATIONS - SAFE WORK PRACTICES

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

5.2.1 Before Drilling Operations

- Identify all underground utilities and buried structures before drilling. Use the Utility Locating and Excavation Clearance Standard Operating Procedure provided in Attachment II. See notes for the time lines required on and off-Base utility clearances under mobilization/demobilization Section 4.1.

- All drilling 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. All repairs or deficiencies identified will be corrected prior to use. The inspection will be accomplished using the Equipment Inspection Checklist provided in Attachment III. Inspection frequencies will be once every 10 day shift or following repairs.

- The work area around the point of operation will be graded to the extent possible to remove any trip hazards near or surrounding operating equipment.

- The driller's helper will establish an equipment staging and lay-down plan. The purpose of this is to keep the work area clear of clutter and slips, trips, and fall hazards. Mechanisms to secure heavy objects such as drill flights will be provided to avoid the collapse stacked equipment.

- All potentially contaminated tooling will be wrapped in polyethylene sheeting for storage and transport to the centrally located decontamination unit.

5.2.2 During Drilling 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 five 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 drill rig.

- In order to minimize contact with potentially contaminated tooling and media and to minimize lifting hazards, multiple personnel should move heavy tooling, where necessary.

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

5.2.3 After Drilling Operations

- All 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.

- All motorized equipment will be fueled prior to the commencement of the day's activities. During fueling operations all equipment will be shutdown and bonded to the fuel provider.

- When not in use all direct push rigs will be shutdown, emergency brakes set, and wheels chocked.

- All areas subjected to subsurface investigative methods will be restored to equal or better condition than original to remove any contamination brought to the surface and to remove any physical hazards. In situations where these hazards cannot be removed these areas will be barricaded to minimize the impact on field crews working in the area.

TABLE 5-1

TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM
NAVAL CONSTRUCTION BATTALION CENTER GULFPORT, MISSISSIPPI

Task/Operation/Location	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring - Type and Action Levels	Personal Protective Equipment (Items in italics are optional as determined by the FOL or SSO.)	Decontamination Procedures
Mobilization/ Demobilization	***Chemical hazards:*** 1) The on-site Hazard Communication Program (Section 5.0 TtNUS Health and Safety Guidance Manual) will be followed. All chemicals brought onto the site by Tetra Tech NUS and subcontractor personnel will be inventoried and have an MSDS on site, on file. This effort shall include - Accurate Chemical Inventory List (Entries will match chemicals brought on-site, as the names appear on the MSDS) This list, which also includes quantities and storage locations will be provided to NCBC Gulfport Emergency Response Units. - MSDS's will be maintained in a central location, accessible to all personnel. - All containers will have labels specifying the following information: - Chemical Identity (As it appears on the label, MSDS, and Chemical Inventory List) - Appropriate Warning (i.e., Eye and skin irritation, flammable, etc.) - Manufacturer's Name Address and Phone Number It will be the FOL and/or the SSO's responsibility to insure this is completed. ***Physical hazards:*** 2) Lifting (strain/muscle pulls) 3) Pinches and compressions/Struck by 4) Slips, trips, and falls 5) Heavy equipment hazards (rotating equipment, hydraulic lines, etc.) 6) Vehicular and foot traffic 7) Ambient temperature extremes (heat/cold stress) ***Natural hazards:*** 8) Insect/animal bites and stings, poisonous plants, etc. 9) Inclement weather	***Chemical hazards:*** 1) All personnel will be required to review the appropriate MSDS's, prior to the use of a specified chemical substance. This direction should also be communicated on the Safe Work Permit completed for this task. ***Physical hazards:*** 2) Use machinery 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 an item several factors must be considered, these are as follows: Maximum weight lifted by a single person should not exceed 70 pounds. Items over 70 pounds or the amount you feel you can confidently lift up to 70 pounds should define a point where assistance in the lift is sought. Other considerations defining lifting hazards - Area available to maneuver the lift. - Area of the lift – Work place clutter, slippery surfaces - Overall physical condition 3) Keep any machine guarding in place. Do not modify tooling without manufacturer's expressed permission. - Avoid moving parts. - Use tools or equipment where necessary to avoid contacting pinch points. - Adjust machine guarding as necessary to minimize distance between guards and point of operation. - When staging equipment, insure all stacked loads, shelving, are adequately secure to avoid creating a hazard from falling objects. - All equipment will undergo a thorough equipment inspection. Mechanized and powered equipment inspections will be documented on the Equipment Inspection Checklist provided in Attachment III. All hand tools will be inspected (handle condition, cutting attachment, as applicable) to insure acceptable condition. 4) Preview work locations for unstable/uneven terrain. - Cover, guard and barricade all open pits, ditches, and floor opening as necessary. - The FOL and the SSO during site surveys and site preparation should identify these potential hazards. 5) All equipment will be - Inspected in accordance with OSHA and manufacturer's design. - Operated by knowledgeable operators and ground crew. 6) Traffic and equipment considerations are to include the following: - Establish safe zones of approach (i.e. Boom or mast + 5 feet). - Foot and vehicular traffic routes shall be well defined - All self-propelled equipment shall be equipped with movement warning systems. - All activities are to be conducted consistent with the site requirements. - The FOL and/or the SSO as a precautionary measure to remove or demarcate physical hazards shall preview traffic routes (foot and vehicular) before the commitment of personnel and resources. 7) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding heat and cold stress is provided in Section 4.0 of the TtNUS Health and Safety Guidance Manual. ***Natural hazards:*** 8) Avoid nesting areas; Tape pant legs to work boots when in high brush (knee high) (tick hazards); Use repellents – Apply Permonone over clothing articles to avoid skin irritation. Application of repellants should concentrate where ticks and other insects will gain entry. Pant to boots, shirt to pants, collar; Perform close body inspections upon exiting high brush areas to facilitate and remove ticks and other insects; Report potential hazards to the SSO. Follow guidance presented in Section 4.0 of the TtNUS Health and Safety Guidance Manual. 9) Suspend or terminate operations until directed otherwise by SSO.	Visual observation of work practices by the SSO to minimize potential physical hazards (i.e., improper lifting, unsecured loads, noise, etc.).	Level D - (Minimum Requirements) - Standard field attire (Sleeved shirt; long pants) - Safety shoes (Steel toe/shank) - *Safety glasses* - *Hardhat (when overhead hazards exists, or identified as a operation requirement)* - *Reflective vest for high traffic areas* - *Hearing protection for high noise areas, or as directed on an operation by operation scenario.*	Not required. However, to minimize the potential for the ticks or other insects to attach themselves to human hosts, persons exiting woods or high brush areas should perform a close body inspection to identify and remove these vectors as soon as possible. This should be conducted prior to entering site vehicles, trailers, etc. where the ticks or other insects may detach impacting other whose use this equipment or facilities.

TABLE 5-1

TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM
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 optional as determined by the FOL or SSO.)*	Decontamination Procedures
Soil borings using Direct Push Technology (DPT) and Hollow Stem Auger (HAS) Drill Rig	***Chemical hazards:*** 1) Previous analytical data identified the following compounds as contaminants of concern (Air - Dust/particulate contaminants) Benzene, DDT, Dioxin, Herbicide Orange; Solvents (such as MEK, Toluene, and Xylene); Paints and Paint Thinners. It is recommended that exposure (via inhalation, ingestion, or skin contact) be minimized due to its bio-accumulative properties. Further information on this contaminant is presented in Figure 6-1. 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 and Lacerations ***Natural hazards:*** 12) Insect/animal bites and stings, poisonous plants, etc. 13) Inclement weather	***Chemical hazards:*** 1) Always avoid contact with contaminated media (air, water, soils, etc.) and free product. As these materials are most likely bound to particulates, keep dust/particulate levels down. In the event a container is penetrated and product is brought to the surface, detection will be by sight and or smell. Handle all potentially contaminated equipment with caution. Avoid contact and screen for volatiles. 2) Restrict the cross use of equipment and supplies between locations and activities without first going through a suitable decontamination. Work practices including - Use a rigid decontamination procedure between locations to prevent the spread of contamination. ***Physical hazards:*** 3) All equipment will be: - Inspected in accordance with Federal safety and transportation guidelines, OSHA (1926.600.601.602), and manufacturer's design. All inspections will be documented using the Equipment Inspection Checklist found in Attachment III of this HASP. - Operated and supported by knowledgeable operators, and ground crew. - Used within safe work zones, with routes of approach clearly demarcated. All 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 tools - Only manufacturer-approved equipment may be used in conjunction with equipment repair procedures (e.g., flight connectors). - Work areas will be kept clear of clutter. - Secure all loose articles to avoid possible entanglement during coring activities. - All self-propelled equipment shall be equipped with movement warning systems. - All 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 excavations and embankments. 4) Hearing protection will be used during all subsurface activities using drill 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 talk to someone within 2 feet of your location. 5) All 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. 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.	**It is anticipated that potential contaminant concentrations at outdoor locations will be dispersed via natural wind currents and dilution prior to reaching worker-breathing zones.** Photoionization Detector w/ 10.6 eV UV lamp source, or a Flame Ionization Detector, will be used to detect VOCs as follows: Source (borehole and Drill Rig sampler) monitoring will be conducted at regular intervals determined by the SSO. The SSO will also monitor the breathing zone of all potentially affected employees, with the following guidance: - Any sustained reading above 10 ppm in the BZ requires evacuation to a safe area. Most of the contaminants of concern are solid, and non-detectable using PID/FID direct reading instruments. Also, other site contaminants may adhere to or be part of airborne dusts or particulates generated during site activities. Generation of dusts should be minimized to the greatest extent possible to avoid inhalation of contaminated dusts or particulates. Evaluation of dust concentrations will be qualitative by observing work conditions for visible dust clouds or accumulations. Potential exposure to contaminants attached to dust particles will be controlled by using water to suppress dusts, by avoiding dust plumes, or by upgrading the level of protection. If determined by the SSO to be a concern then Continuous **dusts/particulates** monitoring may be performed. Where the utility clearance cannot be obtained in a reasonable period, or not located, intrusive activities shall proceed with extreme caution using a magnetometer for periodic downhole surveys every 2 feet to a depth of at least 6 feet. See Attachment II Utility Locating And Excavation Clearance of this HASP.	All drilling operations will be performed in Level D protection, including the following articles: - Standard field dress (long pants, Sleeved shirts) - Steel toe safety shoes or work boots - Hard hat - Tyvek or washable cotton coveralls - Impermeable boot covers **Driller and Driller Helper** - Standard field attire including sleeved shirt and long pants - Safety shoes (Steel toe/shank) - Safety glasses - Nitrile inner gloves; Butyl outer gloves - Hard hat (when overhead hazard exists) - Impermeable outer garments such as PVC Rain-suit or Saranex®, PE coated Tyvek® due to contact with contaminated tooling. An impermeable apron is acceptable due to heat stress. - Hearing protection for high noise areas - *Reflective vest for traffic areas* Upgrade to Level C protection Dust concentrations exceeding 2 mg/m^3 that cannot be controlled through dust suppression methods. - Level D minimum requirements listed above - Full-face APR with organic vapor/acid gas/HEPA cartridges. The material in question is suspected to be in solid form. The cartridges will be changed out as necessary. As the HEPA cartridges become more difficult to breath through the mechanical filtration is becoming overloaded and should be exchanged. **Note:** The Safe Work Permit(s) for this task (see Attachment IV 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 and non-reusable outer protective equipment (boots, gloves, PVC splash suits, as applicable). In addition to the soap and water wash and rinse a vacuum equipped with a HEPA filter may be used to remove dust and dirt from cotton coveralls. 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; Decon 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. 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** - All 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. All 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

TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM
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 optional as determined by the FOL or SSO.)*	Decontamination Procedures
		10) Wear eye protection and hard hat when the drill rig is operating. Restrict all others from the area. 11) Cuts and Lacerations - To prevent cuts and lacerations associated with extracting samples from the acetate liners of the Macro-Core Sampler, the following provisions are required: - Obtain and use the knife and acetate tube retention tub recommended by Geoprobe to prevent accidents of this nature. These items have been engineered to allow sample acquisition without putting the sampler at risk. - Always cut away from yourself and others, then, if a knife slips, you will not impale yourself or others. - Do not place items to be cut in your hand or on your knee. - Change out blades as necessary to maintain a sharp cutting edge. Many accidents result from struggling with dull cutting attachments. ***Natural hazards:*** 12) Avoid nesting areas, use repellents. Report potential hazards to the SSO. See Section 6.3 of this HASP and Section 4.0 of the TtNUS Health and Safety Guidance Manual for additional information concerning natural hazards. 13) Suspend or terminate operations until directed otherwise by SSO.			the requirements in the Sampling and Analysis Plan and/or Work Plan. All 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 COMPENDIUM
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 optional as determined by the FOL or SSO.)*	Decontamination Procedures
Multi-media sampling, including soils (surface and subsurface); surface water, ground water, and sediments This task also includes well development and Aquifer Testing	***Chemical hazards:*** 1) Previous analytical data identified the following compounds as contaminants of concern (Air - Dust/particulate contaminants) Benzene, DDT, Dioxin, Herbicide Orange, Solvents (such as MEK, Toluene, and Xylene), Paints and Paint Thinners. It is recommended that exposure (via inhalation, ingestion, or skin contact) to this contaminant be minimized due to . Further information on this contaminant is presented in Figure 6-1 See Attachment VIII for mathematical calculations for determining potential airborne concentrations 2) Transfer of contamination into clean areas ***Physical hazards:*** 3) Noise in excess of 85 dBA 4) Lifting (strain/muscle pulls) 5) Pinches and compressions 6) Slips, trips, and falls 7) Ambient temperature extremes (heat/cold stress) 8) Vehicular and foot traffic 9) Site Characterization ***Natural hazards:*** 10) Insect/animal bites and stings, poisonous plants, etc. 11) Inclement weather	1) Avoid contact with contaminated media (air, water, soils, etc) and free product As most of the materials in question are likely to be bound to particulates, dust/particulate suppression will be used to minimize potential exposure. Although this is unlikely even in the absence of any control measures, monitoring will be conducted to provide quantitative data regarding emissions 2) Decontaminate all 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) When sampling at an operating DPT or Hollow Stem Auger or other type of drill rig use hearing protection. The use of hearing protection outside of 25 feet from the DPT rig should be incorporated under the following condition: If you have to raise your voice to talk to someone who is within 2 feet of your location, you may be approaching excessive noise levels (>85dBA) and hearing protection should be worn until the noise source may be positively quantified 4) Use machinery or multiple personnel for heavy lifts Use proper lifting techniques (See Lifting Mobilization/Demobilization, Page 1 of 6, Table 5-1). 5) Avoid moving parts, do not remove any machine guarding - Use tools or equipment where necessary to avoid contacting pinch points - A remote sampling device must be used to sample drill cuttings near rotating tools The equipment operator shall shutdown machinery if the sampler is near moving machinery parts. - Remove any snag points - Follow Safe Work Permit and Safe Work Practices for drilling procedures when working in and around the drill rigs(See Section 5.1 & 5 2) 6) 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°. 7) 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. 8) 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. - All 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 9) 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 10) Avoid nesting areas, use repellents approved by the FOL. Report potential hazards to the SSO. Follow guidance presented in Appendix F, Hazard Assessment. 11) Suspend or terminate operations until directed otherwise by the SSO	**It is anticipated that potential contaminant concentrations at outdoor locations will be dispersed via natural wind currents and dilution prior to reaching worker-breathing zones.** Photoionization Detector w/ 10.6 eV UV lamp source, or a Flame Ionization Detector, will be used to detect VOCs as follows: Source (borehole and Drill Rig sampler) monitoring will be conducted at regular intervals determined by the SSO. The SSO will also monitor the breathing zone of all potentially affected employees, with the following guidance: - Any sustained reading above 10 ppm in the BZ requires evacuation to a safe area. Most of the contaminants of concern are solid, and non-detectable using PID/FID direct reading instruments. Also, other site contaminants may adhere to or be part of airborne dusts or particulates generated during site activities. Generation of dusts should be minimized to the greatest extent possible to avoid inhalation of contaminated dusts or particulates. Evaluation of dust concentrations will be qualitative by observing work conditions for visible dust clouds or accumulations. Potential exposure to contaminants attached to dust particles will be controlled by using water to suppress dusts, by avoiding dust plumes, or by upgrading the level of protection. If determined by the SSO to be a concern then Continuous **dusts/particulates** monitoring may be performed. Where the utility clearance cannot be obtained in a reasonable period, or not located, intrusive activities shall proceed with extreme caution using a magnetometer for periodic downhole surveys every 2 feet to a depth of at least 6 feet. See Attachment II Utility Locating And Excavation Clearance of this HASP.	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) - Safety shoes (steel toe/shank) - 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.* Upgrades to Level C protection will be based on the following: Dust concentrations exceeding 2 mg/m^3 that cannot be controlled through dust suppression methods - Level D minimum requirements listed above - Full-face APR with organic vapor/acid gas/HEPA cartridges The material in question is suspected to be in solid form The cartridges will be changed out as necessary. As the HEPA cartridges become more difficult to breath through the mechanical filtration is becoming overloaded and should be exchanged **Note:** The Safe Work Permit(s) for this task (See Attachment IV) 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 drilling 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** All 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

TABLE 5-1

TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM
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 optional as determined by the FOL or SSO.)	Decontamination Procedures
Surveying – Geographical and Geophysical This activity is proposed for improved areas The likelihood of encountering some of the natural hazards discussed is negligible. However, the information is provided in the event that benchmarks (horizontal and vertical control) has to be carried from a remote location	***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 5) Insect/animal bites or stings, poisonous plants, etc.	***Physical hazards:*** 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 - Insure handles are of good construction (no cracks, splinters, loose heads/cutting apparatus - Insure all cutting tools are maintained Blades shall be sharp without nicks and gouges in the blade - All hand tools (brush hooks, machetes, etc) with cutting blades shall be provided with a sheath to protect individuals when not in use - All personnel will maintain a 10-foot perimeter around persons clearing brush **Note:** It is not anticipated that trees will be required to be dropped as part of this operation and therefore will not be addressed. The additional use of chainsaws and chippers will require this HASP to be modified. 3) Wear appropriate clothing for weather conditions. Acceptable shelter and liquids for field crews ***Natural hazards:*** 4) Suspend or terminate operations until directed otherwise by SSO 5) To combat the potential impact of natural hazards, the following actions are recommended - Avoid nesting – Preview routes, monitoring well protective casings for nests Avoid if at all possible. - Wear light color clothes. This will allow easier detection of ticks and insects crawling on your body It will also assist in heat stress control. - Tape pant legs to work boots to block direct access. - Use repellents – Permanone should be applied liberally to the clothing, but not the skin as it may cause irritation. Concentrate on areas where ticks and other insects may access your body such as pant cuffs, shirt to pants, and collars - Upon exiting the high brush and wooded areas perform a close body inspection to remove any ticks or other insects that have attached to your clothing or skin - If clearing lines in snake infested areas surveyors are recommended to wear snake chaps as a precaution. - Report potential hazards or signs and symptoms to the 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 - Safety shoes (Steel toe/shank) - 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 IV) 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 remot However, survey parties should inspect themselves an 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

TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM
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 optional as determined by the FOL or SSO.)	Decontamination Procedures
Decontamination of Sampling and Heavy Equipment It is anticipated that this activity will take place at centralized locations. 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 only chemical to pose an occupational threat during sampling was TCDD This substance is in a solid form It is anticipated, once wetted down are not considered to pose an occupational threat through inhalation. However, ingestion may still pose an exposure threat Benzene, DDT, Dioxin, Herbicide Orange; Solvents (such as MEK, Toluene, and Xylene), Paints and Paint Thinners. 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) Struck by 7) Slips, trips, and falls ***Natural hazards:*** 8) Inclement weather	1) and 2) Use 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 All 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. All 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) Struck by – Insure wash and drying racks are suitable construction to support heavier items such as auger flights and will secure them against falling during this process 7) 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. 8) Suspend or terminate operations until directed otherwise by SSO	Use visual observation and real-time monitoring instrumentation to ensure all 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 IV) 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 rins 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** - All heavy equipment decontaminatior 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 centra decontamination area. All site vehicles will have restricted access to exclusion zones, and have their wheels/tires sprayed off as not to tracl 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. All 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

The following 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. Figure 6-1, which is included as part of this HASP, 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 work to be conducted at NCBC Gulfport include inhalation, ingestion, and dermal contact with contaminants that may be present in soil. Based on the site history and prior sampling efforts, the following have been identified as the primary classes of site contaminants, including the specific compound(s) of interest:

- Benzene, DDT, Dioxin, Herbicide Orange
- Solvents such as MEK, Toluene, and Xylene
- Fuel Oils
- Paints and Paint Thinners

Figure 6-1 provides information on these chemicals including information on the toxicological, chemical, and physical properties of this substance. It is anticipated that the greatest potential for exposure to site contaminants is during intrusive activities (soil borings, sampling, etc.). Exposure to these compounds is most likely to occur through inhalation or dermal contact of contaminated soil or water, 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. Inhalation exposure will be avoided by using appropriate PPE and engineering controls where necessary. Given the nature of planned activities and that work will be conducted outside in the open air, however, it us highly unlikely that any appreciable airborne concentrations will be present.

