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LETTER REPORT REGARDING TREATABILITY STUDY MEMORANDUM SITE 4 NCBC GULFPORT MS

6/11/2007

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TtNUS/TLH-06-067/9666-4.1

June 11, 2007

Project Number 9666

Commander, Southeast
Naval Facilities Engineering Command
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Remedial Project Manager
2155 Eagle Drive
North Charleston, SC 29419-9010

Reference: Clean Contract No. N62467-94-D0888
Contract Task Order No. 9666

Subject: Treatability Study (TS) Memorandum for Site 4
Naval Construction Battalion Center, Gulfport, Mississippi

Dear Mr. Art Conrad:

Tetra Tech NUS (TtNUS), under contract to the U. S. Department of the Navy, Naval Facilities Engineering Command Southeast (NAVFAC SE), has prepared this Treatability Study (TS) Memorandum for Site 4 at the Naval Construction Battalion Center (NCBC) in Gulfport, Mississippi. This memorandum was prepared under the Comprehensive Long-term Environmental Action Navy (CLEAN) III, Contract No. N62467-94-D-0888.

Introduction

The objective of the TS at Site 4 was to provide information for the selection of a remedial option for chlorinated volatile organic compounds (CVOCs) in groundwater to compliment the overall cap/cover presumptive remedy for Site 4. A bioaugmentation technology using substrate and microbial culture injection was tested in a small area of the site. Analytical data collected prior to and following the technology application were evaluated to determine how successfully the injected materials were in dechlorinating CVOCs present in groundwater at the site. This report describes the field activities, data collection, laboratory analyses, and data evaluation that were

performed for the TS. Initial information on the TS was provided in the Remedial Investigation (RI) and Treatability Study Work Plan Addendum submitted in November 2005. The following investigation activities provided the data for evaluating conditions at Site 4:

1997/1998	Base wide groundwater study and surface water/sediment study identified CVOC plume
August 2004	RI DPT groundwater sampling
September 2004	RI monitoring well sampling
March 2006	Groundwater delineation - DPT Sampling with mobile laboratory
April 2006	Baseline groundwater and soil sampling
September 2006	Verification groundwater sampling and substrate (sodium lactate) application
October 2006	Injection of Bacterial Culture
January 2007	Performance Monitoring

Site Background

The RI conducted at Site 4 in 2004 investigated a plume of CVOC-contaminated groundwater first detected in 1997. 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 monitoring wells. CVOCs were detected in groundwater samples at concentrations exceeding risk-based screening criteria. 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.) indicated that reducing conditions were present in site groundwater.

These data suggest that the phenomena known as "DCE/VC stall" has occurred in the dissolved VOC plume at Site 4. A site is considered to be in DCE/VC stall if these compounds are accumulating as concentrations of TCE are reduced. DCE/VC stall may occur when insufficient electron donors or microbes are present, and/or adverse environmental conditions prevent complete biological anaerobic reductive dechlorination (ARD) of VOCs to non-toxic components such as ethene, ethane, carbon dioxide, and water. Despite the fact that DCE/VC stall is occurring at the site, the lack of VOCs in some wells and the relatively high ethane concentrations in the wells sampled provide evidence that complete ARD is also occurring.

Field Activities

Field activities conducted for the TS include:

- Installation of three temporary monitoring points (MPs) in treatment cell area, installed to a depth of 18 feet
- Collection of groundwater and soil samples from the MP locations and groundwater samples from selected monitoring wells to establish baseline conditions
- Technology application - Injection of substrate and microbial culture
- Performance Monitoring

Field activities were conducted in accordance with the site specific Health and Safety Plan and the RI Work Plan (TtNUS, 2004). Detailed descriptions of field procedures are located in the RI Work Plan. Locations that were sampled for the TS and parameters analyzed are summarized in Table 1.

To fill data gaps from the initial RI, additional field sampling activities were conducted in March and April 2006. The activities included advancement of 20 soil borings via DPT and collection of 63 groundwater samples at varying depths in those borings. DPT groundwater samples were analyzed in a mobile laboratory. Data from the field analysis of the samples found the highest VOC concentrations were at the 04GP28 DPT location (Figure 1):

- trichloroethene (TCE) - 120 micrograms per liter (µg/L)
- cis-1,2-dichlorethene (cis-1,2-DCE) - 970 µg/L
- trans-1,2-dichloroethene (trans-1,2-DCE) - 800 µg/L
- vinyl chloride (VC) - 1,600 µg/L

Ten permanent monitoring wells were installed for long term monitoring of the CVOC plume. Three of these wells were installed in the 04GP28 area:

- GPT-04-21 screened from 6 to 16 feet
- GPT-04-22 screened from 19 to 24 feet
- GPT-04-23 screened from 40 to 45 feet

Groundwater samples were collected from each of these locations as well as seven existing monitoring wells and analyzed in a fixed-base laboratory. These data were used to delineate the extent of the CVOC plume and identify the location of the highest CVOC concentrations.

Because the groundwater samples collected at 04GP28 had the highest detected CVOC concentrations, the treatment cell for the TS was moved from between monitoring wells GPT-04-13/GPT-04-14 and GPT-04-16/GPT-04-17, as originally planned, to the area between monitoring wells GPT-04-13/GPT-04-14 and GPT-04-21/GPT-04-22/GPT-04-23 (Figure 1).

MP installation

Three temporary MPs were installed for the TS. Two of the MPs, MP-01 and MP-02, were located downgradient of monitoring well GPT-04-21 (installed at the 04GP28 location) in the general direction of monitoring wells GPT-04-13/GPT-04-14 (Figure 1). The third MP, MP-03, was installed to the west of monitoring wells GPT-04-21/GPT-04-22/GPT-04-23 (Figure 1).

Baseline Sampling

Baseline or pre-treatment sampling for the TS was conducted to determine the existing contaminant concentrations and geochemical conditions. Baseline samples were collected from the three temporary MPs installed in the TS cell area and selected permanent monitoring wells. The baseline sampling analyses are summarized in Table 1. Field sampling data forms and validated laboratory data are included in the Appendix.

Baseline Site Conditions

CVOC concentrations were less than expected in the MP samples. Elevated CVOC concentrations in the TS cell area were limited to GPT-04-22 (screened from 19 to 24 feet):

- TCE 110 µg/L
- cis-1,2-DCE 470 µg/L
- trans-1,2-DCE 310 µg/L
- VC 190 µg/L

Elevated CVOC concentrations were reported in GPT-04-14 and GPT-04-16, located downgradient of the TS area (Table 2). These results indicated that the CVOC contamination was occurring in the deeper part of the shallow aquifer. Analytical results for CVOCs are summarized in Table 2.

Conditions in the aquifer at the site range from slightly reducing to strongly reducing. The oxidation reduction potential (ORP) was negative, ranging from -19 to -132 millivolts (mV). The dissolved oxygen (DO) readings were below 1 milligram per liter (mg/L), with one of the readings below 0.5 mg/L. pH readings ranged from 5.75 to 6.85 in the TS area. Field water quality measurements are summarized in Table 3.

Very low quantities of microbes responsible for degradation of DCE and VC were present in the groundwater at MP-01 and MP-03. Dhc concentrations at those wells were 13.4 and 5.48 cells per milliliter, respectively (Table 4). The functional genes believed to be responsible for reduction of DCE and VC, BAV1 VC R-Dase and VC R-Dase, were present at only very low concentrations, less than 1 cell per milliliter. Laboratory reports for the microbial census are included in the Appendix.

Soil samples from the temporary wells indicate that chlorinated VOCs are not present in the soil in the TS area (Table 5).

Pre-Treatment Verification Sampling

Because the CVOC concentrations in the baseline samples from the three MPs were far lower than anticipated (Table 2), the three shallow MPs were resampled and DPT groundwater samples were collected from locations adjacent to the MPs at a depth of 24 feet before the injection of the sodium lactate substrate. The DPT sample locations are identified as MP-01D, MP-02D, and MP-03D. Analytical results from the verification samples indicated that the CVOC plume did not have the horizontal extent in the TS cell area and was at deeper depths than suggested by the DPT data collected for the RI.

Technology Selection

Using data from the RI and baseline and verification sampling, several remedial technologies were evaluated for the TS, including

- chemical oxidation,
- enhanced aerobic biodegradation,
- enhanced ARD via biostimulation (addition of substrate),
- enhanced ARD via biostimulation and bioaugmentation (addition of suitable microbiota),
- cometabolic biodegradation.

Chemical oxidation, enhanced aerobic biodegradation, and cometabolic biodegradation rely on the presence of an oxidizing environment. At Site 4, the present conditions are naturally reducing. Additionally, there is a significant amount of organic carbon present in the soil and groundwater at the site which would deplete the oxidizer or other aerobic amendment as it was added, thus competing with the aerobic degradation of VOCs. Before these technologies could be effective, the natural reducing conditions would have to be overcome, requiring application of significant quantities of oxidizer or other aerobic amendment, potentially over a series of injection events.

Therefore, technologies were evaluated that would exploit the naturally occurring reducing conditions and enhance the natural ARD occurring at the site. Based on the data, it appeared that natural reduction of TCE was occurring, with the reactions in some portions of the site stalling at DCE and VC. This is a common occurrence at sites where either insufficiently reducing conditions, lack of the proper microbial community, and/or some other condition inhibiting biodegradation (e.g., pH outside of the optimal range, elevated sulfate concentrations, etc.) are present.

Data from the site indicate that while reducing conditions sufficient for ARD of DCE and VC are present in some portions of the site, they may not be present in the area where the highest contaminant concentrations have been observed (the TS area). Therefore, biostimulation, through the addition of a carbon source (substrate) to the subsurface, will be implemented. In this case, a fast acting substrate (lactate) has been chosen over a slow release substrate such as vegetable oil; lactate was chosen to quickly achieve strongly reducing conditions in the TS area and to provide timely information on the success of enhanced ARD.

Another cause of DCE/VC stall can be the lack of the proper microbial community in the subsurface. While several bacterial groups are involved in partial reductive dechlorination (e.g., *Dehalobacter, Desulfuromonas, etc*), *Dehalococcoides* (Dhc) is the key consortia involved in complete reductive dechlorination to ethene. However, the Dhc organism is not ubiquitous and, if present, may be at insufficient quantities for complete ARD. Laboratory data from Site 4 showed that Dhc concentrations in the TS area were orders of magnitude below levels believed to sustain ARD. Further, the Dhc functional genes believed to be responsible for ARD of DCE and VC are not present at sufficient levels. Bioaugmentation is the process of supplementing the existing microbial population with a culture of Dhc. In this case, biostimulation was implemented with bioaugmention to create favorable conditions and continue to provide a food source for the

bacteria for complete, efficient, and rapid ARD, while providing more of the microbes responsible for complete ARD.

Treatment Design and Application

Based on the reducing conditions already present at the site, and the low levels of microbes capable of reducing VC and DCE, ARD via biostimulation and bioaugmentation was chosen as the technology most likely to be successful at Site 4. Specifically, this included injection of fast acting organic substrate (lactate) and microorganisms known to degrade less chlorinated VOCs (e.g., Dhc) into the subsurface. Other conditions that may be contributing to the DCE/VC stall the site include low pH and the presence of competing electron acceptors. The optimal pH for ARD is between 6 and 9. The pH observed at GPT-04-22, located in the TS area, was 5.75. Therefore, sodium bicarbonate was added with the substrate to raise the pH to more optimal conditions.

The substrate application was conducted in September 2006. 220 gallons of 60% sodium lactate solution was mixed with tap water to create a lactate solution of approximately 15 percent (by weight). A total of approximately 650 gallons of water was required to properly dilute the lactate. The solution was mixed in approximately 175-gallon batches. Each batch contained 44 gallons of lactate and 130 gallons of water. Because of the low pH in the TS area, approximately six pounds of sodium bicarbonate was added to each batch of the solution, to raise the pH of the aquifer.

The solution was injected into the aquifer at five locations using DPT (Figure 2). Each 175-gallon batch of solution was injected evenly through the DPT rods from a depth of approximately 24 feet to a depth of approximately eight feet.

The microbial culture was applied in October 2006. The selected Dhc culture was KB-1 dechlorinator provided by SiREM Laboratories. The Dhc culture was added to the aquifer after sufficient time to develop reducing conditions to allow the microbes to propagate, based on field readings (primarily DO and ORP) after addition of the lactate in September (Table 3). The injection of the Dhc culture (in locations at or near the locations of the lactate addition) was done in accordance with the manufacturer's instructions. Field data records of the KB-1 application and photographs of the application equipment are included in the Appendix.

Performance Monitoring

To evaluate the efficacy of the technology chosen for the treatability study, a round of performance monitoring sampling was conducted in January 2007, approximately three months following the injection of the Dhc culture. Baseline samples were collected from the three temporary MPs installed in the TS cell area, using DPT at locations adjacent to the MPs, and selected permanent monitoring wells. The baseline sampling analyses are summarized in Table 1. Field sampling data forms and validated laboratory data are included in the Appendix.

