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NCBC GULFPORT
5090.3a

FINAL WORK PLAN FOR REMEDIAL INVESTIGATION SITE 10 WITH TRANSMITTAL (MISSING APPENDIX B) NCBC GULFPORT MS
8/1/2003
TETRA TECH NUS

NCBC Gulfport Administrative Record
Document Index Number

39501 - IRP
03.04.10.0005

FINAL
WORK PLAN
for
REMEDIAL INVESTIGATION
at
SITE 10 - PARADE FIELD DITCH
at the
NAVAL CONSTRUCTION BATTALION CENTER GULFPORT
GULFPORT, MISSISSIPPI

Southern Division

Naval Facilities Engineering Command

Contract Number N62467-94-D-0888

Contract Task Order 0288

August 2003

01.01.10.0005

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TTNUS/TAL-03-068/1831-3.2

27 August, 2003

Project Number N1831

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Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Mr. Art Conrad (Code ES32)
Remedial Project Manager
2155 Eagle Drive
North Charleston, South Carolina 29419-9010

Reference: Clean Contract No. N62467-94-D0888
Contract Task Order No. 0288

Subject: **Final** Work Plan For Remedial Investigation At Site 10 – Parade Field Ditch

Dear Mr. Conrad:

Tetra Tech NUS, Inc. is pleased to submit the enclosed **Final** Work Plan For Remedial Investigation at Site 10 – Parade Field Ditch At The Naval Construction Battallion Center Gulfport, Mississippi. If you have any questions regarding this submittal or require further information, you may contact me at (850) 385-9899.

Sincerely,

Robert Fisher, P.G.
Task Order Manager

/bh

Enclosure

c: Gordon Crane
Bob Merrill, MDEQ
Debbie Wroblewski (Cover Letter Only)
Mark Perry(Unbound)

Rev. 1
08/27/03

FINAL
WORK PLAN
FOR
REMEDIAL INVESTIGATION
AT
SITE 10 – PARADE FIELD DITCH
AT
NAVAL CONSTRUCTION BATTALION CENTER
GULFPORT, MISSISSIPPI

RECEIVED
SEP - 8 2003

Submitted to:
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Submitted by:
Tetra Tech NUS, Inc.
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Pittsburgh, Pennsylvania 15220

CONTRACT NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0288

AUGUST 2003

PREPARED UNDER THE SUPERVISION OF:

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ACRONYMS AND ABBREVIATIONS

ABB	ABB Environmental Services, Inc.
ARAR	
BLS	Below Land Surface
CADD	Computer Automated Drafting and Design
COC	Chain-of-Custody
DOQQ	Digital Ortho Quarter Quads
DPT	Direct-Push Technology
DQO	Data Quality Objective
DVC	Data Validation Coordinator
EDB	Ethylene Dibromide
EDD	Electronic Data Deliverable
EGIS	Environmental Geographic Information System
EISOPQAM	Environmental Investigations Standard Operating Procedures and Quality Assurance Manual
FOL	Field Operations Leader
FS	Feasibility Study
GIS	Geographic Information System
HHRA	Human Health Risk Assessment
IDW	Investigation
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
PCB	Polychlorinated Biphenyl
QAPP	Quality Assurance Project Plan
RPM	Remedial Project Manager
SDG	Sample Delivery Group
SMC	Sample Management Coordinator
SOUTHDIV	Southern Division Naval Facilities Engineering Command
SWL	Static Water Level
TOM	Task Order Manager
TRG	Target Risk Goal
TSCA	Toxic Substances Control Act

TSSDS	Tri-Service Spatial Data Standards
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

1.0 INTRODUCTION

Tetra Tech NUS (TtNUS) under contract to the U. S. Department of the Navy, Southern Division, Naval Facilities Command (SOUTHNAVFACENGCOM), this Remedial Investigation (RI) 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 Contract Task Order (CTO) 288, requests that TtNUS conduct:

- Project Management
- Community Relations
- Work Plan
- Field Investigations
- Laboratory Analyses
- Data Management
- RI Report
- Feasibility Study
- Decision Documents

The primary objective of the work will be to support the preparation of a remedy that is protective of human health and the environment for contamination at Site 10. In order to achieve this primary objective, additional samples from various media will be collected and analyzed to fill data gaps from previous investigations. Previous investigations and removal actions at the site focused on PCB and transformer oil-related contaminants, therefore additional samples will be collected and analyzed to evaluate the nature and extent of other contaminants that may have been released at the site. Samples from various media will also be used to confirm the extent of PCB-related contamination previously documented at the site and evaluate the effect remedial actions have had on site conditions.

This Work Plan describes the field investigation to be performed onsite to determine the nature and extent of contaminants in sediment, surface water, soil and groundwater at Site 10. 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, Mississippi, in southeastern Harrison County, about 2 miles north of the Gulf of Mexico (Figure 2-1). NCBC Gulfport occupies approximately 1,100 acres and has an elevation averaging approximately 30 feet above sea level.

Surface and shallow subsurface soils in this area are primarily sand to sandy loam with minor clay horizons. The top of the local confining clay layer was encountered at a depth of approximately 23 feet at Site 10. The depth to groundwater at NCBC Gulfport ranges from approximately three to ten feet and is controlled primarily by surface topography.

Surface water in the vicinity of NCBC Gulfport is abundant. Average annual mean rainfall in the area is approximately 65 inches and individual storms are often intense and may produce large 24-hour precipitation totals. Storm water runoff is collected in a series of ditches and canals and directed off base.

NCBC Gulfport is an active military facility. Land uses on base include training activities, equipment and materials storage, maintenance areas, and residential housing for military personnel. Land use in the offbase areas adjacent ot NCBC Gulfport is primarily residential.

The Initial Assessment Study (IAS) for NCBC Gulfport, conducted in 1985, identified eight pad mounted transformers containing PCBs on the base (Envirodyne Engineers, Inc., 1985). A release from one of the transformers reportedly occurred in 1977.

2.1 SITE 10 DESCRIPTION

Site 10 is a short section of primary drainage ditch located in the south-central section of NCBC Gulfport adjacent to the Parade Field (Figure 2-2). It is bordered to the north by a parking area (the former location of the Building 295) and to the south by the Parade Field. The site topography is relatively flat. A sidewalk, leading south from the former location of Building 295, crosses the ditch via a footbridge and continues south to the Parade Field.

The drainage ditch at Site 10 is approximately 10 feet wide and approximately 4 feet deep. Stormwater runoff from the paved areas surrounding Site 10 flows into various tributary ditches which feed into the larger primary ditch. Surface water runoff in the primary ditch is conveyed to the west into Canal No. 1, which collects the runoff from Drainage Area 5 (Figure 2-2). Surface water in Canal No. 1 flows to the north and eventually leaves the NCBC Gulfport at Outfall 1, located at 28th Street.

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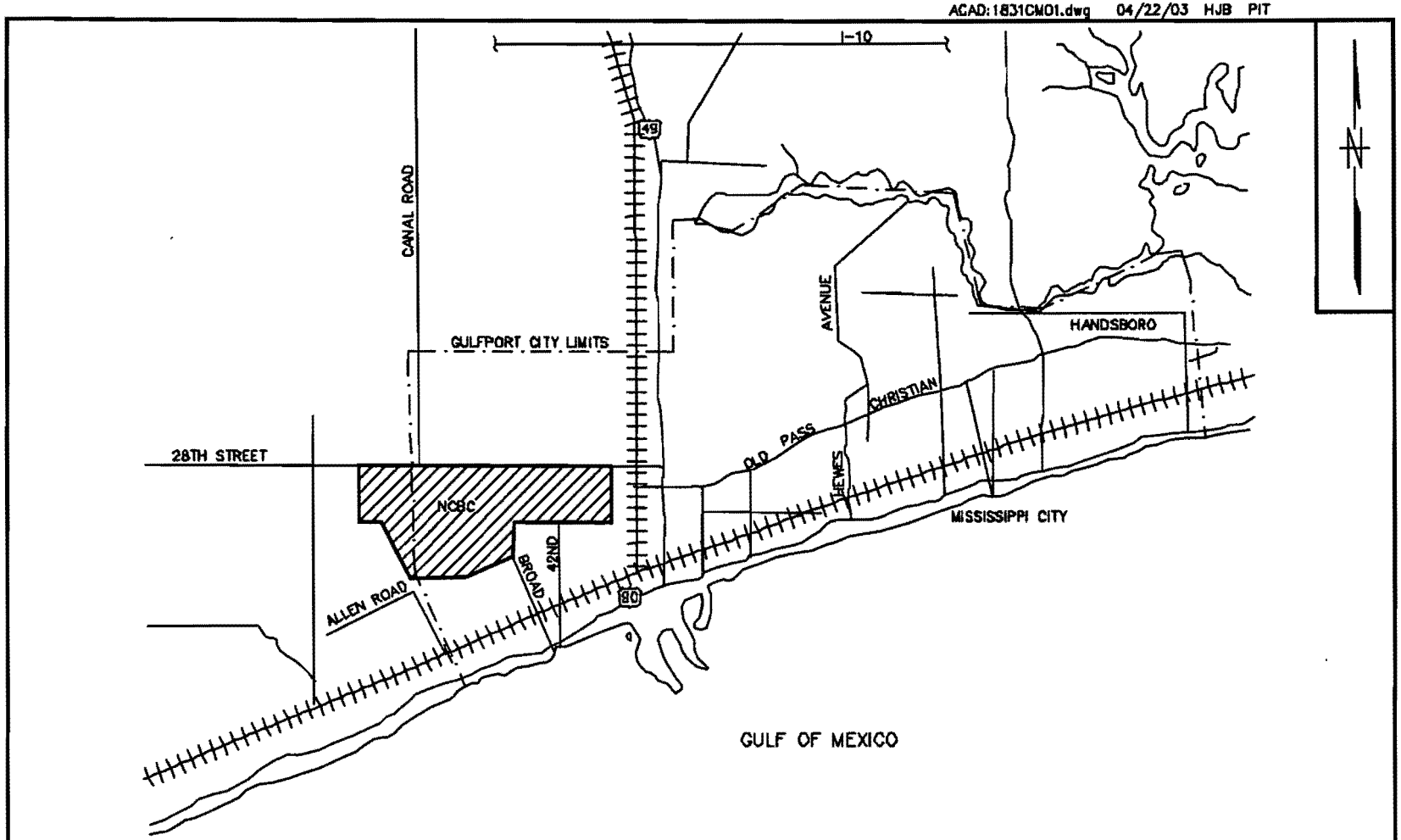

DRAWN BY HJB DATE 4/22/03			CONTRACT NO. 1831
CHECKED BY DATE		VICINITY MAP SITE 10 – PARADE FIELD DITCH REMEDIAL INVESTIGATION WORK PLAN NAVAL CONSTRUCTION BATTALION CENTER GULFPORT GULFPORT, MISSISSIPPI	APPROVED BY DATE
COST/SCHED-AREA			APPROVED BY DATE
SCALE NOT TO SCALE			DRAWING NO. FIGURE 2-1 REV. 0

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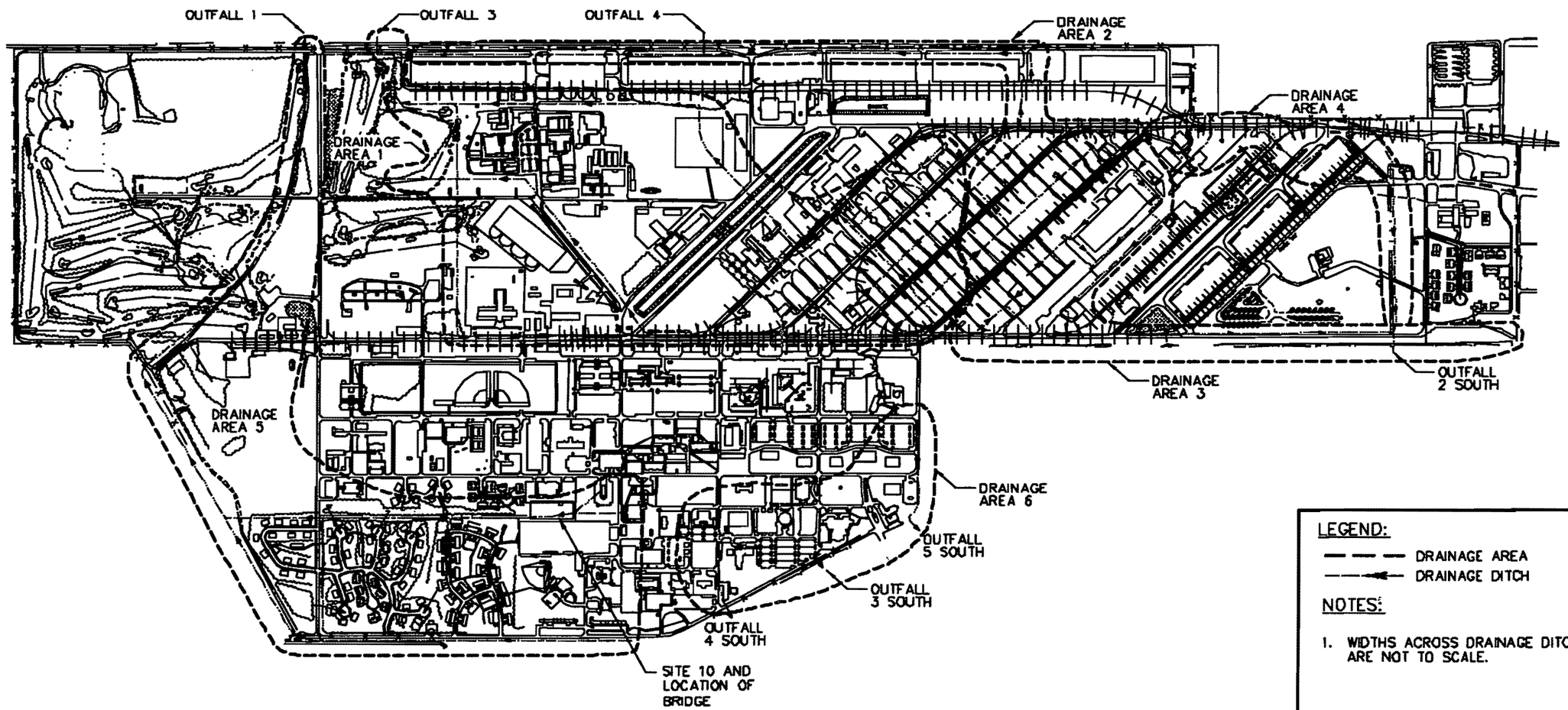

LEGEND:

— — — DRAINAGE AREA

—◄— DRAINAGE DITCH

NOTES:

1. WIDTHS ACROSS DRAINAGE DITCHES ARE NOT TO SCALE.

0 1000 2000
SCALE IN FEET

SOURCE: NAVAL CONSTRUCTION BATTALION CENTER, GULFPORT MS., JUNE 2001

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES	DRAWN BY DATE HJB 4/22/03	SITE LOCATION MAP SITE 10 - PARADE FIELD DITCH REMEDIAL INVESTIGATION WORK PLAN NAVAL CONSTRUCTION BATTALION CENTER GULFPORT GULFPORT, MISSISSIPPI	CONTRACT NO. 1831
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2.2 SITE 10 HISTORY

Originally, nine sites were identifed in the IAS as potential threats to human health or the environment. Contamination was first detected at the area later designated as Site 10 during the dioxin delineation activities for on- and off-site surface water drainage features conducted in 1997 (ABB, 1997). Analytical results from the samples collected at drainage Area 5 (southwest corner of NCBC) for this investigation reported high levels of dioxins and furans, particularly hexachlorinated-dibenzo-furans (HxCDFs) in the drainage ditch to the south of Building 369. Further evaluation indicated that the responses interpreted as elevated HxCDFs were actually caused by octachlorinated-biphenyl ethers (OCBEs), which are commonly found in transformer oils manufactured in the 1940's and 1950's. Two of the samples collected during this study were analyzed for PCBs. Aroclor-1260-PCB was detected at concentrations exceeding screening levels in these samples. Analysis of sediment samples for volatile organic compounds also detected elevated levels of chlorobenzene, another common ingredient in transformer oil.