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 Health and Safety Guidance Manual) and for collecting the appropriate Material Safety Data Sheets (MSDS) from the chemical manufacturers/suppliers. The SSO is also responsible for completing the Safe Work Permit for the decontamination task using the appropriate MSDS 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

Substance	CAS No.	Air Monitoring/Sampling Information		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.	Air sample using 2 ml Tedlar sample bags or charcoal tube with carbon disulfide desorption Sampling and analytical protocol in accordance with NIOSH Method # 3700 or #1500 and OSHA 07.	OSHA 1 ppm 5 ppm (STEL) *See 29 CFR 1910.1028* ACGIH. 10 ppm NIOSH: 0.1 ppm IDLH· 500 ppm	Inadequate - Odor threshold 1.4-120 ppm. The use of half-face air-purifying respirators with organic vapor cartridge up to 10 ppm is acceptable 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:** 1.2% **UEL/UFL:** 7.8% **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, difficulty breathing, and intoxification Long duration exposures may result in respiratory collapse. May cause damage to the blood forming organs and may cause a form of cancer called leukemia The ACGIH, IARC, and OSHA list benzene as a carcinogen
DDT and the major metabolites; DDD and DDE.	50-29-3 72-54-8 72-55-9	Substance is not volatile, I.P. is unknown, detection by PID is unknown. Substance non-combustible, therefore a FID is anticipated to have reduced response to DDT.	Air sample using a binder free, glass fiber filter; isooctane desorption; gas chromatography-electron capture detector. Sampling and analytical protocol will proceed in accordance with NIOSH Method #3(S274).	OSHA, ACGIH: 1 mg/m³ NIOSH 0 5 mg/m³	Adequate - Can use air purifying respirator with high efficiency particulate air filter (HEPA) **Recommended glove:** Nitrile acceptable for incidental contact	**Boiling Pt:** 230°F, 110°C **Melting Pt:** 226°F; 108°C **Solubility:** Insoluble **Flash Pt:** 162-171°F; 72-77°C **LEL/LFL:** Not available **UEL/UFL:** Not available **Vapor Density:** Not available **Vapor Pressure:** Low **Specific Gravity:** 0.99 **Incompatibilities:** Strong oxidizers and alkalis **Appearance and Odor:** Colorless crystals or off-white powder with a slight aromatic odor	Large doses are followed by vomiting due to gastric irritation, diarrhea may follow Numbness and parethesias of the lips tongue and face associated with malaise, headache, sore throat, fatigue and weakness Coarse tremors (usually first of the neck, head, and eyelids) This may be accompanied by confusion, apprehension, and depression Convulsions may result and death may occur from respiratory failure DDT is absorbed and retained in the fat of humans Chronic exposure may result in damage to the liver, kidneys and Peripheral Nervous System DDT is recognized as possessing carcinogenic properties by IARC and NTP.

Table 6-1

CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA

Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Diesel Fuel No.2-D	Mixture	Components of this substance will be detected readily however no documentation exists as to the relative response ratio of either PID or FID.	Air sample using charcoal tube as a collection media; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol in accordance with NIOSH Method #1550.	OSHA, NIOSH; ACGIH: 5 mg/m³ as mineral oil mist. In addition NIOSH and ACGIH establish 10 mg/m³ as a STEL.	Kerosene odor **Recommended Air Purifying cartridges:** Organic vapor **Recommended gloves:** Nitrile	**Boiling Pt:** <170-400°F, 77-204°C **Melting Pt:** Not available **Solubility:** Negligible **Flash Pt:** 125°F; 52°C **LEL/LFL:** 0.6% **UEL/UFL:** 7 5% **Vapor Density:** >5 **Vapor Pressure:** <1 mmHg @ 70°F; 21°C **Specific Gravity:** 0 86 **Incompatibilities:** strong oxidizers, halogens, and hypochlorites **Appearance and odor:** Colorless to amber with a kerosene odor	Prolonged or repeated exposures to this product may cause skin and eye irritation. Due to the defatting capabilities this exposure may lead to a dermatitis condition High vapor concentrations are irritating to the eyes and respiratory tract. Exposure to high airborne concentrations may result in narcotic effects including dizziness, headaches, and anesthetic to unconsciousness. High concentrations in a confined space may adequately displace oxygen thereby resulting in suffocation
Waste Oils All information is based on mineral oil	N.E. 8012-95-1 for mineral oil	Varies between fractions however waste oils tend to be less volatile. The FID tends to handle the longer chained aliphatic hydrocarbons more efficiently than its PID counterpart and would be selected as the instrument of choice.	Sampling and analytical protocol shall be in accordance with NIOSH Method #5026 is the recommended method for mineral oil mist.	ACGIH, NIOSH: 5 mg/m³ (Oil mists); 10 mg/m³ STEL OSHA: 5 mg/m³ (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/m³. **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
Methyl ethyl ketone (2-Butanone)	78-93-3	PID: I P. 9 54 eV, high response with PID and 10.2 eV lamp. FID: 80% relative response ratio with FID.	Air sample using Ambersorb tube; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol shall proceed in accordance with OSHA Method #16, 84 or NIOSH Method #2500.	OSHA; NIOSH; ACGIH: 200 ppm NIOSH; ACGIH: have established STEL of 300 ppm IDLH: 3000 PPM	Adequate - Can use air purifying respirator with organic vapor cartridges up to 2000 ppm. **Recommended glove:** Poly vinyl alcohol or natural rubber	**Boiling Pt:** 175°F; 79°C **Melting Pt:** -124°F, -86 4°C **Solubility:** 28% **Flash Pt:** 16°F; 9°C **LEL/LFL:** 1 4% **UEL/UFL:** 11.4% **Vapor Density:** 2.41 **Vapor Pressure:** 71 mmHg **Specific Gravity:** 0 81 **Incompatibilities:** Strong oxidizers, amines, ammonia, inorganic acids, caustics, copper, isocyanates, pyridines **Appearance and odor:** Colorless liquid with a moderately sharp, fragrant mint- or acetone like odor	Exposure may result in irritation to the eyes and nose Overexposure may cause headache, dizziness, and vomiting Target organs are the Central Nervous System and lungs

Table 6-1

CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA

Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Toluene	108-88-3	PID: I P 8 82 eV, High response with PID and 10.2 eV lamp. FID: 110% response with FID	Air sample using charcoal tube; carbon disulfide desorption. Sampling and analytical protocol shall proceed in accordance with OSHA Method #07, or NIOSH Method #1500.	OSHA: 200 ppm 300 ppm (Ceiling) ACGIH: 50 ppm (skin) NIOSH. 100 ppm 150 ppm STEL IDLH: 500 ppm	Adequate - Odor threshold 1 6 ppm is considered good. Can use air-purifying respirator with organic vapor cartridge up to 1,000 ppm. **Recommended gloves:** Teflon >15.00 hrs; Viton >16.00 hrs; silver shield >6,00 hrs; supported nitrile (Useable time limit 0.5 hr, complete submersion for the nitrile selection); PV alcohol >25 00 hrs	**Boiling Pt:** 232°F; 111°C **Melting Pt:** -139°F, -95°C **Solubility:** 0 05% (61°F,16°C) **Flash Pt:** 40°F; 4°C **LEL/LFL:** 1.2% **UEL/UFL:** 7.1% **Vapor Density:** 3 14 **Vapor Pressure:** 20 mmHg @ 65°F; 18°C **Specific Gravity:** 0.87 **Incompatibilities:** Strong oxidizers **Appearance and odor:** Colorless liquid with a sweet pungent aromatic odor.	Overexposure to this substance may result in mild to moderate irritation at all points of contact, and CNS changes including euphoria, confusion, nervousness, and possibly paresthesia characterized by an abnormal burning sensation, pricking, or numbness At 200-500 ppm exposure has resulted in headaches, nausea, eye irritation, loss of appetite, bad taste, impair coordination, fatigue, and weariness. Chronically, toluene overexposure may result in dermatitis, liver, and kidney damage.
Xylene All isomers o-,m-, p-	1330-20-7	PID: I.P. 8.56 eV, High response with PID and 10 2 eV lamp. FID· 110% response with FID.	Air sample using charcoal tube; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol shall proceed in accordance with OSHA 07, or NIOSH Method 1500.	ACGIH, & NIOSH· 100 ppm, 150 ppm STEL OSHA: 100 ppm IDLH. 900 ppm	Adequate - Odor thresholds for the following isomers: 0.6 m-, 5 4 p-; 20 o- ppm. Can use air-purifying respirator with organic vapor cartridge up to 9 00 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

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 health and Safety Guidance Manual. Additionally, information on the associated control measures for these hazards are 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.
- Establish anchor points and rope handrails for traversing/ascending/descending angles and slopes greater than 45% grade.
- Footwear with an adequate traction.
- Prepare work areas by removing tripping hazards (ruts, roots, debris). This is especially critical around rotating equipment, where a fall into the rotating apparatus could be life threatening.

6.2.2 Cuts or Other Injuries Associated with Hand Tool Use

The clearing of brush and vegetation will be performed using hand tools that may include machetes, and brush axes. However, the use of hand tools has only briefly discussed. 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 all 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.
- Inspect all hand tools [i.e., shovel handles (cracks, splinters, etc.), brush hook handles and blade attachment points, etc.)
- Ensure all hand tools are sharp to facilitate cutting action. This will avoid persons forcing the tool to cut and increasing potential hazards.
- Use the proper tool for the intended purpose. The proper tool is the acetate tube retention tub recommended by Geoprobe. This will avoid potential injury possibly created through improper cutting procedures.

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, all subsurface activities must be conducted following the requirements of the Tetra Tech NUS SOP for "Utility Locating and Excavation Clearance (HS-1.0)".** 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. Time lines required to obtain utility clearances are as follows:

Public Works: 10-Day advance notification

Mississippi One Call System, Inc.: 2-working day advance notification, ticket then is good for a period of 10 days before renewal is required.

Additionally, drilling operations will be conducted at a safe distance from overhead power lines as discussed in Attachment II. 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 Insect Bites and Stings

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

Insect/animal bites and stings are difficult to control given the climate and environmental setting of NCBC Gulfport. However, in an effort to minimize this hazard the following control measures will be implemented where possible.

- Commercially available bug sprays and repellents will be used whenever possible – Pesticides analytical screening includes chlordane, endrin, lindane, methoxychlor, toxaphene and heptachlor. Commercially available repellants may be used providing they don't contain substances which appear on the analytical list for pesticide analysis. Products such as DEET should not be applied directly to the skin due to potential irritation. This product, when permitted for use, should be applied over clothing articles.

- Where possible, loose-fitting and light-colored clothing with long sleeves should be worn. This will also aid in insect control by providing a barrier between the field person and the insects and to provide easy recognition of crawling insects against the lighter background. Pant legs should be secured to the work-boots using duct tape to prevent access by ticks. Mosquito nets are also recommended for use when commercially available repellents are not permitted.

- Clothing/limited body checks for ticks and other crawling insects should be conducted upon exiting heavily vegetated areas. Workers should perform a more detailed check of themselves when showering

6.3.2 Snakes and Other Wild Animals

Indigenous animals including snakes (poisonous and non-poisonous varieties), raccoons, and other animals native to the region may be present at the site. These animals may be encountered if work locations encroach on nesting or territories claimed by these animals. This is not generally considered to be a problem at this location as most of the activities will take place in improved areas. It is however addressed as part some tasks that may take personnel off of improved areas.

To avoid the obvious hazards conveyed as part of a direct encounter, the following actions will be taken to minimize impact on the field crews and/or operations. The FOL/SSO will preview access routes and work locations for nesting areas or signs of animal activities (tracks, foraging areas, etc.). All identified suspect areas will be communicated to the field crews. Snake chaps will be required as a precaution.

6.3.2.1 Snake Bites

All initial efforts will be directed to avoid, where possible, nesting and territorial areas. However, should field personnel come in contact with these animals and receive a bite, the following actions are necessary.

- Obtain a detailed description of the snake. This and the bite mark will enable medical personnel administering medical aid to provide prompt and correct antidotes, as necessary.

- Immobilize the bite victim to the extent possible. Physical exertion will mobilize the toxins (if poisonous varieties) from the bite point systemically through the body.

- Apply a pressure wrap (for extremities), just above and over the bite area. With a couple wraps of the pressure wrap in place over the bite area, apply a splint, and continue the application of the pressure wrap. The purpose for the splint is to restrict the movement of the extremity, this along with the pressure wrap will aid in restricting the toxins from leaving the site of the bite.

- Seek medical attention immediately.

6.3.2.2 Alligators

Alligators are indigenous to south eastern portion of the United States including the eastern third of Texas and may be present in ponds, swamps, drainage channels, and other wet areas. Alligators are fairly inactive in the winter months when the water temperatures are cool; their metabolism slows down and there is little need for food. The breeding season is mostly during April and May (but may begin as early as mid-February); male and female move around more during this time. Nests are constructed by the

female during June and July. The female will build a nest of leaves and vegetation up to 6 feet across and several feet high. She lays and buries her eggs in the center of this mound, allowing the warmth of the pile to incubate the eggs. Females typically lay over 50 eggs and each egg is about 3 inches long. The eggs incubate for about 9 weeks, and the female will watch and defend the nest during this time. As the young hatch, they "peep" and the female will assist them by digging them out of the nest. Newborn alligators are about 9 inches long and will stay near the female for up to a year. The female will continue to protect the young during this period.

Alligators are very protective of their domain during courtship and nesting. Alligators can outrun humans for short distances.

Other indication of their presence includes slides (areas marked by entering and exiting the water) and areas of cleared access for purposes of sunning (internal thermal regulation).

Control Measures

- Treat alligators with extreme caution. Never approach an alligator, either on land or in the water.
- If sampling involves entering areas where alligators may be present, use an "alligator-watch" as a lookout.
- Use a remote sampling device (such as a sample jar/vial on a long pole) to reach into surface water and along waters edge, **Never Use Your Hand.**
- When accessing sample locations always insure you have left yourself a clear means of retreat. Obtain the sample as quickly as possible and immediately leave the area.

6.3.3 Poisonous Plants

Various plants which can cause allergic reactions may be encountered during field work. These include, poison ivy, poison oak, and poison sumac. Contact with these plants may occur when clearing vegetation for access to work areas, or as a result of movement through these plants. An irritating, allergic reaction can occur after direct contact with the plant or indirect contact through some piece of equipment or clothing article. Oils are transferred from the plant to exposed skin, clothing, or piece of equipment. The degree of the irritating, allergic reaction can vary significantly from one person to the next.

Protective measures to control and minimize the effects of this hazard may include, but not be limited to, the following:

- Identify plants for field personnel.

- Poison Ivy - Characterized by climbing vines, three leaf configuration ovate to elliptical in shape, deep green leaves with a reddish tint, greenish flowers, and white berries.
- Poison Sumac - Characterized as a tall bush of the sumac family bearing compound leaves (7-13 entire leaflets), branched from a central axis, drooping, with axillary clusters of white fruit: However, these white fruits and berries may exist only during pubescent stages.
- Poison oak - Characterized as similar to poison ivy consisting of a shrub, stems erect, 0.3 to 2.0 meters tall, leaflets consist of broad thick lobes coarsely serrated configuration, denser at the base, less so than the top.

- Protective measures may include wearing disposable garments such as Tyvek when clearing brush. These may be carefully removed and disposed of along with any oils accumulated from the plants.

- Personal Hygiene - The oils obtained from the plants will only elicit an allergic response when the person's bare skin layer is contacted. This can be aggravated when skin pores are open (perspiring), or through breaks in the skin such as cuts, nicks, scratches, etc. This can also be accomplished when using excessively hot water for cleaning the skin, which also causes pores to open. Prior to break time, lunchtime, etc. personnel should wash with cool water and soap to remove as much of the oils as possible. In heavily vegetated areas of these plants, additional measures including barrier creams and blocks may be used to prevent the oils from accessing and penetrating the skin.

All of these plants present an airborne sensitization hazard when burned. This is not to occur as part of this scope of work and therefore will not be addressed.

6.3.4 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.

7.0 HAZARD MONITORING – TYPES AND ACTION LEVELS

This section provides direction and protocol for the real time monitoring. The monitoring of hazardous conditions has two primary objectives.

- Qualify and quantify potential hazards (chemical, physical, and biological) that may impact the work force or sensitive receptors in the immediate area.

- Evaluate environmental sampling media, which will be sent off-site. The purpose of this evaluation will be to qualify potential hazards to provide sufficient warning to down stream parties, which may potentially encounter these hazards. This would include hazard qualification for transportation purposes as well as notification to the analytical laboratory of potentially high hazard samples.

7.1 TASKS TO BE CONDUCTED

The following tasks are to be conducted as part of the scope of work at NCBC Gulfport. It is hazards associated with these tasks, which may be monitored for the purpose of quantification/ qualification of those hazards.

- Soil boring including Direct Push Technology (DPT) and Hollow Stem Auger (HSA) Drilling
- Monitoring Well Development/Monitoring Well Sampling
- Multi-media Sampling – Surface and subsurface soils; sediment; surface and groundwater sampling.
- Aquifer Testing
- Decontamination activities
- Geophysical and Geographical surveying

7.2 ASSOCIATED HAZARDS

Hazards associated with these tasks for which monitoring may be used to qualify/quantify, include, but not limited to:

- Noise – Information obtained from previous monitoring efforts indicate noise levels associated with this type of activity, dependent on the type of rig,

    - HSA Drill rig sound levels range from 87 to 92 dBA- Time Weighted Average (TWA)
    - DPT range from 90 to 102 dBA-TWA

- Generators – When generators are used as portable power sources for well development or sampling, the generator should be placed a sufficient distance from the operation to eliminate the noise hazard. The generators emit approximately 82 to 88 dBA.
- Steam Cleaners and pressure washers – Previous data indicate that these machines emit from 94 to 102 dBA.

Noise dosimetry may be performed to quantify noise levels associated with the type of rig selected to perform the subsurface investigation. In addition noise quantification may be performed to insure the hearing protection devices selected attenuation capabilities are sufficient for those noise levels produced. All noise monitoring will proceed in accordance with the Hearing Conservation Program provided in Attachment VI of this HASP.

7.3 INSTRUMENTS TO BE USED FOR HAZARD MONITORING

The following instrument will be used for monitoring the hazards identified above.

7.3.1 Metrosonics dB-307 Noise Dosimeter/Sound Level Meter

The db-307 is a dual purpose sound level meter and noise dosimeter. The instrument is calibrated in accordance with manufacturers instructions using a 102dBA acoustical calibrator. The instrument is calibrated pre- and post to monitoring activities in accordance with the Hearing Conservation program provided in Attachment VI of this HASP. Information regarding calibration is recorded either on the Noise Dosimetry Log or the Sound Level Measurement Log, relative to the type of monitoring being performed.

7.3.1.1 Frequency of Monitoring

Noise dosimetry and sound level measurements will be performed under the following circumstances:

- Noise source exists for which no similar data is available.
- Quantification is necessary to evaluate hearing protection attenuation capabilities.

Additional monitoring will only be performed if it is necessary to quantify other noise sources or through changes in procedure that may result in higher noise levels.

This monitoring will be conducted during intervals of the project, as deemed necessary, during the operation of powered equipment capable of generating noise sources over 85 dBA.

7.3.2 Chemical Contaminant Monitoring

Monitoring for airborne chemical contaminant released from environmental media will be performed during the following intrusive activities:

- Soil boring and sampling activities

Chemical air monitoring will be performed by the SSO or field team members using a Photo Ionization or Flame Ionization Detector to detect VOC's. The SSO may require a Mini-Ram Dust Monitor to measure fugitive emissions if the dust levels are high during mechanical dispersion associated during soil boring activities. This activity denotes general screening based on previous analytical results these substances do not present an exposure threat based on concentrations reported.

7.4 INSTRUMENT PREPARATIONS FOR FIELD SERVICE

All direct reading instruments will require calibration prior to use. The frequency of this calibration is stated below.

- PID/FID Manufacturer yearly service and primary calibration
  In the field – Pre and Post secondary calibration to a reference gas

- Noise Dosimeter - Manufacturer yearly service and primary calibration
  In the field – Pre and Post secondary calibration to a yearly calibrated acoustical reference.

- Dust Monitor – Manufacturer yearly service and primary calibration
  In the field – Pre and Post secondary calibration to a reference gas

All instruments used on the site will be operated and calibrated in accordance to manufacturer instructions.

Calibration information will be recorded on the equipment calibration sheet provided as Figure 7-1.

7.5 INSTRUMENT MAINTENANCE

Maintenance activities to be conducted on site are as follows:

- Wiping down the outer shells of the monitoring equipment used – Daily
- Battery charging – Daily (As applicable)

- Dust Monitor – Filter Replacement – Daily
- PID/FID – Filter Replacement as needed

Maintenance greater than that mentioned above will require the attention of a certified technician and will not be performed on site.