Data Evaluation

The success of the technology application in promoting ARD has been evaluated using two lines of evidence:

- Primary Evidence – Evaluate changes in CVOC concentrations and mass balance that may be attributed to ARD and the concentrations of final break-down products of ARD - dissolved gas (ethene and ethane) and chloride.

- Secondary Evidence– Determine if aquifer geochemical conditions support ARD and if a suitable microbiological consortium is present

Data were compared for locations in the treatment cell MP-01/MP-01D and GPT-04-22, downgradient of the injection area, MP-02/MP-02D and side gradient of the treatment cell, MP-03/MP-03D (CVOC concentrations at this location were less than TRGs). CVOC data from the TS sampling events are shown in Figure 2.

Changes in Contaminant Concentration

The concentrations of CVOCs at each of the sample locations decreased following the application of the substrate and Dhc culture, except for the VC concentration at GPT-04-22, which increased (Table 6). The decreased CVOC concentrations may not necessarily indicate destruction of the CVOCs. Comparison of overall changes of the total CVOC concentration to changes in individual CVOC species can indicate if decreasing concentrations have resulted from dechlorination. Analytical results from MP-01D and GPT-04-22, within the treatment cell, clearly show higher concentrations changes for TCE and lower concentration changes for VC, suggesting ARD in these locations. The increasing VC concentration in GPT-04-22 particularly indicates dechlorination of TCE and DCE, producing VC. The data from MP-02D, located downgradient of

the treatment cell, indicate that each of the chlorinated ethenes decreased equally in concentration, suggesting that the reduced concentrations did not result from dechlorination.

Changes in the contaminant mass balance

Comparison of the ratios of molar concentrations of CVOCs is more indicative of contaminant destruction than comparison of concentration by volume, because dechlorination of CVOCs produces lower molecular weight daughter products (Table 7). Analytical data from MP-01, MP-01D, and GPT-04-22 again generally show decreases in TCE and DCE as part of the total CVOC mass and increases in VC, indicating that the more chlorinated ethenes are being reduced to VC or ethene. By comparison, data from MP-02D show that the molar fractions of the CVOCs do not change as the mass per volume concentrations decrease, indicating that the decrease is not due to ARD.

Changes in concentrations of break-down products

Chloride concentrations almost doubled in the sample locations in the treatment cell (MP-01 and GPT-04-22). Chlorine atoms removed from the CVOCs during dechlorination can increase the chloride concentration in the groundwater. Chloride concentrations increased less significantly at MP-02 and MP-03.

Ethene concentrations increased three orders of magnitude in the treatment cell area. Ethene is the resulting byproduct when all of the chlorine atoms are removed from a chlorinated ethene, e.g., DCE or VC. Therefore, an increase in ethene concentrations can indicate that CVOCs are being dechlorinated. Ethene concentrations outside the treatment cell and ethane concentrations in the samples collected showed little change.

Secondary Lines of Evidence

Evaluation of secondary lines of evidence for ARD helps determine the degree to which the technology application was successful in creating conditions in the subsurface suitable for ARD, including indicators of reductive conditions (DO and ORP), microbial concentrations, volatile fatty acids concentrations, and concentrations of bio-indicator parameters. These data are summarized in Table 8.

ORP in each of the sample locations decreased shortly following the substrate application and have remained at these decreased levels, indicating that an adequate amount of substrate was supplied to maintain highly reducing conditions in the treatment cell area.

DO concentrations in each of the wells and monitoring points showed an increase following the substrate injection (Table 3). This DO increase may have resulted from the use of tap water to dilute the sodium lactate solution. These changes in DO concentration do not correlate with observed increases in methane or the very low ORP measurements, which indicate reducing conditions. DO data measured during the performance monitoring sampling event indicated that DO concentrations in locations outside of the treatment cell, MP-02 and MP-03 had returned to very low levels, while the DO concentrations in the treatment cell area, MP-01 and GPT-04-22 were still elevated.

Hydrogen concentrations in the treatment cell area, MP-01 and GPT-04-22 remained at levels conducive to ARD, greater than 2 nanomoles per liter (nM/L) (Table 8). Hydrogen concentrations decreased in wells outside of the treatment cell compared to the baseline and correspond to a higher redox state more suitable to iron (0.2 to 0.8 nM/L) and sulfate reduction (1 to 4 nM/L).

The microbial census data showed an increase in the population of Dhc in the site groundwater, but an overall decrease in total microbes (Table 5). These changes in microbe abundance can be attributed to the dilution of the existing micro biota and the preferential addition of Dhc in the KB-1 Dechlorinator.

Concentrations of volatile fatty acids were observed to increase, up to five or six orders of magnitude in some cases, at the sample locations inside the treatment cell, suggesting increased microbial metabolic activity (Table 8).

Sulfate concentrations inside the treatment cell area decreased, suggesting that sulfate reduction is not competing with ARD in this area (Table 8). Sulfate concentrations increased outside of treatment area.

Sulfide concentrations increased across the TS area (Table 8), suggesting the sufficiently reducing conditions are present to reduce sulfate.

Dissolved iron concentrations decreased at the sampling locations inside and outside of the treatment cell (Table 8), which is the opposite of what is expected under reducing conditions. The decrease in iron concentrations may be tied to coprecipitation of iron with the increased sulfides.

Nitrate and nitrite concentrations have been at or below detection limits in samples collected at Site 4, indicating that nitrate reduction is not a factor in groundwater geochemistry at the site.

Concentrations of orthophosphate in site groundwater have been low and shown little change, indicating little impact on microbial activity at the site (Table 8).

Summary of Treatability Study

Data collected during the TS indicate that enhanced ARD can be an effective remedial approach for this site as demonstrated by the following:

- The substrate injection appears to have rapidly improved aquifer conditions for ARD
- Application of the Dhc culture has established a higher proportion of Dhc in the subsurface micro biota
- Evidence of ARD was observed in two sampling locations, MP-01/MP-01D and GPT-04-22, where mass balance changes in CVOCs suggest dechlorination is occurring.
- Increased chloride and ethene concentrations as break down products in the treatment cell area also support the occurrence of ARD

A pilot scale test should be considered prior to full scale implementation of this technology at Site 4. To optimize application of Dhc culture, more detailed vertical delineation of the contaminant plume is advised. A source of low DO groundwater water or treated tap water should be secured prior to preparation of the lactate solution. DPT injection appears to be a viable method of substrate and Dhc application. The area of influence of each injection location and injection spacing was suitable to treat groundwater in the treatment cell, however there appears to have been little enhancement of ARD downgradient or sidegradient of the treatment cell.

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

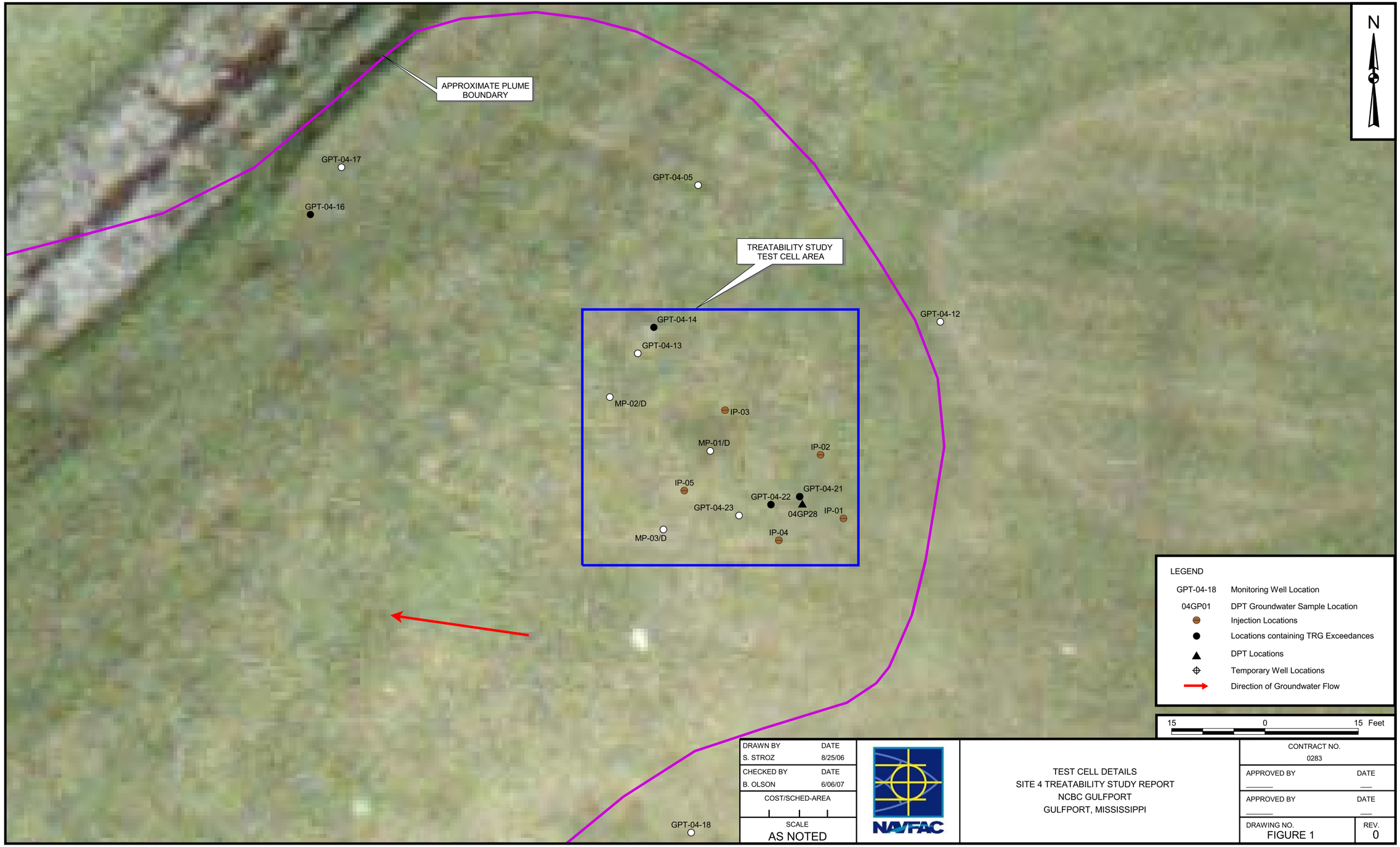
Sincerely,

Robert Fisher
Task Order Manager

Enclosures: 2 copies

CC:
Gordon Crane, NCBC Gulfport (2 copies)
Debbie Humbert (Letter Only)
Mark Perry/File

P:\GIS\GULFPORT_CBC\MAPDOCS\APR\SITE04.APR UPDATED SITE 4 GROUNDWATER VOC TRG LAYOUT 6/06/07 SS



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COST/SCHED-AREA	
SCALE	
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TEST CELL DETAILS
SITE 4 TREATABILITY STUDY REPORT
NCBC GULFPORT
GULFPORT, MISSISSIPPI