The detections of OCBE, chlorobenzene, and Aroclor-1260 PCB indicate the probable release or releases of electrical transformer oil adjacent to or directly into the drainage ditch near the foot bridge as the source of contamination at Site 10.

3.0 PREVIOUS INVESTIGATIONS

The following is a discussion of the previous environmental investigations and remedial activities conducted at Site 10:

- The initial field investigation (ABB, 1997)
- The source removal and associated sampling (CCI, 2000)
- The post removal site evaluation (TtNUS, 2002)

3.1 Initial Field Investigation

Further delineation studies were conducted at Site 10 in July 1997 (ABB, 1997). The field screening and sediment sample analysis indicated an area of PCB exceedances approximately 100 feet along the length of the ditch (Figure 3-1). The vertical extent of contamination appeared to be confined to the upper three feet of sediment and soil below the base of the ditch. This delineation was based on a PCB screening level of 1 ppm; a level established by the Toxic Substances Control Act (TSCA) standards (USEPA, 1985 and 1986). The highest contaminant levels were found within a 15-foot area near the footbridge. The maximum level of PCB contamination measured during this event was 140 ppm. Screening level exceedences continued, at decreasing concentrations, for almost 80 feet downstream of the footbridge. The Investigation Report (ABB, 1997) summarized the results of the investigation and provided recommendations for soil removal strategies.

3.2 Source Removal

The levels of PCB and Chlorobenzene contamination in the sediments in the ditch at Site 10 prompted a source removal excavation in August 1999. Approximately 80 cubic yards (120 tons) of sediment and soil with PCB concentrations exceeding the Mississippi Department of Environmental Quality (MDEQ) unrestricted Tier 1 Target Risk Goal (TRG) of 1 ppm was removed from the site (the Phase I excavation). Confirmation sampling from the bottom of the excavation indicated that PCB concentrations up to 1,240 ppm remained in the soil below the area of excavation (Figure 3-1). Therefore, an additional 1.5-foot layer of sediment was removed and additional confirmation samples were collected (the Phase II excavation). Results of the Phase II confirmation sampling identified PCB concentrations up to 16,300 ppm. Excavation activities were suspended and further delineation sampling was conducted using DPT sampling methods. Results showed that PCB concentrations exceeding the Tier I TRG continued to a depth of 22 feet (Figure 3-1), with PCB concentrations declining with depth. Based on these results, the Phase III excavation was conducted (Figure 3-1). An additional 3 to 6 feet of soil was removed from the excavation area, with a maximum excavation depth of 14.5 feet in the vicinity of the foot bridge.

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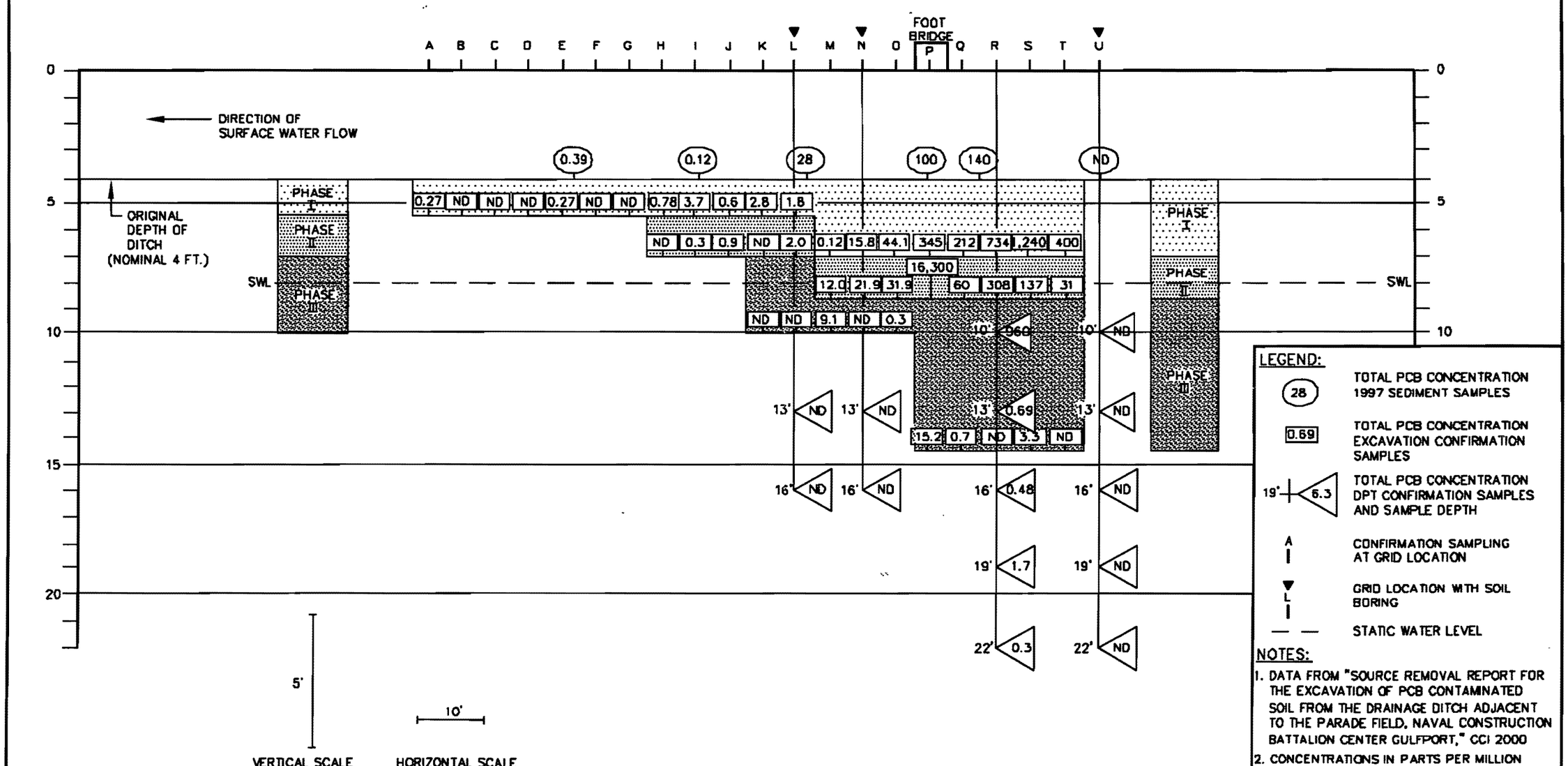

LEGEND:

- (28) TOTAL PCB CONCENTRATION 1997 SEDIMENT SAMPLES
- [0.69] TOTAL PCB CONCENTRATION EXCAVATION CONFIRMATION SAMPLES
- 19' 6.3 TOTAL PCB CONCENTRATION DPT CONFIRMATION SAMPLES AND SAMPLE DEPTH
- A CONFIRMATION SAMPLING AT GRID LOCATION
- L GRID LOCATION WITH SOIL BORING
- STATIC WATER LEVEL

NOTES:

1. DATA FROM "SOURCE REMOVAL REPORT FOR THE EXCAVATION OF PCB CONTAMINATED SOIL FROM THE DRAINAGE DITCH ADJACENT TO THE PARADE FIELD, NAVAL CONSTRUCTION BATTALION CENTER GULFPORT," CCI 2000
2. CONCENTRATIONS IN PARTS PER MILLION

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY DM DATE 4/18/03
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COST/SCHED-AREA
SCALE AS NOTED

Tetra Tech NUS, Inc.

RESULTS OF PREVIOUS PCB SAMPLING
SITE 10 - PARADE FIELD DITCH
REMEDIAL INVESTIGATION WORK PLAN
NCBC GULFPORT
GULFPORT, MISSISSIPPI

CONTRACT NO. 1831
OWNER NO. ----
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APPROVED BY DATE
DRAWING NO. FIGURE 3-1
REV. 0

FORM CADD NO. TtNUS_BM.DGN - REV 0 - 1/28/98

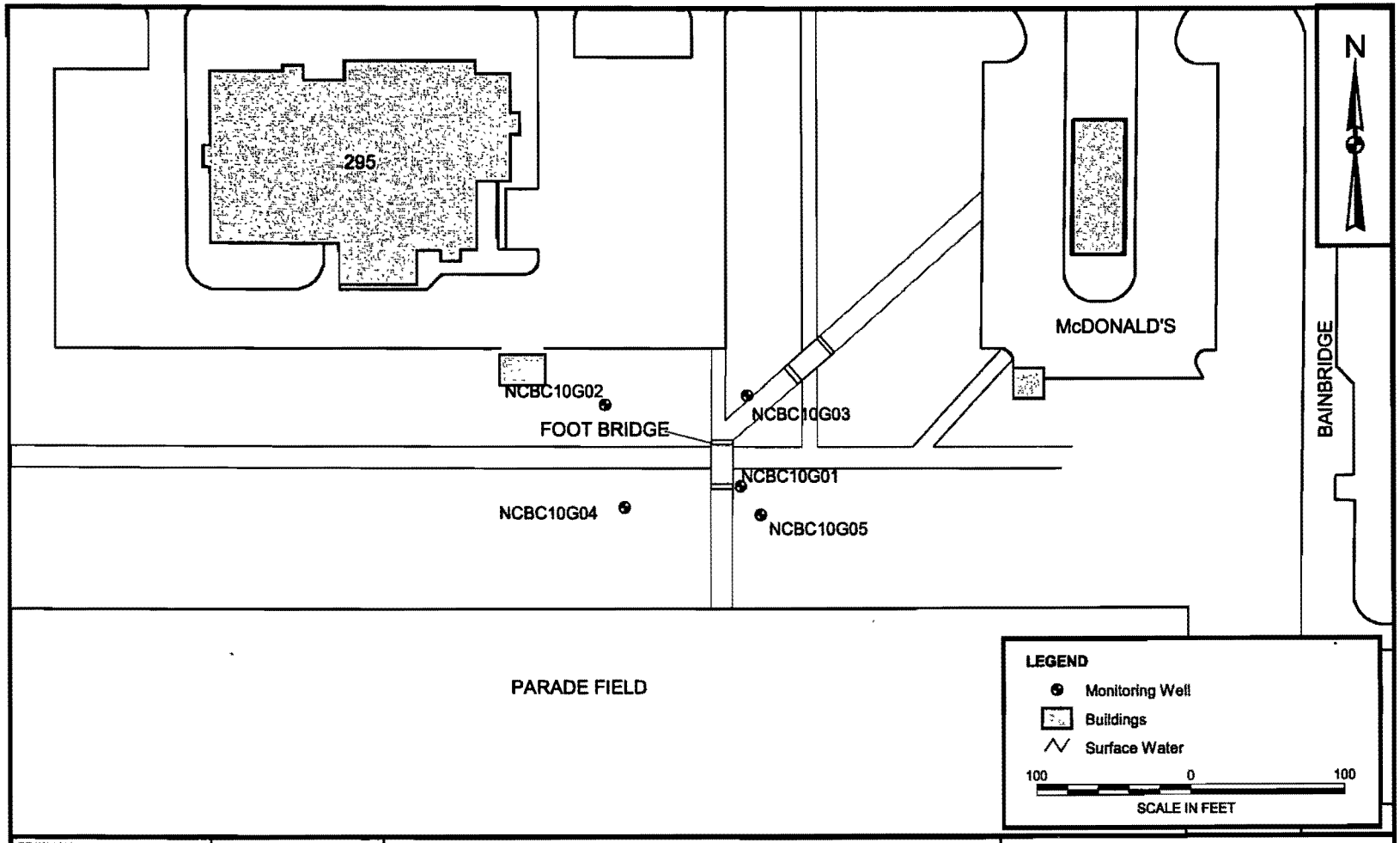
Confirmation samples collected from three locations at the bottom of the Phase III excavation had PCB concentrations exceeding the screening level.

3.3 Site Evaluation Post Removal

Following the source removal excavations and site restoration, additional samples were collected to evaluate the effectiveness of the remedial action (TtNUS 2002). Five monitoring wells were installed and groundwater samples were collected (Figure 3-2). Three surface water samples were collected (Figure 3-3) and six sediment samples were collected (Figure 3-4). Surface and subsurface soil samples were collected from twenty three locations using a DPT rig and sampling tools (Figure 3-5). The samples from the various media were analyzed for volatile organic compounds, pesticides and PCBs, and ethylene dibromide (EDB).

The analytical results from this sampling effort were screened against the appropriate MDEQ Tier 1 (unrestricted) levels. Results indicate that PCB concentrations exceeding screening levels were still present in site sub-surface soil from the vicinity of the foot bridge. Groundwater, sediment and surface water sample results were less than screening criteria.

The continued presence of PCB concentrations exceeding the screening levels in these subsurface soil samples prompted the Navy to conduct a more comprehensive investigation and evaluation of remedial alternatives. Site conditions would require significant shoring and dewatering to conduct an effective excavation.