7.6 INSTRUMENT CALIBRATION

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

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

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 Tetra Tech NUS and subcontractor personnel participating in on site activities.

8.1.1 Requirements For All Field Personnel

All Tetra Tech NUS 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

Tetra Tech NUS will provide site-specific training to all Tetra Tech NUS 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. All 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 10.10).

8.3 MEDICAL SURVEILLANCE

8.3.1 Medical Surveillance Requirements for Tetra Tech NUS and Subcontractor Personnel

All Tetra Tech NUS and subcontractor personnel participating in project field activities will have had a physical examination. All physical examinations shall meet the minimum requirements of paragraph (f) of OSHA 29 CFR 1910.120. The physical examinations will be performed to ensure all personnel are medically qualified to perform hazardous waste site work using respiratory protection.

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, or 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 Code of Federal Regulations (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
- Date of the exam
- The persons identified have been cleared, by a licensed physician, to perform hazardous waste site work and to wear positive- and negative- pressure respiratory protection.

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

8.3.2 Requirements for All Field Personnel

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 which is available in Attachment V 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 Health and Safety Manager.**

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 (Section 1.2)
- Safety, health, and other hazards present on site (Table 5-1 and 6-1)
- Use of personal protective equipment (Table 5-1)
- Safe use of engineering controls and equipment (Table 5-1)
- Medical surveillance requirements (Section 8.3)
- Signs and symptoms of overexposure (Table 6-1)
- Contents of the Health and Safety Plan
- Emergency response procedures (evacuation and assembly points)(Section 2.0)
- Incipient response procedures (Section 2.0)
- Review of the contents of relevant Material Safety Data Sheets
- Review of the use of Safe Work Permits (Attachment IV)

My signature below indicates that I have been given the opportunity to ask questions and that all of 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

This program applies to the single or aggregate accumulation of bulk storage materials (over 55-gallons). As the classification of certain materials such as IDW is unknown, all materials will be treated as hazardous, pending laboratory certification to the contrary. The types of materials for which this program will apply are as follows:

- Investigative Derived Wastes (IDW) such as decontamination fluids, soil cuttings, and purge and well development waters
- Resource Storage – Limited fuel and lubricant storage

The spill containment and control will be engaged any time there is a release of the above-identified materials from a containment system or vessel. This spill containment program will be engaged in order to minimize associated hazards.

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

9.3 CONTAINMENT AREAS

In order to facilitate leak and spill inspection and response, and to minimize potential hazards which may impact the integrity of the storage containers, the staging area for these substances will be structured as follows:

9.3.1 IDW

- 55 Gallon Drums (United Nations 1A2 configurations) – 4 Drums to a Pallet; labels and the retaining ring bolt and nut on the outside of each drum to facilitate easy access; Minimum 3 feet between each row of pallets. The decision to construct a bermed and lined area will be the decision of project management .

- Storage Tank – Polyethylene Construction – Tank shall be placed into a bermed enclosure of sufficient size to accommodate 110% of anticipated volume (Largest container plus 10% for rainwater and container displacement).

Regardless of container types selected, the staging area will be identified as a Satellite Storage Area with proper signage, points of contact in the event of an emergency, alternate contacts, and identification of stored material (i.e., Purge or decontamination waters, soil cuttings, etc.).

An Inventory Log will be maintained by the FOL regarding types of IDW and volumes generated. An updated Inventory List will be provided by the FOL to the designated Emergency Response Agency or Base Contact during days off and between shifts or phases of operations.

9.3.2 Flammable/POL Storage

Flammable Storage [i.e., fuels, decontamination solvents (Isopropanol)] and Petroleum/oil/lubricants (POL) will require proper dispensing containers and necessary storage for cumulative volumes in excess of 25 gallons. Storage and dispensing will comply with the following requirements:

- All fuels, which will be stored and dispensed from portable containers, will utilize safety cans.
- All portable hand held storage containers will be labeled per Hazard Communication requirements.
- Larger volumes stored for fueling equipment will be stored in approved mobile Above Ground Storage Tanks with secondary containment capable of holding the tank volume plus 10%.
- All portable flammable liquid storage tanks will be properly grounded and will have bonding capabilities for the transfer of loading and off-loading of its contents.
- All dispensing locations will be supported by a Fire Extinguisher positioned no closer than 50 feet from the storage tank, properly mounted and identified.
- The storage location will be well marked with proper signage, protective bumper poles and will have straight through access/egress for vehicles.

9.4 MATERIALS HANDLING

To minimize the hazards associated with moving drums and containers (i.e., lifting, pinch and compression points) material handling will be supported in the following manner:

- A drum cart with pneumatic tires will be required, if drums are used for IDW storage. This cart will be used to relocate drums within the staging and satellite storage location.

- In addition, a mechanized means such as a suitably equipped skid loader or back-hoe will be provided to move IDW containers from the field location to the staging and satellite storage location. This piece of equipment will also be used in site clearance and restoration as deemed appropriate and necessary.

Other means of material handling will be evaluated by the SSO based on their ability to minimize or eliminate material handling hazards.

9.5 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 or in the Resource Deployment area will be conducted during working hours to visually determine that storage vessels are not leaking. If a leak is detected, the FOL will be notified and the Spill Containment/Control Response Plan as specified in Section 9.8 will be engaged. All inspections will be documented in the project logbook.

9.6 PERSONNEL TRAINING AND SPILL PREVENTION

All personnel will be instructed in the procedures for incipient spill prevention, containment, and collection of hazardous materials in the site-specific training. The FOL and/or the SSO will serve as the Spill Response Coordinators for this operation, should the need arise. Personnel through the course of this project will be drilled as part of testing the EAP.

9.7 SPILL 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 Containment/Control Plan.

- Sand, clean fill, vermiculite, or other non combustible absorbent (Oil-dry)
- Extra Drums (55-gallon U.N. 1A2) should the need to transfer material from leaking containers arise.

- Pumps (Gas or Electric necessary for transferring liquids from leaking containers)/tubing
- Drum Repair Kit
- Shovels, rakes, and brooms
- Container labels
- Personal Protective Equipment
  - Nitrile outer gloves
  - Splash Shield
  - Impermeable over-boots
  - Rain suit

9.8 SPILL CONTAINMENT/CONTROL RESPONSE PLAN

This section describes the procedures the Tetra Tech NUS field personnel will employ upon the detection of a spill or leak.

- Notify the SSO or FOL immediately upon detection of a leak or spill. Activate emergency alerting procedures for that area to remove all non-essential personnel.

- Employ the personal protective equipment 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.

- 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.

- Re-containerize 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, notification of the appropriate Emergency Response agencies will be carried out by the FOL or SSO in accordance with the procedures specified 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

Tetra Tech NUS 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.

10.1.1 Exclusion Zone

An Exclusion Zone will be established at each sampling point/location. The purpose of the exclusion zone is to define a area where a more rigorous protocol for workers within what is determined to be an impact area. The impact area is that area which could be adversely impacted by either chemical or physical hazards. Exclusion zone size and dimensions will vary based on activities. Impact areas dimensions will be influenced by the following considerations:

- Physical and topographical features of the site
- Weather conditions
- Field and analytical measurements of air and environmental contaminants
- Air dispersion calculations
- Potential for explosion and dispersion
- Physical, chemical and toxicological properties of the contaminants being investigated
- Tasks to be conducted
- Decontamination procedures
- Potential for exposure

As conditions change the dimensions of the exclusion zone will change. However, the following dimension represent a starting point from which the exclusion zones will be expanded:

- Soil Boring. The exclusion zone for this activity will be set at the height of the mast, plus five feet surrounding the point of operation, with a minimum of 25 feet. This distance will also apply when subsurface soil sampling from behind these type rigs.

- Monitoring well development and sampling. The exclusion zone for this activity will be set at 10 feet surrounding the well head and discharge collection container.

- Surface soils and surface/groundwater sampling. The exclusion zone for this activity will be set at five feet surrounding the point of operation.

- Clearing and grubbing. The exclusion zone for this activity will be set at 10 feet surrounding someone with a brush hook or machete.

- Decontamination operation. The exclusion zone for this activity will be set at 25 feet surrounding the gross contamination wash and rinse as well as 25 feet surrounding the heavy equipment decontamination area.

- Investigative Derived Waste (IDW) area will be constructed and barricaded. Only authorized personnel will be allowed access.

All exclusion zones shall remain marked until the SSO has evaluated the restoration effort and has authorized changing the zone status.

Exclusion zones will be marked using barrier tape, traffic cones and/or drive poles. Signs will be posted to inform and direct site personnel and site visitors.

10.1.2 Contamination Reduction Zone

The contamination reduction zone will be split to represent two separate functions. The first function will be a control/supply point for supporting exclusion zone activities. The second function, which may take place a sufficient distance from the exclusion zone is the decontamination of personnel and heavy equipment.

In order to move from the exclusion zone to a separate location the following activities will be used:

- As samplers move from location to location during sampling activities, dedicated sampling devices and PPE will be washed of gross contamination, removed, separated, and bagged. Personnel will use

hygienic wipes, such as Handy Wipes, as necessary for personnel decontamination until they can access the centralized decontamination unit. At the first available opportunity personnel will wash their face and hands. This is critical prior to breaks and lunch when contamination can be transferred to the mouth through hand to mouth contact.

- Muddy over-boots and gloves may be required to go through a gross contamination wash at the exclusion zone. These items will then be cleaned thoroughly at the centralized decontamination unit.

- Potentially contaminated tooling along with PPE will be wrapped, when necessary, for transport to the decontamination area.

- Upon completion of the assigned tasks all personnel will move through the central decontamination area to clean reusable PPE and field equipment. Based on ambient conditions medical evaluations may take place at the termination point of the decontamination line. These evaluations will include pulse rate, oral temperature, breathing rate to evaluate physiological demands on site personnel. As stated earlier, these evaluations will be based on ambient conditions and acclimation periods.

10.1.3 Support Zone

The Support Zone will consist of a field trailer, storage, lay-down areas, or some other uncontaminated, controlled point. The Support Zone for this project will include a staging area where site vehicles can be parked, equipment will be unloaded, and where food and drink containers will be maintained. In all cases, the support zones will be established in clean areas of the site.

10.2 SAFE WORK PERMITS

All Exclusion Zone work conducted in support of this project will be performed using Safe Work Permits to guide and direct field crews on a task by task basis. An example of the Safe Work Permit 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. All Safe Work Permits will require the signatures of either the FOL or the SSO. All 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 into 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. All permit turned in with suggestions, difficulties, or complaints will be forwarded to the PHSO for review.

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, dispersion routes are determined, a site map will be generated and adjusted as site conditions change. This map will be posted to illustrate up-to-date information of contaminants and adjustment of zones and access points. This map will be posted at the field support trailer. Figure 10-2 will serve as the preliminary version until investigation reveals more information.

10.4 BUDDY SYSTEM

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

FIGURE 10-1

SAFE WORK PERMIT

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

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

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

II. Names: _____

III. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____ _____

TtNUS

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

IV. Protective equipment required

Level D ☐ Level B ☐

Level C ☐ Level A ☐

Respiratory equipment required

Full face APR	☐	Escape Pack	☐
Half face APR	☐	SCBA	☐
SKA-PAC SAR	☐	Bottle Trailer	☐
Skid Rig	☐	None	☐

Modifications/Exceptions: _____

V.

Chemicals of Concern	Action Level(s)	Response Measures

VI. Additional Safety Equipment/Procedures

Hardhat	☐ Yes	☐ No	Hearing Protection (Plugs/Muffs)	☐ Yes	☐ No
Safety Glasses	☐ Yes	☐ No	Safety belt/harness	☐ Yes	☐ No
Chemical/splash goggles	☐ Yes	☐ No	Radio	☐ Yes	☐ No
Splash Shield	☐ Yes	☐ No	Barricades	☐ Yes	☐ No
Splash suit/coveralls (Type:_____)	☐ Yes	☐ No	Gloves (Type)	☐ Yes	☐ No
Steel toe/shank Workboots	☐ Yes	☐ No	Work/rest regimen	☐ Yes	☐ No

Chemical Protective Over-boots (Type:_____) ☐ Yes ☐ No

Modifications/Exceptions:_____

VII. Procedure review with permit acceptors

	Yes	NA		Yes	NA
Safety shower/eyewash (Location & Use)	☐	☐	Emergency alarms	☐	☐
Procedure for safe job completion	☐	☐	Evacuation routes	☐	☐
Contractor tools/equipment inspected	☐	☐	Assembly points	☐	☐

VII. Site Preparation

	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Equipment and Foot Traffic Routes Cleared and Established	☐	☐	☐
Physical Hazards Barricaded and Isolated	☐	☐	☐
Emergency Equipment Staged	☐	☐	☐

VIII. Additional Permits required (Hot work, confined space entry, excavation, etc.). ☐Yes ☐No

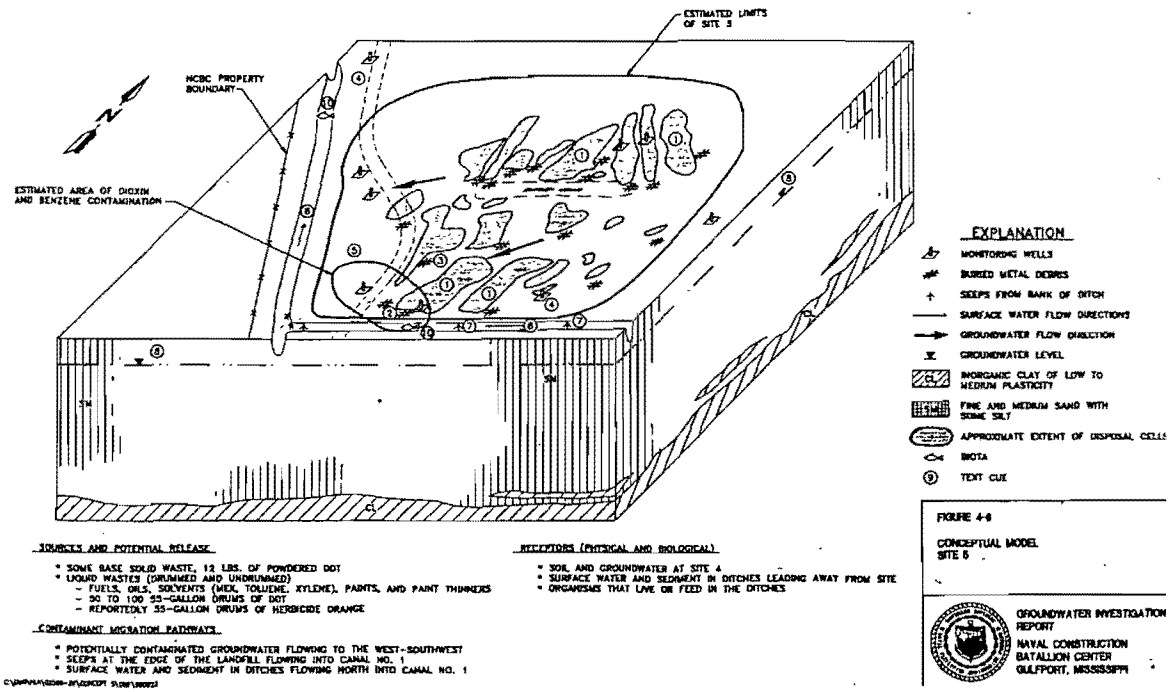
If yes, See SSO for appropriate permit

IX. Special instructions, precautions:_____

Permit Issued by:_____ Permit Accepted by:_____

FIGURE 10-2

SITE MAP



10.5 MATERIAL SAFETY DATA SHEET (MSDS) REQUIREMENTS

Tetra Tech NUS personnel will provide MSDSs for all chemicals brought on-site. The contents of these documents will be reviewed by the SSO with the user(s) of the chemical substances prior to any actual use or application or the substances on-site. The MSDSs will be maintained in a central location (i.e., 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 Health and Safety Guidance Manual). 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 a cellular means will not be used.

The hand-held radios and cellular phones that will be used if permitted are as follows:

Motorola HT-1000	Power Output <5 watts
Cellular Phone	Power Output <2.5 watts

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 Tetra Tech NUS.
- Regulatory personnel (i.e., DOD, MDEQ, EPA, OSHA, etc.)
- Southern Division Navy personnel
- Other authorized visitors

All 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, all personnel who require access to Tetra Tech NUS 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, all site visitors wishing to observe operations in progress will be required to meet the minimum requirements as stipulated below.

- All site visitors will be routed to the FOL, who will sign them into the field logbook. Information to be recorded in the logbook will include the individuals name (proper identification required), who they represent, and the purpose for the visit. **The FOL is responsible for ensuring that site visitors are escorted at all times.**

- All 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 all Southern Division Navy Personnel), and medical surveillance as stipulated in Section 8.3, of this document. In addition, to enter the sites operational zones during planned activities, all visitors will be required to first go through site-specific training covering the topics stipulated in Section 8.2 of this HASP.

Once the site visitors have completed the above items they will be permitted to enter the site and applicable operational areas. All visitors are required to observe the protective equipment and site restrictions in effect at the work areas visited. Any and all 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 all 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

As 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. Tetra Tech NUS 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.

10.9 SANITATION AND BREAK AREAS

This section will address the following items:

- Toilets
- Potable water
- Showers and change rooms
- Break Areas

10.9.1 Toilets

One toilet will be provided for every 20 people. All toilets will be unisex and will have locking doors. The toilet provided will either be a chemical toilet and service provider or the flush toilet associated with a predetermined location.

10.9.2 Potable Water

Potable water as well as electrolyte balance sports drinks such as Gatorade will be provided to the field crews for fluid replacement. Storage and dispensing will proceed as follows:

- All containers will be clean and replenished daily.

- All containers will clearly marked as to their contents (Potable Water – Drinking Water Only; Gatorade, etc.).

- Dispensing locations will be placed in identified break areas within the support zone. The most likely location will be a break trailer. This will serve as an area for cooling or warming as well as an identified food and drink consumption area.

- If larger containers are used, dispensing cups will be provided.

- The coolers used for storage of potable drinks and cups will be stored in plastic bags away from potentially contaminating materials.

Fluid intake recommendations will be made based on the medical evaluations conducted at the end of the decontamination process.

10.9.3 Showers and Change Rooms

Based on this scope and duration of this project shower facilities and locker rooms will not be provided.

10.9.4 Break Areas

Suitable locations will be provided for field personnel for the following use:

- Break areas for food and drink consumption
- Areas suitable for warming and cooling regimens
- Areas suitable for Safety Meetings

This location will be either the project trailer, or its own separate trailer based on the crew size. This area will be climate control to provide suitable shelter to combat heat or cold stress.

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 (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry).
- Is not designed for continuous employee occupancy.

A Permit-Required Confined Space is one that:

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

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

12.0 MATERIALS AND DOCUMENTATION

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

- A complete copy of this HASP
- Health and Safety Guidance Manual
- Incident Reports
- Medical Data Sheets
- Material Safety Data Sheets for all chemicals brought on site, including 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 all 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 all site personnel. These documents should match all the listings on the chemical inventory
list for all substances employed on-site. It is acceptable to have these documents within a central folder and the chemical inventory as the table of contents.

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

Site Clearance (maintained) - This list is found within the training section of the HASP (See Figure 8-2). This list identifies all site personnel, dates of training (including site-specific training), and medical surveillance. The lists 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 all 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 injury or illness requiring medical attention to the medical facility. A copy of this sheet or a wallet card will be given to all personnel to be carried on their person.

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

Personnel Monitoring (maintained) - All results generated through personnel sampling (levels of airborne 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 Department of Transportation (DOT) placards and acceptable (Hazard Communication 29 CFR 1910.1200(f)) labels.

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

13.0 GLOSSARY

ACGIH	American Conference of Governmental Industrial Hygienists
APR	Air Purifying Respirators
AOC	Area of Concern
CERCLA	Comprehensive Environmental Response Compensation, and Liability Act
CFR	Code of Federal Regulations
CNS	Central Nervous System
CRZ	Contamination Reduction Zone
CTO	Contract Task Order
DOD	Department of Defense
DOT	Department of Transportation
DPT	Direct-Push Technology
EPA	Environmental Protection Agency
FDEP	Florida Department of Environmental Protection
FFA	Federal Facilities Agreement
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
HSM	Health and Safety Manager
IDW	Investigation-derived Waste
LEL/O_2	Lower Explosive Limit/Oxygen
MSDS	Material Safety Data Sheet
N/A	Not Available
NAS	Naval Air Station
NIOSH	National Institute Occupational Safety and Health
NPL	National Priorities List
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor)
PEL	Permissible Exposure Limit
PHSO	Project Health and Safety Officer
PID	Photo Ionization Detector
PM	Project Manager
PPE	Personal Protective Equipment
RIFS	Remedial Investigation and Feasibility Study

SAP	Sampling and Analysis Plan
SCBA	Self Contained Breathing Apparatus
SOPs	Standard Operating Procedures
SSO	Site Safety Officer
STEL	Short Term Exposure Limit
SVOC	Semi-volatile Organic Compounds
TOM	Task Order Manager
TPH	Total Petroleum Hydrocarbons
TtNUS	Tetra Tech NUS, Inc.
TWA	Time Weighted Average
USTs	Underground Storage Tanks
UV	Ultra Violet
VOCs	Volatile Organic Compounds

ATTACHMENT I

INJURY/ILLNESS PROCEDURE AND REPORT FORM

case no. _____

TETRA TECH NUS, INC.

