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NCBC GULFPORT
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LETTER REGARDING THE REMEDIAL INVESTIGATION AND TREATABILITY STUDY WORK
PLAN ADDENDUM LETTER REPORT SITE 4 NCBC GULFPORT MS
12/2/2005
TETRA TECH NUS

**TETRA TECH NUS, INC.**

3360 Capital Circle N.E., Suite B • Tallahassee, FL 32308
Tel 850.385.9899 • Fax 850.385.9860 • www.tetrattech.com

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December 2, 2005

Project Number 9666

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Art Conrad
2155 Eagle Drive
North Charleston, South Carolina 29406

Reference: Clean Contract No. N62467-94-D0888
Contract Task Order No. 0283

Subject: Remedial Investigation and Treatability Study Work Plan
Addendum Letter Report for Site 4
Naval Construction Battalion Center (NCBC)
Gulfport, Mississippi

Dear Mr. Art Conrad:

Tetra Tech NUS (TtNUS), under contract to the U. S. Department of the Navy, Southern Division, Naval Facilities Command (NAVFAC EFD SOUTH), has prepared this Remedial Investigation (RI) and Treatability Study Work Plan Addendum for Site 4 at 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 primary objective of the RI at Site 4 is to support the selection of a remedial option that is protective of human health and the environment. In order to achieve this primary objective, samples from various media were collected and analyzed to fill data gaps from previous investigations and to evaluate the extent of contamination previously identified at the site. This document describes the field activities, laboratory analyses, and data management that will be performed to supplement the Site 4 RI.

SITE BACKGROUND AND HISTORY

Part of the RI focused on a plume of volatile organic compound (VOC) contaminated groundwater detected in 1997. During the RI, groundwater samples were collected using direct push technology (DPT) from 25 locations for VOC analysis and groundwater samples were collected for full suite analysis from 13 monitoring wells (Figure 1). The following is a brief summary of preliminary RI results:

- VOCs were detected in groundwater samples at concentrations exceeding risk based screening criteria.
- The VOC plume at Site 4 remains at concentrations similar to those detected in 1997 and 1999.
- The area of greatest dissolved VOC concentration appears to have migrated downgradient over time.

- The horizontal extent of the plume has not been fully delineated in the southwest corner of the site near Seventh Street or on the northwest side of Canal 1 (Figure 1).
- The lithology of the site includes discontinuous clay and sandy clay horizons that may influence vertical distribution of contaminants.
- Analysis of natural biodegradation indicator parameters (e.g. dissolved oxygen, reduction/oxidation potential, etc.) indicates that reducing conditions are present in site groundwater.

Data collected to this point suggest that the phenomena known as DCE stall has occurred in the dissolved VOC plume at Site 4. DCE stall in groundwater systems results when insufficient electron acceptors or substrates or adverse environmental conditions prevent further biologically mediated reductive dechlorination of VOCs.

The contaminants in Site 4 groundwater will require measures to eliminate or minimize exposure by active cleanup, engineering controls, and/or institutional controls. A detailed evaluation of alternatives to achieve this goal will be presented in a Feasibility Study (FS) for Site 4.

WORK PLAN RATIONALE

This document is an Addendum to the "Work Plan for Remedial Investigation at Site 4 – Golf Course Landfill" (TINUS, 2004). The goal of the RI Addendum and treatability study fieldwork is to fill data gaps identified from the previous investigation. Additional DPT groundwater sampling will be conducted to further delineate the horizontal and vertical extent of VOC plume. The results from the DPT sampling will be used to select locations for installation of permanent groundwater monitoring wells. Application of biostimulation, augmentation or chemical oxidation technologies may be appropriate at sites where DCE stall has occurred; therefore, during the Treatability Study, soil and groundwater samples will be analyzed for geochemical and biochemical parameters to support the evaluation of selected technologies as remedial action alternatives during the FS.

DATA QUALITY

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. 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

The DQOs for Site 4 are presented in Section 4.0 of the Quality Assurance Project Plan (QAPP) which is located in Appendix B of the RI Work Plan (TINUS, 2004).