DRAWN BY: J. LAMEY	DATE: 6/10/02	MONITORING WELL LOCATIONS SITE 10 REMOVAL SITE EVALUATION NAVAL CONSTRUCTION BATTALION CENTER GULFPORT, MISSISSIPPI	CONTRACT NUMBER: 4046
CHECKED BY: —	DATE: —		APPROVED BY: — DATE: —
COST/SCHEDULE-AREA			APPROVED BY: — DATE: —
SCALE: AS NOTED			DRAWING NO.: FIGURE 3-2 REV: 0

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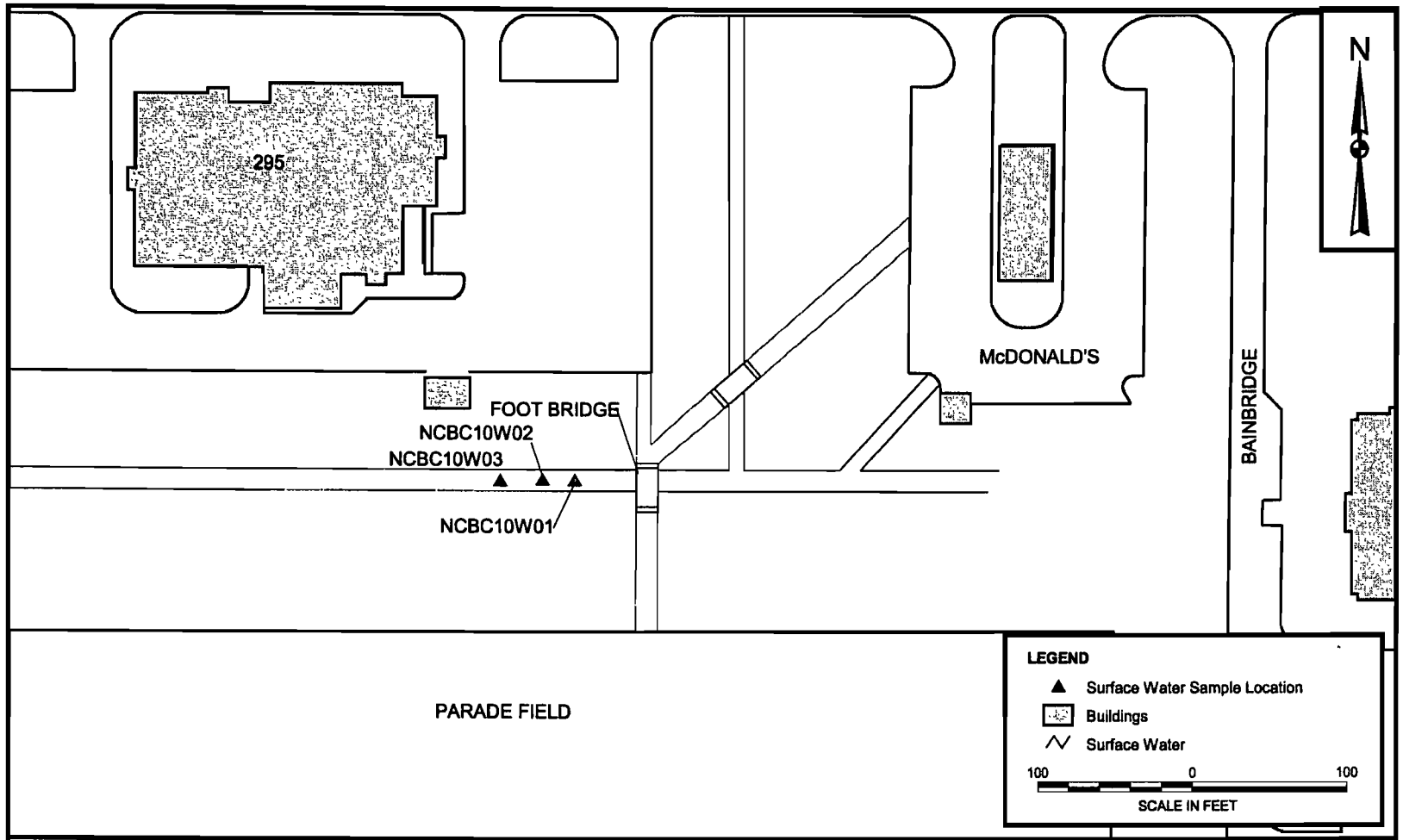

DRAWN BY J. LAMEY	DATE 6/10/02	SURFACE WATER SAMPLE LOCATIONS SITE 10 REMOVAL SITE EVALUATION NAVAL CONSTRUCTION BATTALION CENTER GULFPORT, MISSISSIPPI	CONTRACT NUMBER 4046
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COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO FIGURE 3-3 REV 0

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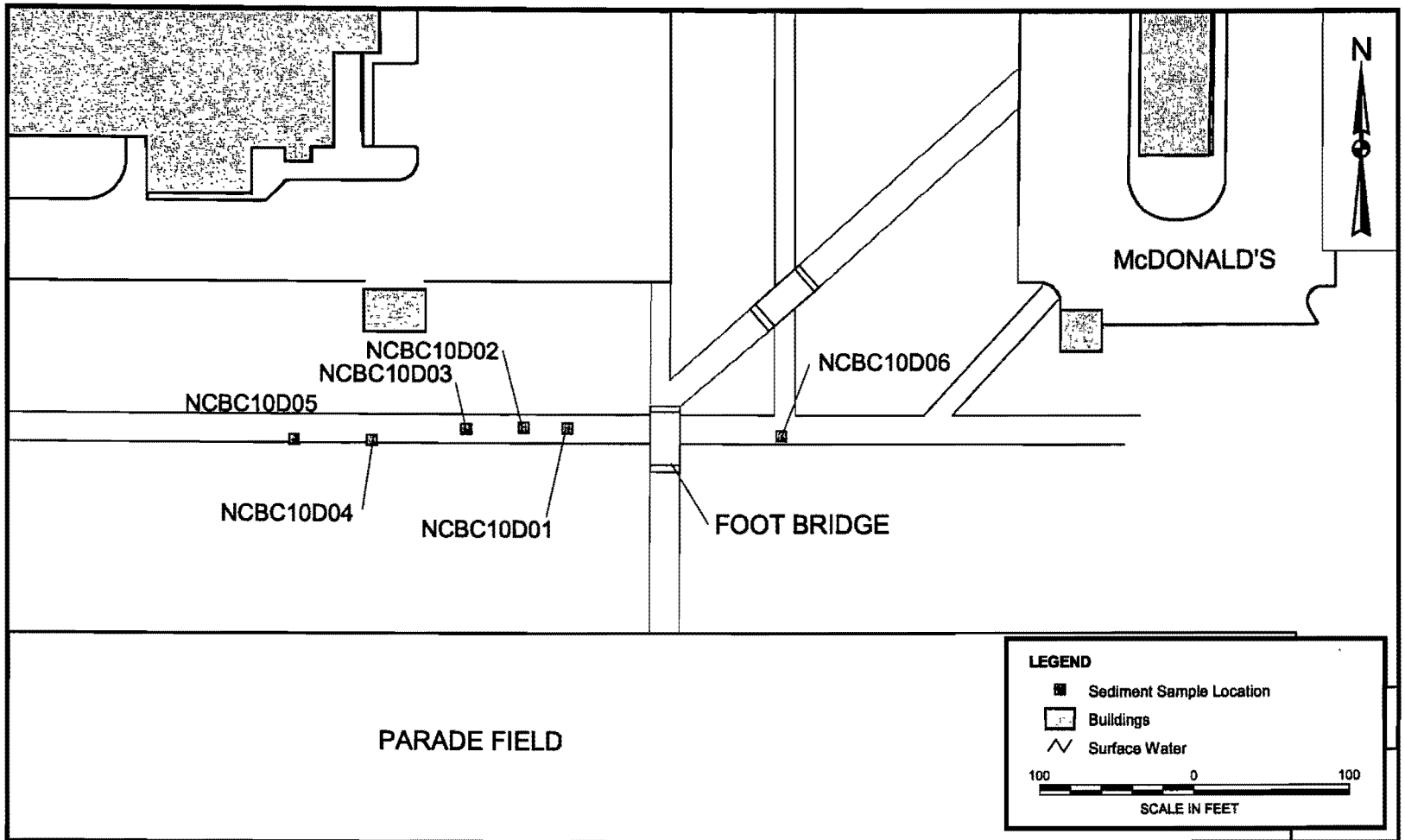

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K. PEILA	6/11/02
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COST/SCHEDULE-AREA

SCALE
AS NOTED

SEDIMENT SAMPLE LOCATIONS
SITE 10 REMOVAL SITE EVALUATION
NAVAL CONSTRUCTION BATTALION CENTER
GULFPORT, MISSISSIPPI

CONTRACT NUMBER
4046

APPROVED BY — DATE —

APPROVED BY — DATE —

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REV 0

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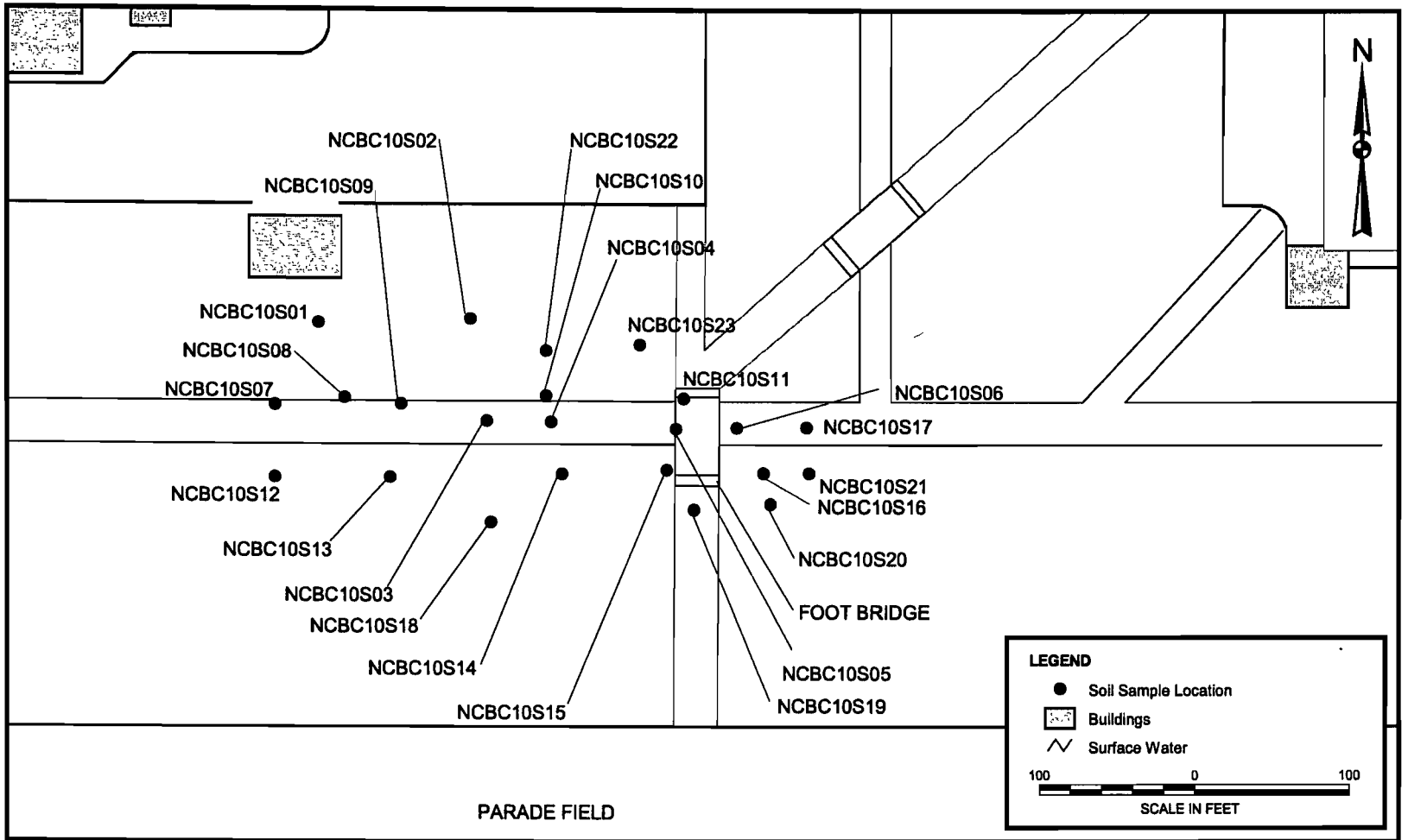

DRAWN BY J LAMEY	DATE 6/10/02	SUB-SURFACE SOIL SAMPLE LOCATIONS SITE 10 REMOVAL SITE EVALUATION NAVAL CONSTRUCTION BATTALION CENTER GULFPORT, MISSISSIPPI	CONTRACT NUMBER 4046
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COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO FIGURE 3-5 REV 0

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4.0 WORK PLAN RATIONALE

The goal of this RI is to support the selection of a remedial alternative for Site 10. In order to achieve this goal, additional data will be collected at Site 10 to fill data gaps identified from the previous investigations regarding the nature and extent of contaminants and to evaluate potential risk to human health and the environment.

4.1 WORK PLAN APPROACH

The RI Work Plan documents the following aspects of the planned investigation:

- Field Sampling Activities
- Chemical Analyses
- Data Management
- Risk Assessment
- Costs and assumptions
- Schedule
- Project Management

The objectives that guide the planning and execution of the investigation are described in the following sections:

4.2 DATA QUALITY OBJECTIVES

The Data Quality Objectives (DQOs) for an RI are project specific and are based on the intended use of the data in the decision process (USEPA EISOPQAM 1997). DQO selection is the main factor in identifying:

- The types of samples are to be collected
- The sample collection locations
- The types of equipment to be used
- The analytical requirements (USEPA EISOPQAM 1997).

The DQOs for Site 10 are presented in Section 4.0 of the Quality Assurance Project Plan (QAPP) for the Site (Appendix A).

4.3 REMEDIAL ACTION OBJECTIVES AND ALTERNATIVES

The preliminary remedial action alternatives are based on data reported from previous investigations. This information was evalauted to ensure that sufficient data is collected during this RI to support the screening and detailed analysis of alternatives during the Feasibility Study (FS).

Based on the conceptual model for Site 10 (Figure 4-1), the primary affected media are surface and subsurface soil due to exceedances of Tier 1 unrestricted screening values – the chemical specific ARARs. Potential exposure to contaminated groundwater, soil, surface water and sediment are also evaluated. The remedial action alternatives considered for the impacted media are provided in the following table.