INJURY/ILLNESS PROCEDURE
WORKER'S COMPENSATION PROGRAM

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

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

ADDITIONAL QUESTIONS REGARDING WORKER'S COMPENSATION:

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

case no. _____

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

WHO IS COVERED:

All employees of Tetra Tech, whether they are on a full-time, part-time or temporary status, working in an office or in the field, are entitled to worker's compensation benefits. All employees must follow the above injury/illness reporting procedures. Consultants, independent contractors, and employees of subcontractors are not covered by Tetra Tech's Worker's Compensation plan.

WHAT IS COVERED:

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

case no. _____

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

To: Corporate Health and Safety Manager
Human Resource Administrator

Prepared by: _____

Position: _____

Office: _____

Telephone: _____

Project Name: _____

Project No. _____

Information Regarding Injured or Ill Employee:

Name: _____ Office: _____

Home address: _____ Gender: M ☐ F ☐ No. of dependents: _____

_____ Marital status: _____

Home telephone: _____ Date of birth: _____

Occupation (regular job title): _____ Social Security No.: _____

Department: _____

Date of Accident: _____ **Time of Accident:** _____

Location of Accident Was place of accident or exposure on employer's premises Yes ☐ No ☐

Street address: _____

City, state, and zip code: _____

County: _____

Narrative Description of How Accident Occurred: (Be specific. Explain what the employee was doing and how the accident occurred.)

TETRA TECH NUS, INC.

INJURY/ILLNESS REPORT

Did employee die? Yes ☐ No ☐

Was employee performing regular job duties? Yes ☐ No ☐

Was safety equipment provided? Yes ☐ No ☐

Was safety equipment used? Yes ☐ No ☐

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

Witness(es):

Name:

Address:

Telephone:

Describe the Illness or Injury and Part of Body Affected:

Name the Object or Substance which Directly Injured the Employee:

Medical Treatment Required:

☐ No ☐ Yes ☐ First Aid Only

Physician's Name: _____

Address: _____

Hospital or Office Name: _____

Address: _____

_____

Telephone No.: _____

Lost Work Days:

☐ No. of Lost Work Days _____

Last Date Worked _____

Time Employee Left Work _____

Date Employee Returned to Work _____

☐ No. of Restricted Work Days _____

☐ None

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

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

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

Date of Report: _____ Time of Report: _____

	Printed Name	Signature	Telephone No.	Date
Project or Office Manager				
Site Safety Coordinator				
Injured Employee				

To be completed by Human Resources:

Date of hire: Hire date in current job:

Wage information: $_____ per _____ (hour, day, week, or month)

Position at time of hire:

Shift hours:

State in which employee was hired:

Status: ☐ Full-time ☐ Part-time Hours per week: _____ Days per week: _____

Temporary job end date:

To be completed during report to workers' compensation insurance carrier:

Date reported: Reported by:

TeleClaim phone number:

TeleClaim account number:

Location code:

Confirmation number:

Name of contact:

Field office of claims adjuster:

ATTACHMENT II

STANDARD OPERATING PROCEDURE
FOR
UTILITY LOCATING AND EXCAVATION CLEARANCE

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1.0 PURPOSE

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

The purpose of this procedure is to provide minimum requirements and technical guidelines regarding the appropriate procedures to be followed when performing subsurface and overhead utility locating services. It is the policy of Tetra Tech NUS, Inc. (TtNUS) to provide a safe and healthful work environment for the protection of our employees. The purpose of this Standard Operating Procedure (SOP) is to aid in achieving the objectives of the TtNUS Utility Locating and Clearance Policy. The TtNUS Utility Locating and Clearance Policy must be reviewed by anyone potentially involved with underground or overhead utility services.

2.0 SCOPE

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

3.0 GLOSSARY

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

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

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

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

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

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

4.0 RESPONSIBILITIES

Project Manager (PM)/Task Order Manager (TOM) - Responsible for ensuring that all field activities are conducted in accordance with this procedure and the TtNUS Utility Locating and Clearance Policy.

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

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

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

Site Personnel – Responsible for understanding and implementing this SOP and the TtNUS Utility Locating and Clearance Policy.

5.0 PROCEDURES

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

5.1 Buried Utilities

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

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

1. A comprehensive review must be made of any available property maps, blue lines, or as-builts prior to site activities. Interviews with local personnel familiar with the area should be performed to provide additional information concerning the location of potential underground utilities. Information regarding utility locations shall be added to project maps upon completion of this exercise.

2. A visual site inspection must be performed to compare the site plan information to actual field conditions. Any findings must be documented and the site plan/maps revised. The area(s) of proposed excavation or other subsurface activities must be marked at the site in white paint or pin flags to identify those locations of the proposed intrusive activities. The site inspection should focus on locating surface indications of potential underground utilities. Items of interest include the presence of nearby area lights, telephone service, drainage grates, fire hydrants, electrical service vaults/panels, asphalt/concrete scares and patches, and topographical depressions. Note the location of any emergency shut off switches. Any additional information regarding utility locations shall be added to project maps upon completion of this exercise and returned to the PM/TOM.

3. If the planned work is to be conducted on private property (e.g., military installations, manufacturing facilities, etc.) the FOL must identify and contact appropriate facility personnel (e.g., public works or facility engineering) before any intrusive work begins to inquire about (and comply with) property owner requirements. It is important to note that private property owners may require several days to several weeks advance notice prior to locating utilities.

4. If the work location is on public property, the state agency that performs utility clearances must be notified (see Attachment 1). State "one-call" services must be notified prior to commencing fieldwork per their requirements. Most one-call services require, by law, 48- to 72-hour advance notice prior to beginning any excavation. Such services typically assign a "ticket" number to the particular site. This ticket number must be recorded for future reference and is valid for a specific period of time, but may be extended by contacting the service again. The utility service will notify utility representatives who then mark their respective lines within the specified time frame. It should be noted that most military installations own their own utilities but may lease service and maintenance from area providers. Given this situation, "one call" systems may still be required to provide location services on military installations.

5. Utilities must be identified and their locations plainly marked using pin flags, spray paint, or other accepted means. The location of all utilities must be noted on a field sketch for future inclusion on project maps. Utility locations are to be identified using the following industry-standard color code scheme, unless the property owner or utility locator service uses a different color code:

white	excavation/subsurface investigation location
red	electrical
yellow	gas, oil, steam
orange	telephone, communications
blue	water, irrigation, slurry
green	sewer, drain

6. Where utility locations are not confirmed with a high degree of confidence through drawings, schematics, location services, etc., the work area must be thoroughly investigated prior to beginning the excavation. In these situations, utilities must be identified using such methods as passive and intrusive surveys, physical probing, or hand augering. Each method has advantages and disadvantages including complexity, applicability, and price. It also should be noted that in many states, initial excavation is required by hand to a specified depth.

7. At each location where trenching or excavating will occur using a backhoe or other heavy equipment, and where utility identifications and locations cannot be confirmed prior to groundbreaking, the soil must be probed with a hand auger or pole (tile probe) made of non-conductive material. If these efforts are not successful in clearing the excavation area of suspect utilities, hand shoveling must be performed for the perimeter of the intended excavation.

8. All utilities uncovered or undermined during excavation must be structurally supported to prevent potential damage. Unless necessary as an emergency corrective measure, TtNUS shall not make any repairs or modifications to existing utility lines without prior permission of the utility owner, property owner, and Corporate HSM. All repairs require that the line be locked-out/tagged-out prior to work.

5.2 Overhead Power Lines

If it is necessary to work within the minimum clearance distance of an overhead power line, the overhead line must be de-energized and grounded, or re-routed by the utility company or a registered electrician. If protective measures such as guarding, isolating, or insulating are provided, these precautions must be

adequate to prevent employees from contacting such lines directly with any part of their body or indirectly though conductive materials, tools, or equipment.

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

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

6.0 UNDERGROUND LOCATING TECHNIQUES

6.1 Geophysical Methods

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

Electromagnetic Induction

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

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

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

Magnetics

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

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

Ground Penetrating Radar

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

6.2 Passive Detection Surveys

Acoustic Surveys

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

Thermal Imaging

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

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

6.3 Intrusive Detection Surveys

Vacuum Excavation

Vacuum excavation is used to physically expose utility services. The process involves removing the surface material over approximately a 1' x 1' area at the site location. The air-vacuum process proceeds with the simultaneous action of compressed air-jets to loosen soil and vacuum extraction of the resulting debris. This process ensures the integrity of the utility line during the excavation process, as no hammers, blades, or heavy mechanical equipment comes into contact with the utility line, eliminating the risk of damage to utilities. The process continues until the utility is uncovered. Vacuum excavation can be used at the proposed site location to excavate below the "utility window" which is usually 8 feet.

Hand-auger Surveys

When the identification and location of underground utilities cannot be positively confirmed through document reviews and/or other methods, borings must be hand-augered for all locations where there is a potential to impact buried utilities. The minimum hand-auger depth that must be reached is to be determined considering the geographical location of the work site. This approach recognizes that the

placement of buried utilities is influenced by frost line depths that vary by geographical region. Attachment 2 presents frost line depths for the regions of the contiguous United States. At a minimum, hand-auger depths must be at least to the frost line depth plus two (2) feet, but never less than 4 feet below ground surface (bgs). For augering, the hole must be reamed by hand to at least the diameter of the drill rig auger or bit prior to drilling. For soil gas surveys, the survey probe shall be placed as close as possible to the cleared hand-auger. It is important to note that a post-hole digger must not be used in place of a hand-auger.

Tile Probe Surveys

For some soil types, site conditions, and excavation requirements, tile probes may be used instead of or in addition to hand-augers. Tile probes must be performed to the same depth requirements as hand-augers. Depending upon the site conditions and intended probe usage, tile probes should be made of non-conductive material such as fiberglass.

7.0 INTRUSIVE ACTIVITIES SUMMARY

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

1. Map and mark all subsurface locations and excavation boundaries using white paint or markers specified by the client or property owner.

2. Notify the property owner and/or client that the locations are marked. At this point, drawings of locations or excavation boundaries shall be provided to the property owner and/or client so they may initiate (if applicable) utility clearance.

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

3. Notify "One Call" service. If possible, arrange for an appointment to show the One Call representative the subsurface locations or excavation boundaries in person. This will provide a better location designation to the utilities they represent. You should have additional drawings should you need to provide plot plans to the One Call service.

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

8.0 REFERENCES

TtNUS Utility Locating and Clearance Policy
TtNUS SOP GH-3.1; Resistivity and Electromagnetic Induction
TtNUS SOP GH-3.2; Magnetic and Metal Detection Surveys
TtNUS SOP GH-3.4; Ground-penetrating Radar Surveys

ATTACHMENT 1
LISTING OF UNDERGROUND UTILITY CLEARANCE RESOURCES

ALABAMA
Alabama Line Location (800) 292-8525

Tucson Blue Stake Center (800) 782-5348

Alaska
Locate Call Center of Alaska Inc (800) 478-3121

Arizona
Arizona Blue Stake Inc (800) 782-5348

Arkansas
Arkansas One Call System Inc. (800) 482-8998

California
Underground Service Alert North (800) 227-2600

Underground Service Alert South (800) 227-2600

Colorado
Utility Notification Center of Colorado
(800) 922-1987

Connecticut
Call Before You Dig (800) 922-4455

Delaware
Miss Utility of Delmarva
(800) 282-8555

District of Columbia
Miss Utility (800) 257-7777

Florida
Call Sunshine (800) 432-4770

Georgia
Utilities Protection Center Inc.
(800) 282-7411

Idaho
Palouse Empire Underground Coordinating Council
(800) 882-1974

Utilities Underground Location Center
(800) 424-5555

Kootenai Country Utility Coordinating Council
(800) 428-4950

Shoshone County One Call (800) 398-3285

Dig Line (800) 342-1585

One Call Concepts (800) 626-4950

Illinois
Julie Inc. (800) 892-0123

Digger (Chicago Utility Alert Network)
(312) 744-7000

Indiana
Indiana Underground Plant Protection Services
(800) 382-5544

Iowa
Underground Plant Location Service Inc
(800) 292-8989

Kansas
Kansas One-Call Center (800) 344-7233

Kentucky
Kentucky Underground Protection Inc.
(800) 752-6007

Louisiana
Louisiana One Call (800) 272-3020

Maine
Dig Safe – Maine (800) 225-4977

Maryland
Miss Utility (800) 257-777

Miss Utility of Delmarva (800) 282-8555

Massachusetts
Dig Safe – Massachusetts (800) 322-4844

Michigan
Miss Dig System (800) 482-7171

Minnesota
Gopher State One Call (800) 252-1166

Mississippi
Mississippi One-Call System Inc. (800) 227-6477

Missouri
Missouri One Call System Inc (800) 344-7483

Montana
Utilities Underground Location Center
(800) 424-5555

Montana One Call Center (800) 551-8344

Nebraska
Diggers Hotline of Nebraska (800) 331-5666

Nevada
Underground Service Alert North (800) 227-2600

New Hampshire
Dig Safe – New Hampshire (800) 225-4977

New Jersey
New Jersey One Call (800) 272-1000

New Mexico
New Mexico One Call System Inc
(800) 321-ALERT

Las Cruces-Dona Utility Council (505) 526-0400

New York
Underground Facilities Protection Organization
(800) 962-7962

New York City: Long Island One Call Center
(800) 272-4480

North Carolina
The North Carolina One-Call Center Inc.
(800) 632-4949

North Dakota
Utilities Underground Location Center
(800) 795-0555

Ohio
Ohio Utilities Protection Service
(800) 362-2764

Oil & Gas Producers Underground Protection Service
(800) 925-0988

Oklahoma
Call Okie (800) 522-6543

Oregon
Utilities Underground Location Center
(800) 424-5555

Douglas Utilities Coordinating Council
(503) 673-6676

Josephine Utilities Coordinating Council
(503) 476-6676

Rogue Basin Utility Coordinating Council
(503) 779-6676

Utilities Notification Center
(800) 332-2344

Pennsylvania
Pennsylvania One Call System Inc
(800) 242-1776

Rhode Island
Dig Safe – Rhode Island (800) 225-4977

South Carolina
Palmetto Utility Protection Service Inc
(800) 922-0983

South Dakota
South Dakota One Call (800) 781-7474

Tennessee
Tennessee One-Call System (800) 351-1111

Texas
Texas One Call System (800) 245-4545

Texas Excavation Safety System (800) 344-8377

Lone Star Notification Center (800) 669-8344

Utah
Blue Stakes Location Center (800) 662-4111

Vermont
Dig Safe – Vermont (800) 225-4977

Virginia
Miss Utility of Virginia (800) 552-7001

Miss Utility (800) 257-7777

Miss Utility of Delmarva (800) 441-8355

Washington
Utilities Underground Location Center
(800) 424-5555

Grays Harbor & Pacific County
Utility Coordinating Council
(206) 535-3550

Utilities County of Cowlitz County
(360) 425-2506

Chelan-Douglas Utilities Coordinating Council
(509) 663-6111

Upper Yakima County
Underground Utilities Council
(800) 553-4344

Inland Empire Utility Coordinating Council
(509) 456-8000

Palouse Empire Utilities Coordinating Council
(800) 822-1974

Utilities Notification Center (800) 332-2344

West Virginia
Miss Utility of West Virginia Inc (800) 245-4848

Wisconsin
Diggers Hotline Inc (800) 242-8511

Wyoming
West Park Utility Coordinating Council
(307) 587-4800

Call-In Dig-In Safety Council (800) 300-9811

Fremont County Utility Coordinating Council
(800) 489-8023

Central Wyoming Utilities Coordinating Council
(800) 759-8035

Southwest Wyoming One Call (307) 362-8888

Carbon County Utility
Utility Coordinating Council (307) 324-6666

Albany County Utility Coordinating Council
(307) 742-3615

Southeast Wyoming Utilities Coordinating Council
(307) 638-6666

Wyoming One-Call
(800) 348-1030

Utilities Underground Location Center
(800) 454-5555

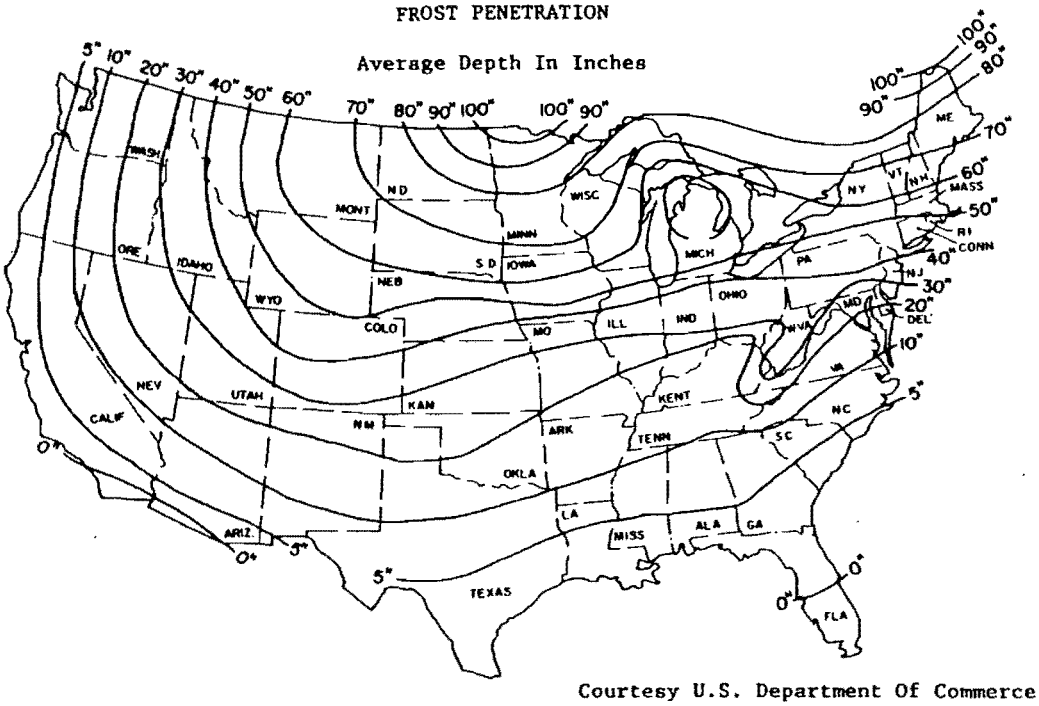
Converse County Utility Coordination Council
(800) 562-5561

ATTACHMENT 2

FROST LINE PENETRATION DEPTHS BY GEOGRAPHIC LOCATION

FROST PENETRATION

Average Depth In Inches



Courtesy U.S. Department Of Commerce

ATTACHMENT 3
UTILITY CLEARANCE FORM

Client: _____ Project Name: _____

Project No.: _____ Completed By: _____

Location Name: _____ Work Date: _____

Excavation Method/Overhead Equipment: _____

1. Underground Utilities — Circle One

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

2. Overhead Utilities — Present Absent

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

3. Notes:

_____

_____

_____

Approval:

_____ _____

Site Manager/Field Operations Leader Date

c: PM/Project File
Program File

ATTACHMENT III

EQUIPMENT INSPECTION CHECKLIST

EQUIPMENT INSPECTION FOR DRILL RIGS

COMPANY:_____ **UNIT NO.**_____

FREQUENCY: Inspect at the initiation of the project, after repairs, once every 10-day shift.

