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FINAL ENHANCED NATURAL ATTENUATION TREATABILITY STUDY WORK PLAN FOR UNDERGROUND STORAGE TANK SITE 18 WITH TRANSMITTAL LETTER NAS PENSACOLA FL
12/1/2003
TETRA TECH

Dave Siefken
0004

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Document No. 04JAX0037

December 1, 2003

Project Number N0844

Commander
Southern Division
Naval Facilities Engineering Command
ATTN: Mr. Byas Glover (Code ES24)
Remedial Project Manager
2155 Eagle Drive
North Charleston, South Carolina 29406

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order No. 0313

Subject: Submittal of Enhanced Natural Attenuation Treatability Study Work Plan for Site 18, Revision 1 at Naval Air Station Pensacola, Pensacola, Florida

Dear Mr. Glover:

Tetra Tech NUS is pleased to submit the Enhanced Natural Attenuation Treatability Study Work Plan for Site 18 at Naval Air Station Pensacola, Pensacola, Florida.

Based on our previous discussions concerning review of Treatability Study Work Plans, a copy of this Work Plan will not be sent to Florida Department of Environmental Protection for comment or approval. However, as indicated below, a copy of this document is being sent to Mr. Greg Campbell at Naval Air Station Pensacola.

If you have any questions, please call me at (850) 385-9899.

Sincerely yours,

Gerald Walker, P.G.
Project Manager

GAW/gaw

Enclosure

c: Greg Campbell, NAS Pensacola PWC
Debbie Wroblewski (Cover Letter Only)
Mark Perry/file
TtNUS File, Tallahassee

Rev. 1
12/01/03

0004

Enhanced Natural Attenuation Treatability Study Work Plan
for
UST Site 18

Naval Air Station Pensacola
Pensacola, Florida

Southern Division
Naval Facilities Engineering Command
Contract Number N62467-94-D-0888
Contract Task Order 0313

December 2003

Rev. 1
12/1/03

ENHANCED NATURAL ATTENUATION TREATABILITY STUDY WORK PLAN FOR UST SITE 18

NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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

Submitted by:
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CONTRACT NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0313

DECEMBER 2003

PREPARED UNDER THE SUPERVISION OF:

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The professional opinions rendered in this decision document identified as Enhanced Natural Attenuation Treatability Study Work Plan for UST Site 18, Naval Air Station Pensacola, Pensacola, Florida were developed in accordance with commonly accepted procedures consistent with applicable standards of practice. This document was prepared under the supervision of the signing engineer and is based on information obtained from others. If conditions are determined to exist differently than those described in this document, then the undersigned professional engineer should be notified to evaluate the effects of any additional information on the project described in this document.

December 1, 2003
Gregory S. Robi, P.E.
Professional Engineering Number 50842
Tetra Tech NUS, Inc. Engineering No. 7988

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ACRONYMS

bls	Below Land Surface
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
btoc	Below Top of Casing
°C	Degrees Celsius
CAR	Contamination Assessment Report
CH2MHILL	CH2M Hill Constructors, Inc.
CLEAN	Comprehensive Long-term Environmental Action Navy
COC	Constituents of Concern
CTO	Contract Task Order
DPT	Direct-Push Technology
EAH	EnSafe/Allen & Hoshall
EDB	Ethylene Dibromide
EnSafe	EnSafe, Inc.
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FID	Flame Ionization Detector
FL-PRO	Florida Petroleum Range Organics
FMC	FMC Corporation
FOL	Field Operations Leader
ft	Feet/Foot
GCTLs	Groundwater Cleanup Target Levels
H_2SO_4	Sulfuric Acid
HASP	Health and Safety Plan
HCl	Hydrochloric Acid
HDPE	High Density Polyethylene
HNO_3	Nitric Acid
HSM	Health and Safety Manager
ID	Inside Diameter
IDW	Investigation-Derived Waste
IR	Installation Restoration
µg/L	Micrograms per Liter
mg/L	Milligrams per Liter
MgO_2	Magnesium Peroxide
$Mg(OH)_2$	Magnesium Hydroxide
ml	Milliliter

ACRONYMS (CONTINUED)

MOP	Monitoring Only Plan
MSDS	Material Safety Data Sheet
MTBE	Methyl Tert-butyl Ether
NAS	Naval Air Station
NAVD	North American Vertical Datum
NAVFAC EFD SOUTH	Southern Division, Naval Facilities Engineering Command
Navy	United States Navy
ORP	Oxidation-Reduction Potential
PAH	Polynuclear Aromatic Hydrocarbons
POC	Point of Compliance
PPE	Personal Protective Equipment
PVC	Polyvinyl Chloride
QA	Quality Assurance
QC	Quality Control
RAP	Remedial Action Plan
RPM	Remedial Project Manager
SOPs	Standard Operating Procedures
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
TRPH	Total Recoverable Petroleum Hydrocarbons
TtNUS	Tetra Tech NUS, Inc.
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VOCs	Volatile Organic Compounds

1.0 INTRODUCTION

This Enhanced Natural Attenuation Treatability Study Work Plan has been prepared by Tetra Tech NUS, Inc. (TtNUS) under the Comprehensive Long-term Environmental Action Navy (CLEAN) Contract Number N62467-94-D-0888 Contract Task Order (CTO) 0313. This work plan has been prepared to develop an application and testing methodology to evaluate if enhanced natural attenuation is an appropriate remedial technology for Underground Storage Tank (UST) Site 18 at Naval Air Station (NAS) Pensacola, Pensacola, Florida. The scope of this Treatability Study is limited to the documented groundwater contamination that has been previously identified at this site.

During the planning stage, the purpose of this Treatability Study was to determine if the application of an oxygen releasing compound (PermeOx® Plus) can significantly reduce petroleum impacted groundwater on a full-scale basis. However, the additional investigation failed to reduce the horizontal extent of groundwater contamination. Therefore, TtNUS focused the injection on the area with the most elevated concentrations of contaminants. This work plan incorporates field and laboratory data collected during the site characterization event performed in August 2003.

1.1 DOCUMENT ORGANIZATION

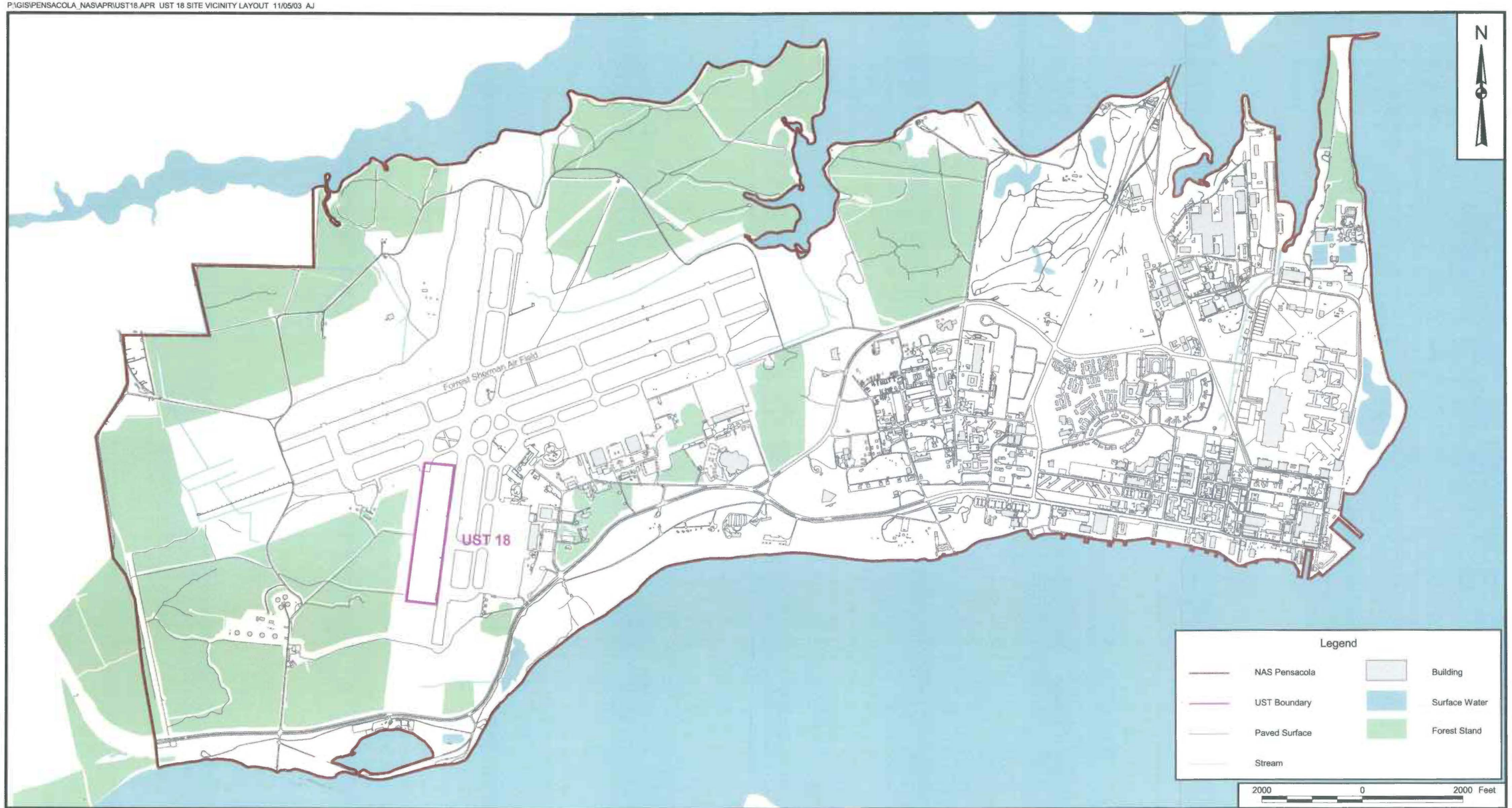
Section 1.0 of this report presents this introduction, a site description, the project scope, and project goals. Section 2.0 describes the proposed field investigation activities. Section 3.0 describes the environmental sampling and analysis activities. Section 4.0 describes management aspects of the project such as management structure, reporting requirements, and quality assurance (QA) activities.

1.1.1 Site Operations and History

UST SITE 18 is located on NAS Pensacola in Escambia County, Florida and occupies approximately 900 feet (ft) by 2,300 ft of open land along the southwestern border of Forrest Sherman Field. The site is bordered on the east by aircraft Runway 19, to the north by a paved taxiway, to the west by scattered brush and woods, and to the south by an open field. A general site vicinity map is included as Figure 1-1. Site details can be seen on Figure 1-2 (Site Feature Map).