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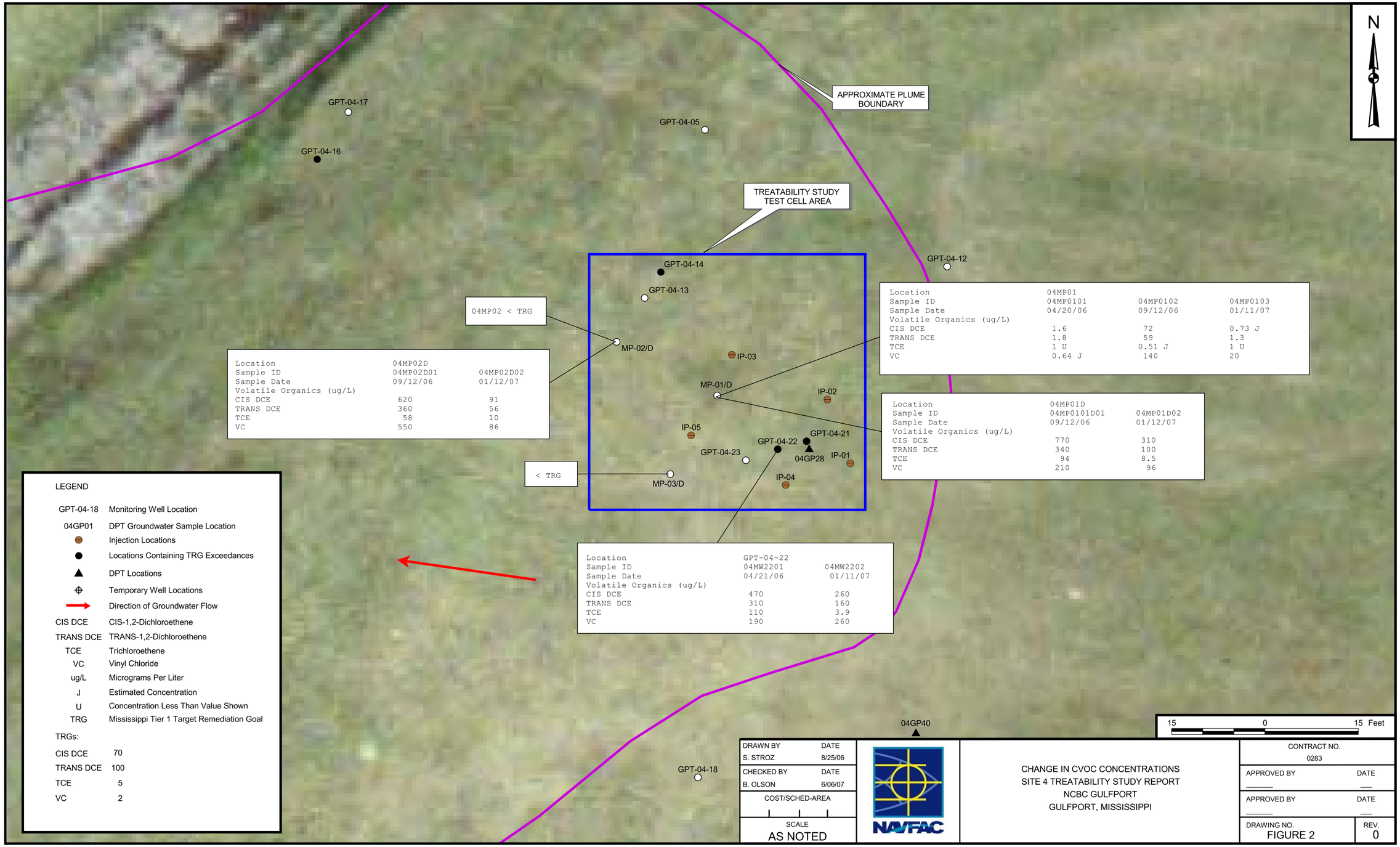
P:\GIS\GULFPORT_CBC\MAPDOCS\APR\SITE04.APR CHANGES IN CVOC CONCENTRATIONS LAYOUT 6/06/07 SS



Location	04MP02D	
Sample ID	04MP02D01	04MP02D02
Sample Date	09/12/06	01/12/07
Volatile Organics (ug/L)		
CIS DCE	620	91
TRANS DCE	360	56
TCE	58	10
VC	550	86

Location	04MP01		
Sample ID	04MP0101	04MP0102	04MP0103
Sample Date	04/20/06	09/12/06	01/11/07
Volatile Organics (ug/L)			
CIS DCE	1.6	72	0.73 J
TRANS DCE	1.8	59	1.3
TCE	1 U	0.51 J	1 U
VC	0.64 J	140	20

Location	04MP01D	
Sample ID	04MP0101D01	04MP01D02
Sample Date	09/12/06	01/12/07
Volatile Organics (ug/L)		
CIS DCE	770	310
TRANS DCE	340	100
TCE	94	8.5
VC	210	96

Location	GPT-04-22	
Sample ID	04MW2201	04MW2202
Sample Date	04/21/06	01/11/07
Volatile Organics (ug/L)		
CIS DCE	470	260
TRANS DCE	310	160
TCE	110	3.9
VC	190	260

LEGEND

GPT-04-18	Monitoring Well Location
04GP01	DPT Groundwater Sample Location
	Injection Locations
	Locations Containing TRG Exceedances
	DPT Locations
	Temporary Well Locations
	Direction of Groundwater Flow
CIS DCE	CIS-1,2-Dichloroethene
TRANS DCE	TRANS-1,2-Dichloroethene
TCE	Trichloroethene
VC	Vinyl Chloride
ug/L	Micrograms Per Liter
J	Estimated Concentration
U	Concentration Less Than Value Shown
TRG	Mississippi Tier 1 Target Remediation Goal

TRGs:

CIS DCE	70
TRANS DCE	100
TCE	5
VC	2

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COST/SCHED-AREA

SCALE
AS NOTED

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CHANGE IN CVOC CONCENTRATIONS
SITE 4 TREATABILITY STUDY REPORT
NCBC GULFPORT
GULFPORT, MISSISSIPPI

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0283

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TABLE 1
SAMPLING AND ANALYSIS SUMMARY
SITE 4 TREATABILITY STUDY
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Baseline Sampling			Verification Sampling			Performance Monitoring		
March/April 2006			September 12, 2006			January 11, 2007		
Location	**Sample ID**	**Analyses**	**Location**	**Sample ID**	**Analyses**	Location	Sample ID	Analyses
Monitoring Wells								
GPT-04-16	04GW1602	CVOC/NA/Microbial Census						
GPT-04-22	04MW2201	VOC				GPT-04-22	04MW2202	CVOC
Temporary Monitoring Points								
04MP01	04MP0101	CVOC/NA/Microbial Census/Soil	04MP01	04MP0102	CVOC	04MP01	04MP0103	CVOC
04MP02	04MP0201	CVOC/NA/Soil	04MP02	04MP0202	CVOC	04MP02	04MP0203	CVOC/NA/Microbial Census
04MP03	04MP0301	CVOC/NA/Microbial Census/Soil	04MP03	04MP0302	CVOC	04MP03	04MP0303	CVOC/NA/Microbial Census
			DPT Monitoring Points					
			04MP01D	04MP01D01	CVOC	04MP01D	04MP01D02	CVOC
			04MP02D	04MP02D01	CVOC	04MP02D	04MP02D02	CVOC
			04MP03D	04MP03D01	CVOC	04MP03D	04MP03D02	CVOC

Notes:
CVOC Chlorinated Volatile Organic Compounds
NA Natural Attenuation Parameters
Soil Soil samples for CVOC and total organic carbon

TABLE 2
GROUNDWATER CVOC ANALYTICAL SUMMARY
SITE 4 TREATABILITY STUDY
NCBC GULFPORT
GULFPORT, MISSISSIPPI

MONITORING WELLS

location		GPT-04-13		GPT-04-14		GPT-04-16		GPT-04-17		GPT-04-21	GPT-04-22		GPT-04-23
sample ID		04GW1301	04MW1302	04GW1401	04MW1402	04GW1601	04GW1602	04GW1701	04MW1702	04MW2101	04MW2201	04MW2202	04MW2301
sample date	Mississippi	09/22/04	04/11/06	09/22/04	04/13/06	09/13/04	03/30/06	09/13/04	04/13/06	04/21/06	04/21/06	01/11/07	04/20/06
sample depth - feet	Tier 1	5-15		24-34		4-14		35-40		6-16	19-24		45-50
sample event	TRG	RI Sampling	Baseline	RI Sampling	Baseline	RI Sampling	Baseline	RI Sampling	Baseline	Baseline	Baseline	Perf. Mon.	Baseline
Volatile Organics (ug/L)													
1,1-DICHLOROETHENE	7	5 U	1 U	5 U	1 U	0.6 J	2 U	5 U	1 U	1 U	1.2	2 U	1 U
1,2-DICHLOROETHANE	5	5 U	1 U	5 U	1 U	0.2 J	2 U	5 U	1 U	1 U	0.24 J	2 U	1 U
CIS-1,2-DICHLOROETHENE	70	5 U	1 U	55	47	**280**	**170**	5 U	1 U	5.9	**470**	**260**	1 U
TRANS-1,2-DICHLOROETHENE	100	5 U	1 U	30	22	**190**	89	5 U	1 U	6.4	**310**	**160**	1 U
TETRACHLOROETHENE	5	5 U	1 U	5 U	1 U	5 U	2 U	5 U	1 U	1 U	0.72 J	2 U	1 U
TRICHLOROETHENE	5	5 U	1 U	0.8 J	0.55 J	**8**	4.1	5 U	1 U	1	**110**	3.9	1 U
VINYL CHLORIDE	2	5 U	1 U	**25**	**14**	**150**	**84**	5 U	1 U	**18**	**190**	**260**	1 U

TEMPORARY MONITORING POINTS

location		04MP01			04MP02			04MP03		
sample ID		04MP0101	04MP0102	04MP0103	04MP0201	04MP0202	04MP0203	04MP0301	04MP0302	04MP0303
sample date	Mississippi	04/20/06	09/12/06	01/11/07	04/20/06	09/12/06	01/11/07	04/20/06	09/12/06	01/11/07
sample depth - feet	Tier 1	8-18			8-18			8-18		
sample event	TRG	Baseline	Verification	Perf. Mon.	Baseline	Verification	Perf. Mon.	Baseline	Verification	Perf. Mon.
Volatile Organics (ug/L)										
1,1-DICHLOROETHENE	7	1 U	0.46 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-DICHLOROETHANE	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
CIS-1,2-DICHLOROETHENE	70	1.6	**72**	0.73 J	0.37 J	1 U	1 U	1 U	1 U	1 U
TRANS-1,2-DICHLOROETHENE	100	1.8	59	1.3	0.38 J	1 U	1 U	1 U	1 U	1 U
TETRACHLOROETHENE	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
TRICHLOROETHENE	5	1 U	0.51 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U
VINYL CHLORIDE	2	0.64 J	**140**	**20**	1 U	1.4	1 U	1 U	1 U	1 U

DPT MONITORING POINTS

location		04MP01D		04MP02D		04MP03D	
sample ID		04MP01D01	04MP01D02	04MP02D01	04MP02D02	04MP03D01	04MP03D02
sample date	Mississippi	09/12/06	01/12/07	09/12/06	01/12/07	09/12/06	01/12/07
sample depth - feet	Tier 1	20-24		20-24		20-24	
sample event	TRG	Verification	Perf. Mon.	Verification	Perf. Mon.	Verification	Perf. Mon.
Volatile Organics (ug/L)							
1,1-DICHLOROETHENE	7	10 U	2 U	10 U	1 U	1 U	1 U
1,2-DICHLOROETHANE	5	10 U	2 U	10 U	1 U	1 U	1 U
CIS-1,2-DICHLOROETHENE	70	**770**	**310**	**620**	**91**	1 U	0.84 J
TRANS-1,2-DICHLOROETHENE	100	**340**	100	**360**	56	1 U	1 U
TETRACHLOROETHENE	5	100	2 U	10 U	1 U	1 U	1 U
TRICHLOROETHENE	5	**94**	**8.5**	**58**	**10**	1 U	1 U
VINYL CHLORIDE	2	**210**	**96**	**550**	**86**	1 U	0.32 J

Notes:

ug/L	micrograms per liter
Perf. Mon.	Performance Monitoring Event
U	Concentration less than value shown
J	Estimated concentration

Concentrations in bold exceed Tier 1 TRG

TABLE 3
FIELD WATER QUALITY DATA
SITE 4 TREATABILITY STUDY REPORT
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Sample Location	GPT-04-22			MP-01			MP-02			MP-03		
Sample Date		9/27/2006	1/11/2007		9/27/2006	1/11/2007		9/27/2006	1/11/2007		9/27/2006	1/11/2007
Sample Event	Baseline	Verification	Perf. Mon.	Baseline	Verification	Perf. Mon.	Baseline	Verification	Perf. Mon.	Baseline	Verification	Perf. Mon.
pH	5.75	6.14	5.48	6.56	6.64	5.54	6.83	7.12	6.00	6.85	6.98	5.87
Conductivity (mS/cm)	0.92	1.49	2.56	1.91	6.8	2.86	2.03	1.46	2.37	2.20	1.98	2.72
Temperature (C^o)	22.56	24.46	23.05	21.65	25.85	22.12	21.48	25.74	20.08	22.22	26	21.34
Turbidity (NTU)	2.4	195	8.4	20.5	61.1	9	11.3	17	0.16	6.16	9.5	2.1
Dissolved Oxygen (mg/L)	0.44	2.26	2.08	0.57	2.10	1.11	0.94	2.18	0.00		2.81	0.00
ORP (mV)	-19	-315	-298	-118	-434	-395	-197	-270	-274	-132	-322	-337

Notes:

Perf. Mon.	Performance Monitoring
mS/cm	millisiemens/centimeter
C^o	Degrees celsius
NTU	Nephelometric Turbidity Unit
mg/L	milligrams per liter
ORP	Oxidation-Reduction Potential
mV	millivolts