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

(e.g., **Drill Rigs** Hollow Stem, Mud Rotary, Direct Push)

	Good	Need Repair	N/A
Emergency Stop Devices (At points of operation)	☐	☐	☐
Tires (Tread) or tracks	☐	☐	☐
Hoses and belts	☐	☐	☐
Cab, mirrors, safety glass	☐	☐	☐
- Turn signals, lights, brake lights, etc. (front/rear) for equipment approved for highway use?	☐	☐	☐
- Is the equipment equipped with audible back-up alarms and back-up lights?	☐	☐	☐
Horn and gauges	☐	☐	☐
Brake condition (dynamic, park, etc.)	☐	☐	☐
Fire extinguisher (Type/Rating -_____)	☐	☐	☐
Fluid Levels:			
- Engine oil	☐	☐	☐
- Transmission fluid	☐	☐	☐
- Brake fluid	☐	☐	☐
- Cooling system fluid	☐	☐	☐
- Windshield wipers	☐	☐	☐
- Hydraulic oil	☐	☐	☐
Oil leak/lube	☐	☐	☐
Coupling devices and connectors	☐	☐	☐
Exhaust system	☐	☐	☐
Mast condition (Mast Height_____)	☐	☐	☐
Access-ways: Frame, hand holds, ladders, walkways (non-slip surfaces), guardrails?	☐	☐	☐
Steering (standard and emergency)	☐	☐	☐
Power cable and/or hoist cable	☐	☐	☐
➢ Hooks			
- Safety Latch	☐	☐	☐
- Wear in excess of 10% original dimension	☐	☐	☐
- A bend or twist exceeding 10% from the plane of an unbent hook	☐	☐	☐
- Increase in throat opening exceeding 15% from new condition	☐	☐	☐
- Excessive nicks and/or gouges	☐	☐	☐

- Wire Rope (Hoist Mechanism)
  - Reduction in Rope diameter (5/16 wire rope>1/64 reduction nominal size -replace) ☐ ☐ ☐
    (3/8 to 1/2 wire rope>1/32 reduction nominal size-replace)
    (9/16 to 3/4 wire rope>3/64 reduction nominal size-replace)
  - Number of broken wires (12 randomly broken wires in one rope lay) ☐ ☐ ☐
    (4 broken wires in one strand)
  - Number of wire rope wraps left on the Running Drum at nominal use (≥3 required) ☐ ☐ ☐
  - Lead (primary) sheave is centered on the running drum ☐ ☐ ☐
  - Lubrication of wire rope (adequate?) ☐ ☐ ☐

	Good	Needs Repaired	N/A
- Number of U-Type (Crosby) Clips (5/16 – 5/8 = 3 clips minimum) (3/4 – 1 inch = 4 clips minimum) (1 1/8 – 1 3/8 inch = 5 clips minimum)	☐	☐	☐
➢ Kinks, bends – Flattened to > 50% diameter	☐	☐	☐

- Hemp/Fiber rope (Cathead/Split Spoon Hammer)
  - Minimum ¾;maximum 1inch rope diameter (Inspect for physical damage) ☐ ☐ ☐
  - Rope to hammer is securely fastened ☐ ☐ ☐

Safety Guards:

	Yes	No
Around rotating apparatus (belts, pulleys, sprockets, spindles, drums, flywheels, chains) all points of operations protected from accidental contact?_____	☐	☐
Hot pipes and surfaces exposed to accidental contact?_____	☐	☐
All emergency shutoffs have been identified and communicated to the field crew?_____	☐	☐
Are any structural members bent, rusted, or otherwise show signs of damage?_____	☐	☐
Are fueling cans used with this equipment approved type safety cans?_____	☐	☐
Have the attachments designed for use (as per manufacturer's recommendation) with this equipment been inspected and are considered suitable for use?_____	☐	☐

Cleanliness:

Overall condition (was the decontamination performed prior to arrival on-site considered acceptable)?_____

_____

Where was this equipment used prior to its arrival on site?_____

Site Contaminants of concern at the previous site?_____

Inside debris (coffee cups, soda cans, tools and equipment) blocking free access to foot controls?_____

Flammable solvents stored in the operators cab?_____

Operator Qualifications (as applicable for all heavy equipment):

Does the operator have proper licensing where applicable, (e.g., CDL)?_____

Does the operator, understand the equipment's operating instructions?_____

Is the operator experienced with this equipment? _____

Is the operator 21 years of age or more?_____

ADDITIONAL INSPECTION REQUIRED PRIOR TO USE ON-SITE

	Yes	No
Does equipment emit noise levels above 90 decibels?	❒	❒
If so, has an 8-hour noise dosimetry test been performed?	❒	❒

Results of noise dosimetry:_____

Defects and repairs needed:_____

General Safety Condition: _____

Operator or mechanic signature:_____

Site Safety Officer Signature:_____

Approved for Use: ❒ Yes ❒ No

ATTACHMENT IV

SAFE WORK PERMITS

SAFE WORK PERMIT
DECONTAMINATION ACTIVITIES
NCBC GULFPORT, GULFPORT, MISSISSIPPI

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

SECTION I: General Job Scope

I. Work limited to the following (description, area, equipment used): Decontamination of sampling equipment and machinery (i.e., drill rigs, augers). Brushes and spray bottles will be used to decon small sampling equipment. Pressure washers or steam cleaning units will be used to decon the augers and drilling rig.

II. Required Monitoring Instrument(s): None

III. Field Crew: _____

IV. On-site Inspection conducted ☒ Yes ☐ No Initials of Inspector _____ _____

TtNUS

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

V. Protective equipment required

Level D ☒ Level B ☐
Level C ☐ Level A ☐
Detailed on Reverse

Respiratory equipment required

Full face APR	☐	Escape Pack	☐
Half face APR	☐	SCBA	☐
SKA-PAC SAR	☐	Bottle Trailer	☐
Skid Rig	☐	None	☒

Modifications/Exceptions: When using pressure washers, steam cleaners field crews will wear hearing protection, and face shields.

VI.

Chemicals of Concern	Action Level(s)	Response Measures
Benzene, DDT, Dioxin,	visible dust >2 mg/m^3	Dust Suppression/Area Wetting.
Herbicide Orange; Solvents	VOCs >10 ppm sustained	Evacuate area only investigate
Paints and Paint Thinners		when safe levels returned.
Decontamination Solvent		Per MSDS.

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	☐ Yes	☒ No
Splash Shield	☒ Yes	☐ No	Barricades	☐ Yes	☒ No
Splash suits/coveralls	☒ Yes	☐ No	Gloves (Type - Nitrile)	☒ Yes	☐ No
Steel toe Work shoes or boots	☒ Yes	☐ No	Work/rest regimen	☐ Yes	☒ No
Chemical Resistant Boot Covers	☒ Yes	☐ No	Impermeable apron	☒ Yes	☐ No

Modifications/Exceptions: PVC rain suits or PE or PVC coated Tyvek for protection against splashes and overspray. Chemical resistant boot covers if excessive liquids are generated or to protected footwear. Hearing protection when operating the steam cleaner or pressure washer. Impermeable aprons are acceptable when cleaning sampling equipment instead of a splash suit.

SAFE WORK PERMIT

DECONTAMINATION ACTIVITIES

NCBC GULFPORT, GULFPORT, MISSISSIPPI

VIII. Procedure review with permit acceptors	Yes	NA		Yes	NA
Safety shower/eyewash (Location & Use)	☐	☐	Emergency alarms	☒	☐
Procedure for safe job completion	☐	☐	Evacuation routes	☐	☐
Contractor tools/equipment/PPE inspected	☐	☐	Assembly points	☐	☐

IX. Site Preparation	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☒
Vehicle and Foot Traffic Routes Cleared and Established	☐	☐	☐
Physical Hazards Barricaded and Isolated	☐	☐	☒
Emergency Equipment Staged	☐	☐	☐

X. Additional Permits required (Hot work, confined space entry, excavation etc.). ☐ Yes ☒ No

If yes, complete permit required or contact Health Sciences, Pittsburgh Office

XI. Special instructions, precautions: Chemical hazards with decontamination due to fluids such as isopropyl alcohol, etc. Site personnel will use PPE and prevent contact equipment. Refer to the manufacturer's MSDS regarding PPE, handling, storage, and first-aid measures related to decontamination fluids. For pressure washers or steam cleaners in excess of 3,000 psi use a fan tip of 25° or greater to control potential for water cuts. Inspect all hoses and fittings for structural integrity prior to use. Decontamination Pad construction – sloped a sufficient degree to allow collection at a sump away from the work area; constructed of 10-30 mil polyethylene sheeting should be covered in a light coating of sand if the surface becomes to slippery.

Permit Issued by:_____ Permit Accepted by:_____

SAFE WORK PERMIT
MOBILIZATION AND DEMOBILIZATION ACTIVITIES
NCBC GULFPORT, GULFPORT, MISSISSIPPI

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

SECTION I: General Job Scope

I. Work limited to the following (description, area, equipment used): Mobilization and demobilization activities.

II. Required Monitoring Instruments: None

III. Field Crew: _____

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____ _____

TtNUS

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

V. Protective equipment required

Level D ☒ Level B ☐
Level C ☐ Level A ☐
Detailed on Reverse

Respiratory equipment required

Full face APR	☐	Escape Pack	☐
Half face APR	☐	SCBA	☐
SKA-PAC SAR	☐	Bottle Trailer	☐
Skid Rig	☐	None	☒

Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, or coveralls, safety glasses and safety footwear. Hard hats and hearing protection will be worn when working near operating equipment

VI. Chemicals of Concern	Action Level(s)	Response Measures
None anticipated		

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	☐ Yes	☒ No
Splash Shield	☐ Yes	☒ No	Barricades	☐ Yes	☒ No
Splash suits/coveralls	☐ Yes	☒ No	Gloves (Type -)	☐ Yes	☒ No
Steel toe Work shoes or boots	☒ Yes	☐ No	Work/rest regimen	☐ Yes	☒ No

Modifications/Exceptions: Pant legs taped to work boots if in an area of heavy vegetation. Tyvek coverall may also be used to protect against natural hazards (e.g., ticks). If working in areas where snakes are a threat, wear

snake chaps to protect against bites. Area which are frequented by alligators should also take the necessary precautions listed in Section 6.3 of this HASP

VIII. Procedure review with permit acceptors	Yes	NA		Yes	NA
Safety shower/eyewash (Location & Use)	☐	☒	Emergency alarms	☒	☐
Procedure for safe job completion	☐	☒	Evacuation routes	☐	☐
Contractor tools/equipment/PPE inspected	☐	☐	Assembly points	☐	☐

IX. Site Preparation	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☒
Vehicle and Foot Traffic Routes Cleared and Established	☐	☐	☐
Physical Hazards Barricaded and Isolated	☐	☐	☐
Emergency Equipment Staged	☐	☐	☐

X. Additional Permits required (Hot work, confined space entry, excavation etc.). ☐ Yes ☒ No

If yes, complete permit required or contact Health Sciences, Pittsburgh Office

XI. Special instructions, precautions: Preview work locations to identify potential hazards (slips, trips, and falls, natural hazards, etc.) Avoid potential nesting areas. Wear light colored clothing so that ticks and other biting insects can be easily visible and can be removed. Inspect clothing and body for ticks. Minimize contact with potentially contaminated media. Suspend site activities in the event of inclement weather. Employ proper lifting techniques as described on Table 5-1 for this task.

Permit Issued by:_____ Permit Accepted by:_____

SAFE WORK PERMIT

MULTI-MEDIA SAMPLING

NCBC GULFPORT, GULFPORT, MISSISSIPPI

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

SECTION I: General Job Scope

I. Work limited to the following (description, area, equipment used): Multi media sampling including soils (surface and sub surface); sediments; groundwater, aquifer testing and IDW.

II. Required Monitoring Instrument(s): PID with 10.6 eV lamp or FID and Mini-Ram Dust Monitor, if necessary (See Table 5-1)

III. Field Crew: _____

IV. On-site Inspection conducted ☒ Yes ☐ No Initials of Inspector _____ _____

TtNUS

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

V. Protective equipment required

Level D ☒ Level B ☐

Level C ☐ Level A ☐

Detailed on Reverse

Respiratory equipment required

Full face APR	☐	Escape Pack	☐
Half face APR	☐	SCBA	☐
SKA-PAC SAR	☐	Bottle Trailer	☐
Skid Rig	☐	None	☒

Modifications/Exceptions: Minimum requirement are stated below. Upgrading to Level C is based on visible dust concentrations >2 mg/m3. Level C consists of full-face APR with organic vapor/HEPA cartridge for protection against airborne dust.

VI.

Chemicals of Concern	Action Level(s)	Response Measures
Benzene, DDT, Dioxin,	visible dust >2 mg/m^3	Dust Suppression/Area Wetting.
Herbicide Orange; Solvents	VOCs >10 ppm sustained	Evacuate area only investigate
Paints and Paint Thinners		when safe levels return.

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	☐ Yes	☐ No
Splash Shield	☐ Yes	☒ No	Barricades	☐ Yes	☒ No
Splash suits/coveralls	☐ Yes	☐ No	Gloves (Type - Nitrile)	☒ Yes	☐ No
Steel toe Work shoes or boots	☒ Yes	☐ No	Work/rest regimen	☐ Yes	☒ No
Chemical Resistant Boot Covers	☒ Yes	☐ No	Impermeable apron	☒ Yes	☐ No

Modifications/Exceptions: Tyvek coverall if there is a potential for soiling work clothes and PVC or PE coated Tyvek if saturation or work clothes may occur. Impermeable aprons may be used in lieu of the coveralls if it can

be demonstrated that it offers as much protection as the coveralls. This modification may be made to support measures against effects of heat stress.

VIII. Procedure review with permit acceptors	Yes	NA		Yes	NA
Safety shower/eyewash (Location & Use)	☐	☐	Emergency alarms	☒	☐
Procedure for safe job completion	☐	☐	Evacuation routes	☐	☐
Contractor tools/equipment/PPE inspected	☐	☐	Assembly points	☐	☐

IX. Site Preparation	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Cleared and Established	☐	☐	☐
Physical Hazards Barricaded and Isolated	☐	☐	☐
Emergency Equipment Staged	☐	☐	☐

X. Additional Permits required (Hot work, confined space entry, excavation etc.). ☐ Yes ☐ No

If yes, complete permit required or contact Health Sciences, Pittsburgh Office

XI. Special instructions, precautions: Avoid potential nesting areas. Snake chaps or leggings should be worn in areas prone to snakes. Remote sampling devices should be used for sample acquisition of surface waters and obstructed view areas due to potential for alligators and snakes. The SSO shall preview work areas for signs of habitation, nesting, or foraging in remote areas where sampling is to be conducted. Wear light colored clothing so that ticks and other biting insects can be easily visible and can be removed. Inspect clothing and body for ticks upon exiting wooded areas and high brush. Minimize contact with potentially contaminated media. Suspend site activities in the event of inclement weather. Use proper lifting techniques as described on Table 5-1 for mobilization/demobilization.

Permit Issued by:_____ Permit Accepted by:_____

SAFE WORK PERMIT

SOIL BORING AND SUBSURFACE SOIL SAMPLING OPERATIONS

NCBC GULFPORT, GULFPORT, MISSISSIPPI

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

SECTION I: General Job Scope

I. Work limited to the following (description, area, equipment used): Subsurface soil sample collected via direct push technology or hollow stem auger.

II. Required Monitoring Instruments: PID with 10.6 eV lamp or FID and Mini-Ram Dust Monitor, if necessary (See Table 5-1)

III. Field Crew: _____

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____ _____

TtNUS

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

V. Protective equipment required

Level D ☒ Level B ☐

Level C ☐ Level A ☐

Detailed on Reverse

Respiratory equipment required

Full face APR	☐	Escape Pack	☐
Half face APR	☐	SCBA	☐
SAR	☐	Bottle Trailer	☐
Skid Rig	☐	None	☒

Modifications/Exceptions: Minimum requirements stated below. Upgrade to Level C protection - full-face APR with organic vapor/HEPA cartridges if dust suppression is unsuccessful. This is not anticipated given the concentration of the contaminant in the soils.

VI. Chemicals of Concern	Action Level(s)	Response Measures
Benzene, DDT, Dioxin,	visible dust	Dust Suppression/Area Wetting.
Herbicide Orange; Solvents	VOCs >10 ppm sustained	Evacuate area only investigate
Paints and Paint Thinners		when safe levels return.

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	☐ Yes	☐ No
Splash Shield	☐ Yes	☒ No	Barricades	☐ Yes	☐ No
Splash suits/coveralls	☐ Yes	☒ No	Gloves (Type - Nitrile)	☒ Yes	☐ No
Steel toe Work shoes or boots	☒ Yes	☐ No	Work/rest regimen	☐ Yes	☒ No
Chemical Resistant Boot Covers	☒ Yes	☐ No	Impermeable apron	☒ Yes	☐ No

Modifications/Exceptions: Reflective vests for high traffic areas. Tyvek coverall if there is a potential for soiling work clothes. PVC or PE coated Tyvek, if saturation or work clothes may occur. The Driller and the Driller's

helper should wear impermeable aprons to prevent soiling of work clothes when handling auger flights against the body. This can be used if heat stress is an issue. Safety harnesses will be used for activities greater than 6 feet above ground surface without support of safety handrail.

VIII. Procedure review with permit acceptors	Yes	NA		Yes	NA
Safety shower/eyewash (Location & Use)	☐	☐	Emergency alarms	☒	☐
Procedure for safe job completion	☐	☐	Evacuation routes	☐	☐
Contractor tools/equipment/PPE inspected	☐	☐	Assembly points	☐	☐

IX. Site Preparation	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☐
Vehicle and Foot Traffic Routes Cleared and Established	☐	☐	☐
Physical Hazards Barricaded and Isolated	☐	☐	☐
Emergency Equipment Staged	☐	☐	☐

X. Additional Permits required (Utility Locating and Excavation Clearance – Attachment II)..... ☒ Yes ☐ No

If yes, complete permit required or contact Health Sciences, Pittsburgh Office

XI. Special instructions, precautions: Follow safe work practices specified in Section 5.0 of this HASP. Complete an Equipment Inspection Checklist for the Drill Rig upon arrival to the site, and then every 10 day shift thereafter or after major repairs. Test all emergency stop devices initially then periodically to insure operational status. Decontamination of equipment will consist of soap and water wash and rinse with the use of a pressure washer until visibly clean. Personnel decontamination will consist of vacuuming outer garments and soap and water wash and rinse of outer PPE and hands and face prior to breaks or meals.

Permit Issued by:_____ Permit Accepted by:_____

SAFE WORK PERMIT

GEOPHYSICAL AND GEOGRAPHICAL SURVEYING

NCBC GULFPORT, GULFPORT, MISSISSIPPI

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

SECTION I: General Job Scope

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

II. Required Monitoring Instruments: None

III. Field Crew: _____

IV. On-site Inspection conducted ☐ Yes ☐ No Initials of Inspector _____ _____

TtNUS

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

V. Protective equipment required

Level D ☒ Level B ☐

Level C ☐ Level A ☐

Detailed on Reverse

Respiratory equipment required

Full face APR	☐	Escape Pack	☐
Half face APR	☐	SCBA	☐
SAR	☐	Bottle Trailer	☐
Skid Rig	☐	None	☒

Modifications/Exceptions: Minimum requirements include sleeved shirt and long pants and safety footwear.(except for magnetometer, geophysical surveys) Safety glasses, hard hats, and hearing protection will be worn when working near operating equipment.

VI.

Chemicals of Concern	Action Level(s)	Response Measures
None anticipated given the	None	
nature of surveying activities		
and limited contact w/ media.		

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	☐ Yes	☒ No
Splash Shield	☐ Yes	☒ No	Barricades	☐ Yes	☒ No
Splash suits/coveralls	☐ Yes	☐ No	Gloves (Type - Work)	☒ Yes	☐ No
Steel toe Work shoes or boots	☐ Yes	☐ No	Work/rest regimen	☐ Yes	☒ No

Modifications/Exceptions: Pant legs are to taped to work boots to prevent entry under the clothing by ticks and other insects. Use repellants applied directly to the clothing at all entry points(pants to boots, shirt to pants, etc.) Tyvek coveralls may be used in heavy brush to protect against natural hazards (e.g., ticks) and also to make identification easier. If working in areas where snakes are a threat, wear snake chaps to protect against bites.

SAFE WORK PERMIT

GEOPHYSICAL AND GEOGRAPHICAL SURVEYING

NCBC GULFPORT, GULFPORT, MISSISSIPPI

VIII. Procedure review with permit acceptors	Yes	NA		Yes	NA
Safety shower/eyewash (Location & Use)	☐	☒	Emergency alarms	☒	☐
Procedure for safe job completion	☐	☒	Evacuation routes	☒	☐
Contractor tools/equipment/PPE inspected	☐	☒	Assembly points	☒	☐

IX. Site Preparation	Yes	No	NA
Utility Locating and Excavation Clearance completed	☐	☐	☒
Vehicle and Foot Traffic Routes Cleared and Established	☐	☐	☒
Physical Hazards Barricaded and Isolated	☐	☐	☒
Emergency Equipment Staged	☐	☐	☒

X. Additional Permits required (Hot work, confined space entry, excavation etc.). ☐ Yes ☒ No

If yes, complete permit required or contact Health Sciences, Pittsburgh Office

XI. Special instructions, precautions: Preview work locations to identify potential hazards (slips, trips, and falls, natural hazards, etc.) Avoid potential nesting areas. Wear light colored clothing so that ticks and other biting insects can be easily visible and can be removed. Decontamination is not required for this operation, it is however, required that persons perform a close body inspection upon exiting wooded or brush areas for ticks prior to entering vehicles and work trailers, etc.. Minimize contact with potentially contaminated media. Suspend site activities in the event of inclement weather. Inspect all hand tools to insure in good condition prior to use (i.e., cutting tools are sharp, handles are free from defects, etc.) Maintain a ten foot radius around anyone clearing brush using a brush hook or machete

Permit Issued by:_____ Permit Accepted by:_____

ATTACHMENT V

MEDICAL DATA SHEET

MEDICAL DATA SHEET

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

Project _____

Name _____ Home Telephone _____

Address _____

Age _____ Height _____ Weight _____

Name of Next Kin _____

Drug or other Allergies _____

Particular Sensitivities _____

Do You Wear Contacts? _____

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

_____

_____

What medications are you presently using? _____

_____

_____

Do you have any medical restrictions? _____

_____

_____

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

_____

_____

_____

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

_____ _____

Signature Date

ATTACHMENT VI

HEARING CONSERVATION PROGRAM

HEARING CONSERVATION

1.0 PURPOSE

To establish general and site-specific hearing conservation procedures and guidelines.