Between 1955 and 1997, the UST SITE 18 area was used to train firefighters for aircraft crash responses, using available fuel as a combustion source. Historically, during training exercises, approximately 30 to 700 gallons of fuel were poured into unlined pits or onto various pieces of equipment and then ignited to simulate aircraft crashes. The former fire-fighting training pits are presented on historical Figure 2-3 [CH2M Hill Constructors, Inc. (CH2MHILL), 2003] in Appendix A.

P:\GIS\PENSACOLA_NAS\APR\UST18.APR UST 18 SITE VICINITY LAYOUT 11/05/03 AJ



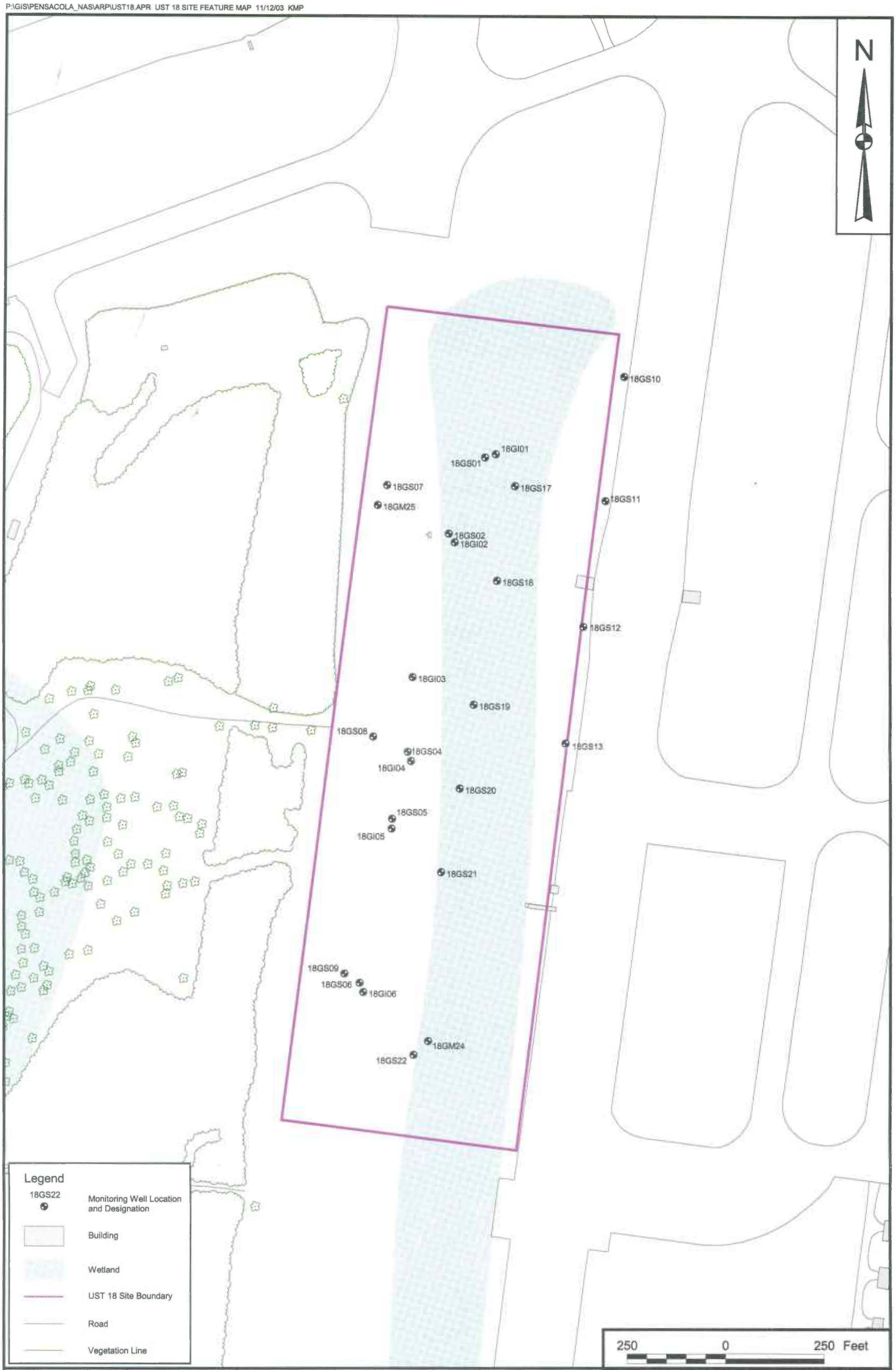
NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY A. JANOCHA	DATE 7/14/03
CHECKED BY C. METZ	DATE 11/05/03
COST/SCHED-AREA	
SCALE AS NOTED	

SITE VICINITY MAP
UST SITE 18
NAS PENSACOLA
PENSACOLA, FL

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

P:\GIS\PENSACOLA_NAS\ARP\UST18.APR UST 18 SITE FEATURE MAP 11/12/03 KMP



DRAWN BY	DATE			CONTRACT NUMBER
A. JANOCHA	10/06/03	SITE FEATURE MAP		—
CHECKED BY	DATE	UST SITE 18	APPROVED BY —	DATE —
C. METZ	11/07/03	NAS PENSACOLA	APPROVED BY —	DATE —
COST/SCHEDULE-AREA		PENSACOLA, FLORIDA	DRAWING NO. FIGURE 1 - 2	REV 0
SCALE AS NOTED				

The northernmost pit, which was lined and filled with water, contained a mock aircraft cockpit. Several other burn pits contained miscellaneous pieces of equipment, including a fuel trailer, various airplane parts, and metal and non-metallic debris of unknown, but presumably of aircraft origin. Most recently, only the northernmost pit was used for fire training. Firefighter training ceased at UST Site 18 in May 1997 (CH2MHILL, 2003).

UST Site 18 was initially investigated under the Comprehensive Environmental Response, Compensation, and Liability Act as Installation Restoration (IR) Site 3. Field work indicated only the presence of petroleum related constituents resulting in the NAS Pensacola Tier 1 Partnering Team transferring the site to the petroleum program in March 1995 [EnSafe/Allen & Hoshall (EAH), 1996].

A Contamination Assessment Report (CAR) was prepared for UST Site 18 in January 1996 by EAH (EAH, 1996). As part of the CAR, 22 permanent shallow and intermediate groundwater monitoring wells were installed and soil, sediment, groundwater, and surface water samples were collected and analyzed for petroleum constituents. Contaminants consistent with fuel contamination, including benzene, toluene, ethylbenzene, xylene (BTEX), ethylene dibromide (EDB), naphthalene, and lead were detected (EAH, 1996).

A Remedial Action Plan (RAP) was prepared by EnSafe, Inc. (EnSafe) for UST Site 18 on December 19, 1997. The RAP proposed using landfarming to remediate the soil contamination and thereby removing the source of groundwater contamination. Groundwater modeling indicated that natural attenuation would remediate the groundwater once the landfarming was complete. A Monitoring Only Plan (MOP) was proposed for groundwater remediation (Ensafe, 1997).

CH2MHILL performed a remedial action for the impacted soil at UST Site 18 that consisted of landfarming of petroleum contaminated soil in the four former firefighter training burn pits. Landfarming activities were conducted between September 2000 and September 2001 and consisted of biweekly soil tilling and the collection and analysis of monthly soil samples and groundwater samples from specific groundwater monitoring wells. The tilling was accomplished using a farm tractor and disk harrow, which turned and aerated the soil to a depth of 6 inches below land surface (bls). Landfarming operations ceased in September 2001 when soil analytical results indicated that soil cleanup goals had been achieved (CH2MHILL, 2003).

Quarterly groundwater monitoring was performed to evaluate whether the groundwater concentrations were decreasing after the remediation of the impacted soil and to ensure that the point-of-compliance (POC) wells were not affected. CH2MHILL performed groundwater monitoring monthly from December 2000 through August 2001 and quarterly until December 2002. Concentrations of BTEX, polynuclear aromatic

hydrocarbons (PAHs), total recoverable petroleum hydrocarbons (TRPH), and lead were consistently reported to exceed Florida Department of Environmental Protection (FDEP) Groundwater Cleanup Target Levels (GCTLs) during quarterly sampling. Historical Figure 2-3, Appendix A (CH2MHILL, 2003), presents the December 2002 groundwater contamination results for the quarterly sampling event.

CH2MHILL performed its last sampling event in December 2002. Groundwater analytical results indicated that petroleum constituent concentrations were not decreasing at UST Site 18 (CH2MHILL, 2003). Southern Division, Naval Facilities Engineering Command (NAVFAC EFD SOUTH) then requested that TtNUS perform a treatability study to evaluate PermeOx® Plus for remediation of petroleum hydrocarbons. During the planning of the treatability study, TtNUS recommended performing an additional groundwater investigation to better define the groundwater contamination in an effort to reduce the size of the treatment area.

1.2 ADDITIONAL SITE ASSESSMENT SAMPLING

TtNUS performed the additional groundwater investigation in August 2003. Fifty-six direct-push technology (DPT) groundwater samples were collected from the 2 to 6 ft bls interval. The DPT sampling locations were selected based on historical documentation of contamination at this site. Step outs of 50 ft were used to attempt to define the contaminant boundaries. Figure 1-3 shows the locations of the DPT points. Two of the DPT points (DPT02 and DPT10) exhibiting high concentrations of constituents of concern (COCs) also had groundwater samples collected at 19, 34 and 50 ft bls. COCs for this site are BTEX, methyl tert-butyl ether (MTBE), naphthalene, 1-methylnaphthalene, 2-methylnaphthalene, and TRPH. TtNUS also collected a groundwater sample from DPT 13 from the 15 to 19 ft bls interval. Groundwater samples were then analyzed on site by a mobile laboratory for BTEX, MTBE, naphthalene, 1-methylnaphthalene, 2-methylnaphthalene. Six DPT groundwater samples (DPT02, DPT05, DPT06, DPT07, DPT08, and DPT39) were sent to a fixed-base laboratory for TRPH analysis.