TABLE 4
MICROBIAL CENSUS RESULTS
SITE 4 TREATABILITY STUDY
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Location	04MP01		04MP03		GPT-4-16
Sample ID	04MP0101	04MP0103	04MP0301	04MP0303	04GW1602
Depth Range (feet)					
Sample Date	4/20/2006	1/11/2007	4/20/2006	1/11/2007	3/30/2006
Dechlorinating Bacteria (cells/mL)					
Dehalococcoides spp	1.34E+01	**5.35E+01**	5.48E+00	**1.44E+01**	3.52E-01
Desulfuromonas sp	9.88E+01	1.73E+01	9.11E+01	**1.04E+02**	1.2E+00
Dehalobacter spp.	5.5E+03	8.51E+00	1.92E+03	7.89E-01	9.24E+03
Desulfitobacterium sp.	3.1E+04	2.03E+02	7.35E+04	2.1E+03	5.29E+01
Functional Genes (cells/mL)					
BAV1 VC R-Dase	<8.33E-01	<6.25E-01	<4.17E-01	<3.33E-01	<2E-01
TCE R-Dase	<8.33E-01	**3.56E-01 (J)**	<4.17E-01	<3.33E-01	<2E-01
VC R-Dase	<8.33E-01	**2.01E+01**	1.21E-01 (J)	<3.33E-01	<2E-01
Soluble Methane Monooxygenase	2.67E+01	**1.98E+02**	1.19E+01	**1.3E+04**	1.43E+02
Other Genera (cells/mL)					
Geobacter spp.	2.47E+03	<9.38E-01	1.34E+03	<5E-01	3.99E+01
Other Genera (cells/mL)					
Eubacteria	1.29E+06	**2.99E+06**	5.79E+05	**2.63E+06**	1.21E+05
Methanogens	3.11E+04	<1.25E+00	2.71E+04	**3.36E+04**	8.72E+03
Sulfate and Iron Reducing Bacteria	9.86E+03	<9.38E-01	6.91E+03	2.55E+01	4.46E+02
Methanotrophs (total)	2.67E+04	**8.45E+06**	4.29E+04	**2.99E+07**	2.15E+04
Type I MOB	1.37E+04	4.84E+03	1.55E+04	**2.81E+06**	5.E+03
Type II MOB	1.31E+04	**8.45E+06**	2.75E+04	**2.71E+07**	1.65E+04

Notes:
J = estimated value
Values in bold show an increase over baseline sampling results

TABLE 5
SOIL ANALYTICAL RESULTS
SITE 4 TREATABILITY STUDY
NCBC GULFPORT
GULFPORT, MISSISSIPPI

Sample ID Sample Depth - Feet Sample Date	04MP0101 4-8 04/13/06	04MP0201 4-8 04/13/06	04MP0301 4-8 04/13/06
Volatile Organics (ug/kg)			
1,1-DICHLOROETHENE	5 U	5.6 U	6.6 U
1,2-DICHLOROETHANE	5 U	5.6 U	6.6 U
CARBON TETRACHLORIDE	5 U	5.6 U	6.6 U
CHLOROFORM	5 U	5.6 U	6.6 U
CHLOROMETHANE	0.55 U	0.45 U	0.74 U
CIS-1,2-DICHLOROETHENE	5 U	5.6 U	6.6 U
METHYLENE CHLORIDE	13 U	13 U	17 U
TETRACHLOROETHENE	5 U	5.6 U	6.6 U
TRANS-1,2-DICHLOROETHENE	5 U	5.6 U	6.6 U
TRICHLOROETHENE	5 U	5.6 U	6.6 U
VINYL CHLORIDE	5 U	5.6 U	6.6 U
Miscellaneous Parameters (mg/kg)			
TOTAL ORGANIC CARBON	2700	2600	5000

ug/kg - micrograms per kilogram
mg/kg - milligrams per kilogram
U - Sample concentration less than value shown

TABLE 6
GROUNDWATER CVOC ANALYTICAL RESULTS
SITE 4 TREATABILITY STUDY
NCBC GULFPORT
GULFPORT, MISSISSIPPI

	RI SAMPLING	BASELINE SAMPLING	VERIFICATION SAMPLING	PERFORMANCE MONITORING	CONCENTRATION CHANGE
location		04MP01	04MP01	04MP01	
sample ID		04MP0101	04MP0102	04MP0103	
sample date		04/20/06	09/12/06	01/11/07	% decreased
CIS-1,2-DCE		1.6	72	0.73	99
TRANS-1,2-DCE		1.8	59	1.3	98
TCE		1 U	0.51	0.5	2
VINYL CHLORIDE		0.64 J	140	20	86
TOTAL CVOC			272	23	92
location			04MP01D	04MP01D	
sample ID			04MP01D01	04MP01D02	
sample date			09/12/06	01/11/07	% decreased
CIS-1,2-DCE			770	310	60
TRANS-1,2-DCE			340	100	71
TCE			94	8.5	91
VINYL CHLORIDE			210	96	54
TOTAL CVOC			1,414	515	64
location			04MP02D	04MP02D	
sample ID			04MP02D01	04MP02D02	
sample date			09/12/06	01/11/07	% decreased
CIS-1,2-DCE			620	91	85
TRANS-1,2-DCE			360	56	84
TCE			58	10	83
VINYL CHLORIDE			550	86	84
TOTAL CVOC			1,588	243	85
location		GPT-04-22		GPT-04-22	
sample ID		04MW2201		04MW2202	
sample date		04/20/06		1/11/2007	% decreased
CIS-1,2-DCE		470		220	53
TRANS-1,2-DCE		310		130	58
TCE		110		4.6	96
VINYL CHLORIDE		190		260	Increased 37 %
TOTAL CVOC		1,080		615	43
location	GPT-04-14	GPT-04-14			
sample ID	04GW1401	04GW1402			
sample date	09/22/04	04/11/06			% decreased
CIS-1,2-DCE	55	47			15
TRANS-1,2-DCE	30	22			27
TCE	0.8	0.55			31
VINYL CHLORIDE	25	14			44
TOTAL CVOC	111	84			25
location	GPT-04-16	GPT-04-16			
sample ID	04GW1601	04GW1602			
sample date	09/13/04	03/30/06			% decreased
CIS-1,2-DCE	280	170			39
TRANS-1,2-DCE	190	89			53
TCE	8	4.1			49
VINYL CHLORIDE	150	84			44
TOTAL CVOC	628	347			45

DCE - Dichloroethene
TCE - Trichloroethene
Concentrations in ug/L

TABLE 6
GROUNDWATER CVOC ANALYTICAL RESULTS
SITE 4 TREATABILITY STUDY
NCBC GULFPORT
GULFPORT, MISSISSIPPI

CVOC - Chlorinated Volatile Organic Compounds

TABLE 7
CVOC MASS BALANCE
SITE 4 TREATABILITY STUDY
NCBC GULFPORT
GULFPORT, MISSISSIPPI

location	04MP01	Molar	Molar	04MP01	Molar	Molar	Change in
sample ID	04MP0102	Concentration	Fraction	04MP0103	Concentration	Fraction	Molar Fraction
sample date	09/12/06	(moles/liter)	(per cent)	01/11/07	(moles/liter)	(per cent)	(per cent)
CIS-1,2-DCE (ug/L)	72	7.42651E-07	21	0.73	7.52965E-09	3	-17
TRANS-1,2-DCE (ug/L)	59	6.08561E-07	17	1.3	1.3409E-08	6	-11
TCE (ug/L)	0.51	3.88157E-09	0.1	0.5	5.1573E-09	2	2
VINYL CHLORIDE (ug/L)	140	2.23964E-06	62	20	2.06292E-07	89	26
	Total	3.59474E-06		Total	2.32388E-07		

location	04MP01D	Molar	Molar	04MP01D	Molar	Molar	Change in
sample ID	04MP01D01	Concentration	Fraction	04MP01D02	Concentration	Fraction	Mole Fraction
sample date	09/12/06	(moles/liter)	(per cent)	01/11/07	(moles/liter)	(per cent)	(per cent)
CIS-1,2-DCE (ug/L)	770	7.94224E-06	51	310	3.19752E-06	55	4
TRANS-1,2-DCE (ug/L)	340	3.50696E-06	23	100	1.03146E-06	18	-5
TCE (ug/L)	94	7.15427E-07	5	8.5	6.46929E-08	1	-3
VINYL CHLORIDE (ug/L)	210	3.35946E-06	22	96	1.53575E-06	26	5
	Total	1.55241E-05		Total	5.82943E-06		

location	04MP02D	Molar	Molar	04MP02D	Molar	Molar	Change in
sample ID	04MP02D01	Concentration	Fraction	04MP02D02	Concentration	Fraction	Mole Fraction
sample date	09/12/06	(moles/liter)	(per cent)	01/11/07	(moles/liter)	(per cent)	(per cent)
CIS-1,2-DCE (ug/L)	620	6.39505E-06	33	91	9.38628E-07	32	-1
TRANS-1,2-DCE (ug/L)	360	3.71325E-06	19	56	5.77617E-07	19	0
TCE (ug/L)	58	4.41434E-07	2	10	7.61093E-08	3	0
VINYL CHLORIDE (ug/L)	550	8.79859E-06	45	86	1.37578E-06	46	1
	Total	1.93483E-05		Total	2.96813E-06		

location	GPT-04-22	Molar	Molar	GPT-04-22	Molar	Molar	Change in
sample ID	04MW2201	Concentration	Fraction	04MW2202	Concentration	Fraction	Mole Fraction
sample date	04/20/06	(moles/liter)	(per cent)	1/11/2007	(moles/liter)	(per cent)	(per cent)
CIS-1,2-DCE (ug/L)	470	4.84786E-06	41	220	2.26921E-06	29	-12
TRANS-1,2-DCE (ug/L)	310	3.19752E-06	27	130	1.3409E-06	17	-10
TCE (ug/L)	110	8.37202E-07	7	4.6	3.50103E-08	0.4	-7
VINYL CHLORIDE (ug/L)	190	3.03951E-06	25	260	4.15933E-06	53	28
	Total	1.19221E-05		Total	7.80445E-06		

Mass/Molar Conversion Factor	grams/mole	ug/mole
CIS-1,2-DICHLOROETHENE	96.95	96,950,000
TRANS-1,2-DICHLOROETHENE	96.95	96,950,000
TRICHLOROETHENE	131.39	131,390,000
VINYL CHLORIDE	62.51	62,510,000

TABLE 8
INDICATOR PARAMETERS
SITE 4 TREATABILITY STUDY
NCBC GULFPORT
GULFPORT, MISSISSIPPI

	In TS Cell		Downgradient of TS Cell		Sidegradient of TS Cell		Downgradient Plume Edge	
location	04MP01	GPT-04-22	04MP02		04MP03		GPT-04-16	
sample ID	04MP0101	04MW2202	04MP0201	04MP0203	04MP0301	04MP0303	04GW1601	04GW1602
sample date	04/20/06	01/12/07	04/20/06	01/12/07	04/20/06		9/13/04	03/30/06
sampling event	Baseline	Perf. Mon.	Baseline	Perf. Mon.	Baseline	Perf. Mon.	RI Sampling	Baseline
Inorganics (ug/L)								
IRON	23,200	11,900	1,720	485	9,440	3,610	48,000	38,600
IRON (Filtered)	20,400	6,260	1,200	289	5,120	700		6,890
Miscellaneous Parameters (mg/L)								
CHLORIDE	28.2	41.2	17.3	23.1	17.5	26.9	34	30.1
ORTHOPHOSPHATE-P	0.076	0.01 U	0.059	0.26	0.041	0.12		0.01 U
SULFATE	106	6.8	222	501	348	568	96	69.2
SULFIDE	0.75 U	5.4	1.3	2.1	0.8 J	2.7		0.75 U
TOTAL ORGANIC CARBON	45	520	25	19	35	28	31	31
Volatile Fatty Acids (mg/L)								
ACETIC ACID	0.667	410		0.12	0.125	1.9		0.11
BUTANOIC ACID	0.282	56		0.07 U	0.07 U	0.07 U		0.07 U
HEXANOIC ACID	0.1 U	6.4		0.1 U	0.1 U	0.1 U		0.10 U
LACTIC ACID	0.1 U	10 J		0.24 U	0.1 U	0.1 U		0.10 U
PENTANOIC ACID	0.07 U	42		0.07 U	0.07 U	0.07 U		0.07 U
PROPIONIC ACID	0.07 U	580		0.07 U	0.07 U	0.13		0.07 U
PYRUVIC ACID	0.07 U	7.3		0.07 U	0.07 U	0.07 U		0.07 U
Light Gases (ug/L)								
BUTANE	0.037	0.05 U	0.044	0.13	0.059	0.046		0.017 J
ETHANE	5.8	6.7	0.27	0.3	2.7	2.3	3.4	2.5
ETHENE	0.038	15	0.009 J	0.008 J	0.013	0.01 U	20	14
ISOBUTANE	0.022 J	0.05 U	0.022 J	0.044 J	0.037	0.022 J		0.014 J
METHANE	3,600	12,000	1,600	6,000	1,900	6,300	3,000	1,600
PROPANE	0.38	0.064	0.27	0.36	0.39	0.24		0.22
PROPYLENE	0.022 J	0.25	0.025 U	0.015 J	0.014 J	0.05 U		0.10
HYDROGEN (NM)	3.9	3	2.6	0.68	2.5	1.3	1.1	3.5

ug/L - micrograms per liter
mg/L - milligrams per liter
NM - Nano moles
ug/Perf. Mon. - Performance Monitoring
J - Estimated concentration
U - Sample concentration less tha value shown
Blank cells indicate sample not analyzed for that parameter

KB-1 Dechlorinator transfer vessel showing inlet and outlet ports

Driving DPT screen to application depth

Withdrawing DPT rods to open screen

Application of KB-1 at selected depth, note scale used to determine injection amount

Application of KB-1 using argon gas displacement

2340 Stock Creek Blvd.
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Analysis Report

Client: Amy Thompson
Tetra Tech , Inc.
661 Andersen Drive
Foster Plaza 7
Pittsburgh, PA 15220

Phone: (412) 921-8874

Fax: (412) 921-7276

MI Identifier: 057DC **Date Rec:** 03/31/2006 **Report Date:** 04/05/2006

Client Project #: N9666 **Client Project Name:** Gulfport/Site 4

Purchase Order #:

Analysis Requested: CENSUS (final)

Comments:

All samples within this data package were analyzed under U.S. EPA Good Laboratory Practice Standards: Toxic Substances Control Act (40 CFR part 790). All samples were processed according to standard operating procedures. Test results submitted in this data package meet the quality assurance requirements established by Microbial Insights, Inc.