FIELD ACTIVITIES

Field activities conducted for the RI and treatability study will include:

- DPT
- Soil and groundwater sampling
- Monitoring well installation
- Sample management
- IDW management

Field activities will be conducted in accordance with the site specific Health and Safety Plan (HASP) and the RI Work Plan (TtNUS, 2004). Detailed descriptions of field procedures are located in the RI Work Plan (TtNUS, 2004).

A Treatability Study work plan Addendum will be prepared following the delineation and characterization sampling field activities and will detail the final design for the treatability study.

PLUME DELINEATION AND CHARACTERIZATION

Up to 20 DPT borings will be advanced to delineate the horizontal and vertical extent of the CVOC plume in groundwater (Figure 2). Up to 5 groundwater samples will be collected per boring for on site CVOC analysis in a mobile laboratory (Table 1). The intervals selected for analysis will be based on field observation of lithology changes and field screening for organic vapors.

To further characterize the geochemical environment to aid in final design for the treatability study, up to three temporary monitoring points will be installed using DPT. Soil and groundwater samples collected from these monitoring points will be analyzed at an off site laboratory for CVOCs and natural attenuation parameters (Table 1).

WELL INSTALLATION/BASELINE SAMPLING

Additional monitoring wells will be installed to provide long term monitoring locations to evaluate the plume behavior. Locations for the new monitoring wells will be based on the results of the delineation and characterization activities. Estimated locations for the new wells are shown on Figure 2. The monitoring wells will be installed in shallow and deep pairs using standard hollow stem auger drilling techniques. The shallow wells will be installed to total depths of approximately 25 feet and the deep wells will be installed to total depths of approximately 40 feet. Details of well installation and development are included in the RI work plan (TtNUS, 2004).

Baseline groundwater samples will be collected from seven existing monitoring wells, the eight new monitoring wells, and the three temporary monitoring points and analyzed at an off site laboratory for CVOCs (Table 1). A round of static water level measurements will be conducted, including the permanent monitoring wells and the temporary monitoring points.

TREATABILITY STUDY

Following the completion of the delineation and baseline sampling tasks, a treatability study work plan addendum will be prepared to detail the final design for the treatability study, including the application concentrations and techniques for the selected technology and the performance monitoring protocol.

One test cell will be established for application of the selected technology (Figure 3) and will incorporate the temporary monitoring points installed for the site characterization sampling.

Based on the results of the delineation and characterization sampling, an appropriate remedial technology will be chosen for the treatability study.

Previous site investigations indicate that reducing conditions are present in the shallow aquifer in the landfill areas of Site 4, suggesting that technologies which enhance reductive dechlorination of CVOCs should be suitable for this site. These include the addition of fast acting (lactate) or slow acting (vegetable oil or HRC) organic substrates and microorganisms known to degrade less chlorinated CVOCs (e.g. *Dehalococcoides* [DHC]). If the delineation and characterization

sampling indicate that reductive dechlorination is not suitable for Site 4, a chemical oxidizer (potassium permanganate) may be selected for application.

The selected material will be applied to the test cell through direct injection using DPT equipment (up to 5 locations) or through the temporary monitoring points (3 locations) that will be installed at the test cell.

PERFORMANCE MONITORING

To evaluate the efficacy of the technology chosen for the treatability study, two rounds of performance monitoring sampling will be conducted. The performance monitoring schedule will be based on the nature of the selected technology.

For the first performance monitoring event, groundwater samples will be collected from the three temporary monitoring points and up to two permanent monitoring wells and analyzed at an off site laboratory for CVOCs. Groundwater samples from three selected sample locations will also be analyzed for natural attenuation parameters (Table 1).

For the second performance monitoring event, groundwater samples will be collected from the three temporary monitoring points and two permanent monitoring wells and analyzed at an off site laboratory for CVOCs. Groundwater samples from three selected sample locations will also be analyzed for natural attenuation parameters (Table 1). Soil samples will also be collected at three monitoring points installed for site characterization and analyzed at an off site laboratory for CVOCs and natural attenuation parameters (Table 1). The performance monitoring analytical results will be compared to the baseline data.