Groundwater samples were collected from 21 monitoring wells during the additional groundwater investigation. The groundwater monitoring wells were sampled to help delineate the groundwater contamination and to provide baseline information for the PermeOx® Plus Treatability Study. Baseline sampling for the treatability study was performed at wells 18GS01 (18 indicates the site name and GS indicates a shallow groundwater well), GS02, GS03, GS04, GS05, GS06, GS11, GS13, GS17, GS20, GS21, and GM24 and included analysis for field and laboratory natural attenuation parameters, BTEX, MTBE, naphthalene, 1-methylnaphthalene, 2-methylnaphthalene, and TRPH. Field natural attenuation parameters included pH, oxidation-reduction potential (ORP), conductivity, temperature, dissolved oxygen, alkalinity, carbon dioxide, ferrous iron, hydrogen sulfide, and sulfide. Groundwater sampling forms are provided in Appendix B. Laboratory natural attenuation parameters included iron and manganese (filtered and unfiltered), alkalinity and anions, total organic carbon (TOC), and methane,

P:\GIS\PENSACOLA_NAS\APR\UST18.APR UST 18 DPT LOCATION LAYOUT 11/12/03 KMP

DRAWN BY A. JANOCHA	DATE 10/06/03	DPT LOCATION MAP UST SITE 18 NAS PENSACOLA PENSACOLA, FLORIDA	CONTRACT NUMBER N0844
CHECKED BY C. METZ	DATE 11/05/03		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 1 - 3 REV 0

ethane, and ethene. The remaining wells (GS02A, GS07, GS08, GS09, GS10, GS12, GS18, GS19, and GS22) were analyzed on site by the mobile laboratory for COCs. The locations of the groundwater monitoring wells are shown on Figure 1-2. Prior to sampling, water level measurements were recorded for the on-site monitoring wells.

1.3 NATURE AND EXTENT OF GROUNDWATER CONTAMINATION

Groundwater contamination has been documented at UST Site 18 during previous assessment activities. The recent groundwater assessment activities by TtNUS confirm and more accurately define the extent of petroleum contamination present at UST Site 18. Exceedances of FDEP GCTLs for BTEX, naphthalene, 1-methylnaphthalene, 2-methylnaphthalene, and TRPH were reported for DPT and monitoring well groundwater samples collected in August 2003. Table 1-1 is a summary of the analytical results for DPT groundwater samples analyzed by the mobile laboratory. DPT samples where COC concentrations did not exceed FDEP GCTLs were not included in Table 1-1. TRPH analytical results for DPT samples analyzed at the fixed-base laboratory are provided in Table 1-2. The laboratory analytical data for all groundwater samples collected from the site monitoring wells is summarized in Table 1-3. Laboratory analytical reports from the fixed-base and mobile laboratories are provided in Appendix C.

Figure 1-4 shows an aerial representation of the groundwater contaminated in excess of FDEP GCTLs. The contamination boundaries were based on any FDEP GCTLs exceedance of the site COCs. As indicated on Figure 1-4, there are two primary contamination areas present at the north and south end of the site. Two smaller plumes are present between the northern and southern plumes. The analytical results that exceeded FDEP GCTLs for the site COCs in the northern plume area are provided on Figure 1-5. A similar analytical summary map of the two southern plumes is provided as Figures 1-6.

Limited vertical sampling of the contaminant plume indicates that contamination extends to at least 50 ft bls (maximum depth sampled). All COCs, except toluene, were detected in excess of GCTLs in the three groundwater samples (DPT02, DPT10, and DPT13) collected at 19 ft bls. Benzene, 2-methylnaphthalene, and total xylenes were detected at concentrations exceeding their respective GCTLs in the samples (DPT02 and DPT10) collected at 34 ft bls. Total xylenes were present in excess of its GCTL (20 µg/L) at a depth of 50 ft bls in both deep groundwater samples (DPT02 and DPT10). Total xylenes concentrations for DPT02 and DPT10 were 34.1 µg/L and 46.2 µg/L, respectively. Based on the analytical results from DPT02 and DPT10, it is likely the contamination is present down to the confining aquifer layer, which reportedly occurs between 50 and 60 ft bls.

Groundwater measurements collected on August 25, 2003 for UST Site 18 are provided in Table 1-4. Groundwater flow is generally to the southeast at this site. A groundwater contour map is provided as Figure 1-7. The groundwater contours were based on eight top of casing elevations for groundwater

TABLE 1-1
ANALYTICAL SUMMARY OF DPT GROUNDWATER SAMPLES EXCEEDING FDEP GCTLS - UST SITE 18
MOBILE LABORATORY ANALYSIS RESULTS
ENHANCED NATURAL ATTENUATION TREATABILITY STUDY WORK PLAN
NAS PENSACOLA, PENSACOLA, FLORIDA

PAGE 1 OF 4

Sample ID			PEN-18-DP01	PEN-18-DP02	PEN-18-DP02*G19	PEN-18-DP02*G34	PEN-18-DP02*G50	PEN-18-DP06	PEN-18-DP08	PEN-18-DP10	PEN-18-DP10*G19	PEN-18-DP10*G34	PEN-18-DP10*G50	PEN-18-DP11
Analysis Date			08/25/03	08/25/03	08/28/03	08/29/03	08/29/03	08/25/03	08/25/03	08/25/03	08/26/03	08/29/03	08/29/03	08/25/03
Sample Location			DPT01	DPT02	DPT02	DPT02	DPT02	DPT06	DPT08	DPT10	DPT10	DPT10	DPT10	DPT11
Dilution Factor(s)			1,10	1,10	10	5	1	1	10	10,20	5	1	1	10
	Units	GCTL[1] (µg/L)												
Benzene	µg/L	1	1 U	1 U	*10 U*	*5.0 U*	1 U	1 U	1 U	*10 U*	**5.5**	1.4	1 U	*10 U*
Ethylbenzene	µg/L	30	1 U	16.4	10 U	5.0 U	2.0	1 U	20	**190**	**54**	8.5	5.1	10 U
Toluene	µg/L	40	1 U	29.2	10 U	5.0 U	1.4	1 U	1 U	**1300**	8.3	16.6	10.3	**350**
Total Xylenes([c])	µg/L	20	**261.4**	**440**	**78**	**83**	**34.1**	**45.8**	20	**1680**	**248**	**74.9**	**46.2**	**63**
Naphthalene	µg/L	20	11.8	**51.3**	*50 U*	*25 U*	5.2	16.4	**87**	**240**	**63**	14.3	8.8	*50 U*
1-Methylnaphthalene	µg/L	20	9.9	**34.9**	*50 U*	*25 U*	5.4	**21.7**	**75**	**130**	**50**	16.4	9.6	*50 U*
2-Methylnaphthalene	µg/L	20	8.5	**31.7**	*50 U*	**28**	5.7	18.4	**100**	**130**	**60**	16.9	9	*50 U*

See notes at end of table.

TABLE 1-1 (CONTINUED)
ANALYTICAL SUMMARY OF DPT GROUNDWATER SAMPLES EXCEEDING FDEP GCTLS - UST SITE 18
MOBILE LABORATORY ANALYSIS RESULTS
ENHANCED NATURAL ATTENUATION TREATABILITY STUDY WORK PLAN
NAS PENSACOLA, PENSACOLA, FLORIDA

PAGE 2 OF 4

Sample ID			PEN-18-DP12	PEN-18-DP13	PEN-18-DP13*G19	PEN-18-DP14	PEN-18-DP15	PEN-18-DP18	PEN-18-DP19	PEN-18-DP22	PEN-18-DP23	PEN-18-DP24	PEN-18-DP27	PEN-18-DP28
Analysis Date			08/25/03	08/25/03	08/28/03	08/25/03	08/25/03	08/26/03	08/26/03	08/26/03	08/26/03	08/27/03	08/27/03	08/27/03
Sample Location			DPT12	DPT13	DPT13	DPT14	DPT15	DPT18	DPT19	DPT22	DPT23	DPT24	DPT27	DPT28
Dilution Factor(s)			10,50	20	100	5	10	20	2	20	100	1	1	5
	Units	GCTL[1] (µg/L)												
Benzene	µg/L	1	*10 U*	**60**	*100 U*	**64**	*10 U*	*20 U*	*2.0 U*	*20 U*	*100 U*	1 U	**3.9**	*5.0 U*
Ethylbenzene	µg/L	30	**280**	**350**	**160**	**37**	**39**	20 U	12	28	**120**	2.1	1 U	5.0 U
Toluene	µg/L	40	10	20 U	*100 U*	5 U	10 U	**45**	17	**320**	20 U	1.9	1 U	5.0 U
Total Xylenes(c)	µg/L	20	**1230**	**820**	**380**	**240**	**180**	**305**	**384**	**720**	**1300**	**22.6**	**126.6**	**95**
Naphthalene	µg/L	20	**400**	**400**	**500**	**100**	**100**	*100 U*	**44**	**140**	*500 U*	5.4	5.0 U	*25 U*
1-Methylnaphthalene	µg/L	20	**200**	**250**	**600**	**130**	**100**	*100 U*	**38**	**140**	*500 U*	8.8	5.0 U	*25 U*
2-Methylnaphthalene	µg/L	20	**1230**	**360**	**720**	**150**	**120**	*100 U*	**34**	**140**	*500 U*	10.0	5.0 U	*25 U*

See notes at end of table.

TABLE 1-1 (CONTINUED)
ANALYTICAL SUMMARY OF DPT GROUNDWATER SAMPLES EXCEEDING FDEP GCTLS - UST SITE 18
MOBILE LABORATORY ANALYSIS RESULTS
ENHANCED NATURAL ATTENUATION TREATABILITY STUDY WORK PLAN
NAS PENSACOLA, PENSACOLA, FLORIDA

PAGE 3 OF 4

Sample ID			PEN-18-DP29	PEN-18-DP31	PEN-18-DP32	PEN-18-DP33	PEN-18-DP34	PEN-18-DP35	PEN-18-DP37	PEN-18-DU01	PEN-18-DP38	PEN-18-DP39	PEN-18-DU02	PEN-18-DP40
Analysis Date			08/27/03	08/27/03	08/27/03	08/27/03	08/27/03	08/27/03	08/27/03	08/27/03	08/27/03	08/27/03	08/27/03	08/28/03
Sample Location			DPT29	DPT31	DPT32	DPT33	DPT34	DPT35	DPT37	DPT37	DPT38	DPT39	DPT39	DPT40
Dilution Factor(s)			1	1	1,20	20	20	20	20,100	2,100	100,500	2	1	1
	Units	GCTL[1] (µg/L)												
Benzene	µg/L	1	**17.7**	1 U	1 U	*20 U*	*20 U*	*20 U*	**29**	**34**	*100 U*	*2.0 U*	1 U	**6.2**
Ethylbenzene	µg/L	30	3.6	11.3	**36.9**	**130**	**62**	**62**	**280**	**330**	**880**	**22**	22.3	1 U
Toluene	µg/L	40	2.1	9.5	7.9	**87**	**45**	**55**	**2200**	**2500**	**9800**	35	**37.3**	1.0
Total Xylenes[2]	µg/L	20	**18.1**	**163.1**	**510**	**1860**	**1770**	**1590**	**1880**	**2210**	**4600**	**231**	**245.2**	**106.9**
Naphthalene	µg/L	20	14	19.0	**90.3**	**290**	**200**	*100 U*	**190**	**170**	*500 U*	**68**	**63.6**	16.6
1-Methylnaphthalene	µg/L	20	12.4	**22.4**	**34.3**	**150**	**120**	*100 U*	**130**	**85**	*500 U*	**82**	**72.4**	10.1
2-Methylnaphthalene	µg/L	20	10.7	**23.5**	**36.3**	**200**	**150**	*100 U*	**120**	**78**	*500 U*	**70**	**62.6**	14.5

See notes at end of table.