TABLE 4-1
REMEDIAL ACTION OBJECTIVES AND ALTERNATIVES
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Media	Remedial Action Objectives	Remedial Action Alternatives
Groundwater	Prevent ingestion or direct contact resulting in excess cancer risk of 10^{-6} via source control or removal.	Institutional controls Natural attenuation (passive) Natural attenuation (active) Collection/treatment
Soil	Prevent ingestion or direct contact resulting in excess cancer risk of 10^{-6} via source control or removal.	Institutional controls Natural attenuation (passive) Natural attenuation (active) Containment/capping Collection/treatment
Surface Water	Prevent ingestion of surface water resulting in excess cancer risk of 10^{-6}.	Monitoring Discharge treatment
Sediment	Prevent direct contact with sediment resulting in excess cancer risk of 10^{-6}.	Institutional controls Containment/capping Excavation

Worksheet **Baseline Site Conceptual Exposure Model (SCEM)**

Site Name:
Site Location:

Completed By:
Revision Date:

☐ Complete
○ Potentially Complete

☐ Draft
☐ Final

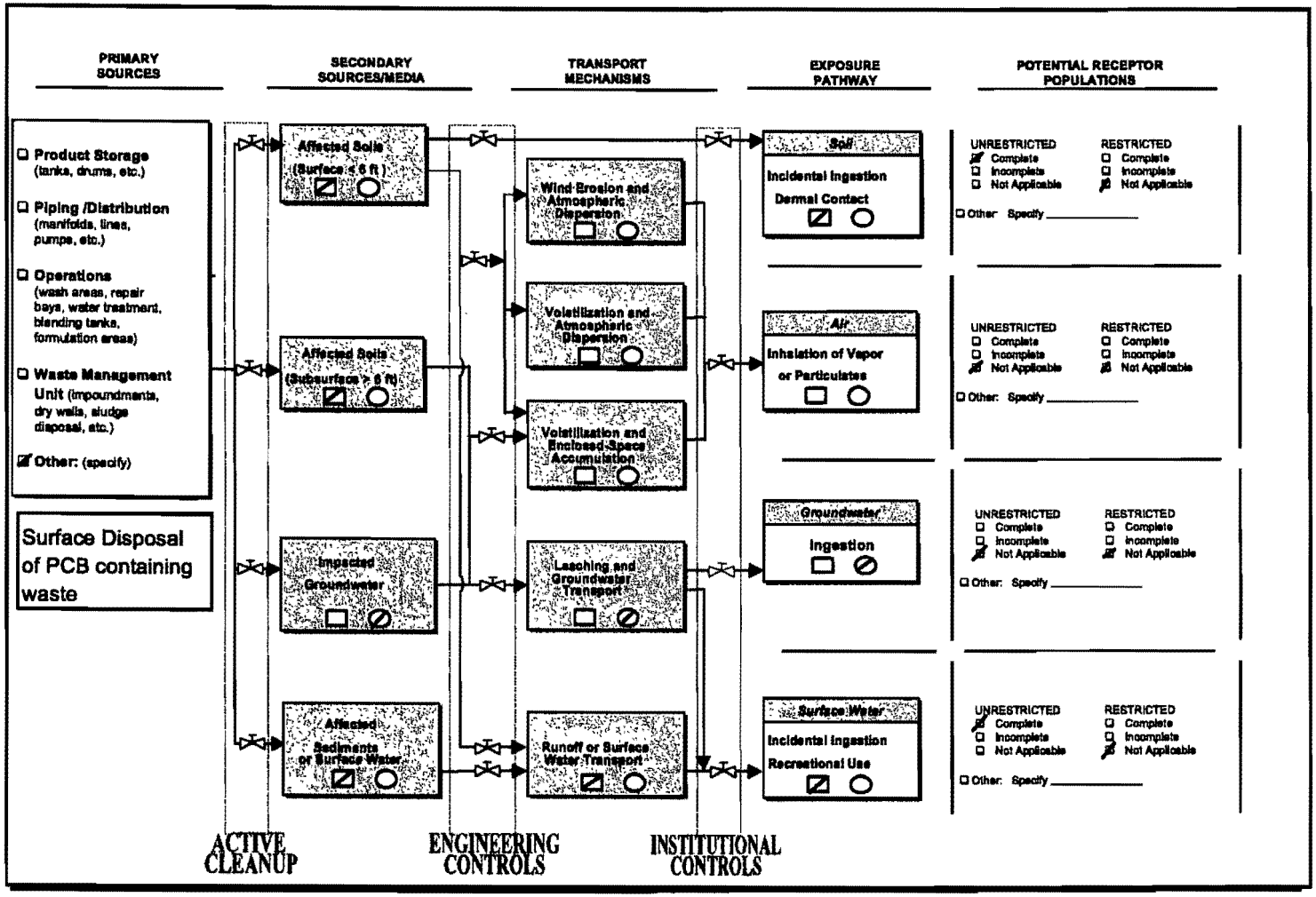


Figure 4-1
Baseline Site Conceptual Exposure Model

5.0 FIELD INVESTIGATION

The following sections describe the activities associated with the proposed field investigation for the RI at Site 10.

5.1 MOBILIZATION

Field mobilization activities will take place over a one-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; and initiation of the field data management system (computer database and filing system).

5.2 FIELD DOCUMENTATION

Field Logbooks

Dedicated field logbooks will be used to record pertinent field activities. The project manager's name, the Field Operations Leader (FOL)'s name, the project name and location, and the project number will be recorded on the inside of the front cover of all logbooks. Entries will be recorded with waterproof, non-erasable ink. Each page of the logbook will be numbered and dated. All entries must be legible and contain accurate and complete information about an individual's project activities. At the end of all entries for a particular day, or a particular event if appropriate, the investigator will draw a diagonal line across the page below the last entry and initial indicating the conclusion of entries. All entries will be objective, factual and free of personal feelings or 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, 10 for Site 10 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-10-02 would indicate
Direct push location
At Site 10
The second direct push location drilled

MW-10-01 would indicate
Monitoring well location
At Site 10
The first monitoring well location drilled

SW/SD-10-03 would indicate
A surface water/sediment location
At Site 10
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:

DP1001G01 will indicate
The sample was collected from DP-10-01
This is a groundwater sample (G)
This was the first groundwater sample collected from this location (01)

MW1002S02 will indicate
The sample was collected from MW-10-02
This is a subsurface soil sample (S)
This was the second subsurface soil sample collected from this location (02)

SW/SD1003D01 will indicate
The sample was collected from SW/SD-10-03
This is a surface water/sediment sample (D)
This was the first 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 FOL will accompany the base utility clearance personnel to the Site to review any restrictions to drilling and monitoring well installation activities.

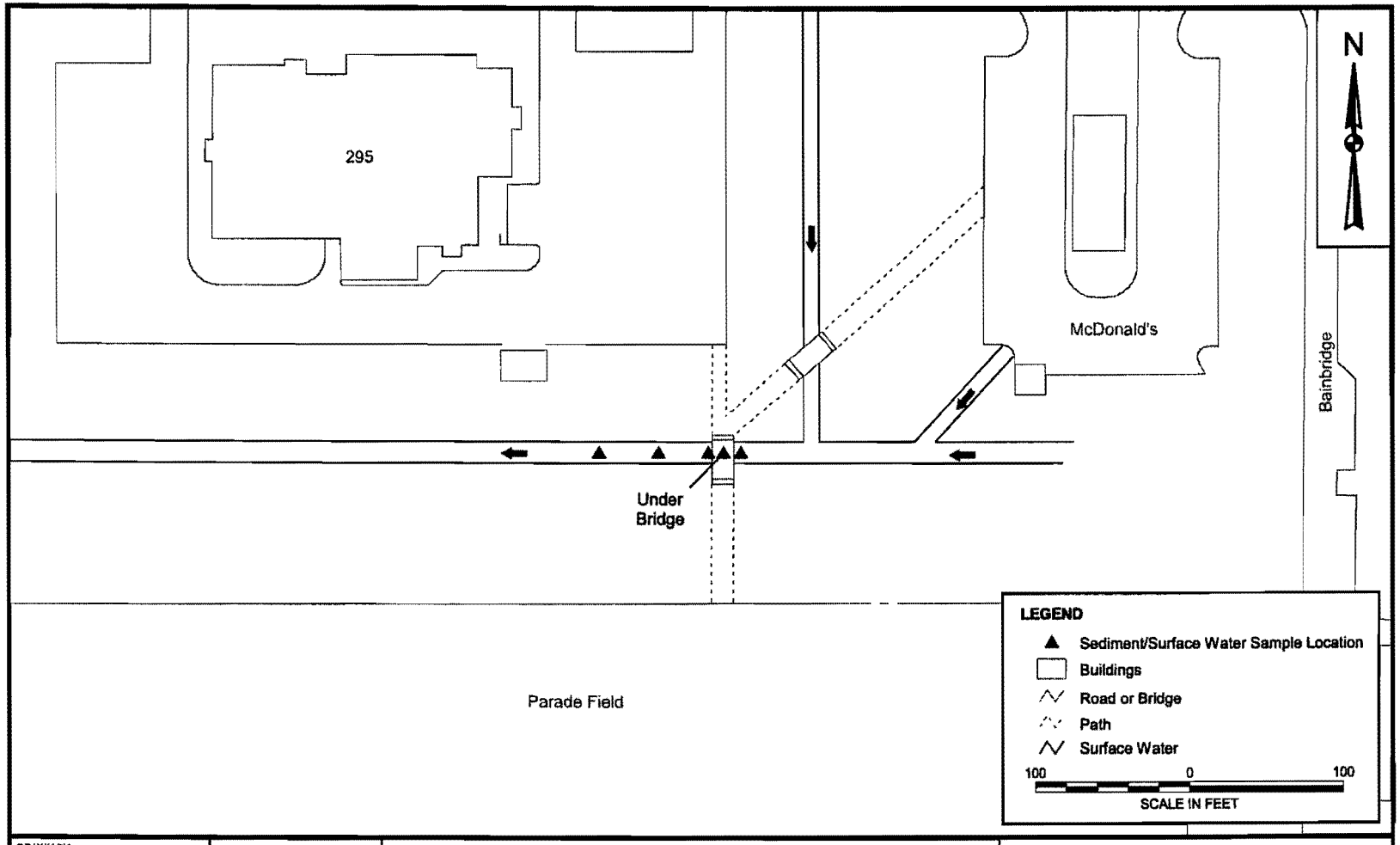
5.4 DIRECT PUSH SAMPLING

Approximately six direct push borings will be installed at the site to a total depth of 23 feet below land surface (BLS) for the collection of sub-surface soil 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 site conditions and the results of the utility clearance. The following sections describe the methods to be used for the collection of these samples.

A total of six sub-surface soil samples will be collected from direct push locations and analyzed for a full suite laboratory analyses. Samples for dioxin analysis will only be collected from outside of the known transformer oil/PCB plume to eliminate the potential for OCBP interference. Five sub-surface soil samples will be collected from within the area of the PCB plume and one soil sample located outside the area of PCB contamination will be collected in an effort to determine if groundwater flow is impacting plume migration. Soil samples will be collected continuously at select locations from ground surface to the top of the first significant clay layer. Samples will be collected in acetate sleeves approximately 48-inches in length. The unused samples will be placed in a container with any other investigation derived waste (IDW) generated at that location. The subsurface soil samples will be analyzed for the full suite of parameters listed in Table 5-2.

TABLE 5-2
DPT SAMPLE ANALYSES

Soil
TAL Metals
TCL VOCs
TCL SVOCs
TCL Pesticides
TCL PCBs
Cyanide



DRAWN BY	DATE
A. JANOCHA	4/24/03
CHECKED BY	DATE
J. BOURGEOIS	4/24/03
COST/SCHEDULE-AREA	
SCALE AS NOTED	

SEDIMENT/SURFACE WATER SAMPLE LOCATIONS
SITE 10 RI
NAVAL CONSTRUCTION BATTALION CENTER
GULFPORT, MISSISSIPPI

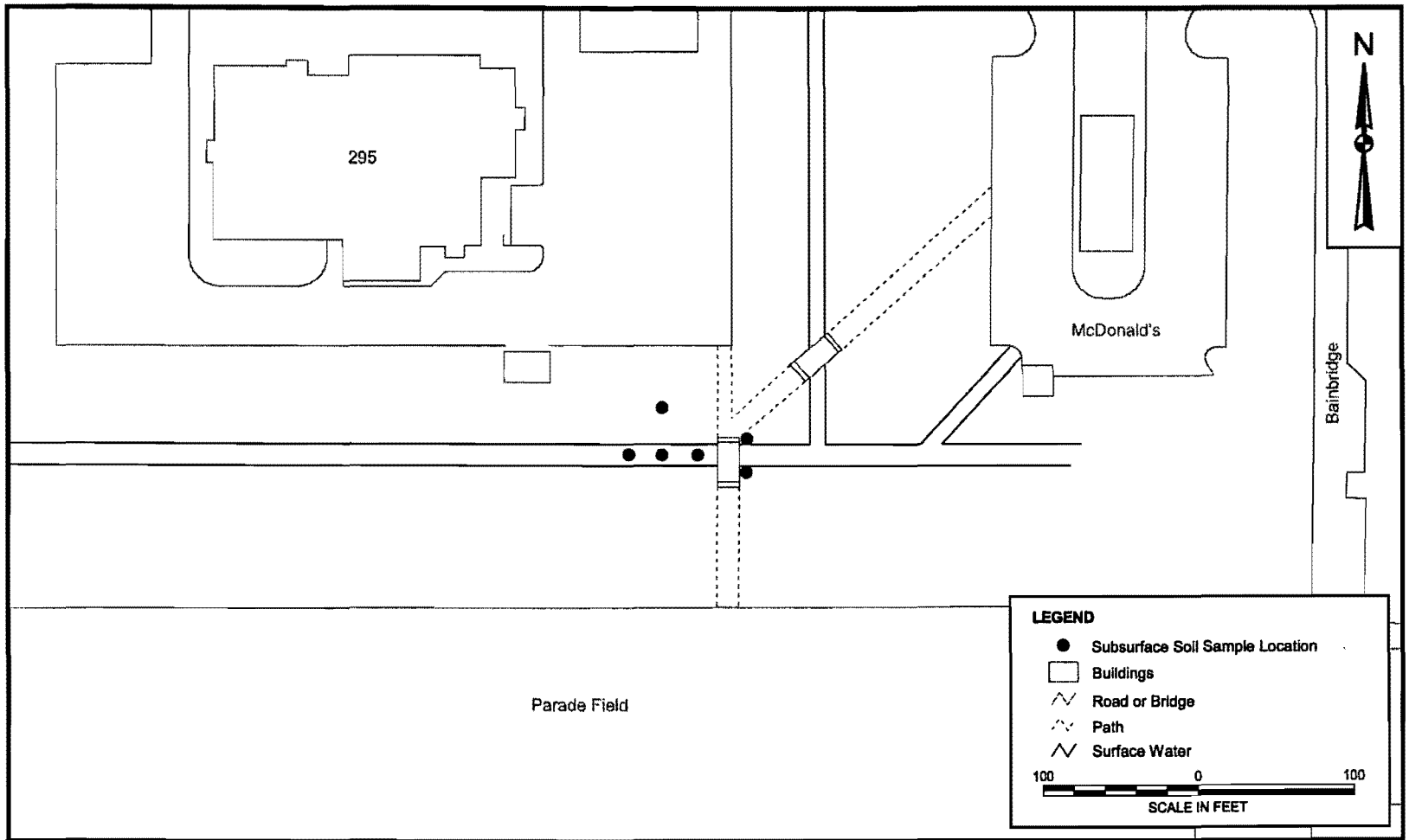
CONTRACT NUMBER	
1831	
APPROVED BY	DATE
—	—
APPROVED BY	DATE
—	—
DRAWING NO FIGURE 5 - 2	REV 0

P:\GIS\GULFPORT_CBC\APR\SITE10.APR PROPOSED SEDIMENT/SURFACE WATER SAMPLE LOCATION LAYOUT 8/25/03 JAL

5.5 SURFACE WATER/SEDIMENT SAMPLES

Approximately three co-located surface water/sediment samples will be collected from the Site 10 drainage ditch beneath and adjacent to the footbridge (see Figure 5-2). The surface water sample will be collected prior to the collection of the sediment sample at each location. Grain-size analysis and moisture content will be collected along the sideslopes of the ditch as well as from the centerline of the drainage ditch in the saturated zone. A sample will also be collected for measurement of water quality parameters such as pH, specific conductance, temperature and turbidity (USEPA EISOPQAM, 1997). Approximately three QA/QC samples will be collected for laboratory utilization. The sample containers will be properly labeled, placed in a sealed plastic bag and packed in a cooler with wet ice. The surface water and sediment samples will be analyzed for the parameters listed in Table 5-3.