A letter report summarizing the treatability study will be prepared following completion of the performance monitoring. The letter report will document test layout, technology application, and performance monitoring results. The conclusions based on the treatability study results will also be incorporated into the RI report and FS for the site where appropriate.

DATA MANAGEMENT

The Data Management Plan (DMP) is included in Appendix A of the RI Work Plan (TtNUS, 2004) and outlines the project-specific procedures that will be used to manage the environmental information pertaining to Site 4. The methods to be used to manage the data generated during the field investigation include the tracking of data in the field and subsequent data validation.

Onsite data management involves the day-to-day recording of sampling and field activities in the field. The project database will be initiated in the field to promote the proper collection and storage of field data and documentation of field activities. Onsite data management requirements are presented in Appendix C of the QAPP, located in Appendix B of the RI Work Plan

(TtNUS, 2004). The FOL and/or sample coordinator will be responsible for entering the data into the database in the field. The following data will be entered into the project database:

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

The laboratory, field and natural attenuation data will be subjected to full validation. The data will be assessed using precision, accuracy, representativeness, completeness and comparability (PARCC) parameters using the National Validation Functional Guidelines for Organic Data Review (June 1991), the Laboratory Data Validation Functional Guidelines for Evaluation of Inorganic Analysis (June 1988), and the TtNUS SOPs in Appendix C of the QAPP (TtNUS, 2004).

INVESTIGATION DERIVED WASTE MANAGEMENT

For this field investigation, IDW management will include drum labeling, record keeping, and staging of materials. IDW generated during this investigation will include soil cuttings, development and purge water, and decontamination waste (water, solvents, and soap). The IDW drums will be labeled with the following information:

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

The drums will remain on site until the results of the characterization are completed. A facility representative will sign waste manifests and bills of lading associated with the transport and off-site disposal of IDW.

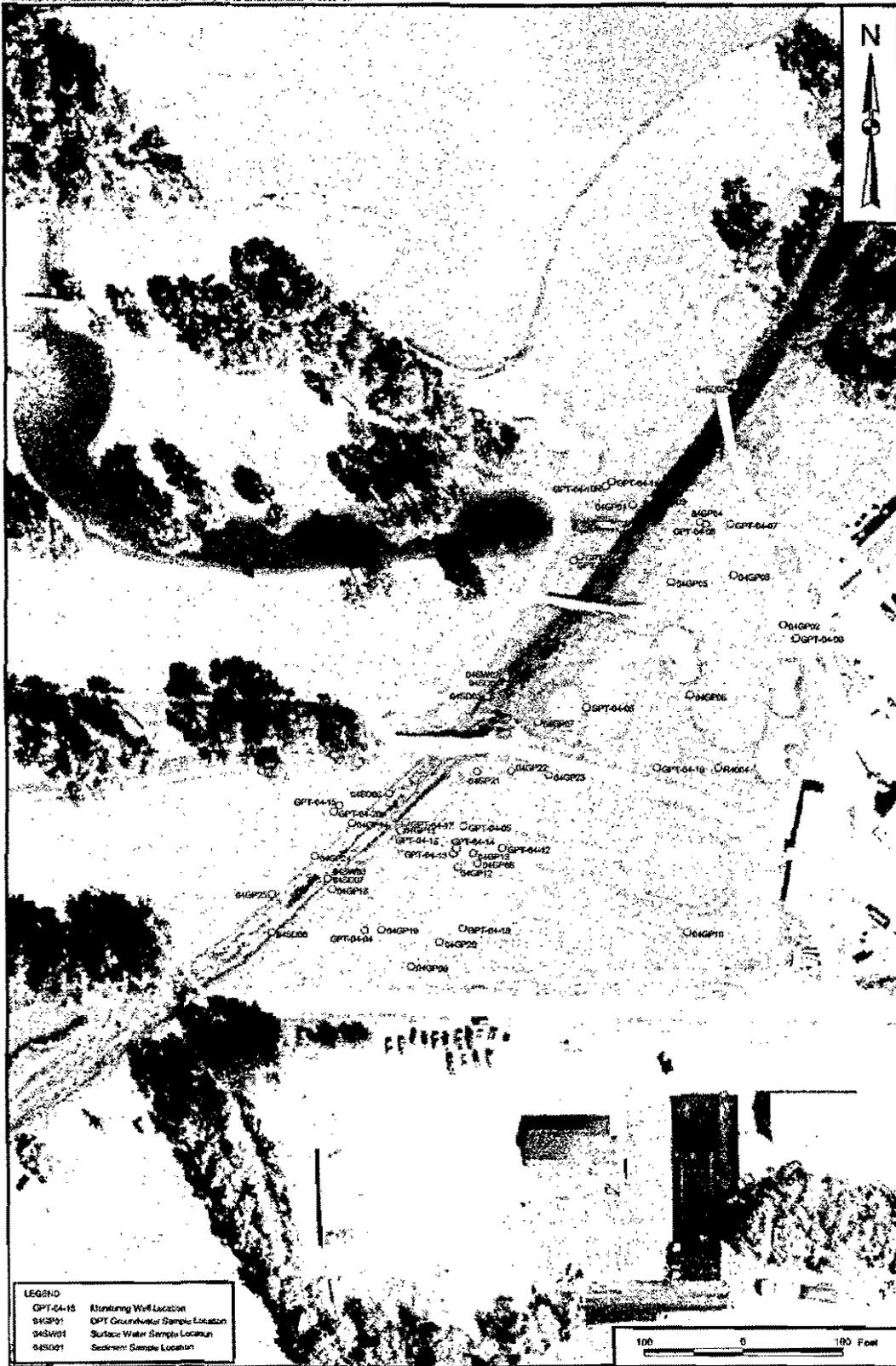
If you have any questions regarding the information presented in this document, please contact me by phone at (850) 385-9899, or via e-mail at fisher@ttnus.com.