TABLE 1-1 (CONTINUED)
ANALYTICAL SUMMARY OF DPT GROUNDWATER SAMPLES EXCEEDING FDEP GCTLS - UST SITE 18
MOBILE LABORATORY ANALYSIS RESULTS
ENHANCED NATURAL ATTENUATION TREATABILITY STUDY WORK PLAN
NAS PENSACOLA, PENSACOLA, FLORIDA

Sample ID			PEN-18-DP41	PEN-18-DP44	PEN-18-DP49	PEN-18-DP50	PEN-18-DP51	PEN-18-DP52	PEN-18-DP55	PEN-18-EB01
Analysis Date			08/28/03	08/29/03	08/29/03	08/29/03	08/29/03	08/29/03	08/29/03	08/28/03
Sample Location			DPT41	DPT44	DPT49	DPT50	DPT51	DPT52	DPT55	
Dilution Factor(s)			1	1	10	20	20	20	1	1
	Units	GCTL[1] (µg/L)								
Benzene	µg/L	1	1 U	**11.9**	*10 U*	*20 U*	*20 U*	*20 U*	1 U	1 U
Ethylbenzene	µg/L	30	1 U	10.9	10 U	**110**	**32**	**89**	1 U	1 U
Toluene	µg/L	40	1 U	1 U	10 U	20 U	20 U	20 U	1 U	1 U
Total Xylenes([2])	µg/L	20	**24.3**	**50.4**	**192**	**1520**	**820**	**2440**	17.6	1 U
Naphthalene	µg/L	20	6.6	**36.8**	*50 U*	**130**	**100**	**250**	11.5	5 U
1-Methylnaphthalene	µg/L	20	5.0 U	**29.6**	**75**	**150**	**150**	**360**	**36.4**	5 U
2-Methylnaphthalene	µg/L	20	5.0 U	**32.2**	**86**	**190**	**160**	**410**	**35.3**	5 U

[1] Groundwater Cleanup Target Level as provided in Chapter 62-777, FAC.
[2] Total Xylenes are sum of o-Xylene and m,p-Xylene. If concentration was below minimum detection limit (MDL), 0 was used as concentration.

Notes:

Bold indicates an exceedance of GCTLs.
Italicized reporting limits represent reporting limits which exceed regulatory criteria
µg/L = micrograms per liter
U = Analyte not detected above the instrument detection limit
FAC = Florida Administrative Code

All samples were collected between 2-6 feet bls unless indicated by *G
*G19 = Groundwater sample collected betweem 15-19 ft bls
*G34 = Groundwater sample collected between 30-34 ft bls
*G50 = Groundwater sample collected between 46-50 ft bls

TABLE 1-2
TRPH EXCEEDANCES IN DPT GROUNDWATER SAMPLES - UST SITE 18
ENHANCED NATURAL ATTENUATION TREATABILITY STUDY WORK PLAN
NAS PENSACOLA, PENSACOLA, FLORIDA

Sample No.		PEN18-DPT02	PEN18-DPT05	PEN18-DPT06	PEN18-DPT07	PEN18-DPT08	PEN18-DPT39	PEN18-DPT39-D
Sample Location		DPT-02	DPT-05	DPT-06	DPT-07	DPT-08	DPT-39	DPT-39(Duplicate)
Collect Date		08/25/03	08/25/03	08/25/03	08/25/03	08/25/03	08/25/03	08/25/03
	GCTL[1] (mg/L)							
TRPH [2] (mg/L)	5	**7.2**	0.500 U	1.5	0.500 U	1.5	**6.8 J**	**16 J**

[1] Groundwater Cleanup Target Level as provided in Chapter 62-777, FAC.
[2] TRPH = Total Recoverable Petroleum Hydrocarbons (FDEP FL-PRO)

Notes:

Bold indicates value exceeds GCTL
mg/L = milligrams per liter
U = Analyte not detected above the instrument detection limit
J = Analyte was detected at an estimated concentration
FAC = Florida Administrative Code
FDEP = Florida Department of Environmental Protection
FL-PRO = Florida Petroleum Range Organics

TABLE 1-3
SUMMARY OF DETECTED ANALYTES IN GROUNDWATER MONITORING WELLS - UST SITE 18
BASELINE EVENT
ENHANCED NATURAL ATTENUATION TREATABILITY STUDY WORK PLAN
NAS PENSACOLA, PENSACOLA, FLORIDA
PAGE 1 OF 3

Sample No.		PEN-18-GS01-01	PEN-18-GS02-01	PEN-18-GS02-01-D	PEN-18-GS02A-01	PEN-18-GS03-01	PEN-18-GS04-01	PEN-18-GS05-01	PEN-18-GS06-01
Sample Location		GS-01	GS-02	GS-02(Duplicate)	GI-02	GS-03	GS-04	GS-05	GS-06
Collect Date	GCTL[1]	08/27/03	08/27/03	08/27/03	08/25/03	08/27/03	08/26/03	08/26/03	08/26/03
Benzene	1	**510**	**12**	**8.4**	1.0 U	1.0 U	1.0 U	1.0 U	*20 U*
Ethylbenzene	30	**140**	**140**	**120**	1.0 U	5.5	2.4	6.4	20 U
Toluene	40	*50 U*	**190**	**140**	1.0 U	**40.9**	1.0 U	1.0 U	**36**
Total Xylenes	20	**290**	**810**	**690**	1.0	**52.4**	15.4	**68.4**	**181**
Naphthalene	20	**270**	**160**	**110**	5.0 U	5.0 U	5.8	16.3	**140**
1-Methylnaphthalene	20	*250 U*	**120**	**76**	5.0 U	11.7	7.0	13.9	**120**
2-Methylnaphthalene	20	*250 U*	**120**	**81**	5.0 U	9.8	8.4	16.8	**140**
TRPH [2] (mg/L)	5	**38**	**19**	NA	NA	**7.3**	2.6	0.9	0.82
Metals [3] (µg/L)									
Iron	300	**446**	**4360**	**4280**	NA	**3000**	**890**	**494**	**484**
Manganese	50	13.9 U	**113**	**114**	NA	31.4	22.7	7.4	17.9
Dissolved Gases [4] (µg/L)									
Methane	NC	15	13	13	NA	4.3	1.3	0.42	0.16
Ethane	NC	0.11	0.01 U	0.01 U	NA	0.01 U	0.01 U	0.01 U	0.01 U
Ethene	NC	0.01 U	0.01 U	0.01 U	NA	0.01 U	0.01 U	0.01 U	0.01 U

See notes at end of table.

TABLE 1-3 (CONTINUED)
SUMMARY OF DETECTED ANALYTES IN GROUNDWATER MONITORING WELLS - UST SITE 18
BASELINE EVENT
ENHANCED NATURAL ATTENUATION TREATABILITY STUDY WORK PLAN
NAS PENSACOLA, PENSACOLA, FLORIDA
PAGE 2 OF 3

Sample No.		PEN-18-GS07-01	PEN-18-GS08-01	PEN-18-GS09-01	PEN-18-GS10-01	PEN-18-GS11-01	PEN-18-GS12-01	PEN-18-GS13-01	PEN-18-GS17-01
Sample Location		GS-07	GS-08	GS-09	GS-10	GS-11	GS-12	GS-13	GS-17
Collect Date	GCTL[1]	08/26/03	08/26/03	08/25/03	08/26/03	08/26/03	08/26/03	08/27/03	08/27/03
Benzene	1	**10**	*2.0 U*	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	**96**
Ethylbenzene	30	**78.7**	12	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	22
Toluene	40	17.2	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	10 U
Total Xylenes	20	**372.2**	15	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	**202**
Naphthalene	20	**120**	14	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	**71**
1-Methylnaphthalene	20	**51.4**	12	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	*50 U*
2-Methylnaphthalene	20	**57.3**	10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	*50 U*
TRPH [2] (mg/L)	5	**30**	0.620	NA	NA	0.500 U	NA	0.500 U	**15**
Metals [3] (µg/L)									
Iron	300	NA	NA	NA	NA	**462**	NA	**3070**	**366**
Manganese	50	NA	NA	NA	NA	1.4 U	NA	7.3	8.8
Dissolved Gases [4] (µg/L)									
Methane	NC	NA	NA	NA	NA	0.01U	NA	0.01 U	11
Ethane	NC	NA	NA	NA	NA	0.01U	NA	0.01 U	0.01 U
Ethene	NC	NA	NA	NA	NA	0.01U	NA	0.01 U	0.01 U

See notes at end of table

TABLE 1-3 (CONTINUED)
SUMMARY OF DETECTED ANALYTES IN GROUNDWATER MONITORING WELLS - UST SITE 18
BASELINE EVENT
ENHANCED NATURAL ATTENUATION TREATABILITY STUDY WORK PLAN
NAS PENSACOLA, PENSACOLA, FLORIDA
PAGE 3 OF 3

Sample No.		PEN-18-GS18-01	PEN-18-GS19-01	PEN-18-GS20-01	PEN-18-GS21-01	PEN-18-GS22-01	PEN-18-GM24-01	PEN-18-EB01-01
Sample Location		GS-18	GS-19	GS-20	GS-21	GS-22	GM-24	Equipment Blank
Collect Date	GCTL[1]	08/25/03	08/26/03	08/26/03	08/28/03	08/25/03	08/26/03	08/28/03
Benzene	1	**41.8**	**1.7**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	30	**120**	4.3	1.0 U	1.0 U	1.0 U	2.5	1.0 U
Toluene	40	16	1.0 U	1.0 U	2.0	1.0 U	1.0 U	1.0 U
Total Xylenes	20	**486.4**	10.3	2.1	1.6	1.0 U	6.9	1.0 U
Naphthalene	20	**47.2**	5.7	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1-Methylnaphthalene	20	**43.5**	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Methylnaphthalene	20	**52.7**	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
TRPH [2] (mg/L)	5	**9.5**	3.0	0.500 U	0.500 U	NA	500 U	500 U
Metals [3] (µg/L)								
Iron	300	NA	NA	**530**	**462**	NA	**666**	13.9 U
Manganese	50	NA	NA	10.0	4.9 U	NA	5.6	0.90 U
Dissolved Gases [4] (µg/L)								
Methane	NC	NA	NA	0.76	0.1	NA	0.062	0.01 U
Ethane	NC	NA	NA	0.01 U	0.01 U	NA	0.01 U	0.01 U
Ethene	NC	NA	NA	0.01 U	0.01 U	NA	0.01 U	0.01 U