2.0 SCOPE

Applies to all hazardous waste and other field activities where exposure to high levels of noise may occur. This program is designed to comply with OSHA General Industry Standard 29 CFR 1910.95.

3.0 RESPONSIBILITIES

Project Health and Safety Officer (PHSO) - The PHSO shall ensure that hearing conservation measures are adequately addressed in the Site Specific Health and Safety Plan.

Site Safety Officer (SSO) - The SSO is responsible for establishing and implementing a hearing conservation program. The SSO also ensures that adequate procedures are followed to prevent excessive exposure of individuals to high levels of noise.

Project Manager (PM) - The PM will ensure that sufficient information has been provided to the PHSO to prepare adequate procedures for inclusion in the site-specific Health and Safety Plan (HASP). The PM is also ultimately responsible for the effective compliance with these requirements.

4.0 MONITORING AND ESTABLISHING HIGH-NOISE AREAS

4.1 The SSO, as necessary, will perform and initial noise survey on Tetra Tech NUS and Subcontractors operations and work areas by the use of a sound meter and/or dosimetry. All monitoring will be done in accordance with 29 CFR 1910.95. Areas and operations which are expected to reach or exceed 85 decibels (dBA) will be required to adhere to the requirements for this program.

4.2 The HASP will set policy on mandatory use of hearing protection in affected areas, and while performing certain operations. The FOL and/or SSO will notify all Tetra Tech NUS and Subcontractor personnel of high noise areas and operations prior to work initiation.

The FOL and/or the SSO will be responsible for implementation and enforcement of the site-specific Hearing Conservation elements.

4.3 The FOL and/or the SSO will post or otherwise identify areas of operations which exceed 85 dBA. If significant changes in noise levels occur (such as a shutdown in an operating unit, change in procedures), the noise levels shall be re-evaluated by the SSO to determine if hearing protection will be worn.

5.0 HEARING PROTECTION

Each employee will have the opportunity to choose from a variety of hearing protection devices. Hearing protectors shall be replaced as necessary. The SSO will evaluate the attenuation factors of hearing protection devices and will select appropriate types based on sound level monitoring or personal dosimetry.

6.0 TRAINING PROGRAM

The Health Sciences Department will institute and maintain an initial training program for new employees and provide an annual training program for employees who may be exposed to noise sources 85 dBA or greater. The annual training will be incorporated with the refresher health and safety training curricula. All affected employees will be involved in the program and their participation documented.

6.1 The training program shall include the effects of noise on hearing. It will also include the purpose of hearing protectors; the advantages, disadvantages, and attenuation factors of the various types. Instruction shall be given on issue points, selection, fitting, use and care of hearing protectors.

6.2 A copy of the OSHA Noise Standard and applicable informational and training material will be available to all employees.

7.0 RECORDKEEPING

Exposure measurements, related records will be kept at the site. Record retention will be done in accordance with the time periods stated in 29 CFR 1910.95 and 1910.20.

8.0 ATTACHMENTS

8.1 29 CFR 1910.95 Occupational Noise Exposure

8.1.1 Code of Federal Regulations, Subsection 1910.95

ATTACHMENT 8.1

29 CFR 1910.95 OCCUPATIONAL NOISE EXPOSURE

Site:		Type of Audio Monitoring Equipment:		Date:
Employee Name	Operation	Hearing Protection Type Attenuation Factor	Noise Levels Measured	Duration of Use

Forward completed table (with backup noise monitoring data) to the Manager, Health Sciences.

FR 5322, Feb. 10, 1984; 55 FR 32015, Aug. 6, 1990; 58 FR 35308, June 30, 1993]

§ 1910.95 Occupational noise exposure.

(a) Protection against the effects of noise exposure shall be provided when the sound levels exceed those shown in Table G-16 when measured on the A scale of a standard sound level meter at slow response. When noise levels are determined by octave band analysis, the equivalent A-weighted sound level may be determined as follows:

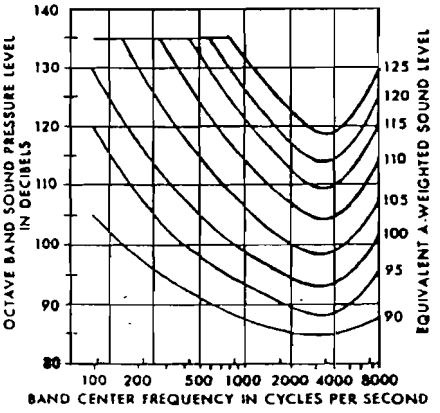


FIGURE G-9

Equivalent sound level contours. Octave band sound pressure levels may be converted to the equivalent A-weighted sound level by plotting them on this graph and noting the A-weighted sound level corresponding to the point of highest penetration into the sound level contours. This equivalent A-weighted sound level, which may differ from the actual A-weighted sound level of the noise, is used to determine exposure limits from Table 1.G-16.

(b)(1) When employees are subjected to sound exceeding those listed in Table G-16, feasible administrative or engineering controls shall be utilized. If such controls fail to reduce sound levels within the levels of Table G-16, personal protective equipment shall be provided and used to reduce sound levels within the levels of the table.

(2) If the variations in noise level involve maxima at intervals of 1 second or less, it is to be considered continuous.

TABLE G-16—PERMISSIBLE NOISE EXPOSURES [1]

Duration per day, hours	Sound level dBA slow response
8	90
6	92
4	95
3	97
2	100
1½	102
1	105
½	110
¼ or less	115

[1] When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect of each. If the sum of the following fractions: $C_1/T_1+C_2/T_2\ C_n/T_n$ exceeds unity, then, the mixed exposure should be considered to exceed the limit value. Cn indicates the total time of exposure at a specified noise level, and Tn indicates the total time of exposure permitted at that level.

Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level.

(c) *Hearing conservation program.* (1) The employer shall administer a continuing, effective hearing conservation program, as described in paragraphs (c) through (o) of this section, whenever employee noise exposures equal or exceed an 8-hour time-weighted average sound level (TWA) of 85 decibels measured on the A scale (slow response) or, equivalently, a dose of fifty percent. For purposes of the hearing conservation program, employee noise exposures shall be computed in accordance with appendix A and Table G-16a, and without regard to any attenuation provided by the use of personal protective equipment.

(2) For purposes of paragraphs (c) through (n) of this section, an 8-hour time-weighted average of 85 decibels or a dose of fifty percent shall also be referred to as the action level.

(d) *Monitoring.* (1) When information indicates that any employee's exposure may equal or exceed an 8-hour time-weighted average of 85 decibels, the employer shall develop and implement a monitoring program.

(i) The sampling strategy shall be designed to identify employees for inclusion in the hearing conservation program and to enable the proper selection of hearing protectors.

(ii) Where circumstances such as high worker mobility, significant variations in sound level, or a significant

component of impulse noise make area monitoring generally inappropriate, the employer shall use representative personal sampling to comply with the monitoring requirements of this paragraph unless the employer can show that area sampling produces equivalent results.

(2)(i) All continuous, intermittent and impulsive sound levels from 80 decibels to 130 decibels shall be integrated into the noise measurements.

(ii) Instruments used to measure employee noise exposure shall be calibrated to ensure measurement accuracy.

(3) Monitoring shall be repeated whenever a change in production, process, equipment or controls increases noise exposures to the extent that:

(i) Additional employees may be exposed at or above the action level; or

(ii) The attenuation provided by hearing protectors being used by employees may be rendered inadequate to meet the requirements of paragraph (j) of this section.

(e) *Employee notification.* The employer shall notify each employee exposed at or above an 8-hour time-weighted average of 85 decibels of the results of the monitoring.

(f) *Observation of monitoring.* The employer shall provide affected employees or their representatives with an opportunity to observe any noise measurements conducted pursuant to this section.

(g) *Audiometric testing program.* (1) The employer shall establish and maintain an audiometric testing program as provided in this paragraph by making audiometric testing available to all employees whose exposures equal or exceed an 8-hour time-weighted average of 85 decibels.

(2) The program shall be provided at no cost to employees.

(3) Audiometric tests shall be performed by a licensed or certified audiologist, otolaryngologist, or other physician, or by a technician who is certified by the Council of Accreditation in Occupational Hearing Conservation, or who has satisfactorily demonstrated competence in administering audiometric examinations, obtaining valid audiograms, and properly using, maintaining and checking calibration and proper functioning of the audiometers being used. A technician who operates microprocessor audiometers does not need to be certified. A technician who performs audiometric tests must be responsible to an audiologist, otolaryngologist or physician.

(4) All audiograms obtained pursuant to this section shall meet the requirements of Appendix C: *Audiometric Measuring Instruments.*

(5) *Baseline audiogram.* (i) Within 6 months of an employee's first exposure at or above the action level, the employer shall establish a valid baseline audiogram against which subsequent audiograms can be compared.

(ii) *Mobile test van exception.* Where mobile test vans are used to meet the audiometric testing obligation, the employer shall obtain a valid baseline audiogram within 1 year of an employee's first exposure at or above the action level. Where baseline audiograms are obtained more than 6 months after the employee's first exposure at or above the action level, employees shall wearing hearing protectors for any period exceeding six months after first exposure until the baseline audiogram is obtained.

(iii) Testing to establish a baseline audiogram shall be preceded by at least 14 hours without exposure to workplace noise. Hearing protectors may be used as a substitute for the requirement that baseline audiograms be preceded by 14 hours without exposure to workplace noise.

(iv) The employer shall notify employees of the need to avoid high levels of non-occupational noise exposure during the 14-hour period immediately preceding the audiometric examination.

(6) *Annual audiogram.* At least annually after obtaining the baseline audiogram, the employer shall obtain a new audiogram for each employee exposed at or above an 8-hour time-weighted average of 85 decibels.

(7) *Evaluation of audiogram.* (i) Each employee's annual audiogram shall be compared to that employee's baseline audiogram to determine if the audiogram is valid and if a standard threshold shift as defined in paragraph (g)(10) of this section has oc-

curred. This comparison may be done by a technician.

(ii) If the annual audiogram shows that an employee has suffered a standard threshold shift, the employer may obtain a retest within 30 days and consider the results of the retest as the annual audiogram.

(iii) The audiologist, otolaryngologist, or physician shall review problem audiograms and shall determine whether there is a need for further evaluation. The employer shall provide to the person performing this evaluation the following information:

(A) A copy of the requirements for hearing conservation as set forth in paragraphs (c) through (n) of this section;

(B) The baseline audiogram and most recent audiogram of the employee to be evaluated;

(C) Measurements of background sound pressure levels in the audiometric test room as required in Appendix D: Audiometric Test Rooms.

(D) Records of audiometer calibrations required by paragraph (h)(5) of this section.

(8) *Follow-up procedures.* (i) If a comparison of the annual audiogram to the baseline audiogram indicates a standard threshold shift as defined in paragraph (g)(10) of this section has occurred, the employee shall be informed of this fact in writing, within 21 days of the determination.

(ii) Unless a physician determines that the standard threshold shift is not work related or aggravated by occupational noise exposure, the employer shall ensure that the following steps are taken when a standard threshold shift occurs:

(A) Employees not using hearing protectors shall be fitted with hearing protectors, trained in their use and care, and required to use them.

(B) Employees already using hearing protectors shall be refitted and retrained in the use of hearing protectors and provided with hearing protectors offering greater attenuation if necessary.

(C) The employee shall be referred for a clinical audiological evaluation or an otological examination, as appropriate, if additional testing is necessary or if the employer suspects that a medical pathology of the ear is caused or aggravated by the wearing of hearing protectors.

(D) The employee is informed of the need for an otological examination if a medical pathology of the ear that is unrelated to the use of hearing protectors is suspected.

(iii) If subsequent audiometric testing of an employee whose exposure to noise is less than an 8-hour TWA of 90 decibels indicates that a standard threshold shift is not persistent, the employer:

(A) Shall inform the employee of the new audiometric interpretation; and

(B) May discontinue the required use of hearing protectors for that employee.

(9) *Revised baseline.* An annual audiogram may be substituted for the baseline audiogram when, in the judgment of the audiologist, otolaryngologist or physician who is evaluating the audiogram:

(i) The standard threshold shift revealed by the audiogram is persistent; or

(ii) The hearing threshold shown in the annual audiogram indicates significant improvement over the baseline audiogram.

(10) *Standard threshold shift.* (i) As used in this section, a standard threshold shift is a change in hearing threshold relative to the baseline audiogram of an average of 10 dB or more at 2000, 3000, and 4000 Hz in either ear.

(ii) In determining whether a standard threshold shift has occurred, allowance may be made for the contribution of aging (presbycusis) to the change in hearing level by correcting the annual audiogram according to the procedure described in Appendix F: *Calculation and Application of Age Correction to Audiograms.*

(h) *Audiometric test requirements.* (1) Audiometric tests shall be pure tone, air conduction, hearing threshold examinations, with test frequencies including as a minimum 500, 1000, 2000, 3000, 4000, and 6000 Hz. Tests at each frequency shall be taken separately for each ear.

(2) Audiometric tests shall be conducted with audiometers (including microprocessor audiometers) that

meet the specifications of, and are maintained and used in accordance with, American National Standard Specification for Audiometers, S3.6-1969.

(3) Pulsed-tone and self-recording audiometers, if used, shall meet the requirements specified in Appendix C: *Audiometric Measuring Instruments.*

(4) Audiometric examinations shall be administered in a room meeting the requirements listed in Appendix D: *Audiometric Test Rooms.*

(5) *Audiometer calibration.* (i) The functional operation of the audiometer shall be checked before each day's use by testing a person with known, stable hearing thresholds, and by listening to the audiometer's output to make sure that the output is free from distorted or unwanted sounds. Deviations of 10 decibels or greater require an acoustic calibration.

(ii) Audiometer calibration shall be checked acoustically at least annually in accordance with Appendix E: *Acoustic Calibration of Audiometers.* Test frequencies below 500 Hz and above 6000 Hz may be omitted from this check. Deviations of 15 decibels or greater require an exhaustive calibration.

(iii) An exhaustive calibration shall be performed at least every two years in accordance with sections 4.1.2; 4.1.3.; 4.1.4.3; 4.2; 4.4.1; 4.4.2; 4.4.3; and 4.5 of the American National Standard Specification for Audiometers, S3.6-1969. Test frequencies below 500 Hz and above 6000 Hz may be omitted from this calibration.

(i) *Hearing protectors.* (1) Employers shall make hearing protectors available to all employees exposed to an 8-hour time-weighted average of 85 decibels or greater at no cost to the employees. Hearing protectors shall be replaced as necessary.

(2) Employers shall ensure that hearing protectors are worn:

(i) By an employee who is required by paragraph (b)(1) of this section to wear personal protective equipment; and

(ii) By any employee who is exposed to an 8-hour time-weighted average of 85 decibels or greater, and who:

(A) Has not yet had a baseline audiogram established pursuant to paragraph (g)(5)(ii); or

(B) Has experienced a standard threshold shift.

(3) Employees shall be given the opportunity to select their hearing protectors from a variety of suitable hearing protectors provided by the employer.

(4) The employer shall provide training in the use and care of all hearing protectors provided to employees.

(5) The employer shall ensure proper initial fitting and supervise the correct use of all hearing protectors.

(j) *Hearing protector attenuation.* (1) The employer shall evaluate hearing protector attenuation for the specific noise environments in which the protector will be used. The employer shall use one of the evaluation methods described in Appendix B: *Methods for Estimating the Adequacy of Hearing Protection Attenuation.*

(2) Hearing protectors must attenuate employee exposure at least to an 8-hour time-weighted average of 90 decibels as required by paragraph (b) of this section.

(3) For employees who have experienced a standard threshold shift, hearing protectors must attenuate employee exposure to an 8-hour time-weighted average of 85 decibels or below.

(4) The adequacy of hearing protector attenuation shall be re-evaluated whenever employee noise exposures increase to the extent that the hearing protectors provided may no longer provide adequate attenuation. The employer shall provide more effective hearing protectors where necessary.

(k) *Training program.* (1) The employer shall institute a training program for all employees who are exposed to noise at or above an 8-hour time-weighted average of 85 decibels, and shall ensure employee participation in such program.

(2) The training program shall be repeated annually for each employee included in the hearing conservation program. Information provided in the training program shall be updated to be consistent with changes in protective equipment and work processes.

(3) The employer shall ensure that each employee is informed of the following:

(i) The effects of noise on hearing;

(ii) The purpose of hearing protectors, the advantages, disadvantages, and attenuation of various types, and instructions on selection, fitting, use, and care; and

(iii) The purpose of audiometric testing, and an explanation of the test procedures.

(l) *Access to information and training materials.* (1) The employer shall make available to affected employees or their representatives copies of this standard and shall also post a copy in the workplace.

(2) The employer shall provide to affected employees any informational materials pertaining to the standard that are supplied to the employer by the Assistant Secretary.

(3) The employer shall provide, upon request, all materials related to the employer's training and education program pertaining to this standard to the Assistant Secretary and the Director.

(m) *Recordkeeping*—(1) *Exposure measurements.* The employer shall maintain an accurate record of all employee exposure measurements required by paragraph (d) of this section.

(2) *Audiometric tests.* (i) The employer shall retain all employee audiometric test records obtained pursuant to paragraph (g) of this section:

(ii) This record shall include:

(A) Name and job classification of the employee;

(B) Date of the audiogram;

(C) The examiner's name;

(D) Date of the last acoustic or exhaustive calibration of the audiometer; and

(E) Employee's most recent noise exposure assessment.

(F) The employer shall maintain accurate records of the measurements of the background sound pressure levels in audiometric test rooms.

(3) *Record retention.* The employer shall retain records required in this paragraph (m) for at least the following periods.

(i) Noise exposure measurement records shall be retained for two years.

(ii) Audiometric test records shall be retained for the duration of the affected employee's employment.

(4) *Access to records.* All records required by this section shall be provided upon request to employees, former employees, representatives designated by the individual employee, and the Assistant Secretary. The provisions of 29 CFR 1910.20 (a)-(e) and (g)-(i) apply to access to records under this section.

(5) *Transfer of records.* If the employer ceases to do business, the employer shall transfer to the successor employer all records required to be maintained by this section, and the successor employer shall retain them for the remainder of the period prescribed in paragraph (m) (3) of this section.

(n) *Appendices.* (1) Appendices A, B, C, D, and E to this section are incorporated as part of this section and the contents of these appendices are mandatory.

(2) Appendices F and G to this section are informational and are not intended to create any additional obligations not otherwise imposed or to detract from any existing obligations.

(o) *Exemptions.* Paragraphs (c) through (n) of this section shall not apply to employers engaged in oil and gas well drilling and servicing operations.

(p) *Startup date.* Baseline audiograms required by paragraph (g) of this section shall be completed by March 1, 1984.

(Approved by the Office of Management and Budget under control number 1218-0048)

APPENDIX A TO § 1910.95—NOISE EXPOSURE COMPUTATION

This Appendix is Mandatory

I. Computation of Employee Noise Exposure

(1) Noise dose is computed using Table G-16a as follows:

(i) When the sound level, L, is constant over the entire work shift, the noise dose, D, in percent, is given by: $D = 100\ C/T$ where C is the total length of the work day, in hours, and T is the reference duration corresponding to the measured sound level, L, as given in Table G-16a or by the formula shown as a footnote to that table.

(ii) When the workshift noise exposure is composed of two or more periods of noise at different levels, the total noise dose over the work day is given by:

$$D=100\ (C_1/T_1+C_2/T_2+\ldots+C_n/T_n),$$

where C_n indicates the total time of exposure at a specific noise level, and T_n indicates the reference duration for that level as given by Table G-16a.

(2) The eight-hour time-weighted average sound level (TWA), in decibels, may be computed from the dose, in percent, by means of the formula: $TWA=16.61\ \log_{10}\ (D/100)+90$. For an eight-hour workshift with the noise level constant over the entire shift, the TWA is equal to the measured sound level.

(3) A table relating dose and TWA is given in Section II.