Sincerely,



Robert Fisher
Task Order Manager

Enclosures: Gordon Crane, NCBC Gulfport
 Bob Merrill, MDEQ
 Debbie Humbert (Cover Letter Only)
 Mark Perry/File (Unbound)



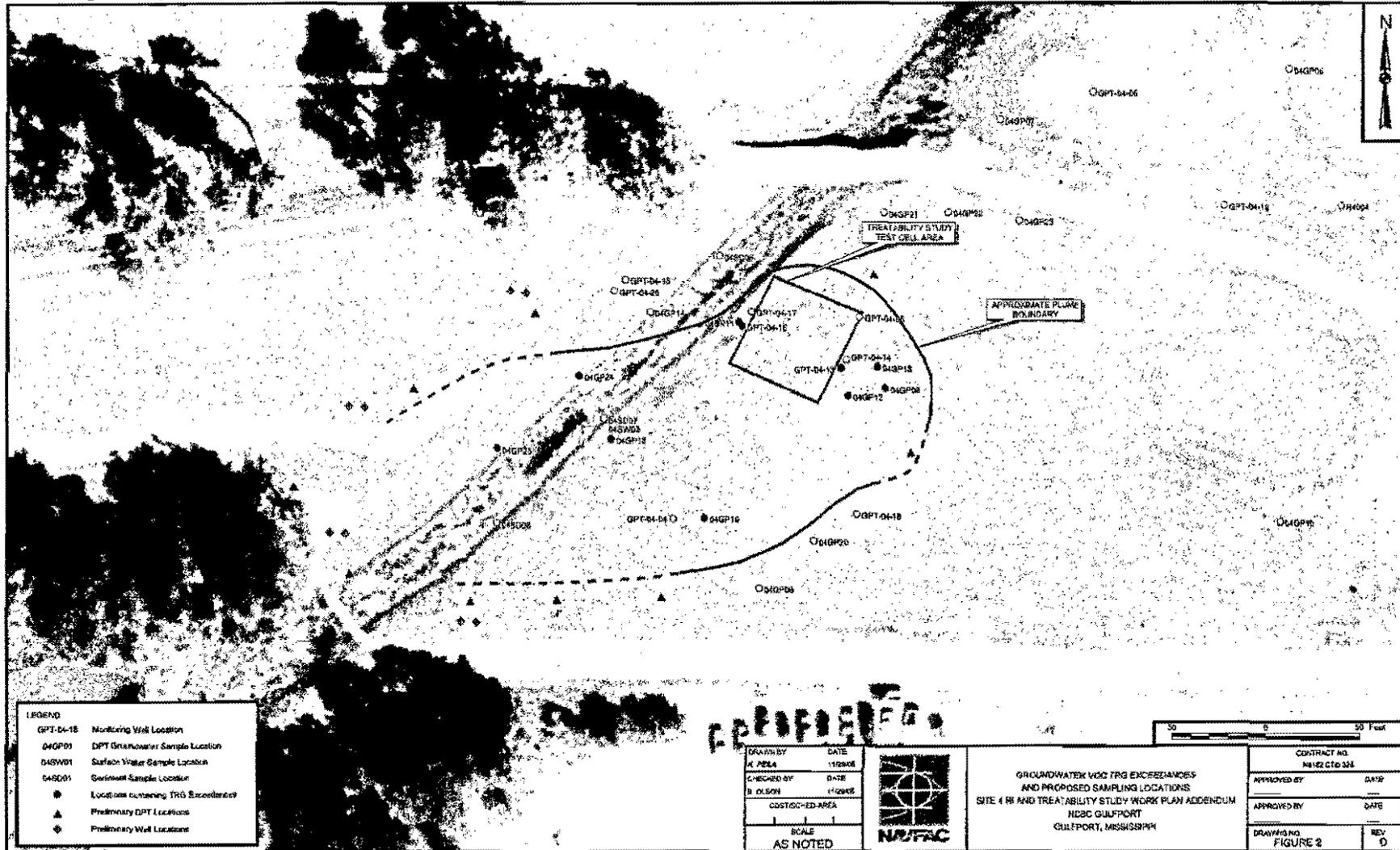
LEGEND
 QPT-04-15 Attenuating Well Location
 QASW01 Surface Water Sample Location
 QASD01 Sediment Sample Location

DESIGNED BY	DATE
C. P. BLA	11/05/95
DRAWN BY	DATE
B. D. S. O. P.	11/05/95
CLIENT	SCALE
NAVSTAR	AS NOTED



SITE 4 RI SAMPLING LOCATIONS
RI AND TREATABILITY STUDY WORK PLAN ADDENDUM
NEBO GULFPORT
GULFPORT, MISSISSIPPI

CONTRACT NUMBER NB152 CTO 325	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO.	REV.
FIGURE 1	6