Notes:
TRPH, Metals, and Dissolved Gases were analyzed by fixed-base laboratory. All other analytes were analyzed by the mobile laboratory
[1] Groundwater Cleanup Target Level as provided in Chapter 62-777, FAC.
[2] VOCs = Volatile Organic Compounds (SW-846 8260B; Mobile Laboratory Results)
[3] PAHs = Polynuclear Aromatic Hydrocarbons (SW-846 8260B; Mobile Laboratory Results)
[4] TRPH = Total Recoverable Petroleum Hydrocarbons (FDEP-FL-PRO)
[5] SW-846 6010B
[6] RSK SOP 147/175

Bold indicates value exceeds GCTL
FAC = Florida Administrative Code
FDEP = Florida Department of Environmental Protection
FL-PRO = Florida Petroleum Range Organics
Italicized = reporting limits are higher than the associated regulatory criteria

mg/L = milligrams per liter
NA = Not Analyzed
NC = No criteria
U = Analyte not detected above the instrument detection limit
µg/L = micrograms per liter

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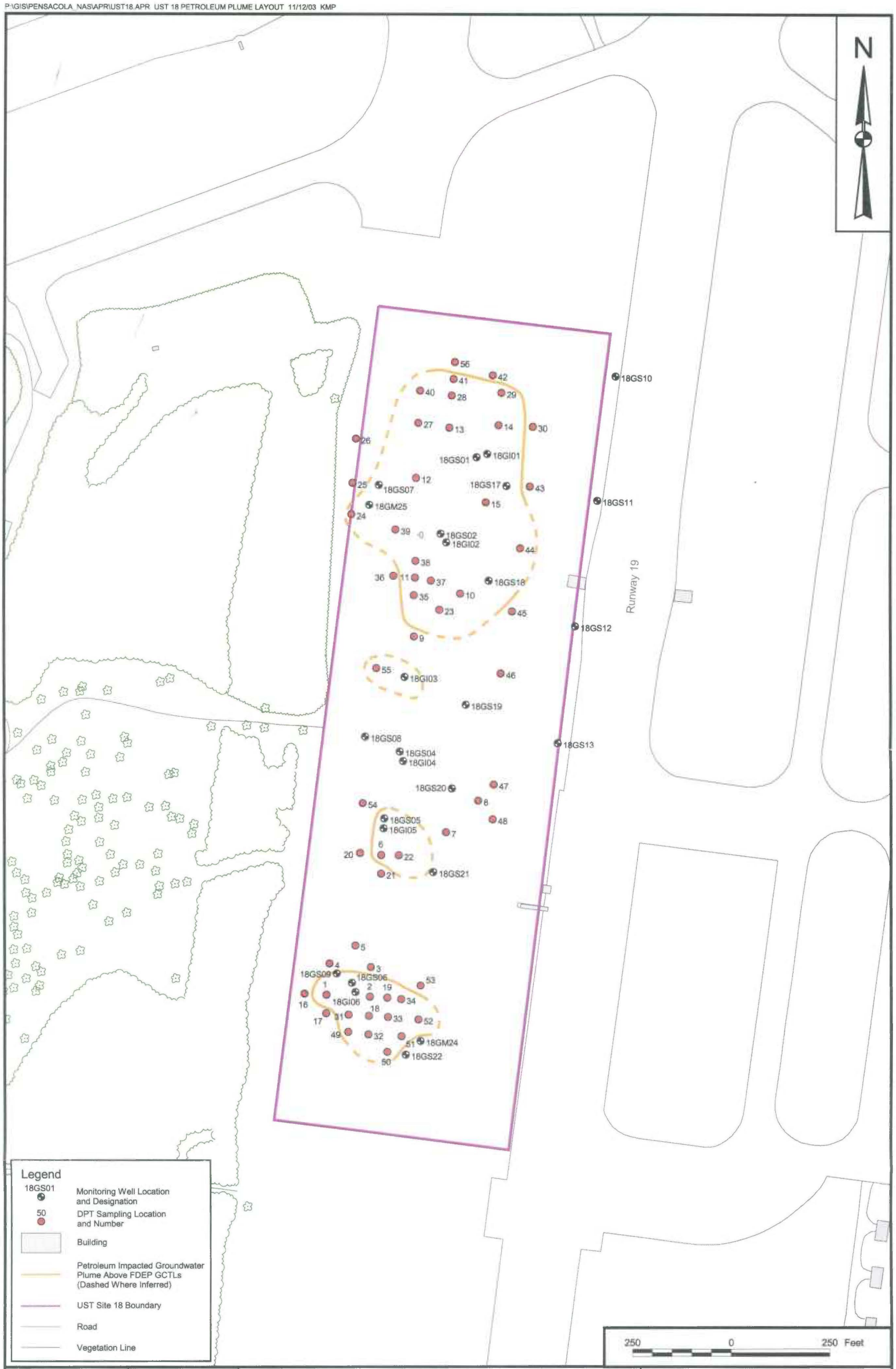

DRAWN BY	DATE
A. JANOCHA	10/13/03
CHECKED BY	DATE
C. METZ	11/05/03
COST/SCHEDULE-AREA	
SCALE	
AS NOTED	

PETROLEUM IMPACTED GROUNDWATER PLUMES
UST SITE 18
NAS PENSACOLA
PENSACOLA, FLORIDA

CONTRACT NUMBER	
N0844	
APPROVED BY	DATE
—	—
APPROVED BY	DATE
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DRAWING NO.	REV
FIGURE 1 - 4	0

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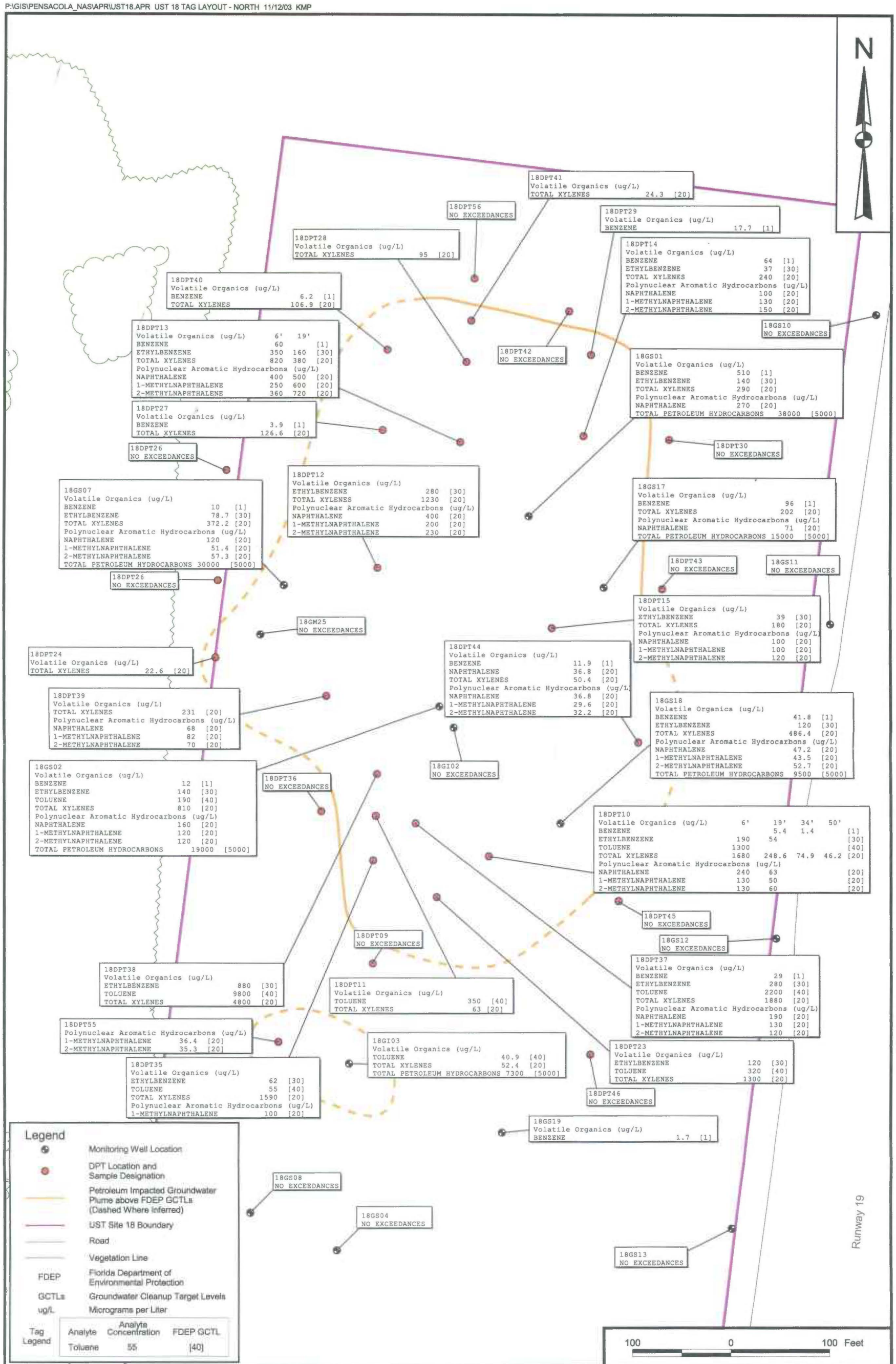

DRAWN BY	DATE
A. JANOCHA	10/16/03
CHECKED BY	DATE
C. METZ	11/06/03
COST/SCHEDULE-AREA	
SCALE	
AS NOTED	

ANALYTICAL SUMMARY OF FDEP GCTL EXCEEDANCES IN
DPT GROUNDWATER SAMPLES - NORTH PLUME
UST SITE 18
NAS PENSACOLA
PENSACOLA, FLORIDA

CONTRACT NUMBER	
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DRAWING NO. FIGURE 1 - 5	REV 0