Two samples will be collected for geotechnical purposes - one sediment sample from the centerline of the drainage channel and one soil/sediment sample from the slideslopes of the drainage channel above the saturated zone. The samples will be collected from a depth interval of 0 to 1 foot bgs. The samples will be classified using the Unified Soils Classification System (USCS) (ASTM D 2487) which includes performing grain-size analysis (ASTM D 422), moisture content (ASTM D 2216), and Atterberg limits (ASTM D 4318 - for cohesive soils only). Information obtained from the analyses will include the sample's heterogeneity and the change in soil consistency as a function of soil water content. This information will provide the geotechnical and geochemical properties of the samples and will be used to evaluate remedial alternatives in the FS.



DRAWN BY	DATE
A. JANOCHA	4/24/03
CHECKED BY	DATE
J BOURGEOIS	4/24/03
COST/SCHEDULE-AREA	
SCALE AS NOTED	

SUBSURFACE SOIL SAMPLE LOCATIONS
SITE 10 RI
NAVAL CONSTRUCTION BATTALION CENTER
GULFPORT, MISSISSIPPI

CONTRACT NUMBER	
1831	
APPROVED BY —	DATE —
APPROVED BY —	DATE —
DRAWING NO. FIGURE 5 - 1	REV 0

P:\GIS\GULFPORT_CBC\APR\SITE10.APR PROPOSED SUBSURFACE SOIL SAMPLE LOCATION LAYOUT 4/24/03 AJ

TABLE 5-3
ADDITIONAL MEDIA ANALYSES

Surface Water/Groundwater	Sediment	Surface Soil
TAL Metals + CN	TAL Metals + CN	TAL Metals + CN
TCL VOCs	TCL VOCs	TCL VOCs
TCL SVOCs	TCL SVOCs	TCL SVOCs
TCL Pesticides	TCL Pesticides	TCL Pesticides
TCL PCBs	TCL PCBs	TCL PCBs
	Grain-Size /Moisture Content	
	Atterberg Limits	

5.6 GROUNDWATER SAMPLES

Groundwater samples will be collected from the five existing monitoring wells (Figure 3-2), and analyzed for a full suite of analyses. Prior to sampling, 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 DIAMETER RELATED TO GALLONS PER FOOT

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

Sampling will begin soon after the purging process so 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 wet 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 5-3.

5.7 DECONTAMINATION PROCEDURES

All sampling and downhole drilling equipment must be decontaminated 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. 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. If necessary, scrub all components with a brush, soap and tap water.
3. Rinse with tap water.
4. 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.

5.8 WATER LEVEL MEASUREMENTS

Two rounds of water level measurements will be collected from 5 existing wells at Site 5. This data will be used to determine the hydraulic gradient of the surficial aquifer and will be used to derive 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.

5.9 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. Bridge corners, ditch margins, and ditch slope will also be surveyed to facitlitate creation of an up-to-date topographic map of the site. The horizontal location and ground surface elevation of all sample locations will also be surveyed. All locations will be referenced to site features such as building corners, roads, etc. It is assumed that sufficient survey control is present within one mile of the site.

5.10 INVESTIGATION DERIVED WASTE MANAGEMENT

TtNUS estimates that approximately 3 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.

5.11 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	6	2	1	1	1
Monitoring Wells:						
	Groundwater	5	1	1	1	1
Additional Media:						
	Surface Water	3	1	1	1	1
	Sediment	3	1	1	1	0

TABLE 6-2
ANALYTICAL PARAMETERS AND METHODS

Parameter	Method (aqueous/soil)	No. Soil	No. Aqueous
TAL Metals + Cyanide	SW-846 6010B/7000A series + 910B/9012A	15	8
TCL VOCs	SW-846 8260B	15	8
TCL SVOCs	SW-846 8270C	15	8
TCL Pesticides	SW-846 8081A	15	8
TCL PCBs	SW-846 8082	15	8
Grain-Size /Moisture Content	ASTM D 421/422	2	0
Atterberg Limits	ASTM D 4318	2	0

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.

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)
- 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 (June1988), and TtNUS Standard Operating Procedures. All dioxin data will be subject to full validation conducted by an independent validation subcontractor.

7.3 DATA EVALUATED

All sample results will be screened against the MDEQ Tier 1 (unrestricted) table to determine the location and magnitude of positive concentrations above actionable levels. All positive results above these screening levels will be noted on the appropriate figures and displayed in "hits" tables in the Remedial Investigation Report.

8.0 RISK ASSESSMENT

Human Health and Ecological risks assessments will be conducted following the field investigation at Site 10. These assessments will evaluate typical exposure pathways only. Atypical exposure pathways and complex computer modeling will not be evaluated. Media to be evaluated include soil, surface water, sediment, and groundwater. Draft and final versions of the Risk Assessment reports will be incorporated into the RI report.

8.1 Potential Routes of Contaminant Migration

The contamination at Site 10 is attributed to the release of transformer oil containing PCBs into surface water and subsurface soil in the drainage ditch. Based on current NCBC Gulfport operations and procedures, additional releases of this type of material at Site 10 are not ongoing or likely to occur again. Sampling at the site indicate that PCB contamination is limited to Site soil in the vicinity of the foot bridge crossing the ditch and that Site surface water, sediment, and groundwater currently have PCB concentrations below screening levels.

In general, PCBs are not very water soluble, are not volatile, and would tend to adhere to soil or sediment particles, limiting contaminant migration. The following primary mechanisms may allow migration of contaminants from site soil to other on- and off-site media:

- Onsite soil to offsite soil by erosion and transport
- Onsite soil to sediment by erosion and transport
- Onsite soil to surface water by solution and by particle transport
- Onsite soil to groundwater by solution
- Onsite soil to air by volatilization and by fugitive dust transport

Transport of contaminants is affected by the chemical and physical properties of both the media and the contaminants. Storm events are of particular concern because of the greater flow velocities in the ditch which may mobilize bedload sediments that are usually not disturbed under normal flow conditions.

8.2 Potential Exposure Pathways

The following sections describe the probable exposure pathways to contaminated media that will be evaluated in the risk assessment for Site 10.

Air

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

Soil

Exposure to contaminated soil at the site under current land use is expected to be limited to surface soil. Under future land use, exposure to chemicals in subsurface soil could occur if the soil were to be uncovered (e.g., during excavation/erosion). In this scenario, it could be assumed that subsurface soil could be brought to the surface and mixed with surface soil. Potential receptors should be assumed to be exposed to the surface/subsurface soil mixture. A receptor may be exposed to soil by inadvertent ingestion of a small amount of soil, by dermal absorption of contaminants from the soil, or by inhalation of vapors or particulates emitted from soil.

Surface water/Sediment

Exposure to contaminated surface water and sediment in the drainage ditch could occur under current and future land uses. In this scenario, potential receptors are assumed to come into direct contact with surface water and sediment while wading. Individuals may be exposed primarily via dermal contact and incidental ingestion but the frequency of exposure is expected to be less than typical residential or industrial exposures to soil. Risks via inhalation and ingestion of surface water are expected to be minimal and are not quantitatively evaluated in the risk assessment.

Groundwater

Currently available information indicates that no domestic groundwater wells have been installed at or immediately downgradient of Site 10. The shallow groundwater is not used as a local source of drinking water and direct exposure to groundwater not expected to occur under current and/or future land uses. However, to aid in risk management decisions, two conservative scenarios for exposure to groundwater will be evaluated in this risk assessment:

- Dermal contact with groundwater should be evaluated for construction workers to account for the possibility that workers may contact groundwater during future excavation activities.

- Current off-site residents and hypothetical future on-site residents could be assumed to use local groundwater as a source of domestic water, resulting in potential ingestion, dermal contact, and inhalation of volatiles.

8.3 Potential Human Receptors

NCBC Gulfport is an active military facility and will remain active for the foreseeable future. Site 10 is located adjacent to the Parade Field and access to the site is not restricted. A foot path traverses over the site. Based on current site conditions and possible future land use, the following receptors may potentially be exposed to contaminated environmental media within the study area:

- Construction//Excavation Workers – A potential receptor under future land use. No construction activities are currently planned for the study area. Construction workers are considered for future land use only and are assumed to be exposed to subsurface soil and sediment (by ingestion and dermal contact), to groundwater (by dermal contact), and to surface water (by dermal contact).

- Commercial/Industrial Workers – A potential receptor under future land use. These workers are assumed to be exposed to surface soil, subsurface soil, and sediment (by ingestion and dermal contact), and to surface water (by dermal contact).

- On-Site Workers – A potential receptor under current land use. This scenario includes adult military or civilian personnel assigned to routine daily maintenance tasks. This receptor is assumed to be exposed to surface soil, subsurface soil, and sediment (by ingestion and dermal contact), and to surface water (by dermal contact).

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

- On-Site Residents (Child and Adult) – An unlikely receptor under future land use. The future residential scenario is typically evaluated as the most conservative scenario in a risk assessment for decision making purposes. A hypothetical resident may be exposed to surface soil, subsurface soil, and sediment (by ingestion and dermal contact), to groundwater (by ingestion, dermal contact, and inhalation of volatiles), and to surface water (by dermal contact).

- Off-Site Residents (Child and Adult) – Because of the close proximity of residential housing to Site 10, off-site residents are considered to be plausible receptors under current and future land use. The off-site residents are assumed to be exposed in the manner as on-site residents.

Table 8-1 summarizes the aspects of the of the human health risk assessment.

TABLE 8-1
HUMAN HEALTH RISK ASSESSMENT SUMMARY

RECEPTORS			EXPOSURE PATHWAYS				
Receptor Scenario	Age Group	Land Use	Surface Soil	Subsurface Soil	Sediment	Surface Water	Groundwater
Construction/Excavation Worker	Adult	Future	Ingestion Dermal Contact	Ingestion Dermal Contact	Ingestion Dermal Contact	Dermal Contact	Dermal Contact
Commercial/Industrial Worker	Adult	Future	Ingestion Dermal Contact	Ingestion Dermal Contact	Ingestion Dermal Contact	Dermal Contact	Dermal Contact
Onsite Worker	Adult	Current	Ingestion Dermal Contact	Ingestion Dermal Contact	Ingestion Dermal Contact	Dermal Contact	Dermal Contact
Recreational User/Trespasser	Adolescent Adult	Current Future	Ingestion Dermal Contact	Ingestion Dermal Contact	Ingestion Dermal Contact	Dermal Contact	Dermal Contact
Onsite Resident	Child Adult	Future	Ingestion Dermal Contact	Ingestion Dermal Contact	Ingestion Dermal Contact	Dermal Contact	Ingestion Dermal Contact Volatile Inhalation

Offsite Resident	Child Adult	Current Future	Ingestion Dermal Contact	Ingestion Dermal Contact	Ingestion Dermal Contact	Dermal Contact	Ingestion Dermal Contact Volatile Inhalation

8.4 Screening Level Ecological Risk Assessment

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

- *Risk Assessment Guidance for Superfund: Environmental Evaluation Manual (USEPA, 1989c)*
- *Ecological Assessment at Hazardous Waste Sites: A Field and Laboratory Reference (USEPA, 1989d)*
- *Framework for Ecological Risk Assessment (USEPA, 1992d)*
- *Ecological Risk Assessment Guidance for Superfund: Process for Designing And Conducting Ecological Risk Assessment (USEPA, 1997b)*
- *Supplemental Guidance to RAGS: Region 4 Bullentis on Ecological Risk Assessment (USEPA, 1995b) and*
- *Guidelines for Ecological Risk Assessment (USEPA, 1998a).*

This assessment will include a hazard assessment, exposure assessment, toxicity assessment, risk characterization, and the screening level ERA summary and recommendations.

9.0 COSTS AND KEY ASSUMPTIONS

Costs and key assumptions developed for the scope of this RI as described in this workplan are contained in the Plan of Action (dated January 2003).

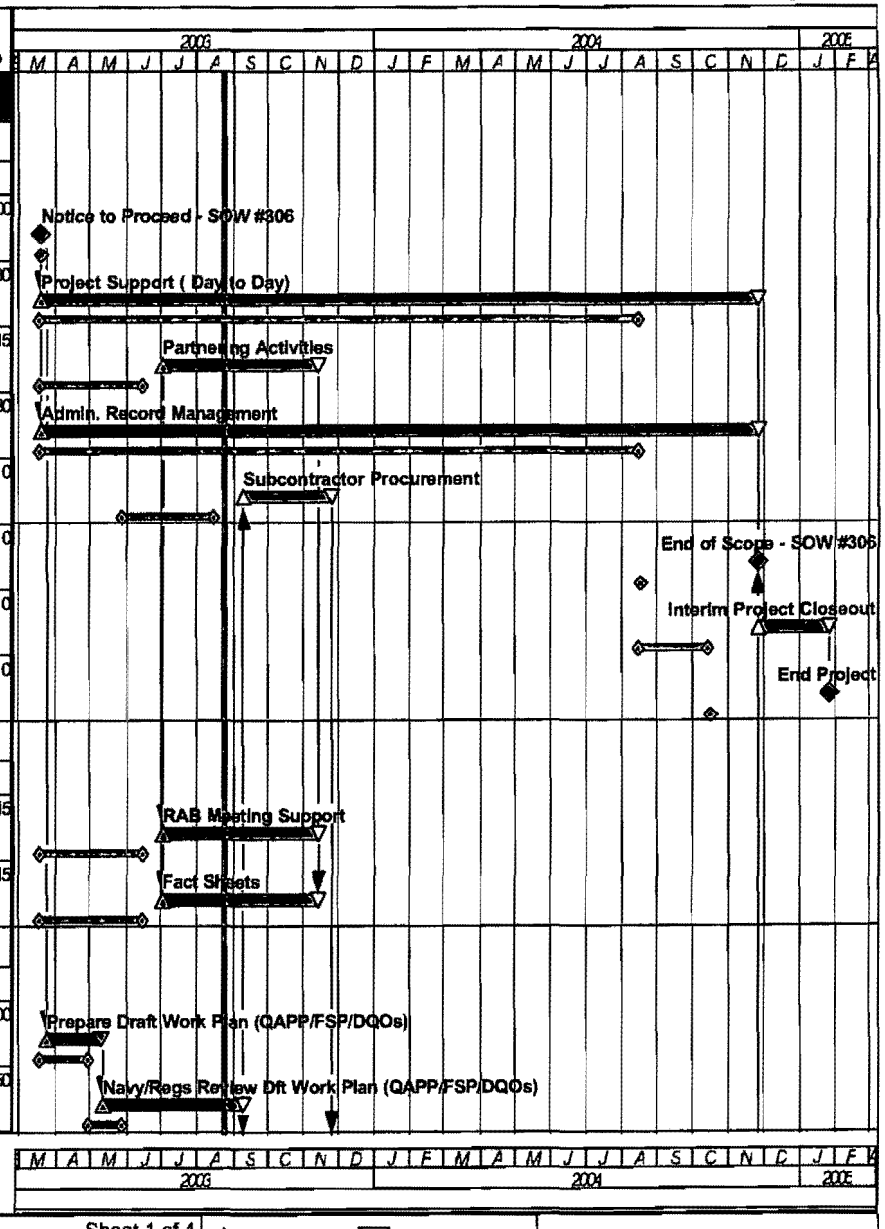
Field operations that deviate from this workplan, and do not have an impact on project costs, will be documented via the Field Change Request Forms available at the site. These deviations will not take place until the Project Manager has signed off and the RPM has been notified of the proposed changes.