LEGEND

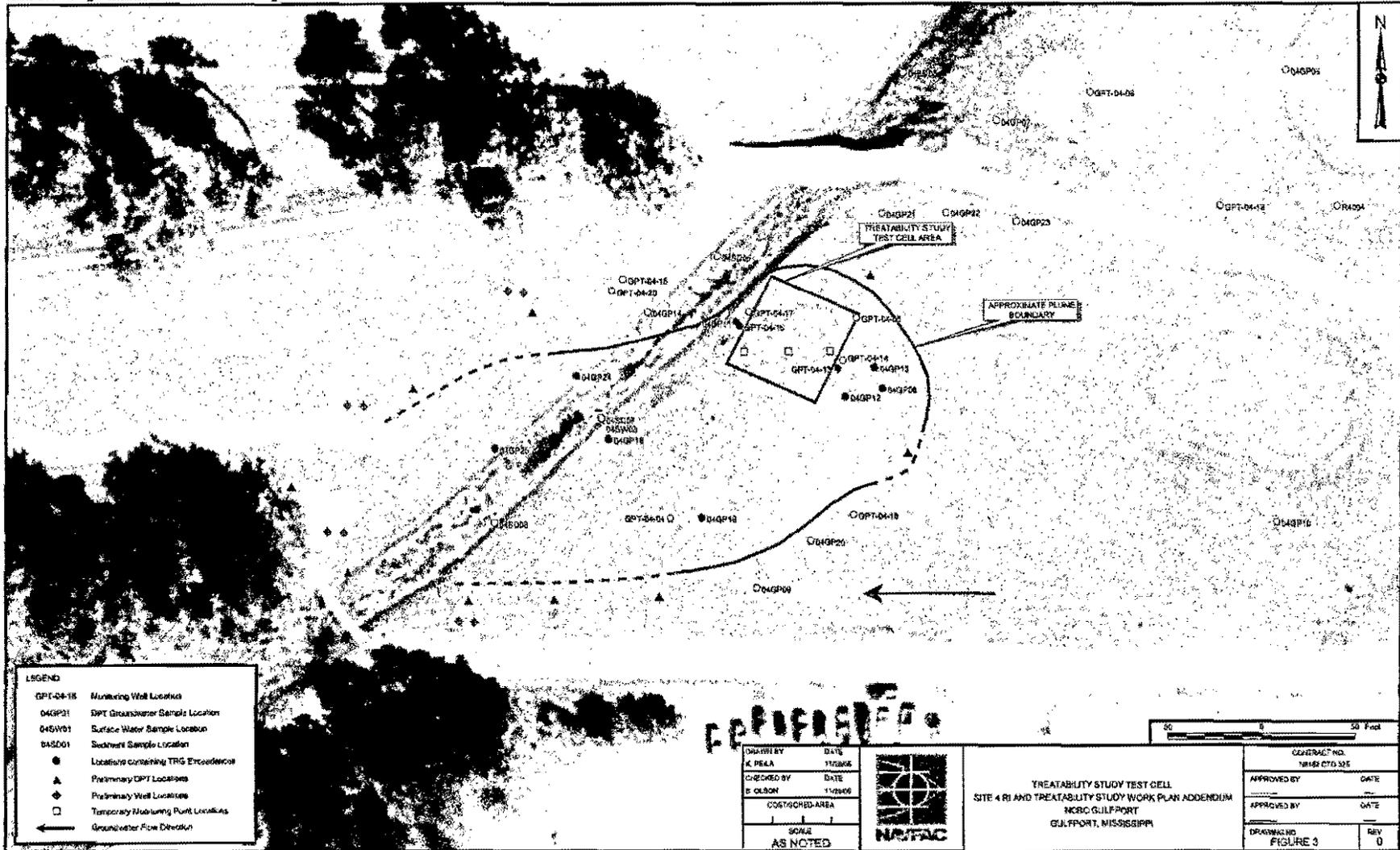
- GPT-04-15 Monitoring Well Location
- G4GP01 DPT Groundwater Sample Location
- G4SM01 Surface Water Sample Location
- G4SD01 Sediment Sample Location
- Locations exceeding TRG Exceedances
- ▲ Preliminary DPT Locations
- ◆ Preliminary Well Locations

DRAWN BY	DATE
A. REA	11/29/05
CHECKED BY	DATE
B. OLSON	11/29/05
COST/SC-ED AREA	
SCALE	
AS NOTED	



GROUNDWATER VOC TRG EXCEEDANCES
AND PROPOSED SAMPLING LOCATIONS
SITE 4 RI AND TREATABILITY STUDY WORK PLAN ADDENDUM
HCBG GULFPORT
GULFPORT, MISSISSIPPI

CONTRACT NO. HCBG CTO 051	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 2	REV. D



LEGEND

DPT-04-16	Monitoring Well Location
D45W01	SPT Groundwater Sample Location
D45W01	Surface Water Sample Location
D45S01	Sediment Sample Location
●	Locations containing TRG Evidence
▲	Preliminary DPT Locations
◆	Preliminary Well Locations
□	Temporary Monitoring Point Locations
←	Groundwater Flow Direction

DRAWN BY K. PEARL	DATE 11/23/05
CHECKED BY B. OLSON	DATE 11/23/05
COORDINATED AREA	
SCALE AS NOTED	



TREATABILITY STUDY TEST CELL
SITE 4 RI AND TREATABILITY STUDY WORK PLAN ADDENDUM
NACB GULFPORT
GULFPORT, MISSISSIPPI

GENERAL NO. 14148 CTS 3/05	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 3	REV 0