Reported By:

Reviewed By:

NOTICE: This report is intended only for the addressee shown above and may contain confidential or privileged information. If the recipient of this material is not the intended recipient or if you have received this in error, please notify Microbial Insights, Inc. immediately. The data and other information in this report represent only the sample(s) analyzed and are rendered upon condition that it is not to be reproduced without approval from Microbial Insights, Inc. Thank you for your cooperation.

MICROBIAL INSIGHTS, INC.

2340 Stock Creek Blvd. Rockford, TN 37853-3044
Tel: (865) 573-8188; Fax: (865) 573-8133

Q Potential (DNA)

Client: **Tetra Tech , Inc.**
Project: Gulfport/Site 4

MI Project Number: **057DC**
Date Received: 03/31/2006

Sample Information

Client Sample ID:	**04GW1602**
Sample Date:	03/30/2006
Units:	cells/mL

Dechlorinating Bacteria

Dehalococcoides spp (1)	DHC	**3.52E-01**
Desulfuromonas sp.	DSM	**1.2E+00**
Dehalobacter spp.	DHB	**9.24E+03**
Desulfitobacterium sp.	DSB	**5.29E+01**

Functional Genes

BAV1 VC R-Dase (1)	BVC	<2E-01
TCE R-Dase (1)	TCE	<2E-01
VC R-Dase	VCR	<2E-01
Soluble Methane Monooxygenase	sMMO	**1.43E+02**

Other Genera

Geobacter spp.	GEO	**3.99E+01**

Phylogenetic Group

Eubacteria	EBAC	**1.21E+05**
Methanogens	MGN	**8.72E+03**
Sulfate & Iron Reducing Bacteria	IRB/SRB	**4.46E+02**
Methanotrophs (total)	MOB	**2.15E+04**
Type I MOB	MOBI	**5E+03**
Type II MOB	MOBII	**1.65E+04**

Legend:
NA = Not Analyzed NS = Not Sampled J = Estimated gene copies below PQL but above LQL I = Inhibited
< = Result not detected

Notes:
1 Bio-Dechlor Census technology was developed by Dr. Loeffler and colleagues at Georgia Institute of Technology and was licensed for use through Regenesis.

KB-1™ Dechlorinator Quote Request Information Sheet

SIREM Site Recovery & Management
130 Research Lane, Suite 2 • Guelph, Ontario, Canada N1G 5G3 • Phone (519) 822-2265 or toll free 1-866-251-1747 Fax (519)822-3151
www.siremlab.com

Name: Bill Olson	Business Phone: 850 385-9899	Site Location: Gulfport, MS
Title: geologist	Business Fax: 850 385-9860	Estimated Start Date: 10-16/06
Organization: T+NUS	E-mail: William.Olson@TNUS.com	Mail
Street Address: 3360 Capital Circle NE Suite A	City: Tallahassee	Please Send Quote via: (circle) Fax
State/Province: FL	Country: US	ZIP/Postal Code: 32317	E-Mail

Physical Description of Biologically Active Zone (BAZ) Closed Land Fill

Predominant Geology of BAZ (e.g., gravel, sand, silt, clay, fractured bedrock, etc.)		Units (circle)
Length	40	feet
Width	30	metres
Saturated Thickness	15	
Heterogeneity	Low / Moderate / High	
BAZ Hydrogeology		
Porosity	30	%
Hydraulic Gradient	0.03	unitless
Bulk Hydraulic Conductivity	40	cm/s / m/s / ft/day
Average Groundwater Velocity	4	m/day / m/year / ft/day / ft/year

BAZ Design/Operation/ Type of Electron Donor (check appropriate boxes)	
BAZ design to treat:	
Plume	
Source	
BAZ operation will be:	
Passive Biobarrier	
Recirculation Loop/System	
Batch Additon of Donors	

Proposed Number of Injection Points: 3

Specify electron donor(s) to be used & anticipated concentration: Sodium lactate 15% Soln

Comments/Additional Information:

DHC census results
134/ml ~~[illegible]~~
5.48/ml
0.352/ml

Current Geochemistry of BAZ (* Required Fields)

		Max	Average	mg/L	µg/L	Other
* Chlorinated Ethenes	PCE	<1			X	
	TCE	34			X	
	cis-DCE	560			X	
	trans-DCE	630			X	
	1,1-DCE	1.2			X	
	VC	1600			X	
Chlorinated Ethanes	1,1,1,2-TeCA	ND				
	1,1,2,2-TeCA	ND				
	* 1,1,1-TCA	ND				
	1,1,2-TCA	ND				
	1,2-DCA	0.6				
	1,1-DCA	1.2				
	CA	ND				
Chlorinated Methanes	CT	ND				
	* CF	ND				
	DCM	ND				
	CM	ND				
Biogenic Gases	Ethene	0.038	0.02		X	
	Ethane	5.8	3		X	
	Methane	3600	2300		X	
Inorganic Parameters	Chloride	28.2	18	X		
	* Nitrate	<0.05		X		
	* Sulfate	348	200	X		
	Dissolved Iron	20400	8900	X		
	Total Iron	23200	11450	X		
	Dissolved Manganese	NA				
Field Parameters	* Dissolved Oxygen	0.94	0.40	X		
	* ORP	-476	-350			mV
	Temperature	26	25			°C
	Specific Conductance	7.32				mS/cm
	* pH	7.12	6.77			
Other Parameters	TOC	45	35	X		

Abreviations
PCE, TCE, DCE, VC: tetrachloroethene, trichloroethene, dichloroethene, vinyl chloride
TeCA, TCA, DCA, CA: tetrachloroethane, trichloroethane, dichloroethane, chloroethane
CT, CF, DCM, CM: carbon tetrachloride, chloroform, dichloromethane, chloromethane
mV: millivolts
ORP: oxidation reduction potential

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Rockford TN 37853-3044
Phone: (865) 573-8188
Fax: (865) 573-8133
Email: info@microbe.com

Analysis Report

Client: Amy Thompson
Tetra Tech , Inc.
661 Andersen Drive
Foster Plaza 7
Pittsburgh, PA 15220

Phone: (412) 921-8874

Fax: (412) 921-7276

MI Identifier: 041DD **Date Rec:** 04/21/2006 **Report Date:** 04/26/2006

Client Project #: CTO 283 **Client Project Name:** Gulfport

Purchase Order #:

Analysis Requested: CENSUS (final), Chain of Custody

Comments:

All samples within this data package were analyzed under U.S. EPA Good Laboratory Practice Standards: Toxic Substances Control Act (40 CFR part 790). All samples were processed according to standard operating procedures. Test results submitted in this data package meet the quality assurance requirements established by Microbial Insights, Inc.

Reported By: Dora M Ogles

Reviewed By: Greg A. Davis

NOTICE: This report is intended only for the addressee shown above and may contain confidential or privileged information. If the recipient of this material is not the intended recipient or if you have received this in error, please notify Microbial Insights, Inc. immediately. The data and other information in this report represent only the sample(s) analyzed and are rendered upon condition that it is not to be reproduced without approval from Microbial Insights, Inc. Thank you for your cooperation.

MICROBIAL INSIGHTS, INC.

2340 Stock Creek Blvd. Rockford, TN 37853-3044
Tel: (865) 573-8188; Fax: (865) 573-8133

Q Potential (DNA)

Client: **Tetra Tech , Inc.**
Project: Gulfport

MI Project Number: **041DD**
Date Received: 04/21/2006

Sample Information

Client Sample ID:		**04MP0101**	**04MP0301**
Sample Date:		04/20/2006	04/20/2006
Units:		cells/mL	cells/mL

Dechlorinating Bacteria

Dehalococcoides spp (1)	DHC	**1.34E+01**	**5.48E+00**
Desulfuromonas sp.	DSM	**9.88E+01**	**9.11E+01**
Dehalobacter spp.	DHB	**5.5E+03**	**1.92E+03**
Desulfitobacterium sp.	DSB	**3.1E+04**	**7.35E+04**

Functional Genes

BAV1 VC R-Dase (1)	BVC	<8.33E-01	<4.17E-01
TCE R-Dase (1)	TCE	<8.33E-01	<4.17E-01
VC R-Dase	VCR	<8.33E-01	**1.21E-01 (J)**
Soluble Methane Monooxygenase	sMMO	**2.67E+01**	**1.19E+01**

Other Genera

Geobacter spp.	GEO	**2.47E+03**	**1.34E+03**

Phylogenetic Group

Eubacteria	EBAC	**1.29E+06**	**5.79E+05**
Methanogens	MGN	**3.11E+04**	**2.71E+04**
Sulfate & Iron Reducing Bacteria	IRB/SRB	**9.86E+03**	**6.91E+03**
Methanotrophs (total)	MOB	**2.67E+04**	**4.29E+04**
Type I MOB	MOBI	**1.37E+04**	**1.55E+04**
Type II MOB	MOBII	**1.31E+04**	**2.75E+04**

Legend:
NA = Not Analyzed NS = Not Sampled J = Estimated gene copies below PQL but above LQL I = Inhibited
< = Result not detected

Notes:
1 Bio-Dechlor Census technology was developed by Dr. Loeffler and colleagues at Georgia Institute of Technology and was licensed for use through Regenesis.

REPORT TO:

Reports will be provided to the contact(s) listed below. Parties other than the contact(s) listed below will require prior approval.

Name: Amy Thomson
Company: Tetra Tech
Address: Foster Plaza 7
Pitt, PA
email:
Phone: ( )
Fax: ( )

Project Manager: Robert Fisher
Project Name: Gulfport
Project No.: CTO 283

INVOICE TO:

For Invoices **paid by a third party** it is imperative that contact information & corresponding reference No. be provided.

Name: Robert Fisher
Company: Tetra Tech
Address: 3360 Capital Circle NE
Suite B
Tall, FL 32308
email:
Phone: (850) 385 8899
Fax: ( )

Purchase Order No.
Subcontract No.

microbialinsights
2340 Stock Creek Blvd.
Rockford, TN 37853-3044
phone (865) 573-8188
fax: (865) 573-8133
email: info@microbe.com
www.microbe.com

Please Check One:
☐ More samples to follow
☒ No Additional Samples

Saturday Delivery
Please see sampling protocol for instructions

Report Type: ☒ Standard (default) ☐ Comprehensive (15% surcharge) ☐ Historical (30% surcharge)

Please contact us prior to submitting samples regarding questions about the analyses you are requesting at (865) 573-8188 (8:00 am to 4:00 pm M-F). After these hours please call (865) 300-8053.

Sample Information

	MI ID (Laboratory Use Only)	Sample Name	Date Sampled	Time Sampled	Matrix	PLFA	VFA	M/E/E	DGGE+3D	DGGE+3D	Q-Potential (DNA)	Q-Expression (RNA)*	qDHC (Dehalococcoides)	Other:	Other:	Other:
1		04MP0101	4/20/06	0825	GW						X					
2		04MP0301	4/20/06	1005	GW						X					

Q-Targets: Prior to selecting targets mark either Q-Potential for DNA or Q-Expression for RNA

Sample(s) Received: 4-21-06 Time: 11:00

COC sent: (Y) N Bottle ID match: (Y) N

Temp.: 5° All intact? ✓

No. of damaged/missing samples: ✓

Sample Analyses Requested

CUL (DNA) IAQ PLFA VFA Other:

Set #: 041DD Signed:

Relinquished by: Date: 4/20/06 Received by:

In order for analysis to be completed correctly, it is vital that chain of custody is filled out correctly & that all relative information is provided. Failure to provide sufficient and/or correct information regarding reporting, invoicing & analyses requested information may result in delays for which MI will not be liable. * additional cost and sample preservation are associated with RNA samples.