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

CTO 288 NCBC GULFPORT- RI/FS@SITE 10

Activity ID	Activity description	Cal ID	Early Start	Early Finish	OD	RD	% Cmp
PROJECT MANAGEMENT							
MOD 02							
PP0010100	Notice to Proceed - SOW #306	1	19MAR03A		0	0	100
PP0010105	Project Support (Day to Day)	1	19MAR03A	26NOV04	616*	458*	30
PP0010108	Partnering Activities	1	03JUL03A	12NOV03	90	80	15
PP0010115	Admin. Record Management	1	19MAR03A	26NOV04	616*	458*	30
PP0010130	Subcontractor Procurement	1	09SEP03	24NOV03	77*	77*	0
PP0010225	End of Scope - SOW #306	1		26NOV04	0	0	0
PP0010230	Interim Project Closeout	1	27NOV04	26JAN05	60	60	0
PP0010233	End Project	1		26JAN05	0	0	0
COMMUNITY RELATIONS							
MOD 02							
PP0020100	RAB Meeting Support	1	03JUL03A	12NOV03	90	80	15
PP0020200	Fact Sheets	1	03JUL03A	12NOV03	90	80	15
WORK PLANS							
MOD 02							
PP0040120	Prepare Draft Work Plan (QAPP/FSP/DQOs)	2	24MAR03A	09MAY03A	30	0	100
PP0040130	Navy/Regs Review Dft Work Plan (QAPP/FSP/DQOs)	1	12MAY03A	08SEP03	30	15	50



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Start Date	31MAR95
Finish Date	26JAN05
Data Date	25AUG03
Run Date	21AUG03 14:36

NAVA - CX88

Sheet 1 of 4

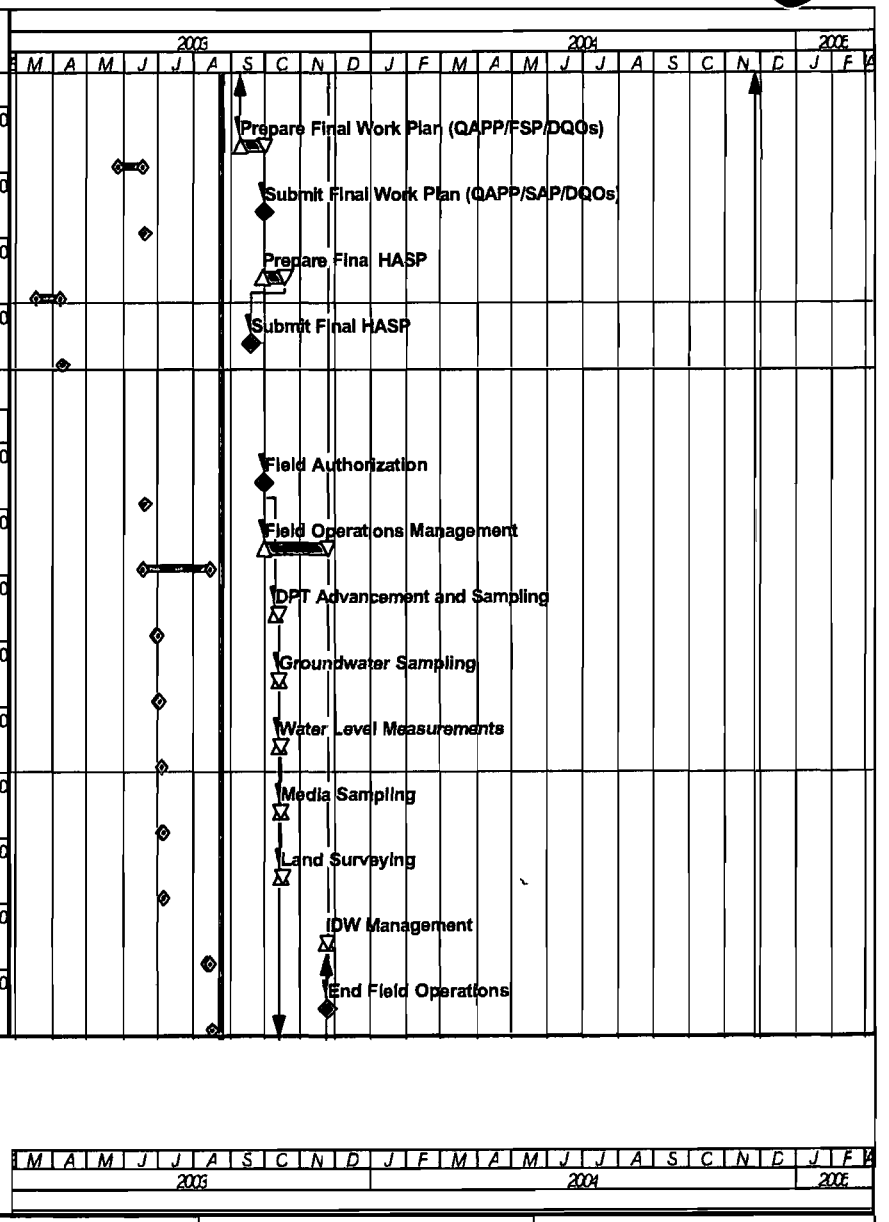
NAVY CLEAN III
TFMR SCHEDULE

Period Ending: 8/24/2003

Early Bar
Target Bar
Progress Bar
Critical Activity

TetraTech NUS

Activity ID	Activity description	Cal ID	Early Start	Early Finish	OD	RD	% Cmp
MOD 02							
PP0040140	Prepare Final Work Plan (QAPP/FSP/DQOs)	2	09SEP03	29SEP03	15	15	0
PP0040142	Submit Final Work Plan (QAPP/SAP/DQOs)	2		29SEP03	0	0	0
PP0040220	Prepare Final HASP	2	29SEP03*	17OCT03	15	15	0
PP0040222	Submit Final HASP	2		18SEP03	0	0	0
FIELD INVESTIGATION							
MOD 02							
PP0050103	Field Authorization	1	30SEP03		0	0	0
PP0050105	Field Operations Management	1	30SEP03	24NOV03	55*	55*	0
PP0050120	DPT Advancement and Sampling	1	10OCT03	12OCT03	3	3	0
PP0050125	Groundwater Sampling	1	13OCT03	13OCT03	1	1	0
PP0050140	Water Level Measurements	1	14OCT03	14OCT03	1	1	0
PP0050145	Media Sampling	1	15OCT03	15OCT03	1	1	0
PP0050165	Land Surveying	1	16OCT03	16OCT03	1	1	0
PP0050200	IDW Management	1	23NOV03	24NOV03	2	2	0
PP0050222	End Field Operations	1		24NOV03	0	0	0



Start Date	31MAR95	NAVA - CX88	Sheet 2 of 4
Finish Date	26JAN05	**NAVY CLEAN III**	
Data Date	25AUG03	**TFMR SCHEDULE**	
Run Date	21AUG03 14:36	**Period Ending: 8/24/2003**	

Early Bar
Target Bar
Progress Bar
Critical Activity

TetraTech NUS

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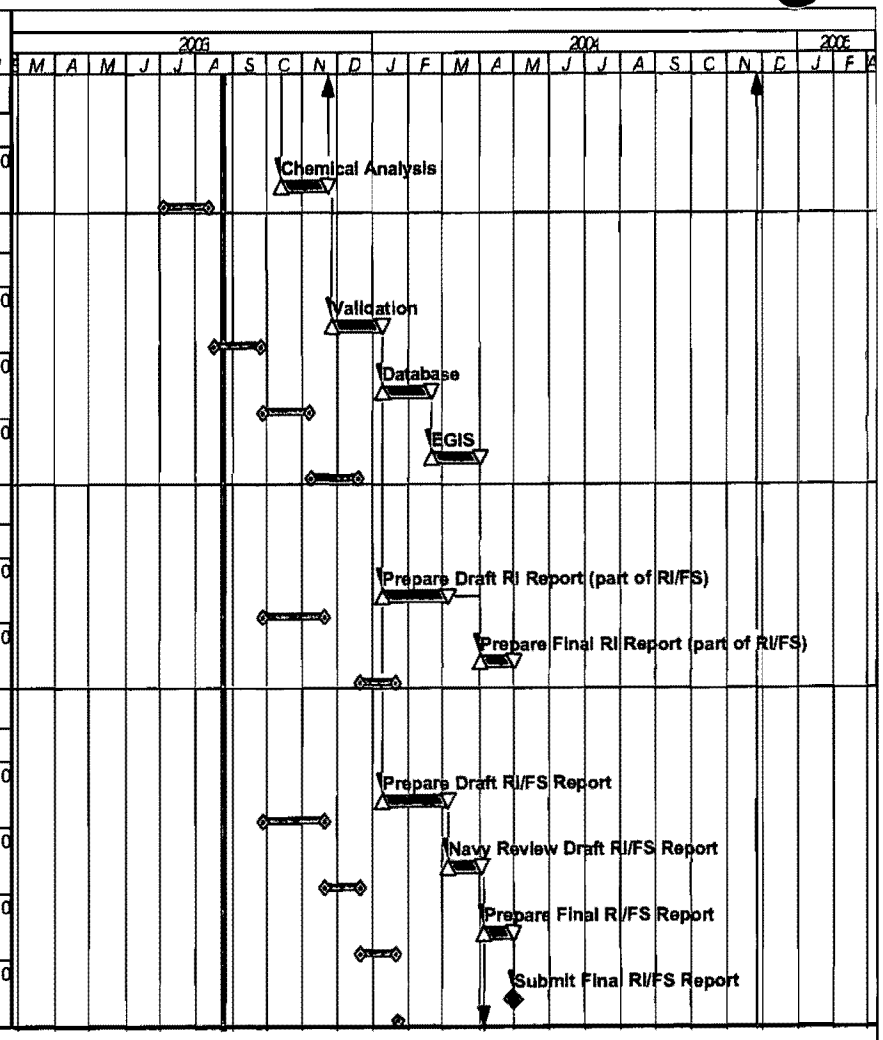
Activity ID	Activity description	Cal ID	Early Start	Early Finish	OD	RD	% Cmp
LABORATORY ANALYSES							
MOD 02							
PP0080110	Chemical Analysis	1	14OCT03	22NOV03	40	40	0
DATA MANAGEMENT							
MOD 02							
PP0070120	Validation	2	26NOV03	08JAN04	30	30	0
PP0070130	Database	2	09JAN04	19FEB04	30	30	0
PP0070145	EGIS	2	20FEB04	01APR04	30	30	0
RI / RFI REPORT							
MOD 02							
PP0090115	Prepare Draft RI Report (part of RI/FS)	2	09JAN04	04MAR04	40	40	0
PP0090150	Prepare Final RI Report (part of RI/FS)	2	02APR04	29APR04	20	20	0
FEASIBILITY STUDY / CMS							
MOD 02							
PP0110100	Prepare Draft RI/FS Report	2	09JAN04	04MAR04	40	40	0
PP0110105	Navy Review Draft RI/FS Report	1	05MAR04	03APR04	30	30	0
PP0110110	Prepare Final RI/FS Report	2	05APR04	30APR04	20	20	0
PP0110112	Submit Final RI/FS Report	2		30APR04	0	0	0



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Start Date	31MAR95
Finish Date	26JAN05
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NAVA - CX88

Sheet 3 of 4

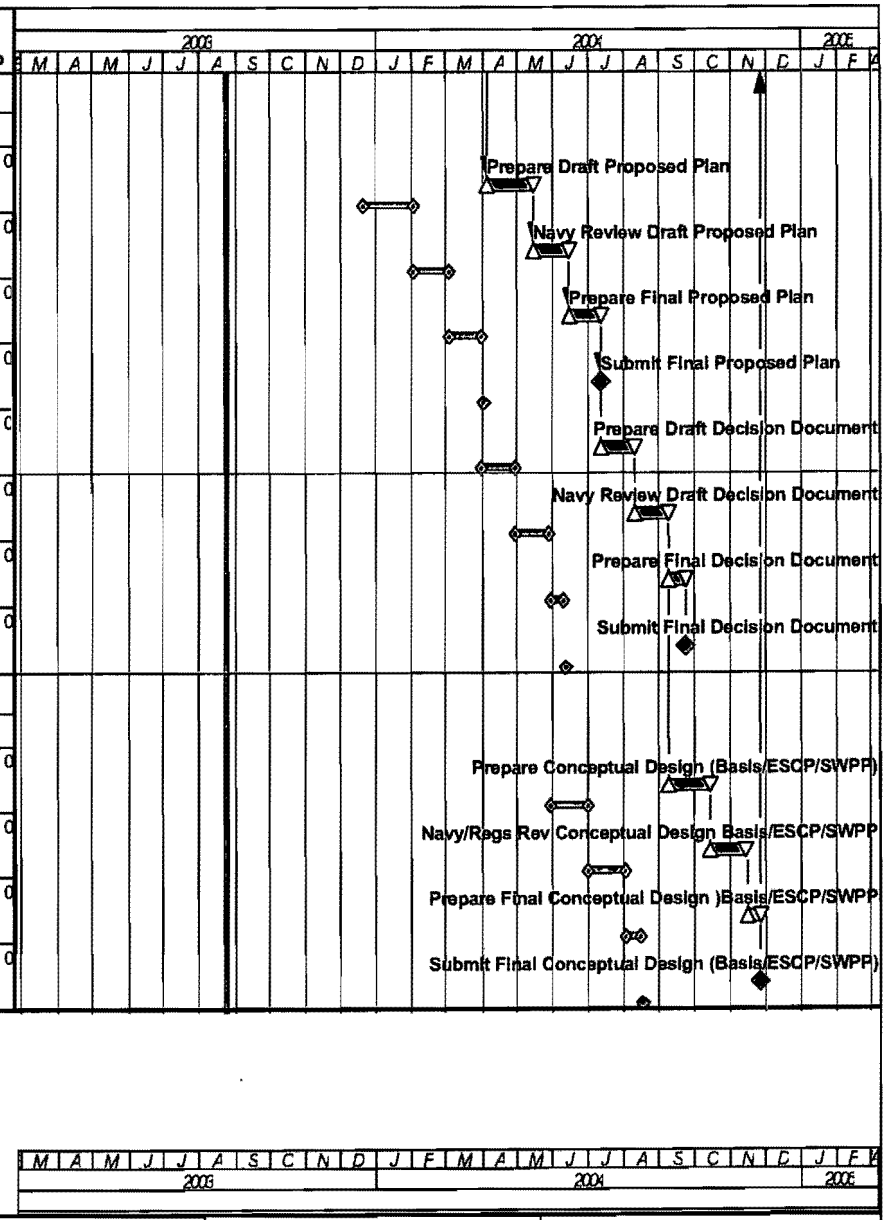
NAVY CLEAN III
TFMR SCHEDULE

Period Ending: 8/24/2003

Early Bar
Target Bar
Progress Bar
Critical Activity

TetraTech NUS

Activity ID	Activity description	Cal ID	Early Start	Early Finish	OD	RD	% Cmp
DECISION DOCUMENTS							
MOD 02							
PP0120100	Prepare Draft Proposed Plan	2	05APR04	14MAY04	30	30	0
PP0120105	Navy Review Draft Proposed Plan	1	15MAY04	13JUN04	30	30	0
PP0120120	Prepare Final Proposed Plan	2	14JUN04	12JUL04	20	20	0
PP0120122	Submit Final Proposed Plan	2		12JUL04	0	0	0
PP0120200	Prepare Draft Decision Document	2	13JUL04	09AUG04	20	20	0
PP0120210	Navy Review Draft Decision Document	1	10AUG04	08SEP04	30	30	0
PP0120220	Prepare Final Decision Document	2	09SEP04	22SEP04	10	10	0
PP0120222	Submit Final Decision Document	2		22SEP04	0	0	0
DESIGN							
MOD 02							
PP0140130	Prepare Conceptual Design (Basis/ESCP/SWPP)	2	09SEP04	13OCT04	25	25	0
PP0140140	Navy/Regs Rev Conceptual Design Basis/ESCP/SWPP	1	14OCT04	12NOV04	30	30	0
PP0140150	Prepare Final Conceptual Design)Basis/ESCP/SWPP	2	15NOV04	26NOV04	10	10	0
PP0140152	Submit Final Conceptual Design (Basis/ESCP/SWPP)	2		26NOV04	0	0	0