TAL
ANALYTICAL PROGRAM
SITE 4 REMEDIAL INVESTIGATION AND TREATABILITY STUDY WORKPLAN ADDENDUM
NCBC GULFPORT
GULFPORT, MISSISSIPPI

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EVENT 1

ANALYTICAL PARAMETER	LABORATORY METHOD	LOCATION TYPE	NUMBER OF LOCATIONS	SAMPLE MATRIX	NUMBER OF SAMPLES	QA/QC			
						FIELD DUP.	MS/MSD	RINSATE	TRIP BLANK
CVOCs	Mobile Lab 8260	DPT	20	GW	100				
CVOCs	SW-846 5035/8260B	MP	3	GW	3	1		1	1
Secondary MNA Parameters	Various	MP	3	GW	3				
Dissolved Gases	RSK SOP 147/157	MP	3	GW	3				
Volatile Fatty Acids		MP	2	GW	2				
Microorganisms	Baseline Community Analysis	MP	2	GW	2				
CVOCs	SW-846 5035/8260B	MP	3	SO	3				
Oxidant Demand		MP	3	SO	3				
Total Organic carbon		MP	3	SO	3				

EVENT 2

ANALYTICAL PARAMETER	LABORATORY METHOD	LOCATION TYPE	NUMBER OF LOCATIONS	SAMPLE MATRIX	NUMBER OF SAMPLES	QA/QC			
						FIELD DUP.	MS/MSD	RINSATE	TRIP BLANK
CVOCs	SW-846 5035/8260B	MW	15	GW	15	2	Y	1	1
CVOCs	SW-846 5035/8260B	MP	3	GW	3				

EVENT 4

ANALYTICAL PARAMETER	LABORATORY METHOD	LOCATION TYPE	NUMBER OF LOCATIONS	SAMPLE MATRIX	NUMBER OF SAMPLES	QA/QC			
						FIELD DUP.	MS/MSD	RINSATE	TRIP BLANK
CVOCs	SW-846 5035/8260B	MW	2	GW	2	1		1	1
CVOCs	SW-846 5035/8260B	MP	3	GW	3				
Secondary MNA Parameters	Various	MP	3	GW	3				
Dissolved Gases	RSK SOP 147/157	MP	3	GW	3				
Volatile Fatty Acids		MP	2	GW	2				
Microorganisms	Baseline Community Analysis	MP	2	GW	2				

See notes at end of page 2

ANALYTICAL PROGRAM
 SITE 4 REMEDIAL INVESTIGATION AND TREATABILITY STUDY WORKPLAN ADDENDUM
 NCBC GULFPORT
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EVENT 5

ANALYTICAL PARAMETER	LABORATORY METHOD	LOCATION TYPE	NUMBER OF LOCATIONS	SAMPLE MATRIX	NUMBER OF SAMPLES	QA/QC			
						FIELD DUP.	MS/MSD	RINSATE	TRIP BLANK
CVOCs	SW-846 5035/8260B	MW	2	GW	2	1	Y	1	1
CVOCs	SW-846 5035/8260B	MP	3	GW	3				
Secondary MNA Parameters	Various	MP	3	GW	3				
Dissolved Gases	RSK SOP 147/157	MP	3	GW	3				
Volatile Fatty Acids		MP	2	GW	2				
Microorganisms	Baseline Community Analysis	MP	2	GW	2				
CVOCs	SW-846 5035/8260B	MP	3	SO	3				
NOTES: CVOCs Chlorinated Volatile Organic Compounds MNA Monitored Natural Attenuation DPT Direct Push Technology MP Monitoring Point - Temporary MW Monitoring Well - Permanent GW Groundwater SO Soil QA/QC Quality Assurance/Quality Control MS/MSD Matrix Spike/Matrix Spike Duplicate (Extra volume collected for laboratory QA/QC)									