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Rev. 1
12/01/03

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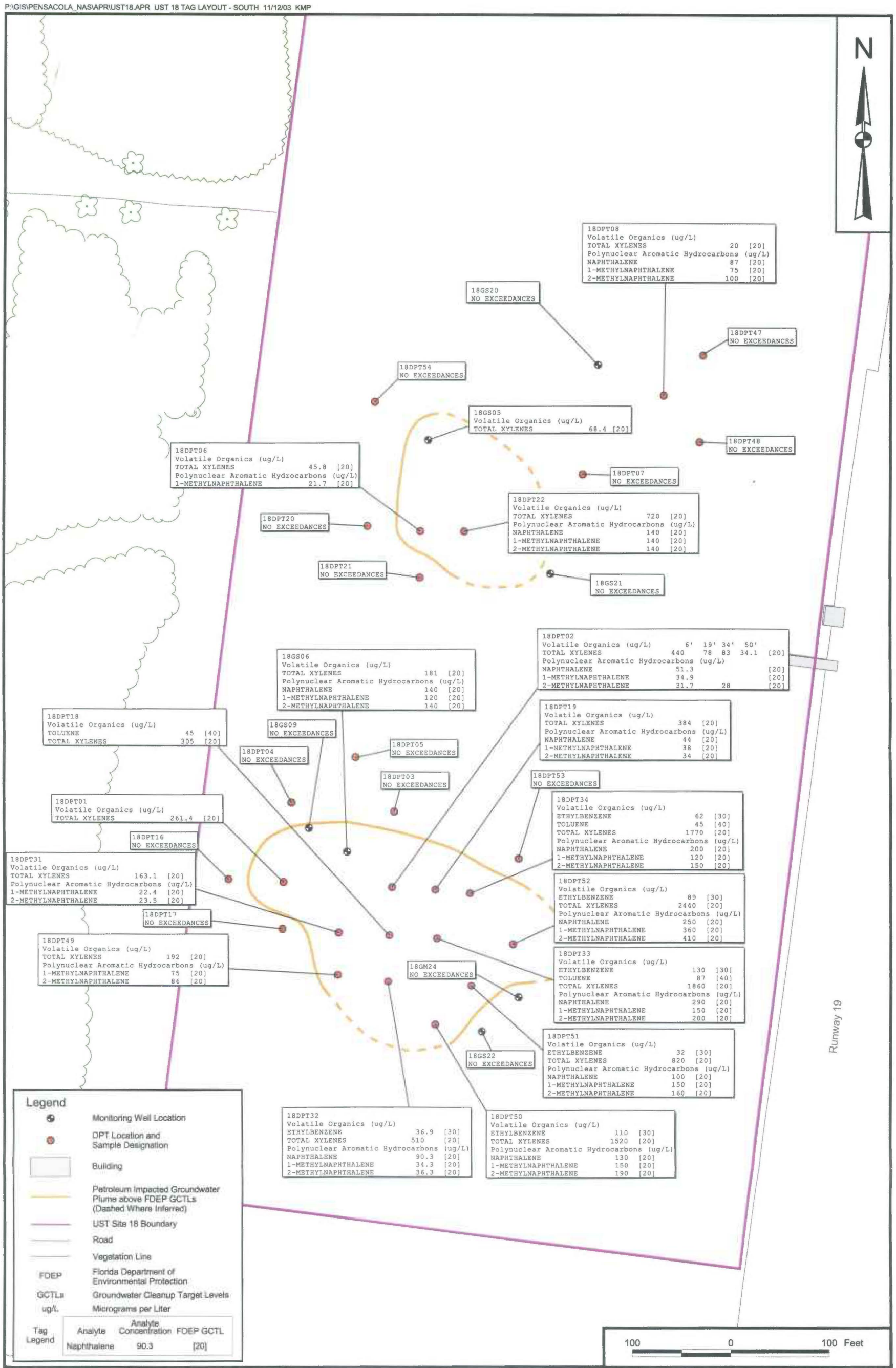

DRAWN BY	DATE
A. JANOCHA	10/16/03
CHECKED BY	DATE
C. METZ	11/05/03
COST/SCHEDULE-AREA	
SCALE	
AS NOTED	

ANALYTICAL SUMMARY OF FDEP GCTL EXCEEDANCES IN
DPT GROUNDWATER SAMPLES - SOUTH PLUME
UST SITE 18
NAS PENSACOLA
PENSACOLA, FLORIDA

CONTRACT NUMBER	
N0844	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 1 - 6	REV 0

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Rev. 1
12/01/03

TABLE 1-4
GROUNDWATER ELEVATION SUMMARY
ENHANCED NATURAL ATTENUATION TREATABILITY STUDY WORK PLAN
UST SITE 18
NAS PENSACOLA, PENSACOLA, FLORIDA

Well ID	Well Depth (ft bls)	TOC[1] Elevation (ft NAVD)	Screened Interval	August 25, 2003	
				Depth to Water (ft btoc)	Groundwater Elevation (ft NAVD)
PEN-18-GS01	11.93	26.36	1.5 - 11.5	1.12	25.24
PEN-18-GS02	10.15	NA	1.65 - 11.65	1.12	NA
PEN-18-GI02	46.80	NA	47.6 - 57.6	5.58	NA
PEN-18-GI03	59.10	NA	48.1 - 58.1	6.37	NA
PEN-18-GS04	11.27	27.02	0.9 - 10.9	2.11	24.91
PEN-18-GS05	12.88	27.05	2.4 - 12.4	2.09	24.96
PEN-18-GI05	59.10	NA	48.1 - 58.1	7.19	NA
PEN-18-GS06	12.50	27.79	2.1-12.1	2.59	25.20
PEN-18-GS07	6.02	NA	0.9 - 10.9	2.44	NA
PEN-18-GS08	13.52	NA	3.1 - 13.1	2.75	NA
PEN-18-GS09	14.70	NA	4.3 - 14.3	3.35	NA
PEN-18-GS10	12.72	NA	2.3 - 12.3	2.67	NA
PEN-18-GS11	12.37	27.74	2.0-12.0	3.09	24.65
PEN-18-GS12	12.61	27.46	2.2-12.2	2.94	24.52
PEN-18-GS13	13.10	27.68	2.7-12.7	3.32	24.36
PEN-18-GS17	12.75	NA	NA	2.04	NA
PEN-18-GM24	12.70	24.68	10.25-12.75	1.28	23.40

Notes:
1 = TOC elevations were surveyed by CH2MHILL and reported in their Fourth Quarter Monitoring Report for UST 18 dated April 2003
bls = below land surface
btoc = below top of casing
ft = feet
NA = Not Available
NAVD = North American Vertical Datum
TOC = Top of Casing

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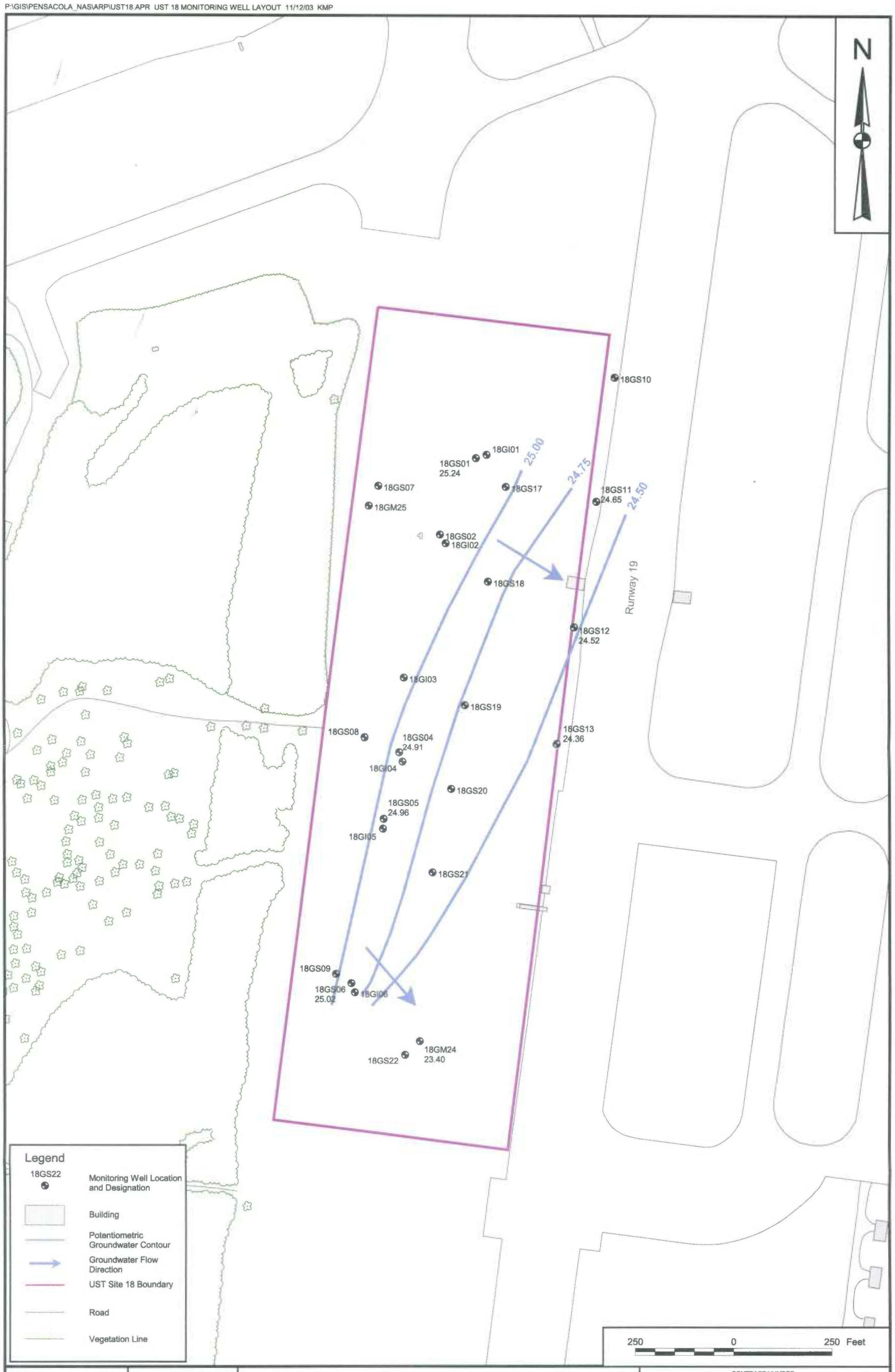


DRAWN BY	DATE			CONTRACT NUMBER
A. JANOCHA	10/06/03	GROUNDWATER CONTOUR MAP		—
CHECKED BY	DATE	UST SITE 18	APPROVED BY —	DATE —
C. METZ	11/07/03	NAS PENSACOLA	APPROVED BY —	DATE —
COST/SCHEDULE-AREA		PENSACOLA, FLORIDA	DRAWING NO. FIGURE 1 - 7	REV 0
SCALE AS NOTED				

monitoring wells that CH2MHILL used to determine groundwater flow direction in their quarterly groundwater monitoring. CH2MHILL also reported that groundwater flow was to the southeast in their Fourth Quarter 2002 Groundwater Monitoring Report (CH2MHILL, 2003).

1.4 NATURAL ATTENUATION RESULTS

The field natural attenuation data is summarized in Table 1-5. Additional baseline sampling is scheduled to be performed on six additional groundwater monitoring wells that are to be installed prior to the PermeOx® Plus injection. Detailed information pertaining to the additional wells can be found in section 2.3 (DPT Monitoring Well Installation). Therefore, complete natural attenuation results and analysis for the baseline sampling will be included in the first quarterly monitoring report.