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Data Date	25AUG03
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NAVA - CX88

Sheet 4 of 4

NAVY CLEAN III
TFMR SCHEDULE

Period Ending: 8/24/2003

Early Bar
Target Bar
Progress Bar
Critical Activity

TetraTech NUS

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 Field Operations Leader (FOL) for the Site 10 RI field investigation will be Jason Bourgeois. Mr. Bourgeois is available at the Tallahassee, Florida office by phone at (850) 385-9899, by facsimile at (850) 385-9860, and by email at bourgeoisj@ttnus.com. During field operations, Mr. Bourgeois will be available at the NCBC Gulfport field office by phone at (228) 575-6286.

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

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APPENDIX A

QUALITY ASSURANCE PROJECT PLAN (QAPP)

Rev.1
09/04/03

QUALITY ASSURANCE PROJECT PLAN

REMEDIAL INVESTIGATION
FOR SITE 10
NAVAL CONSTRUCTION BATTALIAN CENTER GULFPORT
GULFPORT, MISSISSIPPI

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

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

CONTRACT NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0288

SEPTEMBER 2003

PREPARED UNDER THE SUPERVISION OF:

ROBERT FISHER, P.G.
TASK ORDER MANAGER
TETRA TECH NUS, INC.
TALLAHASSEE, FLORIDA

APPROVED FOR SUBMITTAL BY:

Paul V. Frank

PAUL V. FRANK
QUALITY ASSURANCE MANAGER
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APPENDIX

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B TtNUS Corporate SOP SA-6.3

Distribution List

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B. Fisher, TtNUS (2 copies)
M. Perry, TtNUS

ACRONYMS/ABBREVIATIONS

AA	Absorption Spectrophotometer
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
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	Polynuclear Aromatic Hydrocarbon
PARCC	Precision, Accuracy, Representativeness, Comparability, Completeness
PCB	Polychlorinated Biphenyl
PFK	Perfluorokerosene
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

ACRONYMS/ABBREVIATIONS (cont.)

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	micromohs 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
nq/kg	nanogram per kilogram
pq/L	pictogram/liter

1.0 PROJECT DESCRIPTION

1.1 INTRODUCTION

This Quality Assurance Project Plan (QAPP) has been prepared by Tetra Tech NUS, Inc. (TtNUS) on behalf of the United States Navy 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) 288. 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 April 2003, and the Health and Safety Plan (HASP), constitute the project planning documents for the remedial investigation to be performed at NCBC Gulfport Site 10, located in 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. The QA/QC procedures for this project are structured in accordance with applicable technical standards, the Naval Facilities Engineering Service Center (NFESC) guidance document "Navy Installation Restoration Chemical Data Quality Manual" (September 1999), and USEPA Region IV and MDEQ requirements, regulations, guidances, and technical standards.

1.2 FACILITY DESCRIPTION

A description of Site 10 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 objective of the work will be to support the preparation of a remedy for contamination at Site 10 that is protective of human health and the environment. In order to achieve this primary objective, additional samples from various media will be collected and analyzed to fill data gaps from previous investigations. Previous investigations at the site focused on PCB-related contaminants, therefore additional samples will be collected and analyzed to evaluate the nature and extent of other contaminants that may have been released at the site. Samples from various media will also be used to confirm the extent of PCB-related contamination previously documented at the site and evaluate the effect remedial actions have had on site conditions. Project objectives are discussed in more detail in Section 4.0 of the WP.

1.4.2 Project Target Parameters and Intended Data Uses

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

1.4.2.1 Field Parameters

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

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

- specific conductance,
- pH,
- turbidity,
- temperature,
- oxidation-reduction potential (ORP)

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

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

- soil headspace organic vapor concentration

The soil headspace organic vapor concentration will be used to select soil sample collection for off site laboratory analysis. The soil headspace organic vapor concentration will be measured using a portable flame-ionization detector (FID) or photo-ionization detector (PID) organic vapor analyzer. Further details regarding field-sampling methods are provided in Section 16 of the USEPA EISOPQAM.

1.4.2.2 Laboratory Parameters

The analytical methods to be used for the Site 10 groundwater, surface water, soil, and sediment samples have been selected based on data from previous investigations at NCBC Gulfport. The analytical data will be used to fill data gaps and determine the nature of the contamination at Site 10. The suite analyses for the Site 10 investigation includes:

- Target Compound List (TCL) Volatile Organic Compounds (VOCs),
- TCL Semi-Volatile Organic Compounds (SVOCs),
- TCL Polynuclear Aromatic Hydrocarbons (PAHs),
- TCL Pesticides/PCBs,
- Chlorinated Herbicides,
- Dioxins/Furans,
- Target Analyte List (TAL) metals and cyanide.

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

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* VOCs

NCBC GULFPORT SITE 10

Page 1 of 2

Parameter	Required Quantitation Limit	
	Solid Samples	Aqueous Samples
Volatile Organic Compounds	µg/kg	µg/L
Acetone	10	5
Benzene	10	1
Bromodichloromethane	10	1
Bromoform	10	1
Bromomethane	10	1
2-Butanone	10	5
Carbon disulfide	10	1
Carbon tetrachloride	10	1
Chlorobenzene	10	1
Chloroethane	10	1
Chloroform	10	1
Chloromethane	10	1
Dibromochloromethane	10	1
1,2-Dibromo-3-chloropropane	NA	1
1,2-Dibromoethane	10	1
1,2-Dichlorobenzene	NA	1
1,3-Dichlorobenzene	NA	1
1,4-Dichlorobenzene	NA	1
1,1-Dichloroethane	10	1
1,2-Dichloroethane	10	1
1,1-Dichloroethene	10	1
cis-1,2-Dichloroethene	NA	1
trans-1,2-Dichloroethene	NA	1

TABLE 1-1

SW-846 8260B ANALYTICAL QUANTITATION LIMITS
TCL* VOCs

NCBC GULFPORT SITE 10

Page 2 of 2

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

TABLE 1-2
SW-846 8270C ANALYTICAL QUANTITATION LIMITS
TCL* SVOCs

NCBC GULFPORT SITE 10

PAGE 1 OF 3

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

TABLE 1-2
SW-846 8270C ANALYTICAL QUANTITATION LIMITS
TCL* SVOCs

NCBC GULFPORT SITE 10

PAGE 2 OF 3

Parameter	Required Quantitation Limit	
	Solid Samples	Aqueous Samples
Semivolatile Organic Compounds	µg/kg	µg/L
Analyzedos	330	10
VOA Compounds	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* SVOCs

NCBC GULFPORT SITE 10

PAGE 3 OF 3

Parameter	Required Quantitation Limit	
	Solid Samples	Aqueous Samples
Semivolatile Organic Compounds	µg/kg	µg/L
Phenol	330	10
Pyrene	330	10
VOA compound	330	10
2,4,5-Trichlorophenol	830	25
2,4,6-Trichlorophenol	330	10
Benzaldehyde	NA	10
Acetaphenone	NA	10
Caprolactam	NA	10
1-1-'Biphenyl	NA	10
Atrazine	NA	10

TABLE 1-3
SW-846 8081A ANALYTICAL QUANTITATION LIMITS
TCL* PESTICIDES

NCBC GULFPORT SITE 10

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

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

TABLE 1-4
SW-846 8082A ANALYTICAL DETECTION LIMITS
TCL* PCBs

NCBC GULFPORT SITE 10

Parameter	Required Quantitation Limit	
	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

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

TABLE 1-5

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

NCBC GULFPORT SITE 10

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

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

TABLE 1-6
SW-846 8290 ANALYTICAL DETECTION LIMITS
DIOXIN/FURAN LIST

NCBC GULFPORT SITE 10

PAGE 1 OF 2

Parameter	Required Quantitation Limit	
	Solid Samples	Aqueous Samples
Dioxins/Furans	Nq/kg	Pq/L
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
1,2,3,7,8,9-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 1-6
SW-846 8290 ANALYTICAL DETECTION LIMITS

DIOXIN/FURAN LIST

NCBC GULFPORT SITE 10

PAGE 2 OF 2

Parameter	Required Quantitation Limit	
	Solid Samples	Aqueous Samples
Dioxins/Furans	Nq/kq	Pq/L
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	2.5	0.025
1,2,3,6,7,8-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

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

NCBC GULFPORT SITE 10

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

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

2.0 PROJECT ORGANIZATION

The overall organization of the Site 10 remedial investigation is outlined in Figure 2-1. The various quality assurance and management responsibilities of key TtNUS project personnel are defined in the following paragraphs.

CLEAN Program Manager - The TtNUS Program Manager is 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. 288 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. 288 is Mr. Jason Bourgeois.

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.

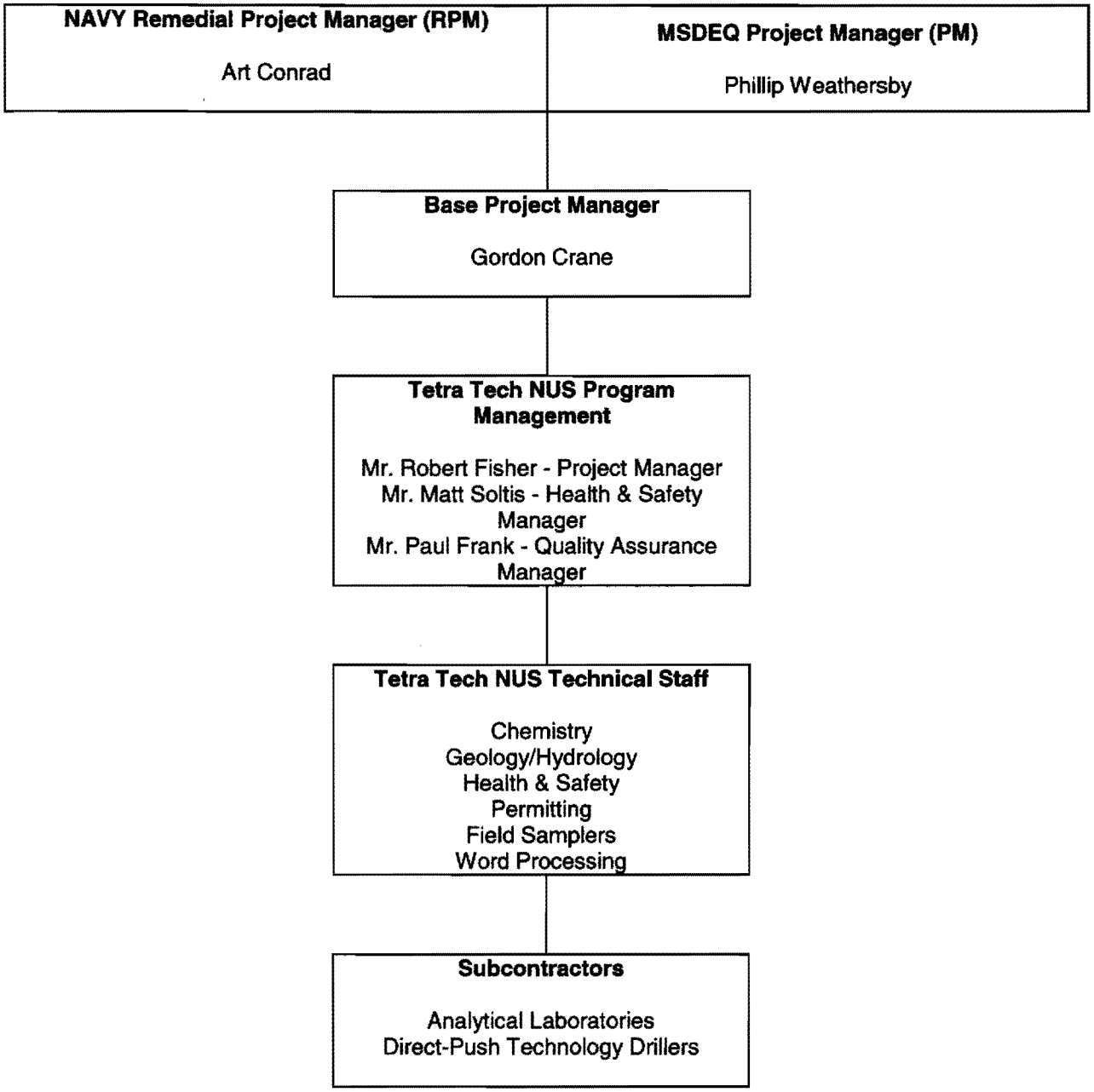
Quality Assurance Manager - The TtNUS Quality Assurance Manager (QAM) for this study is Mr. Paul Frank. The QAM operates independently of the TOM and is responsible for all Program-wide, quality assurance issues and the development of the Quality Assurance Project Plan (QAPP). The QAM

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. 288 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 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

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 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.