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2340 Stock Creek Blvd.
Rockford TN 37853-3044
Phone: (865) 573-8188
Fax: (865) 573-8133
Email: info@microbe.com

Analysis Report

Client: Robert Fisher
Tetra Tech , Inc.
3360 Capital Circle NE
Suite 13
Tallahassee, FL 32308

Phone: (850) 385-9899

Fax:

MI Identifier: 020EA **Date Rec:** 01/12/2007 **Report Date:** 01/19/2007

Client Project #: **Client Project Name:** Gulfport

Purchase Order #:

Analysis Requested: CENSUS (final)

Comments:

All samples within this data package were analyzed under U.S. EPA Good Laboratory Practice Standards: Toxic Substances Control Act (40 CFR part 790). All samples were processed according to standard operating procedures. Test results submitted in this data package meet the quality assurance requirements established by Microbial Insights, Inc.

Reported By: Anita Biernacki

Reviewed By: Dora M Ogles

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MICROBIAL INSIGHTS, INC.

2340 Stock Creek Blvd. Rockford, TN 37853-3044
Tel: (865) 573-8188; Fax: (865) 573-8133

Q Potential (DNA)

Client: **Tetra Tech , Inc.**
Project: Gulfport

MI Project Number: **020EA**
Date Received: 01/12/2007

Sample Information

Client Sample ID:		**04MP0303**	**04MP0103**
Sample Date:		01/11/2007	01/11/2007
Units:		cells/mL	cells/mL

Dechlorinating Bacteria

Dehalococcoides spp (1)	DHC	**1.44E+01**	**5.35E+01**
Desulfuromonas spp.	DSM	**1.04E+02**	**1.73E+01**
Dehalobacter spp.	DHB	**7.89E-01**	**8.51E+00**
Desulfitobacterium sp.	DSB	**2.1E+03**	**2.03E+02**

Functional Genes

TCE R-Dase (1)	TCE	<3.33E-01	<6.25E-01
BAV1 VC R-Dase (1)	BVC	<3.33E-01	**3.56E-01 (J)**
VC R-Dase	VCR	<3.33E-01	**2.01E+01**
Soluble Methane Monooxygenase	sMMO	**1.3E+04**	**1.98E+02**

Other Genera

Geobacter spp.	GEO	<5E-01	<9.38E-01

Phylogenetic Group

Eubacteria	EBAC	**2.63E+06**	**2.99E+06**
Methanogens	MGN	**3.36E+04**	<1.25E+00
Sulfate & Iron Reducing Bacteria	IRB/SRB	**2.55E+01**	<9.38E-01
Methanotrophs (total)	MOB	**2.99E+07**	**8.45E+06**
Type I MOB	MOBI	**2.81E+06**	**4.84E+03**
Type II MOB	MOBII	**2.71E+07**	**8.45E+06**

Legend:
NA = Not Analyzed NS = Not Sampled J = Estimated gene copies below PQL but above LQL I = Inhibited
< = Result not detected

Notes:
1 Bio-Dechlor Census technology was developed by Dr. Loeffler and colleagues at Georgia Institute of Technology and was licensed for use through Regenesis.

REPORT TO:

Reports will be provided to the contact(s) listed below. Parties other than the contact(s) listed below will require prior approval.

Name:
Company: Tetra Tech
Address:

email:
Phone: 850 385 9899
Fax: ( )

Project Manager: Robert Fisher
Project Name: Gulfport
Project No.:

INVOICE TO:

For Invoices paid by a third party it is imperative that contact information & corresponding reference No. be provided.

Name:
Company:
Address:

email:
Phone: ( )
Fax: ( )

Purchase Order No.
Subcontract No.

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Please Check One:
☐ More samples to follow
☒ No Additional Samples

Saturday Delivery
Please see sampling protocol for instructions

Report Type: ☒ Standard (default) ☐ Comprehensive (15% surcharge) ☐ Historical (30% surcharge)

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Sample Information

MI ID (Laboratory Use Only)	Sample Name	Date Sampled	Time Sampled	Matrix	PLFA	VFA	M/E/E	DGGE-3'ID	DGGE-5'ID	Q-Potential (DNA)	Q-Expression (RNA)*	qDHC (Dehalococcoides)	qTCE R-Dase	Other	Other
020EA 1	04MP0303	1-11-07	1310	Aq						X					
2	04MP0103	1-11-07	1200	Aq						X					

Q-Targets: Prior to selecting targets mark either Q-Potential for DNA or Q-Expression for RNA

FedEx

Sample(s) Received: 01.12.07 Time: 1010

COC sent: (Y) N Bottle ID match: (Y) N

Temp.: 8°C All intact? Yes (Field Ref: 1745)

No. of damaged/missing samples:

Sample Analyses Requested

CUL (DNA) PLFA VFA Other:

Set #: 020EA Signed:

Relinquished by: Date: 1/11/07 Received by: Tiffany Stone Date 1-12-07

In order for analysis to be completed correctly, it is vital that chain of custody is filled out correctly & that all relative information is provided. Failure to provide sufficient and/or correct information regarding reporting, invoicing & analyses requested information may result in delays for which MI will not be liable. * additional cost and sample preservation are associated with RNA samples.

PROJ_NO: 9666

SDG: 2834 MEDIA: WATER DATA FRACTION: M

nsample	04GW0901	nsample	04GW1001	nsample	04GW1101
samp_date	9/8/2004	samp_date	9/9/2004	samp_date	9/9/2004
lab_id	WU2885-001	lab_id	WU2934-001	lab_id	WU2934-002
qc_type	NM	qc_type	NM	qc_type	NM
units	UG/L	units	UG/L	units	UG/L
Pct_Solids		Pct_Solids		Pct_Solids	
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	Result	Val Qual	Qual Code
ALUMINUM	382	U	A
ANTIMONY	2.34	U	
ARSENIC	3.03	U	
BARIUM	84.3		
BERYLLIUM	0.27	U	
CADMIUM	3.97	U	
CALCIUM	8920		
CHROMIUM	0.8	U	
COBALT	4.36	U	
COPPER	1.91	U	
IRON	1220		
LEAD	1.7	U	
MAGNESIUM	1270		
MANGANESE	35.1		
MERCURY	0.01	U	
NICKEL	10.8	U	
POTASSIUM	2120	U	A
SELENIUM	3.71	U	
SILVER	3.8	U	A
SODIUM	5770	J	I
THALLIUM	4.09	U	
VANADIUM	4.14	U	
ZINC	1.6		

Parameter	Result	Val Qual	Qual Code
ALUMINUM	17.9	U	
ANTIMONY	2.34	U	
ARSENIC	3.03	U	
BARIUM	229		
BERYLLIUM	0.27	U	
CADMIUM	3.97	U	
CALCIUM	68900		
CHROMIUM	0.8	U	
COBALT	4.36	U	
COPPER	1.91	U	
IRON	2250		
LEAD	1.7	U	
MAGNESIUM	11500		
MANGANESE	57.3		
MERCURY	0.01	U	
NICKEL	10.8	U	
POTASSIUM	5170		
SELENIUM	4.2	U	A
SILVER	2.84	U	
SODIUM	21400	J	I
THALLIUM	11.1	U	A
VANADIUM	4.14	U	
ZINC	1.44	U	

Parameter	Result	Val Qual	Qual Code
ALUMINUM	105	U	A
ANTIMONY	2.34	U	
ARSENIC	3.03	U	
BARIUM	151		
BERYLLIUM	0.27	U	
CADMIUM	3.97	U	
CALCIUM	9400		
CHROMIUM	0.8	U	
COBALT	4.36	U	
COPPER	1.91	U	
IRON	7860		
LEAD	1.7	U	
MAGNESIUM	5520		
MANGANESE	246		
MERCURY	0.01	U	
NICKEL	10.8	U	
POTASSIUM	3410		
SELENIUM	3.71	U	
SILVER	2.84	U	
SODIUM	20100	J	I
THALLIUM	4.09	U	
VANADIUM	4.14	U	
ZINC	1.44	U	

PROJ_NO: 9666

SDG: 2834 MEDIA: WATER DATA FRACTION: M

nsample	04GW1601	nsample	04GW1701	nsample	04GW2001
samp_date	9/13/2004	samp_date	9/13/2004	samp_date	9/10/2004
lab_id	WU2974-001	lab_id	WU2974-002	lab_id	WU2954-002
qc_type	NM	qc_type	NM	qc_type	NM
units	UG/L	units	UG/L	units	UG/L
Pct_Solids		Pct_Solids		Pct_Solids	
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	Result	Val Qual	Qual Code
ALUMINUM	197	U	A
ANTIMONY	2.34	U	
ARSENIC	3.03	U	
BARIUM	405		
BERYLLIUM	0.27	U	
CADMIUM	3.97	U	
CALCIUM	115000		
CHROMIUM	0.8	U	
COBALT	4.36	U	
COPPER	1.91	U	
IRON	48000		
LEAD	1.7	U	
MAGNESIUM	41000		
MANGANESE	390		
MERCURY	0.01	U	
NICKEL	10.8	U	
POTASSIUM	7490		
SELENIUM	3.71	U	
SILVER	2.84	U	
SODIUM	46600	J	I
THALLIUM	4.09	U	
VANADIUM	4.14	U	
ZINC	1.44	U	

Parameter	Result	Val Qual	Qual Code
ALUMINUM	757	U	A
ANTIMONY	2.34	U	
ARSENIC	3.03	U	
BARIUM	210		
BERYLLIUM	0.27	U	
CADMIUM	3.97	U	
CALCIUM	15600		
CHROMIUM	2.3	U	A
COBALT	4.36	U	
COPPER	12.6		
IRON	3920		
LEAD	1.7	U	
MAGNESIUM	7050		
MANGANESE	179		
MERCURY	0.01	U	
NICKEL	10.8	U	
POTASSIUM	3890		
SELENIUM	3.71	U	
SILVER	3	U	A
SODIUM	25400	J	I
THALLIUM	4.09	U	
VANADIUM	4.14	U	
ZINC	3.3		

Parameter	Result	Val Qual	Qual Code
ALUMINUM	93.7	U	A
ANTIMONY	2.34	U	
ARSENIC	3.3		
BARIUM	195		
BERYLLIUM	0.27	U	
CADMIUM	3.97	U	
CALCIUM	17100		
CHROMIUM	0.8	U	
COBALT	4.36	U	
COPPER	1.91	U	
IRON	10300		
LEAD	1.7	U	
MAGNESIUM	8230		
MANGANESE	312		
MERCURY	0.01	U	
NICKEL	10.8	U	
POTASSIUM	3720		
SELENIUM	3.71	U	
SILVER	2.84	U	
SODIUM	26400	J	I
THALLIUM	4.09	U	
VANADIUM	4.14	U	
ZINC	1.44	U	

PROJ_NO: 9666

SDG: 2834 MEDIA: WATER DATA FRACTION: MISC

nsample	04GW0901	nsample	04GW1001	nsample	04GW1101
samp_date	9/8/2004	samp_date	9/9/2004	samp_date	9/9/2004
lab_id	WU2885-1	lab_id	WU2934-1	lab_id	WU2934-2
qc_type	NM	qc_type	NM	qc_type	NM
Pct_Solids		Pct_Solids		Pct_Solids	
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	units	Result	Val Qual	Qual Code
CHLORIDE	MG/L	14		
CYANIDE	UG/L	10	U	
NITRATE-N	MG/L	0.05	UJ	D
NITRITE-N	MG/L	0.05	UJ	D
SULFATE	MG/L	23		
TOTAL ORGANIC CARBON	MG/L	1.8		

Parameter	units	Result	Val Qual	Qual Code
CHLORIDE	MG/L	23		
CYANIDE	UG/L	10	U	
NITRATE-N	MG/L	0.05	UJ	D
NITRITE-N	MG/L	0.05	UJ	D
SULFATE	MG/L	73		

Parameter	units	Result	Val Qual	Qual Code
CHLORIDE	MG/L	5.4		
CYANIDE	UG/L	10	U	
NITRATE-N	MG/L	0.05	UJ	D
NITRITE-N	MG/L	0.05	UJ	D
SULFATE	MG/L	2	U	

PROJ_NO: 9666

SDG: 2834 MEDIA: WATER DATA FRACTION: MISC

nsample	04GW1201	nsample	04GW1201D	nsample	04GW1501
samp_date	9/14/2004	samp_date	9/14/2004	samp_date	9/10/2004
lab_id	WU3000-2	lab_id	WU3000-3	lab_id	WU2954-1
qc_type	NM	qc_type	NM	qc_type	NM
Pct_Solids		Pct_Solids		Pct_Solids	
DUP_OF:		DUP_OF:	04GW1201	DUP_OF:	