1.5 SCOPE AND GOALS

PermeOx® Plus is a proprietary product manufactured by FMC Corporation (FMC) and sold by Panther Technologies, Inc. PermeOx® Plus is a patented formulation of calcium peroxide (CaO_2) that slowly releases molecular oxygen into the aquifer when hydrated. The hydrated product becomes calcium hydroxide [$Ca(OH)_2$] and hydrogen peroxide (H_2O_2). The hydrogen peroxide then decomposes to form oxygen and water thus increasing the dissolved oxygen content of groundwater and soil moisture within the vadose zone. The oxygen consumption rate is dependent upon the level of the contaminant flux. This allows PermeOx® Plus to release oxygen at a relatively constant rate over an extended period of time. The increase in dissolved oxygen in the aquifer creates aerobic conditions to stimulate in-situ bioremediation of the petroleum hydrocarbon plume. During this Treatability Study, a PermeOx® Plus and water mixture (slurry) will be injected into the area of impacted groundwater to provide dissolved oxygen in this area.

A baseline sampling event (prior to PermeOx® Plus injection) and four quarters of post-injection groundwater sampling using 12 on-site monitoring wells are included in the study. The 12 monitoring wells include six previously existing wells (GS01, GS02, GS06, GS17, GS18, and GM24) and six proposed wells (GS26, GI27, GS28, GI29, GS30, and GI31), which are scheduled to be installed prior to the PermeOx® Plus injection. Quarterly performance monitoring letter reports will be prepared and a Final Treatability Study Evaluation Report will be submitted after the post-injection sampling. These sampling events and reports are explained in greater detail in Sections 2.0, 3.0, and 4.0 of this Treatability Study Work Plan.

The objective of the treatability study is to determine the effectiveness of PermeOx® Plus at reducing the contaminant concentrations within the source area. This strategy relies on the released dissolved oxygen to increase the microbial activity, thereby facilitating contaminant reduction through aerobic respiration.

TABLE 1-5
NATURAL ATTENUATION ANALYTICAL RESULTS - UST SITE 18
BASELINE EVENT
ENHANCED NATURAL ATTENUATION TREATABILITY STUDY WORK PLAN
NAS PENSACOLA, PENSACOLA, FLORIDA
PAGE 1 OF 3

Sample No.			PEN-18-GS01-01	PEN-18-GS02-01	PEN-18-GS02-01-D	PEN-18-GS03-01	PEN-18-GS04-01	PEN-18-GS05-01
Sample Location			18GS01	18GS02	18GS02(Duplicate)	18GS03	18GS04	18GS05
Collect Date			08/27/03	08/27/03	08/27/03	08/27/03	08/26/03	08/26/03
Fixed-Base Laboratory Results	Preferred Range	Units						
Alkalinity	> 2X	mg/L	320	140	140	15.47 J	130	3.771 J
Chloride	> 2X	mg/L	130	15	6.6	3	16	14
Nitrate	< 1 mg/L	mg/L	0.05 U	0.0106 J	0.0136 J	0.05 U	0.0255 J	0.07
Nitrite	NR	mg/L	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Sulfate	< 20 mg/L	mg/L	1	3	6	1 U	2	5
Total Organic Carbon	> 20 mg/L	mg/L	210	44	44	24	42	3 U
Field Natural Attenuation Results	Preferred Range	Units						
Alkalinity	> 2X	mg/L	1000 E	100	NM	1000 E	120	1000 E
Carbon Dioxide	> 2X	mg/L	250	180	NM	70	50	30
Ferrous Iron	> 1 mg/L	mg/L	0.81	2.76	NM	2.51	0.75	0.35
Hydrogen Sulfide (HSC)	NA	mg/L	5.0 E	5.0 E	NM	3.5	NR	0.3
Hydrogen Sulfide (HACH DR890)	NA	mg/L	0.80 E	0.80 E	NM	0.32	0.80 E	0
Dissolved Oxygen (CHEMetrics)	> 5 mg/L	mg/L	2.0	0.2	NM	0.2	0.9	1.0
Dissolved Oxygen (YSI®)	> 5 mg/L	mg/L	1.51	0.06	NM	0.04	0.06	1.21
pH	5 < pH < 9	Standard	6.39	5.99	NM	5.47	6.49	6.25
Specific Conductivity	NA	mS/cm	1.220	0.316	NM	0.064	0.257	0.066
Oxidation Reduction Potential	< 50mV or <-100 mV	mV	40.7	-100.8	NM	-56.3	-135.6	56.4
Temperature	> 20°C	°C	25.57	28.26	NM	28.62	26.51	26.72

See notes at end of table.

TABLE 1-5 (CONTINUED)
NATURAL ATTENUATION ANALYTICAL RESULTS - UST SITE 18
BASELINE EVENT
ENHANCED NATURAL ATTENUATION TREATABILITY STUDY WORK PLAN
NAS PENSACOLA, PENSACOLA, FLORIDA
PAGE 2 OF 3

Sample No.			PEN-18-GS06-01	PEN-18-GS07-01	PEN-18-GS08-01	PEN-18-GS11-01	PEN-18-GS13-01	PEN-18-GS17-01
Sample Location			18GS06	18GS07	18GS08	18GS11	18GS13	18GS17
Collect Date			08/26/03	08/26/03	08/26/03	08/26/03	08/27/03	08/27/03
Fixed-Base Laboratory Results	Preferred Range	Units						
Alkalinity	> 2X	mg/L	1.378 J	NA	NA	30	11.02 J	76
Chloride	> 2X	mg/L	18	NA	NA	3	18	22
Nitrate	< 1 mg/L	mg/L	0.06	NA	NA	0.01	0.4	0.0172 J
Nitrite	NR	mg/L	0.05 U	NA	NA	0.05 U	0.05 U	0.1 U
Sulfate	< 20 mg/L	mg/L	5.5	NA	NA	1	9	1 U
Total Organic Carbon	> 20 mg/L	mg/L	2 U	NA	NA	1 U	3 U	47
Field Natural Attenuation Results	Preferred Range	Units						
Alkalinity	> 2X	mg/L	1000 E	NM	NM	1000 E	1000 E	1000 E
Carbon Dioxide	> 2X	mg/L	25	NM	NM	12	13	140
Ferrous Iron	> 1 mg/L	mg/L	0.34	NM	NM	0.03	0.98	0.42
Hydrogen Sulfide (HSC)	NA	mg/L	0	NM	NM	0	0	> 5.0
Hydrogen Sulfide (CHEMetrics)	NA	mg/L	0.12	NM	NM	0.02	0.31	0.80 E
Dissolved Oxygen (CHEMetrics)	> 5 mg/L	mg/L	4.0	NM	NM	3.5	3.0	0.8
Dissolved Oxygen (YSI®)	> 5 mg/L	mg/L	3.02	0.08	0.74	2.94	3.60	0.27
pH	5 < pH < 9	Standard	7.50	9.64	5.34	6.33	5.90	6.09
Specific Conductivity	NA	mS/cm	0.077	0.154	0.054	0.064	0.037	0.244
Oxidation Reduction Potential	< 50mV or <-100 mV	mV	51.9	-17.6	48.1	53.3	91.1	35.3
Temperature	> 20°C	°C	26.69	28.49	27.18	28.02	27.32	25.91

See notes at end of table.

TABLE 1-5 (CONTINUED)
NATURAL ATTENUATION ANALYTICAL RESULTS - UST SITE 18
BASELINE EVENT
ENHANCED NATURAL ATTENUATION TREATABILITY STUDY WORK PLAN
NAS PENSACOLA, PENSACOLA, FLORIDA
PAGE 3 OF 3

Sample No.			PEN-18-GS18-01	PEN-18-GS19-01	PEN-18-GS20-01	PEN-18-GS21-01	PEN-18-GM24-01	PEN-18-EB01-01
Sample Location			18GS18	18GS19	18GS20	18GS21	18GM24	--
Collect Date			08/25/03	08/26/03	08/26/03	08/28/03	08/26/03	08/28/03
Fixed-Base Laboratory Results	Preferred Range	Units						
Alkalinity	> 2X	mg/L	NA	NA	3.845 J	20 U	20 U	20 U
Chloride	> 2X	mg/L	NA	NA	14	11	12 U	2 U
Nitrate	< 1 mg/L	mg/L	NA	NA	0.05 U	0.05 U	0.08	0.05 U
Nitrite	NR	mg/L	NA	NA	0.05 U	0.05 U	0.05 U	0.05 U
Sulfate	< 20 mg/L	mg/L	NA	NA	3.5	5	4.1	1 U
Total Organic Carbon	> 20 mg/L	mg/L	NA	NA	3.3	2 U	0.9669 U	0.57 U
Field Natural Attenuation Results	Preferred Range	Units						
Alkalinity	> 2X	mg/L	NM	NM	1000 E	1000 E	1000 E	NM
Carbon Dioxide	> 2X	mg/L	NM	NM	45	40	14	NM
Ferrous Iron	> 1 mg/L	mg/L	NM	NM	0.94	0.4	0	NM
Hydrogen Sulfide (HSC)	NA	mg/L	NM	NM	1.5	2	0.10	NM
Hydrogen Sulfide (CHEMetrics)	NA	mg/L	NM	NM	0.80 E	0.61	0	NM
Dissolved Oxygen (CHEMetrics)	> 5 mg/L	mg/L	NM	NM	0.2	0.25	4.0	NM
Dissolved Oxygen (YSI®)	> 5 mg/L	mg/L	NM	NM	0.19	0.10	3.3	NM
pH	5 < pH < 9	Standard	NM	NM	6.55	4.69	4.49	NM
Specific Conductivity	NA	mS/cm	NM	NM	0.052	0.056	0.057	NM
Oxidation Reduction Potential	< 50mV or <-100 mV	mV	NM	NM	-29.3	105.9	165.1	NM
Temperature	> 20°C	°C	NM	NM	24.23	24.34	26.02	NM

Notes:

mg/L = milligrams per liter
NC = No criteria
J = Analyte detected at an estimated concentration
NA = Not submitted for analysis
U = Analyte not detected above the instrument detection limit
E = Result exceeded range of test kit
NM = Not measured
mS/cm = millisiemen per centimeter
mV = millivolt
FAC = Florida Administrative Code
NR = No Range