TABLE G-16a

A-weighted sound level, L (decibel)	Reference duration, T (hour)
80	32
81	27.9
82	24.3
83	21.1
84	18.4
85	16
86	13.9
87	12.1
88	10.6
89	9.2
90	8
91	7.0
92	6.1
93	5.3
94	4.6
95	4
96	3.5
97	3.0
98	2.6
99	2.3
100	2
101	1.7
102	1.5
103	1.3
104	1.1
105	1
106	0.87
107	0.76
108	0.66
109	0.57
110	0.5
111	0.44
112	0.38
113	0.33
114	0.29
115	0.25
116	0.22
117	0.19
118	0.16
119	0.14
120	0.125
121	0.11
122	0.095
123	0.082

TABLE G-16a—Continued

A-weighted sound level, L (decibel)	Reference duration, T (hour)
124	0.072
125	0.063
126	0.054
127	0.047
128	0.041
129	0.036
130	0.031

In the above table the reference duration, T, is computed by

$$T = \frac{8}{2^{(L-90)/5}}$$

where L is the measured A-weighted sound level.

II. Conversion Between "Dose" and "8-Hour Time-Weighted Average" Sound Level

Compliance with paragraphs (c)-(r) of this regulation is determined by the amount of exposure to noise in the workplace. The amount of such exposure is usually measured with an audiodosimeter which gives a readout in terms of "dose." In order to better understand the requirements of the amendment, dosimeter readings can be converted to an "8-hour time-weighted average sound level." (TWA).

In order to convert the reading of a dosimeter into TWA, see Table A-1, below. This table applies to dosimeters that are set by the manufacturer to calculate dose or percent exposure according to the relationships in Table G-16a. So, for example, a dose of 91 percent over an eight hour day results in a TWA of 89.3 dB, and, a dose of 50 percent corresponds to a TWA of 85 dB.

If the dose as read on the dosimeter is less than or greater than the values found in Table A-1, the TWA may be calculated by using the formula: $TWA=16.61\ \log_{10}\ (D/100)+90$ where TWA=8-hour time-weighted average sound level and D=accumulated dose in percent exposure.

TABLE A-1—CONVERSION FROM "PERCENT NOISE EXPOSURE" OR "DOSE" TO "8-HOUR TIME-WEIGHTED AVERAGE SOUND LEVEL" (TWA)

Dose or percent noise exposure	TWA
10	73.4
15	76.3
20	78.4
25	80.0
30	81.3
35	82.4
40	83.4
45	84.2
50	85.0
55	85.7
60	86.3
65	86.9
70	87.4
75	87.9
80	88.4
81	88.5
82	88.6
83	88.7
84	88.7
85	88.8
86	88.9
87	89.0
88	89.1
89	89.2
90	89.2
91	89.3
92	89.4
93	89.5
94	89.6
95	89.6
96	89.7
97	89.8
98	89.9
99	89.9
100	90.0
101	90.1
102	90.1
103	90.2
104	90.3
105	90.4
106	90.4
107	90.5
108	90.6
109	90.6
110	90.7
111	90.8
112	90.8
113	90.9
114	90.9
115	91.1
116	91.1
117	91.1
118	91.2
119	91.3
120	91.3
125	91.6
130	91.9
135	92.2
140	92.4
145	92.7
150	92.9
155	93.2
160	93.4
165	93.6
170	93.8
175	94.0

TABLE A-1—CONVERSION FROM "PERCENT NOISE EXPOSURE" OR "DOSE" TO "8-HOUR TIME-WEIGHTED AVERAGE SOUND LEVEL" (TWA)—Continued

Dose or percent noise exposure	TWA
180	94.2
185	94.4
190	94.6
195	94.8
200	95.0
210	95.4
220	95.7
230	96.0
240	96.3
250	96.6
260	96.9
270	97.2
280	97.4
290	97.7
300	97.9
310	98.2
320	98.4
330	98.6
340	98.8
350	99.0
360	99.2
370	99.4
380	99.6
390	99.8
400	100.0
410	100.2
420	100.4
430	100.5
440	100.7
450	100.8
460	101.0
470	101.2
480	101.3
490	101.5
500	101.6
510	101.8
520	101.9
530	102.0
540	102.2
550	102.3
560	102.4
570	102.6
580	102.7
590	102.8
600	102.9
610	103.0
620	103.2
630	103.3
640	103.4
650	103.5
660	103.6
670	103.7
680	103.8
690	103.9
700	104.0
710	104.1
720	104.2
730	104.3
740	104.4
750	104.5
760	104.6
770	104.7
780	104.8
790	104.9
800	105.0
810	105.1

TABLE A-1—CONVERSION FROM "PERCENT NOISE EXPOSURE" OR "DOSE" TO "8-HOUR TIME-WEIGHTED AVERAGE SOUND LEVEL" (TWA)—Continued

Dose or percent noise exposure	TWA
820	105.2
830	105.3
840	105.4
850	105.4
860	105.5
870	105.6
880	105.7
890	105.8
900	105.8
910	105.9
920	106.0
930	106.1
940	106.2
950	106.2
960	106.3
970	106.4
980	106.5
990	106.5
999	106.6

APPENDIX B TO § 1910.95—METHODS FOR ESTIMATING THE ADEQUACY OF HEARING PROTECTOR ATTENUATION

This Appendix is Mandatory

For employees who have experienced a significant threshold shift, hearing protector attenuation must be sufficient to reduce employee exposure to a TWA of 85 dB. Employers must select one of the following methods by which to estimate the adequacy of hearing protector attenuation.

The most convenient method is the Noise Reduction Rating (NRR) developed by the Environmental Protection Agency (EPA). According to EPA regulation, the NRR must be shown on the hearing protector package. The NRR is then related to an individual worker's noise environment in order to assess the adequacy of the attenuation of a given hearing protector. This appendix describes four methods of using the NRR to determine whether a particular hearing protector provides adequate protection within a given exposure environment. Selection among the four procedures is dependent upon the employer's noise measuring instruments.

Instead of using the NRR, employers may evaluate the adequacy of hearing protector attenuation by using one of the three methods developed by the National Institute for Occupational Safety and Health (NIOSH), which are described in the "List of Personal Hearing Protectors and Attenuation Data," HEW Publication No. 76-120, 1975, pages 21-37. These methods are known as NIOSH methods #1, #2 and #3. The NRR described below is a simplification of NIOSH method #2. The most complex method is NIOSH method #1, which is probably the most accurate method since it uses the largest amount of spectral information from the individual employee's noise environment. As in the case of the NRR method described below, if one of the NIOSH methods is used, the selected method must be applied to an individual's noise environment to assess the adequacy of the attenuation. Employers should be careful to take a sufficient number of measurements in order to achieve a representative sample for each time segment.

NOTE: The employer must remember that calculated attenuation values reflect realistic values only to the extent that the protectors are properly fitted and worn.

When using the NRR to assess hearing protector adequacy, one of the following methods must be used:

(i) When using a dosimeter that is capable of C-weighted measurements:

(A) Obtain the employee's C-weighted dose for the entire workshift, and convert to TWA (see appendix A, II).

(B) Subtract the NRR from the C-weighted TWA to obtain the estimated A-weighted TWA under the ear protector.

(ii) When using a dosimeter that is not capable of C-weighted measurements, the following method may be used:

(A) Convert the A-weigh ed dose to TWA (see appendix A).

(B) Subtract 7 dB from the NRR.

(C) Subtract the remainder from the A-weighted TWA to obtain the estimated A-weighted TWA under the ear protector.

(iii) When using a sound level meter set to the A-weighting network:

(A) Obtain the employee's A-weighted TWA.

(B) Subtract 7 dB from the NRR, and subtract the remainder from the A-weighted TWA to obtain the estimated A-weighted TWA under the ear protector.

(iv) When using a sound level meter set on the C-weighting network:

(A) Obtain a representative sample of the C-weighted sound levels in the employee's environment.

(B) Subtract the NRR from the C-weighted average sound level to obtain the estimated A-weighted TWA under the ear protector.

(v) When using area monitoring procedures and a sound level meter set to the A-weighing network.

(A) Obtain a representative sound level for the area in question.

(B) Subtract 7 dB from the NRR and subtract the remainder from the A-weighted sound level for that area.

(vi) When using area monitoring procedures and a sound level meter set to the C-weighting network:

(A) Obtain a representative sound level for the area in question.

(B) Subtract the NRR from the C-weighted sound level for that area.

Appendix C to § 1910.95—Audiometric Measuring Instruments

This Appendix is Mandatory

1. In the event that pulsed-tone audiometers are used, they shall have a tone on-time of at least 200 milliseconds.

2. Self-recording audiometers shall comply with the following requirements:

(A) The chart upon which the audiogram is traced shall have lines at positions corresponding to all multiples of 10 dB hearing level within the intensity range spanned by the audiometer. The lines shall be equally spaced and shall be separated by at least ¼ inch. Additional increments are optional. The audiogram pen tracings shall not exceed 2 dB in width.

(B) It shall be possible to set the stylus manually at the 10-dB increment lines for calibration purposes.

(C) The slewing rate for the audiometer attenuator shall not be more than 6 dB/sec except that an initial slewing rate greater than 6 dB/sec is permitted at the beginning of each new test frequency, but only until the second subject response.

(D) The audiometer shall remain at each required test frequency for 30 seconds (± 3 seconds). The audiogram shall be clearly marked at each change of frequency and the actual frequency change of the audiometer shall not deviate from the frequency boundaries marked on the audiogram by more than ± 3 seconds.

(E) It must be possible at each test frequency to place a horizontal line segment parallel to the time axis on the audiogram, such that the audiometric tracing crosses the line segment at least six times at that test frequency. At each test frequency the threshold shall be the average of the midpoints of the tracing excursions.

Appendix D to § 1910.95—Audiometric Test Rooms

This Appendix is Mandatory

Rooms used for audiometric testing shall not have background sound pressure levels exceeding those in Table D-1 when measured by equipment conforming at least to the Type 2 requirements of American National Standard Specification for Sound Level Meters, S1.4-1971 (R1976), and to the Class II requirements of American National Standard Specification for Octave, Half-Octave, and Third-Octave Band Filter Sets, S1.11-1971 (R1976).

Table D-1—Maximum Allowable Octave-Band Sound Pressure Levels for Audiometric Test Rooms

Octave-band center frequency (Hz)	500	1000	2000	4000	8000
Sound pressure level (dB)	40	40	47	57	62

Appendix E to § 1910.95—Acoustic Calibration of Audiometers

This Appendix is Mandatory

Audiometer calibration shall be checked acoustically, at least annually, according to the procedures described in this appendix. The equipment necessary to perform these measurements is a sound level meter, octave-band filter set, and a National Bureau of Standards 9A coupler. In making these measurements, the accuracy of the calibrating equipment shall be sufficient to determine that the audiometer is within the tolerances permitted by American Standard Specification for Audiometers, S3.6-1969.

(1) Sound Pressure Output Check

A. Place the earphone coupler over the microphone of the sound level meter and place the earphone on the coupler.

B. Set the audiometer's hearing threshold level (HTL) dial to 70 dB.

C. Measure the sound pressure level of the tones at each test frequency from 500 Hz through 6000 Hz for each earphone.

D. At each frequency the readout on the sound level meter should correspond to the levels in Table E-1 or Table E-2, as appropriate, for the type of earphone, in the column entitled "sound level meter reading."

(2) Linearity Check

A. With the earphone in place, set the frequency to 1000 Hz and the HTL dial on the audiometer to 70 dB.

B. Measure the sound levels in the coupler at each 10-dB decrement from 70 dB to 10 dB, noting the sound level meter reading at each setting.

C. For each 10-dB decrement on the audiometer the sound level meter should indicate a corresponding 10 dB decrease.

D. This measurement may be made electrically with a voltmeter connected to the earphone terminals.

(3) Tolerances

When any of the measured sound levels deviate from the levels in Table E-1 or Table E-2 by ± 3 dB at any test frequency between 500 and 3000 Hz, 4 dB at 4000 Hz, or 5 dB at 6000 Hz, an exhaustive calibra-

tion is advised. An exhaustive calibration is required if the deviations are greater than 15 dB or greater at any test frequency.

TABLE E-1—REFERENCE THRESHOLD LEVELS FOR TELEPHONICS—TDH-39 EARPHONES

Frequency, Hz	Reference threshold level for TDH-39 earphones, dB	Sound level meter reading, dB
500	11.5	81.5
1000	7	77
2000	9	79
3000	10	80
4000	9.5	79.5
6000	15 5	85.5

TABLE E-2—REFERENCE THRESHOLD LEVELS FOR TELEPHONICS—TDH-49 EARPHONES

Frequency, Hz	Reference threshold level for TDH-49 earphones, dB	Sound level meter reading, dB
500	13.5	83 5
1000	7.5	77.5
2000	11	81.0
3000	9 5	79 5
4000	10 5	80 5
6000	13.5	83 5

APPENDIX F TO § 1910.95—CALCULATIONS AND APPLICATION OF AGE CORRECTIONS TO AUDIOGRAMS

This Appendix Is Non-Mandatory

In determining whether a standard threshold shift has occurred, allowance may be made for the contribution of aging to the change in hearing level by adjusting the most recent audiogram. If the employer chooses to adjust the audiogram, the employer shall follow the procedure described below. This procedure and the age correction tables were developed by the National Institute for Occupational Safety and Health in the criteria document entitled "Criteria for a Recommended Standard . . . Occupational Exposure to Noise," ((HSM)-11001).

For each audiometric test frequency:

(i) Determine from Tables F-1 or F-2 the age correction values for the employee by:

(A) Finding the age at which the most recent audiogram was taken and recording the corresponding values of age corrections at 1000 Hz through 6000 Hz;

(B) Finding the age at which the baseline audiogram was taken and recording the corresponding values of age corrections at 1000 Hz through 6000 Hz.

(ii) Subtract the values found in step (i)(B) from the value found in step (i)(A).

(iii) The differences calculated in step (ii) represented that portion of the change in hearing that may be due to aging.

EXAMPLE: Employee is a 32-year-old male. The audiometric history for his right ear is shown in decibels below.

Employee's age	Audiometric test frequency (Hz)				
	1000	2000	3000	4000	6000
26	10	5	5	10	5
*27	0	0	0	5	5
28	0	0	0	10	5
29	5	0	5	15	5
30	0	5	10	20	10
31	5	10	20	15	15
*32	5	10	10	25	20

The audiogram at age 27 is considered the baseline since it shows the best hearing threshold levels. Asterisks have been used to identify the baseline and most recent audiogram. A threshold shift of 20 dB exists at 4000 Hz between the audiograms taken at ages 27 and 32.

(The threshold shift is computed by subtracting the hearing threshold at age 27, which was 5, from the hearing threshold at age 32, which is 25). A retest audiogram has confirmed this shift. The contribution of aging to this change in hearing may be estimated in the following manner:

Go to Table F-1 and find the age correction values (in dB) for 4000 Hz at age 27 and age 32.

	Frequency (Hz)				
	1000	2000	3000	4000	6000
Age 32	6	5	7	10	14
Age 27	5	4	6	7	11
Difference	1	1	1	3	3

The difference represents the amount of hearing loss that may be attributed to aging in the time period between the baseline audiogram and the most recent audiogram. In this example, the difference at 4000 Hz is 3 dB. This value is subtracted from the hearing level at 4000 Hz, which in the most recent audiogram is 25, yielding 22 after adjustment. Then the hearing threshold in the baseline audiogram at 4000 Hz (5) is subtracted from the adjusted annual audio-

gram hearing threshold at 4000 Hz (22). Thus the age-corrected threshold shift would be 17 dB (as opposed to a threshold shift of 20 dB without age correction).

TABLE F-1—AGE CORRECTION VALUES IN DECIBELS FOR MALES

Years	Audiometric Test Frequencies (Hz)				
	1000	2000	3000	4000	6000
20 or younger	5	3	4	5	8
21	5	3	4	5	8
22	5	3	4	5	8
23	5	3	4	6	9
24	5	3	5	6	9
25	5	3	5	7	10
26	5	4	5	7	10
27	5	4	6	7	11
28	6	4	6	8	11
29	6	4	6	8	12
30	6	4	6	9	12
31	6	4	7	9	13
32	6	5	7	10	14
33	6	5	7	10	14
34	6	5	8	11	15
35	7	5	8	11	15
36	7	5	9	12	16
37	7	6	9	12	17
38	7	6	9	13	17
39	7	6	10	14	18
40	7	6	10	14	19
41	7	6	10	14	20
42	8	7	11	16	20
43	8	7	12	16	21
44	8	7	12	17	22
45	8	7	13	18	23
46	8	8	13	19	24
47	8	8	14	19	24
48	9	8	14	20	25
49	9	9	15	21	26
50	9	9	16	22	27
51	9	9	16	23	28
52	9	10	17	24	29
53	9	10	18	25	30
54	10	10	18	26	31
55	10	11	19	27	32
56	10	11	20	28	34
57	10	11	21	29	35
58	10	12	22	31	36
59	11	12	22	32	37
60 or older	11	13	23	33	38

TABLE F-2—AGE CORRECTION VALUES IN DECIBELS FOR FEMALES

Years	Audiometric Test Frequencies (Hz)				
	1000	2000	3000	4000	6000
20 or younger	7	4	3	3	6
21	7	4	4	3	6
22	7	4	4	4	6
23	7	5	4	4	7
24	7	5	4	4	7
25	8	5	4	4	7
26	8	5	5	4	8
27	8	5	5	5	8
28	8	5	5	5	8
29	8	5	5	5	9

TABLE F-2—AGE CORRECTION VALUES IN DECIBELS FOR FEMALES—Continued

Years	Audiometric Test Frequencies (Hz)				
	1000	2000	3000	4000	6000
30	8	6	5	5	9
31	8	6	6	5	9
32	9	6	6	6	10
33	9	6	6	6	10
34	9	6	6	6	10
35	9	6	7	7	11
36	9	7	7	7	11
37	9	7	7	7	12
38	10	7	7	7	12
39	10	7	8	8	12
40	10	7	8	8	13
41	10	8	8	8	13
42	10	8	9	9	13
43	11	8	9	9	14
44	11	8	9	9	14
45	11	8	10	10	15
46	11	9	10	10	15
47	11	9	10	11	16
48	12	9	11	11	16
49	12	9	11	11	16
50	12	10	11	12	17
51	12	10	12	12	17
52	12	10	12	13	18
53	13	10	13	13	18
54	13	11	13	14	19
55	13	11	14	14	19
56	13	11	14	15	20
57	13	11	15	15	20
58	14	12	15	16	21
59	14	12	16	16	21
60 or older	14	12	16	17	22

APPENDIX G TO § 1910.95—MONITORING NOISE LEVELS NON-MANDATORY INFORMATIONAL APPENDIX

This appendix provides information to help employers comply with the noise monitoring obligations that are part of the hearing conservation amendment.

WHAT IS THE PURPOSE OF NOISE MONITORING?

This revised amendment requires that employees be placed in a hearing conservation program if they are exposed to average noise levels of 85 dB or greater during an 8 hour workday. In order to determine if exposures are at or above this level, it may be necessary to measure or monitor the actual noise levels in the workplace and to estimate the noise exposure or "dose" received by employees during the workday.

WHEN IS IT NECESSARY TO IMPLEMENT A NOISE MONITORING PROGRAM?

It is not necessary for every employer to measure workplace noise. Noise monitoring or measuring must be conducted only when exposures are at or above 85 dB. Factors which suggest that noise exposures in the workplace may be at this level include employee complaints about the loudness of noise, indications that employees are losing

their hearing, or noisy conditions which make normal conversation difficult. The employer should also consider any information available regarding noise emitted from specific machines. In addition, actual workplace noise measurements can suggest whether or not a monitoring program should be initiated.

HOW IS NOISE MEASURED?

Basically, there are two different instruments to measure noise exposures: the sound level meter and the dosimeter. A sound level meter is a device that measures the intensity of sound at a given moment. Since sound level meters provide a measure of sound intensity at only one point in time, it is generally necessary to take a number of measurements at different times during the day to estimate noise exposure over a workday. If noise levels fluctuate, the amount of time noise remains at each of the various measured levels must be determined.

To estimate employee noise exposures with a sound level meter it is also generally necessary to take several measurements at different locations within the workplace. After appropriate sound level meter readings are obtained, people sometimes draw "maps" of the sound levels within different areas of the workplace. By using a sound level "map" and information on employee locations throughout the day, estimates of individual exposure levels can be developed. This measurement method is generally referred to as *area* noise monitoring.

A dosimeter is like a sound level meter except that it stores sound level measurements and integrates these measurements over time, providing an average noise exposure reading for a given period of time, such as an 8-hour workday. With a dosimeter, a microphone is attached to the employee's clothing and the exposure measurement is simply read at the end of the desired time period. A reader may be used to read-out the dosimeter's measurements. Since the dosimeter is worn by the employee, it measures noise levels in those locations in which the employee travels. A sound level meter can also be positioned within the immediate vicinity of the exposed worker to obtain an individual exposure estimate. Such procedures are generally referred to as *personal* noise monitoring.

Area monitoring can be used to estimate noise exposure when the noise levels are relatively constant and employees are not mobile. In workplaces where employees move about in different areas or where the noise intensity tends to fluctuate over time, noise exposure is generally more accurately estimated by the personal monitoring approach.

In situations where personal monitoring is appropriate, proper positioning of the microphone is necessary to obtain accurate measurements. With a dosimeter, the microphone is generally located on the shoulder and remains in that position for the entire workday. With a sound level meter, the microphone is stationed near the employee's head, and the instrument is usually held by an individual who follows the employee as he or she moves about.