TABLE 3-1

PRECISION CONTROL LIMITS (RPDs)[1]
MATRIX SPIKE/MATRIX SPIKE (Organics) and DUPLICATE (Metals) SAMPLES
NCBC GULFPORT SITE 10, GULFPORT, MISSISSIPPI
PAGE 1 of 2

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
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 10, GULFPORT, MISSISSIPPI
PAGE 2 of 2

Chemical	Aqueous Samples	Soil Samples
Pesticides [4]	**RPD**	**RPD**
All pesticides	25	25
PCBs [5]	**RPD**	**RPD**
Aroclor 1254	20	20
Aroclor 1260	20	20
Herbicides [6]	**RPD**	**RPD**
All herbicides	20	NA
Dioxins/Furans [7]	**RPD**	**RPD**
All dioxins/furans	25	25
Metals [8]	**RPD**	**RPD**
All 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 8081A.

[5] USEPA Method SW-846 8082.

[6] USEPA Method SW-846 8151.

[7] USEPA Method SW-846 8290.

[8] USEPA Method SW-846 6010B.

NA Not Applicable

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, Pesticides/PCBs, Herbicides, Dioxin/Furans, and metals. Tables 3-3 and 3-4 present control limits for matrix and surrogate spike recoveries, respectively, for VOCs, SVOCs, Pesticides/PCBs, Herbicides, Dioxin/Furans, and metals.

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 Site 10 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 10, GULFPORT, MISSISSIPPI
Page 1 of 2

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
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 10, GULFPORT, MISSISSIPPI
Page 2 of 2

Chemical	Aqueous Samples	Soil Samples
Pesticides [4]	**%R**	**%R**
All pesticides	75 - 125	50 - 140
PCBs [5]	**%R**	**%R**
Aroclor 1254	85 - 115	84 – 116
Aroclor 1260	80 – 120	78 - 122
Herbicides [6]	**%R**	**%R**
All herbicides	75 – 125	NA
Dioxins/Furans [7]	**%R**	**%R**
All dioxins/furans	70 - 130	25
Metals [8]	**%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 8081A.

[5] USEPA Method SW-846 8082.

[6] USEPA Method SW-846 8151.

[7] USEPA Method SW-846 8290.

[8] USEPA Method SW-846 6010B.

NA Not Applicable

TABLE 3-3

ACCURACY CONTROL LIMITS (%R)[1]

MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLES

ORGANIC and METAL ANALYSES
NCBC GULFPORT SITE 10, GULFPORT, MISSISSIPPI
Page 1 of 2

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
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 10, GULFPORT, MISSISSIPPI
Page 2 of 2

Chemical	Aqueous Samples	Sediment Samples
Pesticides [4]	***%R***	***%R***
All pesticides	75 - 125	50 - 140
PCBs [5]	***%R***	***%R***
Aroclor 1254	85 - 115	84 – 116
Aroclor 1260	80 – 120	78 - 122
Herbicides [6]	***%R***	***%R***
All herbicides	75 – 125	NA
Dioxins/Furans [7]	***%R***	***%R***
All dioxins/furans	70 - 130	25
Metals [8]	***%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 8081A.

[5] USEPA Method SW-846 8082.

[6] USEPA Method SW-846 8151.

[7] USEPA Method SW-846 8290.

[8] USEPA Method SW-846 6010B.

NA Not Applicable

TABLE 3-4

ACCURACY CONTROL LIMITS (%R)[1]
SURROGATE SPIKES
ORGANIC ANALYSES
NCBC GULFPORT SITE 10, 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
o-Terphenyl	30 – 130	30 – 130
p-Terphenyl	30 - 130	30 - 130
Pesticides [4]	**%R**	**%R**
decachlorobiphenyl	40 – 140	40 – 140
Tetrachloro-m-xylene	50 - 125	50 - 125
PCBs [5]	**%R**	**%R**
decachlorobiphenyl	40 – 140	40 – 140
Herbicides [6]	**%R**	**%R**
2,4-dichlorophenylacetic Acid	50 - 150	NA
Dioxins/Furans [7]	***%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 8081A.

(5) USEPA Method SW-846 8082.

(6) USEPA Method SW-846 8151.

(7) USEPA Method SW-846 8290.

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 10 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 Table 8-1.

4.0 Data Quality Objectives

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 during this process establish the data collection design and define:

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

Satisfying the DQOs will result in a data collection design that meets all performance criteria and any other requirements. The DQO Process has been conducted, by all involved parties, on an informal basis throughout the investigation of Site 10.

4.1 Project objective

The primary objective of the work will be to support the preparation of a remedy for contamination at Site 10 that is protective of human health and the environment. In order to achieve this primary objective, additional samples from various media will be collected and analyzed to fill data gaps from previous investigations. Previous investigations at the site focused on PCB-related contaminants, therefore additional samples will be collected and analyzed to evaluate the nature and extent of other contaminants that may have been released at the site. Samples from various media will also be used to confirm the extent of PCB-related contamination previously documented at the site and evaluate the effect remedial actions have had on site conditions.

4.2 SELECTION OF MEDIA

Subsurface soil, surface water, sediment, and groundwater samples will be collected to determine the nature and extent of the contamination at Site 10.

4.2.1 Soil Data

Soil samples will be collected from within the drainage ditch and areas to the north and south of the release area. Subsurface soil samples will be collected continuously from the ground surface to the top of a clay layer at a depth of approximately twenty-eight feet. This will provide data detailing the

distribution of contaminants and the lithology of the subsurface soil at Site 10. The subsurface soil sample data will be compared to groundwater sample data to determine if contaminants in the subsurface soil impact site groundwater.

4.2.2 Sediment/Surface Water Data

Sediment and surface water samples will be collected from the drainage ditch. The data from the sediment samples will be used to determine if contamination from the release area is being directly transferred from the site by sediment movement within the ditch.

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

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

4.2.3 Groundwater Data

Groundwater samples will be collected from monitoring wells strategically located throughout Site 10. Groundwater sample data will be compared to subsurface soil and surface water data to determine if contaminants in the subsurface soil impact site groundwater or if groundwater contaminants impact surface water in the ditch.

4.3 SELECTION OF ANALYSES

Analytical parameters were chosen based on the potential for release at Site 10. A wide range of materials have been used and disposed of at NCBC Gulfport, therefore it was determined that a "full analytical suite" be conducted on the environmental samples. The samples collected at Site 10 will be analyzed for the following:

- TCL VOCs,
- TCL SVOCs,
- TCL Pesticides/PCBs,
- TAL Metals and Cyanide,
- Appendix IV Chlorinated Herbicides
- Chlorinated Dioxins/Furans

Dioxins/Furans samples will not collected from soil borings installed in areas of known PCB contamination due to analytical interference. Based on previous investigations and knowledge of past disposal practices at NCBC Gulfport, the selected analyses should provide a suitable assessment of the nature of the contamination at Site 10.

4.4 DATA QUALITY ASSESSMENT

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

4.5 SAMPLING AND MEASUREMENT PROCEDURES

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

5.0 SAMPLING PROCEDURES

The specific types of field sampling for the NCBC Gulfport Site 10 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 5.3.2 TtNUS CompQAP
- Sample packaging and shipping procedures – Appendix D, EISOPQAM
- Recordkeeping – TtNUS Corporate SOP SA-6.3 (Appendix B)

6.0 CUSTODY PROCEDURES

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

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

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 calibration and each continuing calibration and must meet all method-specified criteria before analysis may continue. Initial calibration is required before any samples are analyzed and must include a blank and a minimum of five different concentrations as specified in the method. A DFTPP tuning check and a continuing calibration check, including the mid-range standard and a blank, must be performed at the beginning of each 12-hour period during which analyses are performed.

7.2.3 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 Perfluorokerosene (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 GC Pesticide/PCB/Herbicide Analyses

For Pesticide/PCB/Herbicide, the gas chromatograph (GC) system will be calibrated in accordance with the appropriate analytical method. Initial calibration is required before any samples are analyzed and must include a blank and a minimum of five different concentrations as specific 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 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.

7.2.6 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.

7.2.7 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, and
- ORP.

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

- Soil headspace organic vapor

Measurement of field parameters and calibration of field instruments are discussed in Section 16 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.

Environmental samples submitted for VOC, SVOC, Pesticide/PCB, Herbicide, Dioxin/Furan, or inorganic analysis will be analyzed in accordance with current SW-846 methods. Groundwater samples for miscellaneous parameter analyses will be analyzed in accordance with current EPA approved methods. Table 8-1 provides a summary of the laboratory analytical methods for the NCBC Gulfport Site 10 sampling program.

A complete list of the target compounds/analytes RQLs is provided in Section 1.4.2.2 of this QAPP. Data generated through use of the SW-846 method protocols will be reported to the RQL for nondetected compounds from organics analysis. Compounds which are positively identified and which can be

quantitated at concentrations less than the RQL, but above the calculated method detection limit (MDL) will be reported as specified in the appropriate analytical method. Inorganic analytes which are positively identified will be reported to the Instrument Detection Limit (IDL). Environmental data generated through use of non-SW-846 methods will be reported to the laboratory's Reporting Limit (RL). An analyte's RL is an expression of the method 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 10, GULFPORT, MISSISSIPPI

Analytical Parameter	Analytical Method
TCL Volatile Organics	SW-846 8260B (25mL purge)
TCL Semi-Volatile Organics	SW-846 8270C
TCL Pesticides	SW-846 8081A
TCL PCBs	SW-846 8082
Herbicides	SW-846 8151
Dioxins/Furans	SW-846 8290
Cyanide	SW-846 9012
TAL Metals	SW-846 6010

TCL – Target Compound List
TAL – Target Analyte List

9.0 PREVENTIVE MAINTENANCE PROCEDURES

Measuring equipment used in environmental monitoring or analysis for the NCBC Gulfport Site 10 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 INSTURMENT PREVENTIVE MAINTENANCE

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

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

9.2.1 Major Instruments

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

The use of manufacturer recommended grades or better of supporting supplies and reagents is also a form of preventive maintenance. For example, gases used in the various 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 equipment item that the discrepancy has occurred before the condition of the samples is compromised.

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

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

TABLE 9-1

TYPICAL PREVENTIVE MAINTENANCE FOR KEY ANALYTICAL INSTRUMENTS NCBC GULFPORT SITE 10, GULFPORT, MISSISSIPPI

Instrument	Preventive Maintenance	Maintenance Frequency
GC/MS	Bake oven, replace septum, check carrier gas, clip column, clean injection port. Replace solvent washes and clean syringe.	As required. Daily.
GC	Bake oven, replace septum, check carrier gas, clip column, clean injection port. Replace solvent washes and clean syringe.	As required. Daily.
HRGC/HRMS	Bake oven, replace septum, check carrier gas, clip column, clean injection port. Replace solvent washes and clean syringe.	As required. Daily.
ICP	Change sample introduction tubing, clean nebulizer, clean spray chamber, clean torch, manual profile, and automatic profile optics.	As required.
CVAA	Change sample introduction tubing, change drying cell, re-zero detector	As required
GFAA	Clean contact cylinders, replace/clean tube, check lamp 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's 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), method blanks must not contain detected levels of target analytes greater than the reported quantitation limits (above 2.5X the RQL for methylene chloride and above 5X the RQL for acetone and 2-butanone). Under no circumstances are laboratory method blank contaminant values subtracted from environmental sample analysis results.

Matrix spike 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 method. Aqueous LCS results must fall within the control limits specified in the analytical method, where applicable, or established by the laboratory. Aqueous LCSs shall be analyzed utilizing the same sample preparations, analytical methods, and QA/QC procedures as employed for the samples.

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

11.0 DATA REDUCTION, VALIDATION, AND REPORTING

This section describes the procedures to be used for data reduction, review, and reporting for the NCBC Gulfport Site 10 sampling program. 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 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, the data files will be relinquished to the Navy.

11.1 DATA REDUCTION

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

11.1.1 Field Data Reduction

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

The field parameters will be recorded in the site logbook or on sample 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 groundwater parameter measurements will be recorded and reported in the following units:

- Hydronium ion concentration (standard pH units)
- Temperature (degrees Celsius)
- Specific Conductance (ms/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.

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

- Organic vapor concentration in parts per million (ppm)

11.1.2 Laboratory Data Reduction

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

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

- Volatile organics - µg/L
- Semi-Volatile organics - µg/L
- Pesticides - µg/L
- PCBs – ug/L
- Herbicides – ug/L
- Inorganics (metals) – mg/L
- Dioxins/Furans – pq/L

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

- Volatile organics - µg/kg
- Semi-Volatile organics - µg/kg
- Pesticides – µg/kg
- PCBs - 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 10 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. The field data entered into the electronic database will be independently reviewed for transcription errors. A comparison will be made of the number of samples actually collected relative to number of samples planned for collection to ensure that the intended samples have been collected.

11.2.2 Laboratory Data Review

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

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

- 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 guidance to define the criteria for the full data validation items.

11.3 DATA REPORTING

11.3.1 Field Measurement Data Reporting

Field data will be reported in the units discussed in Section 10.1.1. The Report will include a comprehensive database including all field measurements. Field measurements will be transferred from the site logbook or sample 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.

Hard copy 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).

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:

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

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.

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

12.5 DATA USABILITY ASSESSMENT

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

Technical Criteria

Accuracy, precision, and duplicate assessments (the calculations are detailed in Sections 12.1, 12.2, and 12.4, respectively) are based on the technical criteria listed in Section 3 of this QAPP. A completeness assessment is also performed. The data must meet 95% completeness (the calculation is detailed in Section 12.3) to fulfill the completeness standard as stated in Section 3.3 of this QAPP. Guidelines established in the USEPA National Functional Guidelines for Organic Data Review (October 1999), the USEPA National Functional Guidelines for Inorganic Data Review (February 1994), and the NFESC guidelines "Navy Installation Restoration Chemical Data Quality Manual" (September 1999) will be used as 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 approval (in conjunction with USEPA Region IV and MDEQ) will be obtained. The FOL is responsible for initiating FTMRs; an FTMR will be initiated for all deviations from the Project Plan documents, as applicable. An example of an FTMR is provided as Figure 14-1. Copies of all FTMRs will be maintained with the onsite project planning documents and will be placed in the final evidence file.

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

FIGURE 14-1

TETRA TECH NUS, INC.
FIELD TASK MODIFICATION REQUEST FORM

_____ _____ _____
Client Identification Project Number FTMR Number

To_____Location_____Date_____

Description:

_____
_____
_____
_____

Reason for Change:

_____
_____
_____
_____

Recommended Disposition:

_____
_____
_____
_____

_____
Field Operations Leader (Signature, if applicable) Date

Disposition:

_____
_____
_____
_____

_____
Task Order Manager (Signature, if required) Date

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

Others as required_____
_____
_____
_____

14.2 LABORATORY CORRECTIVE ACTION

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

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

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

14.3 CORRECTIVE ACTION DURING DATA REVIEW AND DATA ASSESSMENT

The need for corrective action may become apparent during data review and assessment. Data is sometimes qualified or rejected due to 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 10 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 data review letter reports address major and minor laboratory noncompliances as well as noted sample matrix effects. In the event that major problems occur with the analytical laboratory (e.g., holding time 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.