Parameter	units	Result	Val Qual	Qual Code
CHLORIDE	MG/L	41		
CYANIDE	UG/L	10	U	
NITRATE-N	MG/L	0.0055	J	DP
NITRITE-N	MG/L	0.05	UJ	D
SULFATE	MG/L	68		
TOTAL ORGANIC CARBON	MG/L	29		

Parameter	units	Result	Val Qual	Qual Code
CHLORIDE	MG/L	41		
CYANIDE	UG/L	4.7	J	P
NITRATE-N	MG/L	0.0055	J	DP
NITRITE-N	MG/L	0.05	UJ	D
SULFATE	MG/L	69		
TOTAL ORGANIC CARBON	MG/L	28		

Parameter	units	Result	Val Qual	Qual Code
CHLORIDE	MG/L	19		
CYANIDE	UG/L	10	U	
NITRATE-N	MG/L	0.05	UJ	D
NITRITE-N	MG/L	0.022	J	DP
SULFATE	MG/L	110		
TOTAL ORGANIC CARBON	MG/L	9.7		

PROJ_NO: 9666

SDG: 2834 MEDIA: WATER DATA FRACTION: MISC

nsample	04GW1601	nsample	04GW1701	nsample	04GW2001
samp_date	9/13/2004	samp_date	9/13/2004	samp_date	9/10/2004
lab_id	WU2974-1	lab_id	WU2974-2	lab_id	WU2954-2
qc_type	NM	qc_type	NM	qc_type	NM
Pct_Solids		Pct_Solids		Pct_Solids	
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	units	Result	Val Qual	Qual Code
CHLORIDE	MG/L	34		
CYANIDE	UG/L	10	U	
NITRATE-N	MG/L	0.05	UJ	D
NITRITE-N	MG/L	0.05	UJ	D
SULFATE	MG/L	96		
TOTAL ORGANIC CARBON	MG/L	31		

Parameter	units	Result	Val Qual	Qual Code
CHLORIDE	MG/L	6.4		
CYANIDE	UG/L	10	U	
NITRATE-N	MG/L	0.0054	J	DP
NITRITE-N	MG/L	0.05	UJ	D
SULFATE	MG/L	2.4		
TOTAL ORGANIC CARBON	MG/L	5.2		

Parameter	units	Result	Val Qual	Qual Code
CHLORIDE	MG/L	5.8		
CYANIDE	UG/L	10	U	
NITRATE-N	MG/L	0.05	UJ	D
NITRITE-N	MG/L	0.05	UJ	D
SULFATE	MG/L	1.1		
TOTAL ORGANIC CARBON	MG/L	5.4		

PROJ_NO: 9666

SDG: P0603551 MEDIA: WATER DATA FRACTION: OVG

nsample	04GW1602
samp_date	3/30/2006
lab_id	P0603551-01B
qc_type	NM
units	UG/L
Pct_Solids	0.0
DUP_OF:	

Parameter	Result	Val Qual	Qual Code
ETHANE	2.5		
ETHENE	14		
METHANE	1600		

PROJ_NO: 9666

SDG: P0603551 MEDIA: WATER DATA FRACTION: MISC

nsample	04GW1602
samp_date	3/30/2006
lab_id	P0603551-01A
qc_type	NM
Pct_Solids	0.0
DUP_OF:	

Parameter	units	Result	Val Qual	Qual Code
ACETIC ACID	MG/L	0.11		
ACETYLENE	UG/L	1.0	U	
BUTANE	UG/L	0.017	J	P
BUTANOIC ACID	MG/L	0.07	U	
HEXANOIC ACID	MG/L	0.10	U	
I-HEXANOIC ACID	MG/L	0.10	U	
I-PENTANOIC ACID	MG/L	0.07	U	
ISOBUTANE	UG/L	0.014	J	P
LACTIC ACID	MG/L	0.10	U	
PENTANOIC ACID	MG/L	0.07	U	
PROPANE	UG/L	0.22		
PROPIONIC ACID	MG/L	0.07	U	
PROPYLENE	UG/L	0.10		
PYRUVIC ACID	MG/L	0.07	U	
TOTAL ORGANIC CARBON	MG/L	31.0		

PROJ_NO: 9666

SDG: P0603551 MEDIA: AIR DATA FRACTION: MISC

nsample	04GW1602
samp_date	3/30/2006
lab_id	P0603551-01B
qc_type	NM
Pct_Solids	0.0
DUP_OF:	

Parameter	units	Result	Val Qual	Qual Code
HYDROGEN	NM	3.5		

PROJ_NO: 9666

SDG: 0603432 MEDIA: WATER DATA FRACTION: OV

nsample	04GW1602	nsample	04GW1602
samp_date	3/30/2006	samp_date	3/30/2006
lab_id	0603432-01	lab_id	0603432-01
qc_type	NM	qc_type	NM
units	UG/L	units	UG/L
Pct_Solids		Pct_Solids	
DUP_OF:		DUP_OF:	

Parameter	Result	Val Qual	Qual Code
1,1,1-TRICHLOROETHANE	2	U	
1,1,2,2-TETRACHLOROETHANE	2	U	
1,1,2-TRICHLOROETHANE	2	U	
1,1,2-TRICHLOROTRIFLUOROETHANE	2	U	
1,1-DICHLOROETHANE	2	U	
1,1-DICHLOROETHENE	2	U	
1,2,4-TRICHLOROBENZENE	2	U	
1,2-DIBROMO-3-CHLOROPROPANE	4	U	
1,2-DIBROMOETHANE	2	U	
1,2-DICHLOROBENZENE	2	U	
1,2-DICHLOROETHANE	2	U	
1,2-DICHLOROPROPANE	2	U	
1,3-DICHLOROBENZENE	2	U	
1,4-DICHLOROBENZENE	2	U	
2-BUTANONE	20	U	
2-HEXANONE	10	U	
4-METHYL-2-PENTANONE	10	U	
ACETONE	20	U	
BENZENE	2	U	
BROMODICHLOROMETHANE	2	U	
BROMOFORM	2	U	
BROMOMETHANE	4	U	
CARBON DISULFIDE	2	U	
CARBON TETRACHLORIDE	2	U	
CHLOROBENZENE	2	U	
CHLORODIBROMOMETHANE	2	U	
CHLOROETHANE	4	U	
CHLOROFORM	2	U	
CHLOROMETHANE	4	U	
CIS-1,2-DICHLOROETHENE	170		
CIS-1,3-DICHLOROPROPENE	2	U	
CYCLOHEXANE	4	U	

Parameter	Result	Val Qual	Qual Code
DICHLORODIFLUOROMETHANE	4	U	
ETHYLBENZENE	2	U	
ISOPROPYLBENZENE	2	U	
METHYL ACETATE	2	U	
METHYL CYCLOHEXANE	2	U	
METHYL TERT-BUTYL ETHER	2	U	
METHYLENE CHLORIDE	4	U	
STYRENE	2	U	
TETRACHLOROETHENE	2	U	
TOLUENE	2	U	
TOTAL XYLENES	2	U	
TRANS-1,2-DICHLOROETHENE	89		
TRANS-1,3-DICHLOROPROPENE	2	U	
TRICHLOROETHENE	4.1		
TRICHLOROFLUOROMETHANE	4	U	
VINYL CHLORIDE	84		

PROJ_NO: 9666

SDG: 0603432 MEDIA: WATER DATA FRACTION: M

nsample	04GW1602
samp_date	3/30/2006
lab_id	0603432-01
qc_type	NM
units	UG/L
Pct_Solids	
DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	38600			

PROJ_NO: 9666

SDG: 0603432 MEDIA: WATER DATA FRACTION: MF

nsample	04GW1602
samp_date	3/30/2006
lab_id	0603432-01Solub
qc_type	NM
units	UG/L
Pct_Solids	
DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	6890			

PROJ_NO: 9666

SDG: 0603432 MEDIA: WATER DATA FRACTION: MISC

nsample	04GW1602
samp_date	3/30/2006
lab_id	0603432-01
qc_type	NM
Pct_Solids	
DUP_OF:	

Parameter	units	Result	Lab Qual	Val Qual	Qual Code
CHLORIDE	MG/L	30.1			
NITRATE-N	MG/L	0.05	U	U	
NITRITE-N	MG/L	0.05	U	U	
ORTHOPHOSPHATE-P	MG/L	0.01	U	U	
SULFATE	MG/L	69.2			
SULFIDE	MG/L	0.75	U	U	

PROJ_NO: 9666

SDG: GULFPORT4-001 MEDIA: WATER DATA FRACTION: MISC

nsample	04MP0101	nsample	04MP0201	nsample	04MP0301
samp_date	4/20/2006	samp_date	4/20/2006	samp_date	4/20/2006
lab_id	0604242-03	lab_id	0604242-04	lab_id	0604242-05
qc_type	NM	qc_type	NM	qc_type	NM
Pct_Solids		Pct_Solids		Pct_Solids	
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	units	Result	Lab Qual	Val Qual	Qual Code
CHLORIDE	MG/L	28.2			
NITRATE	MG/L	0.05	U	U	
NITRITE	MG/L	0.05	U	U	
ORTHOPHOSPHATE-P	MG/L	0.076			
SULFATE	MG/L	106			
SULFIDE	MG/L	0.75	U	U	

Parameter	units	Result	Lab Qual	Val Qual	Qual Code
CHLORIDE	MG/L	17.3			
NITRATE	MG/L	0.05	U	U	
NITRITE	MG/L	0.05	U	U	
ORTHOPHOSPHATE-P	MG/L	0.059			
SULFATE	MG/L	222			
SULFIDE	MG/L	1.3			

Parameter	units	Result	Lab Qual	Val Qual	Qual Code
CHLORIDE	MG/L	17.5			
NITRATE	MG/L	0.05	U	U	
NITRITE	MG/L	0.05	U	U	
ORTHOPHOSPHATE-P	MG/L	0.041			
SULFATE	MG/L	348			
SULFIDE	MG/L	0.8	B	J	P

PROJ_NO: 9666

SDG: GULFPORT4-001 MEDIA: WATER DATA FRACTION: MF

nsample	04MP0101	nsample	04MP0201	nsample	04MP0301
samp_date	4/20/2006	samp_date	4/20/2006	samp_date	4/20/2006
lab_id	0604242-03Solub	lab_id	0604242-04Solub	lab_id	0604242-05Solub
qc_type	NM	qc_type	NM	qc_type	NM
units	UG/L	units	UG/L	units	UG/L
Pct_Solids		Pct_Solids		Pct_Solids	
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	20400			

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	1200			

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	5120			

PROJ_NO: 9666

SDG: GULFPORT4-001 MEDIA: WATER DATA FRACTION: M

nsample	04MP0101	nsample	04MP0201	nsample	04MP0301
samp_date	4/20/2006	samp_date	4/20/2006	samp_date	4/20/2006
lab_id	0604242-03	lab_id	0604242-04	lab_id	0604242-05
qc_type	NM	qc_type	NM	qc_type	NM
units	UG/L	units	UG/L	units	UG/L
Pct_Solids		Pct_Solids		Pct_Solids	
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	23200			

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	1720			

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	9440			

PROJ_NO: 9666

SDG: P0604379 MEDIA: WATER DATA FRACTION: MISC

nsample	04MP0101	nsample	04MP0201	nsample	04MP0301
samp_date	4/20/2006	samp_date	4/20/2006	samp_date	4/20/2006
lab_id	P0604379-01A	lab_id	P0604379-02B	lab_id	P0604379-03A
qc_type	NM	qc_type	NM	qc_type	NM
Pct_Solids	0.0	Pct_Solids	0.0	Pct_Solids	0.0
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	units	Result	Lab Qual	Val Qual	Qual Code
ACETIC ACID	MG/L	0.667	M		
ACETYLENE	UG/L	1	U	U	
BUTANE	UG/L	0.037			
BUTANOIC ACID	MG/L	0.282			
HEXANOIC ACID	MG/L	0.1	U	U	
HYDROGEN	NM	3.9			
I-HEXANOIC ACID	MG/L	0.1	U	U	
I-PENTANOIC ACID	MG/L	0.07	U	U	
ISOBUTANE	UG/L	0.022	J	J	P
LACTIC ACID	MG/L	0.1	U	U	
PENTANOIC ACID	MG/L	0.07	U	U	
PROPANE	UG/L	0.38			
PROPIONIC ACID	MG/L	0.07	U	U	
PROPYLENE	UG/L	0.022	J	J	P
PYRUVIC ACID	MG/L	0.07	U	U	
TOTAL ORGANIC CARBON	MG/L	45			

Parameter	units	Result	Lab Qual	Val Qual	Qual Code
ACETYLENE	UG/L	1	U	U	
BUTANE	UG/L	0.044			
HYDROGEN	NM	2.6			
ISOBUTANE	UG/L	0.022	J	J	P
PROPANE	UG/L	0.27			
PROPYLENE	UG/L	0.025	U	U	
TOTAL ORGANIC CARBON	MG/L	25			