Manufacturer's instructions, contained in dosimeter and sound level meter operating manuals, should be followed for calibration and maintenance. To ensure accurate results, it is considered good professional practice to calibrate instruments before and after each use.

HOW OFTEN IS IT NECESSARY TO MONITOR NOISE LEVELS?

The amendment requires that when there are significant changes in machinery or production processes that may result in increased noise levels, remonitoring must be conducted to determine whether additional employees need to be included in the hearing conservation program. Many companies choose to remonitor periodically (once every year or two) to ensure that all exposed employees are included in their hearing conservation programs.

WHERE CAN EQUIPMENT AND TECHNICAL ADVICE BE OBTAINED?

Noise monitoring equipment may be either purchased or rented. Sound level meters cost about $500 to $1,000, while dosimeters range in price from about $750 to $1,500. Smaller companies may find it more economical to rent equipment rather than to purchase it. Names of equipment suppliers may be found in the telephone book (Yellow Pages) under headings such as: "Safety Equipment," "Industrial Hygiene," or "Engineers-Acoustical." In addition to providing information on obtaining noise monitoring equipment, many companies and individuals included under such listings can provide professional advice on how to conduct a valid noise monitoring program. Some audiological testing firms and industrial hygiene firms also provide noise monitoring services. Universities with audiology, industrial hygiene, or acoustical engineering departments may also provide information or may be able to help employers meet their obligations under this amendment.

Free, on-site assistance may be obtained from OSHA-supported state and private consultation organizations. These safety and health consultative entities generally give priority to the needs of small businesses. See the attached directory for a listing of organizations to contact for aid.

OSHA ONSITE CONSULTATION PROJECT DIRECTORY

State	Office and address	Contact
Alabama	Alabama Consultation Program, P.O. Box 6005, University, Alabama 35486.	(205) 348-7136, Mr. William Weems, Director.
Alaska	State of Alaska, Department of Labor, Occupational Safety & Health, 3301 Eagle St., Pouch 7-022, Anchorage, Alaska 99510.	(907) 276-5013, Mr Stan Godsoe, Project Manager (Air Mail).
American Samoa	Service not yet available.	
Arizona	Consultation and Training, Arizona Division of Occupational Safety and Health, P.O. Box 19070, 1624 W Adams, Phoenix, AZ 85005.	(602) 255-5795, Mr Thomas Ramsley, Manager
Arkansas	OSHA Consultation, Arkansas Department of Labor, 1022 High St., Little Rock, Ark. 72202.	(501) 371-2992, Mr. George Smith, Project Director
California	CAL/OSHA Consultation Service, 2nd Floor, 525 Golden Gate Avenue, San Francisco, CA 94102.	(415) 557-2870 Mr. Emmett Jones, Chief
Colorado	Occupational Safety & Health Section, Colorado State University, Institute of Rural Environmental Health, 110 Veterinary Science Building, Fort Collins, CO 80523.	(303) 491-6151, Dr. Roy M. Buchan, Project Director
Connecticut	Division of Occupational Safety & Health, Connecticut Department of Labor, 200 Folly Brook Boulevard, Wethersfield, Conn. 06109.	(203) 566-4550, Mr Leo Alix, Director
Delaware	Delaware Department of Labor, Division of Industrial Affairs, 820 North French Street, 6th Floor, Wilmington, DE 19801.	(302) 571-3908, Mr Bruno Salvadon, Director.
District of Columbia	Occupational Safety & Health Division, District of Columbia, Department Employment Services, Office of Labor Standards, 2900 Newton Street NE., Washington, DC 20018	(202) 832-1230 Mr. Lorenzo M White, Acting Associate Director.
Florida	Department of Labor & Employment Security, Bureau of Industrial Safety and Health, LaFayette Building, Room 204, 2551 Executive Center Circle West, Tallahassee, FL 32301.	(904) 488-3044, Mr John C. Glenn, Administrator
Georgia	Economic Development Division, Technology and Development Laboratory, Engineering Experiment Station, Georgia Institute of Technology, Atlanta, GA 30332.	(404) 894-3806, Mr William C. Howard, Assistant to Director, Mr. James Burson, Project Manager
Guam	Department of Labor, Government of Guam, 23548 Guam Main Facility, Agana, Guam 96921.	(671) 772-6291, Joe R San Agustin, Director
Hawaii	Education and Information Branch, Division of Occupational Safety and Health, Suite 910, 677 Ala Moana, Honolulu, HI 96813	(808) 548-2511, Mr Don Alper, Manager (Air Mail)
Idaho	OSHA Onsite Consultation Program, Boise State University, Community and Environmental Health, 1910 University Drive, Boise, ID 83725	(208) 385-3929, Dr Eldon Edmundson, Director
Illinois	Division of Industrial Services, Dept of Commerce and Community Affairs, 310 S Michigan Avenue, 10 Floor, Chicago, IL 60601.	(800) 972-4140/4216 (Toll-free in State), (312) 793-3270, Mr. Stan Czwinski, Assistant Director
Iowa	Bureau of Labor, 307 E Seventh Street, Des Moines, IA 50319	(515) 281-3606, Mr. Allen J. Meier, Commissioner.
Indiana	Bureau of Safety, Education and Training, Indiana Division of Labor, 1013 State Office Building, Indianapolis, IN 46204.	(317) 633-5845, Mr Harold Mills, Director.
Kansas	Kansas Dept. of Human Resources, 401 Topeka Ave., Topeka, KS 66603	(913) 296-4086, Mr Jerry Abbott, Secretary
Kentucky	Education and Training, Occupational Safety and Health, Kentucky Department of Labor, 127 Building, 127 South, Frankfort, KY 40601.	(502) 564-6895, Mr Larry Potter, Director
Louisiana	No services available as yet (Pending FY 83)	
Maine	Division of Industrial Safety, Maine Dept. of Labor, Labor Station 45, State Office Building, Augusta, ME 04333.	(207) 289-3331, Mr Lester Wood, Director
Maryland	Consultation Services, Division of Labor & Industry, 501 St. Paul Place, Baltimore, Maryland 21202	(301) 659-4210, Ms Ileana O'Brien, Project Manager, 7(c)(1) Agreement.
Massachusetts	Division of Industrial Safety, Massachusetts Department of Labor and Industries, 100 Cambridge Street, Boston, MA 02202	(617) 727-3567, Mr Edward Noseworthy, Project Director

OSHA ONSITE CONSULTATION PROJECT DIRECTORY—Continued

State	Office and address	Contact
Michigan (Health)	Special Programs Section, Division of Occupational Health, Michigan Dept. of Public Health, 3500 N. Logan, Lansing, MI 48909.	(517) 373-1410, Mr. Irving Davis, Chief.
Michigan (Safety)	Safety Education & Training Division Bureau of Safety and Regulation, Michigan Department of Labor, 7150 Harris Drive, Box 30015, Lansing, Michigan 48909.	(517) 322-1809, Mr Alan Harvie, Chief.
Minnesota	Training and Education Unit, Department of Labor and Industry, 5th Floor, 444 Lafayette Road, St. Paul, MN 55101.	(612) 296-2973, Mr. Timothy Tierney, Project Manager.
Mississippi	Division of Occupational Safety and Health, Mississippi State Board of Health, P.O. Box 1700, Jackson, MS 39205	(601) 982-6315, Mr. Henry L. Laird, Director.
Missouri	Missouri Department of Labor and Industrial Relations, 722 Jefferson Street, Jefferson City, MO 65101.	1-(800) 392-0208, (314) 751-3403, Ms. Paula Smith, Mr. Jim Brake
Montana	Montana Bureau of Safety & Health, Division of Workers Compensation, 815 Front Street, Helena, MT 59601.	(406) 449-3402, Mr Ed Gatzemeier, Chief.
Nebraska	Nebraska Department of Labor, State House Station, State Capitol, P.O. Box 94600, Lincoln, NB 68509.	475-8451 Ext. 258, Mr. Joseph Carroll, Commissioner
Nevada	Department of Occupational Safety and Health, Nevada Industrial Commission, 515 E. Musser Street, Carson City, NV 89714	(702) 885-5240, Mr Allen Traenkner, Director.
New Hampshire	For information contact	Office of Consultation Programs, Room N3472 200 Constitution Avenue, NW, Washington, DC 20210, Phone: (202) 523-8985
New Jersey	New Jersey Department of Labor and Industry Division of Work Place Standards, CN-054, Trenton, NJ 08625	(609) 292-2313, FTS-8-477-2313, Mr. William Clark, Assistant Commissioner.
New Mexico	OSHA Consultation, Health and Environment Department, Environmental Improvement Division, Occupational Health & Safety Section, 4215 Morrigomery Boulevard, NE., Albuquerque, NM 87109.	(505) 842-3387, Mr Albert M. Stevens, Project Manager
New York	Division of Safety and Health, New York State Department of Labor, 2 World Trade Center, Room 6995, New York, NY 10047	(212) 488-7746/7, Mr. Joseph Alleva, Project Manager, DOSH.
North Carolina	Consultation Services, North Carolina Department of Labor, 4 West Edenton Street, Raleigh, NC 27601.	(919) 733-4885, Mr David Pierce, Director.
North Dakota	Division of Environmental Research, Department of Health, Missouri Office Building, 1200 Missouri Avenue, Bismarck, ND 58505.	(701) 224-2348, Mr. Jay Crawford, Director
Ohio	Department of Industrial Relations, Division of Onsite Consultation, P.O. Box 825, 2323 5th Avenue, Columbus, OH 43216.	(800) 282-1425 (Toll-free in State), (614) 466-7485 Mr Andrew Doehrel, Project Manager
Oklahoma	OSHA Division, Oklahoma Department of Labor, State Capitol, Suite 118, Oklahoma City, OK 73105	(405) 521-2461, Mr Charles W. McGlon, Director
Oregon	Consultative Section, Department of Workers' Compensation, Accident Prevention Division, Room 102, Building 1, 2110 Front Street NE., Salem, OR 97310.	(503) 378-2890, Mr Jack Buckland, Supervisor
Pennsylvania	For information contact	Office of Consultation Programs, Room N3472, 200 Constitution Avenue NW, Washington, DC 20210, Phone: (202) 523-8985.
Puerto Rico	Occupational Safety & Health, Puerto Rico Department of Labor and Human Resources, 505 Munoz Rivera Ave., 21st Floor, Hato Rey, Puerto Rico 00919	(809) 754-2134, Mr John Cinque, Assistant Secretary, (Air Mail)
Rhode Island	Division of Occupational Health, Rhode Island Department of Health, The Cannon Building, 206 Health Department Building, Providence, RI 02903	(401) 277-2438, Mr James E Hickey, Chief

OSHA ONSITE CONSULTATION PROJECT DIRECTORY—Continued

State	Office and address	Contact
South Carolina	Consultation and Monitoring, South Carolina Department of Labor, P.O. Box 11329, Columbia, SC 29211.	(803) 758-8921, Mr. Robert Peck, Director, 7(c)(1), Project.
South Dakota	South Dakota Consultation Program, South Dakota State University, S.T.A.T.E.-Engineering Extension, 201 Pugsley Center-SDSO, Brookings, SD 57007.	(605) 688-4101, Mr. James Ceglian, Director
Tennessee	OSHA Consultative Services, Tennessee Department of Labor, 2nd Floor, 501 Union Building, Nashville, TN 37219.	(615) 741-2793, Mr L. H. Craig Director.
Texas	Division of Occupational Safety and State Safety Engineer, Texas Department of Health and Resources, 1100 West 49th Street, Austin, TX 78756.	(512) 458-7287, Mr. Walter G. Martin, P.E. Director.
Trust Territories	Service not yet available	
Utah	Utah Job Safety and Health Consultation Service, Suite 4004, Crane Building, 307 West 200 South, Salt Lake City, UT 84101.	(801) 533-7927/8/9, Mr. H. M. Bergeson, Project Director.
Vermont	Division of Occupational Safety and Health, Vermont Department of Labor and Industry, 118 State Street, Montpelier, VT 05602.	(802) 828-2765, Mr Robert Mcleod, Project Director.
Virginia	Department of Labor and Industry, P.O. Box 12064, 205 N. 4th Street, Richmond, Va. 23241.	(804) 786-5875, Mr Robert Beard, Commissioner.
Virgin Islands	Division of Occupational Safety and Health, Virgin Islands Department of Labor, Lagoon Street, Room 207, Frederiksted, Virgin Islands 00840.	(809) 772-1315, Mr. Louis Llanos, Deputy Director-DOSH.
Washington	Department of Labor and Industry, P.O. Box 207, Olympia, WA 98504.	(206) 753-6500, Mr. James Sullivan, Assistant Director.
West Virginia	West Virginia Department of Labor, Room 451B, State Capitol, 1900 Washington Street, Charleston, WV 25305	FTS 8-885-7890, Mr Lawrence Barker, Commissioner.
Wisconsin (Health)	Section of Occupational Health, Department of Health and Social Services, P.O. Box 309, Madison, WI 53701	(608) 266-0417, Ms Patricia Natzke, Acting Chief.
Wisconsin (Safety)	Division of Safety and Buildings, Department of Industry, Labor and Human Relations, 1570 E. Moreland Blvd., Waukesha, WI 53186.	(414) 544-8686, Mr Richard Michalski, Supervisor.
Wyoming	Wyoming Occupational Health and Safety Department, 200 East 8th Avenue, Cheyenne, Wyo 82002.	(307) 777-7786, Mr Donald Owsley, Health and Safety Administrator

APPENDIX H TO § 1910.95—AVAILABILITY OF REFERENCED DOCUMENTS

Paragraphs (c) through (o) of 29 CFR 1910.95 and the accompanying appendices contain provisions which incorporate publications by reference. Generally, the publications provide criteria for instruments to be used in monitoring and audiometric testing. These criteria are intended to be mandatory when so indicated in the applicable paragraphs of § 1910.95 and appendices.

It should be noted that OSHA does not require that employers purchase a copy of the referenced publications. Employers, however, may desire to obtain a copy of the referenced publications for their own information.

The designation of the paragraph of the standard in which the referenced publications appear, the titles of the publications, and the availability of the publications are as follows:

Paragraph designation	Referenced publication	Available from—
Appendix B	"List of Personal Hearing Protectors and Attenuation Data," HEW Pub. No 76-120, 1975. NTIS-PB267461.	National Technical Information Service, Port Royal Road, Springfield, VA 22161
Appendix D	"Specification for Sound Level Meters," S1.4-1971 (R1976).	American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018
§ 1910.95(k)(2), appendix E	"Specifications for Audiometers," S3.6-1969	American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.

ATTACHMENT VII

FIRE EXTINGUISHER

USE AND INSPECTION

FIRE EXTINGUISHER

USE AND INSPECTION

Fire Extinguisher Use and Inspection procedures will be conducted in support of the activities to be conducted at NCBC Gulfport. The following text is intended to provide general instruction to the field personnel charged with this responsibility.

Fire Extinguisher Use

All personnel trained in incidental response measures may be required to use and operate a fire extinguisher in response to an incipient stage fire. Therefore, the following instruction is provided and will be conveyed to all field personnel as part of site-specific training.

To use a portable fire extinguisher, the user should be familiar with the operation of the specific fire extinguisher located in the workplace. The following procedure will properly extinguish a small fire.

1) IDENTIFY THE TYPE OF FIRE (CLASS A, B, C, D).

Note: Water and other extinguishing media, such as carbon dioxide and dry chemicals, are ineffective on metal fires.

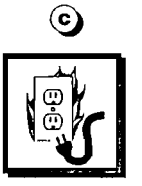
CLASSES OF FIRE/FIRE EXTINGUISHER IDENTIFICATION

Fire is divided into four classes for easy identification and extinguishment. The type of fuel or ignition source will determine the type of extinguishing medium required.

Class A - Ordinary combustibles (wood, paper, rubber, plastic, and cloth). Extinguishers suitable for Class A fires should be identified by a triangle containing the letter "A." If colored, the triangle is green.

Class B - Flammable liquids, gases, and greases. Extinguishers suitable for Class B fires should be identified by a square containing the letter "B." If colored, the square is red. <u>This type of extinguisher is effective on small petroleum product fires</u>.

Class C - Electrically energized systems. Extinguishers suitable for Class C fires should be identified by a circle containing the letter "C." If colored, the circle is blue.



Class D - Combustible metals (sodium, magnesium, phosphorus). Extinguishers suitable for fires involving metals should be identified by a five-pointed star containing the letter "D." If colored, the star is yellow.

NEW NFPA MARKINGS

Class A; B, C

Class B, C

Class A, B

Class A

Class A,B,C

Class B,C

Class A,B

Class A

These pictographs are designed so that their proper use may be determined at a glance. When an application is prohibited, the background is black and the slash is bright red. Otherwise, the background is light blue. Top row of picture symbols indicates an extinguisher for Class A:B:C fires, second row indicates an extinguisher for Class B:C fires; third row indicates an extinguisher for Class A:B fires; and bottom row indicates an extinguisher for Class A fires. (Compliments of NFPA.)

Multi-class (ABC) Fire extinguishers will be provided for use on site. If you will buy a Fire Extinguisher, this is the type recommended. Size or rating recommended is 2 1/2 to 5 lbs.

1. Determine whether the extinguisher is adequate for this fire.

Rating number – The rating number assigned to a fire extinguisher is based on the capabilities of that fire class, for example:

Class 5 A – Will provide extinguishing capabilities equal to that of 5 gallons of water.
Class 20 B - Will provide extinguishing capabilities equal to 20 square feet of flammable liquid burning.
Class C & D are not rated as to their limitations.

2. If adequate, hold the extinguisher upright and pull the ring pin.
3. Stand back 10 feet and aim at base of fire. Be careful not to spread burning material with pressurized extinguishing material.
4. Squeeze lever; sweep extinguisher in a side-to-side motion.

Portable Fire Extinguisher Placement/Mounting

Portable Fire Extinguishers will be placed/mounted in clear view in the areas where flammable materials are stored and/or dispensed. Mounting and placement of fire extinguishers will follow the following requirements

Fixed Locations (Flammable Storage)

- Extinguisher location will be marked by a red painted post to indicate extinguisher location
- The travel distance to access a fire extinguisher shall be no greater than 50 feet.
- The fire extinguisher will be mounted at a maximum height of four feet.

Mobile Locations (Drill Rigs, Support Vehicles)

All vehicles carrying fuel containers or used in the dispensing of fuel will carry at a minimum a 5 pound rated fire extinguisher.

Portable Fire Extinguisher Inspection

All fire extinguishers used in support of this field effort will be inspected on the following frequencies:

- A certified provider will perform maintenance checks of fire extinguishers at least once a year. A tag attached to the neck of the fire extinguisher will indicate documentation of the maintenance check.

- All fire extinguishers will have a current hydrostatic inspection. For the type of extinguishers selected for use at NCBC Gulfport hydrostatic inspections are required every 5 years.

- All fire extinguishers will be inspected monthly. The monthly inspection will cover the following
  - Are the fire extinguisher(s) placed in their designated location(s)?
  - Is the location conspicuously marked (Top 18 inches of the mounting pole to be painted red)?
  - Is the access impeding travel to the fire extinguisher blocked or restricted in any way?
  - Has the fire extinguisher been partially or completely discharged?
  - Is there signs of obvious physical damage?
  - Does the fire extinguisher shows sufficient pressure and are all of the tamper indicators are in place?

This inspection shall be documented on the attached tag provided by the maintenance/hydrostatic inspection service.

FIRE EXTINGUISHER CHECKLIST

NCBC GULFPORT

Project Name: NCBC Gulfport	**CTO 0143**	**Date of Inspection:**_____
Fire Extinguisher Identification Number:_____		**Fire Extinguisher Location:**

Measurement Criteria	**Yes**	**No**	**N/A**	**Needs Repaired**
Are the fire extinguisher(s) placed in their designated location(s)?				
Is the location conspicuously marked (Top 18 inches of the mounting pole to be painted red)?				
Is the access impeding travel to the fire extinguisher blocked or restricted in any way?				
Has the fire extinguisher been partially or completely discharged?				
Is there signs of obvious physical damage?				
Does the fire extinguisher shows sufficient pressure and are all of the tamper indicators are in place?				

Project Name: NCBC Gulfport	**CTO 0143**	**Date of Inspection:**_____
Fire Extinguisher Identification Number:_____		**Fire Extinguisher Location:**

Measurement Criteria	**Yes**	**No**	**N/A**	**Needs Repaired**
ARE THE FIRE EXTINGUISHER(S) PLACED IN THEIR DESIGNATED LOCATION(S)?				
Is the location conspicuously marked (Top 18 inches of the mounting pole to be painted red)?				
Is the access impeding travel to the fire extinguisher blocked or restricted in any way?				
Has the fire extinguisher been partially or completely discharged?				
Is there signs of obvious physical damage?				
Does the fire extinguisher shows sufficient pressure and are all of the tamper indicators are in place?				