Parameter	units	Result	Lab Qual	Val Qual	Qual Code
ACETIC ACID	MG/L	0.125	M		
ACETYLENE	UG/L	1	U	U	
BUTANE	UG/L	0.059			
BUTANOIC ACID	MG/L	0.07	U	U	
HEXANOIC ACID	MG/L	0.1	U	U	
HYDROGEN	NM	2.5			
I-HEXANOIC ACID	MG/L	0.1	U	U	
I-PENTANOIC ACID	MG/L	0.07	U	U	
ISOBUTANE	UG/L	0.037			
LACTIC ACID	MG/L	0.1	U	U	
PENTANOIC ACID	MG/L	0.07	U	U	
PROPANE	UG/L	0.39			
PROPIONIC ACID	MG/L	0.07	U	U	
PROPYLENE	UG/L	0.014	J	J	P
PYRUVIC ACID	MG/L	0.07	U	U	
TOTAL ORGANIC CARBON	MG/L	35			

PROJ_NO: 9666

SDG: P0604379 MEDIA: WATER DATA FRACTION: OVG

nsample	04MP0101	nsample	04MP0201	nsample	04MP0301
samp_date	4/20/2006	samp_date	4/20/2006	samp_date	4/20/2006
lab_id	P0604379-01B	lab_id	P0604379-02B	lab_id	P0604379-03B
qc_type	NM	qc_type	NM	qc_type	NM
units	UG/L	units	UG/L	units	UG/L
Pct_Solids	0.0	Pct_Solids	0.0	Pct_Solids	0.0
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
ETHANE	5.8			
ETHENE	0.038			
METHANE	3600			

Parameter	Result	Lab Qual	Val Qual	Qual Code
ETHANE	0.27			
ETHENE	0.009	J	J	P
METHANE	1600			

Parameter	Result	Lab Qual	Val Qual	Qual Code
ETHANE	2.7			
ETHENE	0.013			
METHANE	1900			

PROJ_NO: 9666

SDG: GULFPORTSITE4-0 MEDIA: WATER DATA FRACTION: MISC

nsample	04MP0203	nsample	04MP0303	nsample	04MW2202
samp_date	1/11/2007	samp_date	1/11/2007	samp_date	1/11/2007
lab_id	0701065-03	lab_id	0701065-04	lab_id	0701065-01
qc_type	NM	qc_type	NM	qc_type	NM
Pct_Solids		Pct_Solids		Pct_Solids	
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	units	Result	Val Qual	Qual Code
CHLORIDE	MG/L	23.1		
NITRATE-N	MG/L	0.05	U	
NITRITE-N	MG/L	0.05	U	
ORTHOPHOSPHATE-P	MG/L	0.26		
SULFATE	MG/L	501		
SULFIDE	MG/L	2.1		

Parameter	units	Result	Val Qual	Qual Code
CHLORIDE	MG/L	26.9		
NITRATE-N	MG/L	0.05	U	
NITRITE-N	MG/L	0.05	U	
ORTHOPHOSPHATE-P	MG/L	0.12		
SULFATE	MG/L	568		
SULFIDE	MG/L	2.7		

Parameter	units	Result	Val Qual	Qual Code
CHLORIDE	MG/L	41.2		
NITRATE-N	MG/L	0.05	U	
NITRITE-N	MG/L	0.05	U	
ORTHOPHOSPHATE-P	MG/L	0.01	U	
SULFATE	MG/L	6.8		
SULFIDE	MG/L	5.4		

PROJ_NO: 9666

SDG: GULFPORTSITE4-0 MEDIA: WATER DATA FRACTION: MF

nsample	04MP0203	nsample	04MP0303	nsample	04MW2202
samp_date	1/11/2007	samp_date	1/11/2007	samp_date	1/11/2007
lab_id	0701065-03Solub	lab_id	0701065-04Solub	lab_id	0701065-01Solub
qc_type	NM	qc_type	NM	qc_type	NM
units	UG/L	units	UG/L	units	UG/L
Pct_Solids		Pct_Solids		Pct_Solids	
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	Result	Val Qual	Qual Code
IRON	289		

Parameter	Result	Val Qual	Qual Code
IRON	700		

Parameter	Result	Val Qual	Qual Code
IRON	6260		

PROJ_NO: 9666

SDG: GULFPORTSITE4-0 MEDIA: WATER DATA FRACTION: M

nsample	04MP0203	nsample	04MP0303	nsample	04MW2202
samp_date	1/11/2007	samp_date	1/11/2007	samp_date	1/11/2007
lab_id	0701065-03	lab_id	0701065-04	lab_id	0701065-01
qc_type	NM	qc_type	NM	qc_type	NM
units	UG/L	units	UG/L	units	UG/L
Pct_Solids		Pct_Solids		Pct_Solids	
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	Result	Val Qual	Qual Code
IRON	485		

Parameter	Result	Val Qual	Qual Code
IRON	3610		

Parameter	Result	Val Qual	Qual Code
IRON	11900		

PROJ_NO: 9666

SDG: GULFPORTSITE4-0 MEDIA: WATER DATA FRACTION: MISC

nsample	04MP0203	nsample	04MP0303	nsample	04MW2202
samp_date	1/11/2007	samp_date	1/11/2007	samp_date	1/11/2007
lab_id	0701065-03	lab_id	0701065-04	lab_id	0701065-01
qc_type	NM	qc_type	NM	qc_type	NM
Pct_Solids		Pct_Solids		Pct_Solids	
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	units	Result	Val Qual	Qual Code
CHLORIDE	MG/L	23.1		
NITRATE-N	MG/L	0.05	U	
NITRITE-N	MG/L	0.05	U	
ORTHOPHOSPHATE-P	MG/L	0.26		
SULFATE	MG/L	501		
SULFIDE	MG/L	2.1		

Parameter	units	Result	Val Qual	Qual Code
CHLORIDE	MG/L	26.9		
NITRATE-N	MG/L	0.05	U	
NITRITE-N	MG/L	0.05	U	
ORTHOPHOSPHATE-P	MG/L	0.12		
SULFATE	MG/L	568		
SULFIDE	MG/L	2.7		

Parameter	units	Result	Val Qual	Qual Code
CHLORIDE	MG/L	41.2		
NITRATE-N	MG/L	0.05	U	
NITRITE-N	MG/L	0.05	U	
ORTHOPHOSPHATE-P	MG/L	0.01	U	
SULFATE	MG/L	6.8		
SULFIDE	MG/L	5.4		

PROJ_NO: 9666

SDG: GULFPORTSITE4-0 MEDIA: WATER DATA FRACTION: MF

nsample	04MP0203	nsample	04MP0303	nsample	04MW2202
samp_date	1/11/2007	samp_date	1/11/2007	samp_date	1/11/2007
lab_id	0701065-03Solub	lab_id	0701065-04Solub	lab_id	0701065-01Solub
qc_type	NM	qc_type	NM	qc_type	NM
units	UG/L	units	UG/L	units	UG/L
Pct_Solids		Pct_Solids		Pct_Solids	
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	Result	Val Qual	Qual Code
IRON	289		

Parameter	Result	Val Qual	Qual Code
IRON	700		

Parameter	Result	Val Qual	Qual Code
IRON	6260		

PROJ_NO: 9666

SDG: GULFPORTSITE4-0 MEDIA: WATER DATA FRACTION: M

nsample	04MP0203	nsample	04MP0303	nsample	04MW2202
samp_date	1/11/2007	samp_date	1/11/2007	samp_date	1/11/2007
lab_id	0701065-03	lab_id	0701065-04	lab_id	0701065-01
qc_type	NM	qc_type	NM	qc_type	NM
units	UG/L	units	UG/L	units	UG/L
Pct_Solids		Pct_Solids		Pct_Solids	
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	Result	Val Qual	Qual Code
IRON	485		

Parameter	Result	Val Qual	Qual Code
IRON	3610		

Parameter	Result	Val Qual	Qual Code
IRON	11900		

PROJ_NO: 9666

SDG: P0701151 MEDIA: AIR DATA FRACTION: MISC

nsample	04MP0303
samp_date	1/11/2007
lab_id	P0701151-03B
qc_type	NM
Pct_Solids	0.0
DUP_OF:	

Parameter	units	Result	Val Qual	Qual Code
HYDROGEN	NM	1.3		

PROJ_NO: 9666

SDG: P0701151 MEDIA: WATER DATA FRACTION: OVG

nsample	04MP0203	nsample	04MP0303	nsample	04MW2202
samp_date	1/11/2007	samp_date	1/11/2007	samp_date	1/11/2007
lab_id	P0701151-02A	lab_id	P0701151-03B	lab_id	P0701151-01A
qc_type	NM	qc_type	NM	qc_type	NM
units	UG/L	units	UG/L	units	UG/L
Pct_Solids	0.0	Pct_Solids	0.0	Pct_Solids	0.0
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	Result	Val Qual	Qual Code
ETHANE	0.3		
ETHENE	0.008	J	P
METHANE	6000		

Parameter	Result	Val Qual	Qual Code
ETHANE	2.3		
ETHENE	0.01	U	
METHANE	6300		

Parameter	Result	Val Qual	Qual Code
ETHANE	6.7		
ETHENE	15		
METHANE	12000		

PROJ_NO: 9666

SDG: P0701151 MEDIA: WATER DATA FRACTION: MISC

nsample	04MP0203	nsample	04MP0303	nsample	04MW2202
samp_date	1/11/2007	samp_date	1/11/2007	samp_date	1/11/2007
lab_id	P0701151-02A	lab_id	P0701151-03A	lab_id	P0701151-01A
qc_type	NM	qc_type	NM	qc_type	NM
Pct_Solids	0.0	Pct_Solids	0.0	Pct_Solids	0.0
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	units	Result	Val Qual	Qual Code
ACETIC ACID	MG/L	0.12		
ACETYLENE	UG/L	0.5	U	
BUTANE	UG/L	0.13		
BUTANOIC ACID	MG/L	0.07	U	
HEXANOIC ACID	MG/L	0.1	U	
I-HEXANOIC ACID	MG/L	0.1	U	
I-PENTANOIC ACID	MG/L	0.07	U	
ISOBUTANE	UG/L	0.044	J	P
LACTIC ACID	MG/L	0.24	U	A
PENTANOIC ACID	MG/L	0.07	U	
PROPANE	UG/L	0.36		
PROPIONIC ACID	MG/L	0.07	U	
PROPYLENE	UG/L	0.015	J	P
PYRUVIC ACID	MG/L	0.07	U	
TOTAL ORGANIC CARBON	MG/L	19		

Parameter	units	Result	Val Qual	Qual Code
ACETIC ACID	MG/L	1.9		
ACETYLENE	UG/L	1	U	
BUTANE	UG/L	0.046		
BUTANOIC ACID	MG/L	0.07	U	
HEXANOIC ACID	MG/L	0.1	U	
I-HEXANOIC ACID	MG/L	0.1	U	
I-PENTANOIC ACID	MG/L	0.07	U	
ISOBUTANE	UG/L	0.022	J	P
LACTIC ACID	MG/L	0.1	U	
PENTANOIC ACID	MG/L	0.07	U	
PROPANE	UG/L	0.24		
PROPIONIC ACID	MG/L	0.13		
PROPYLENE	UG/L	0.05	U	
PYRUVIC ACID	MG/L	0.07	U	
TOTAL ORGANIC CARBON	MG/L	28		

Parameter	units	Result	Val Qual	Qual Code
ACETIC ACID	MG/L	410		
ACETYLENE	UG/L	0.13	J	P
BUTANE	UG/L	0.05	U	
BUTANOIC ACID	MG/L	56		
HEXANOIC ACID	MG/L	6.4		
I-HEXANOIC ACID	MG/L	0.49		
I-PENTANOIC ACID	MG/L	1.9		
ISOBUTANE	UG/L	0.05	U	
LACTIC ACID	MG/L	10	J	P
PENTANOIC ACID	MG/L	42		
PROPANE	UG/L	0.064		
PROPIONIC ACID	MG/L	580		
PROPYLENE	UG/L	0.25		
PYRUVIC ACID	MG/L	7.3		
TOTAL ORGANIC CARBON	MG/L	520		

PROJ_NO: 9666

SDG: P0701168 MEDIA: AIR DATA FRACTION: MISC

nsample	04MP0203	nsample	04MW2202
samp_date	1/12/2007	samp_date	1/12/2007
lab_id	P0701168-01A	lab_id	P0701168-02A
qc_type	NM	qc_type	NM
Pct_Solids	0.0	Pct_Solids	0.0
DUP_OF:		DUP_OF:	

Parameter	units	Result	Val Qual	Qual Code
HYDROGEN	NM	0.68		

Parameter	units	Result	Val Qual	Qual Code
HYDROGEN	NM	3		