2.0 FIELD OPERATIONS

2.1 FIELD OPERATIONS SUMMARY

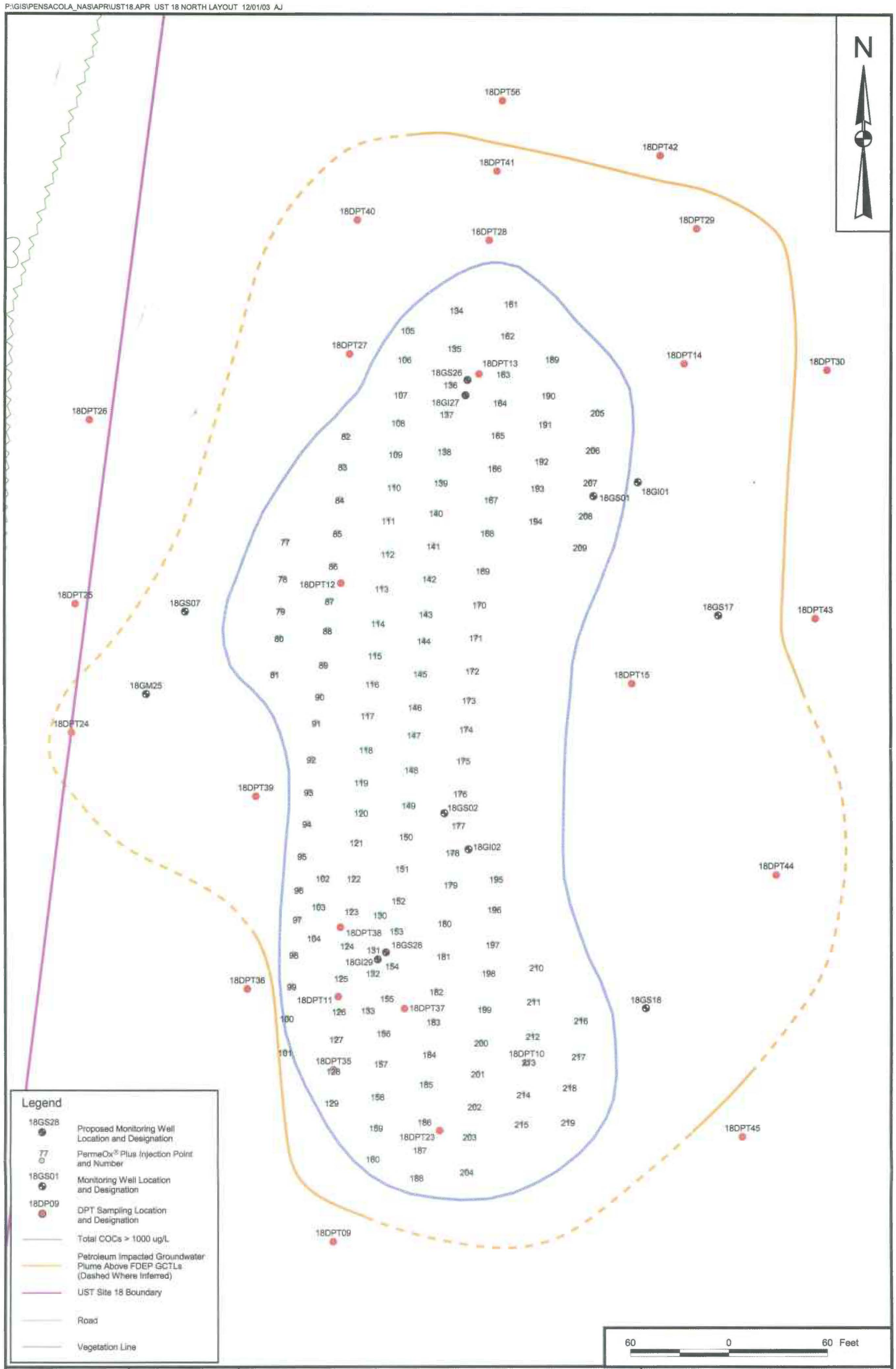
The treatability study consists of the following field activities:

- Mobilization/demobilization.
- Installation of three well nests (See Figures 2-1 and 2-2) at the site to better monitor the results of the treatability study. Each well nest will contain a shallow and intermediate well. TtNUS will perform additional baseline sampling of these six wells prior to injection of PermeOx® Plus
- Installation of 219 (76 in southern plume and 143 in northern plume) PermeOx® Plus injection borings in the source area and injection of a PermeOx® Plus enriched slurry into each of the borings.
- Quarterly sampling and analysis of 12 selected monitoring wells to evaluate water quality parameters and contaminant concentrations.

This treatability study will target the groundwater contaminant plumes identified at UST Site 18. The plumes, as illustrated on Figure 1-4, are defined as the approximate boundary of the reported contamination. For this treatability study, TtNUS is focusing on treating the areas of each plume where the sum total of the COC concentrations is in excess of 1,000 micrograms per liter (µg/L). Treatment of the entire groundwater contaminant plume is not feasible due to the extent of the contamination. Treating the "hottest" areas of the groundwater plumes is expected to result in significant reductions in contaminant concentrations across the plumes.

This pilot-scale study involves installation of injection points via DPT in both the northern and southern groundwater plumes as shown on Figure 1-4. The northern plume will have eight banks of PermeOx® Plus injection borings installed cross-gradient to the groundwater flow (southeast). These banks will be installed in the areas where total concentrations of the site COCs exceeded 1,000 micrograms per liter (µg/L) (see Figure 2-1). Seven additional borings will be installed around groundwater DPT sampling point 18DPT38 because it exhibited the highest COC concentrations (over three times higher). These points will be installed in the approximated locations shown on Figure 2-1. Each bank will contain between 4 and 28 injection borings. Injection borings 105-121, 126-129, and 158-219 will be injected with 3 pounds of PermeOx® Plus slurry per ft (30 pounds per injection boring). The remaining 60 points will be injected with 4 pounds of PermeOx® Plus slurry per ft (40 pounds per injection boring). PermeOx® Plus is being injected at 4 pounds per ft along the up-gradient source areas in an effort to reduce contaminant concentrations before they can migrate across the site.

P:\GIS\PENSACOLA_NAS\APR\UST18.APR UST 18 NORTH LAYOUT 12/01/03 AJ



DRAWN BY	DATE
A. JANOCHA	10/27/03
CHECKED BY	DATE
J. JOHNSON	12/01/03
COST/SCHEDULE-AREA	
SCALE	
AS NOTED	

PROPOSED MONITORING WELL AND PERMEOX® PLUS INJECTION POINTS
FOR NORTHERN PLUME
UST SITE 18
NAS PENSACOLA
PENSACOLA, FLORIDA

CONTRACT NUMBER	
N0844	
APPROVED BY	DATE
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DRAWING NO.	REV
FIGURE 2 - 1	0

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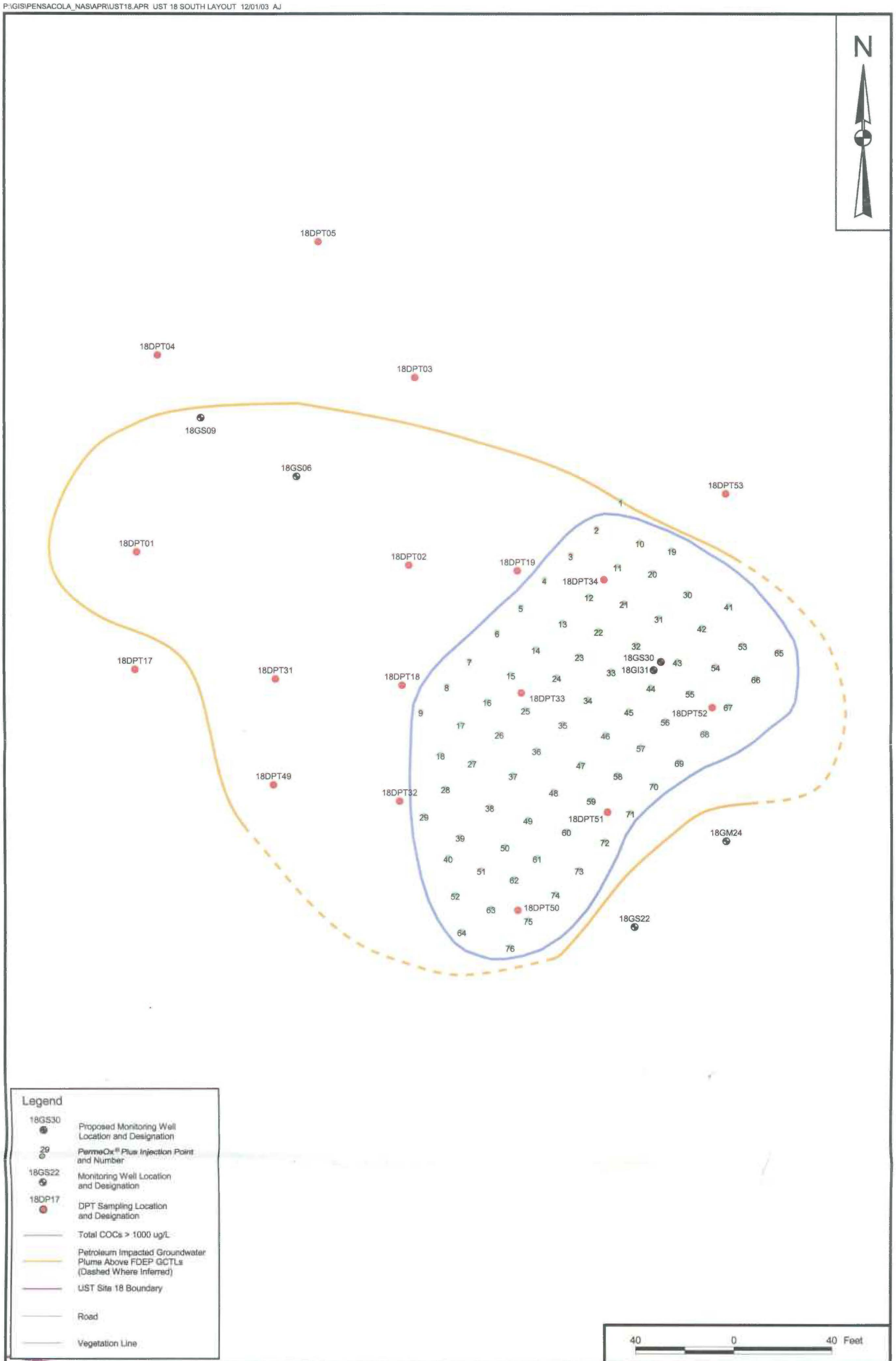


DRAWN BY	DATE	CONTRACT NUMBER
A. JANOCHA	10/27/03	N0844
CHECKED BY	DATE	APPROVED BY / DATE
J. JOHNSON	12/01/03	— / —
COST/SCHEDULE-AREA		APPROVED BY / DATE
		— / —
SCALE		DRAWING NO. / REV
AS NOTED		FIGURE 2 - 2 / 0

PROPOSED MONITORING WELL AND PERMEOX® PLUS INJECTION POINTS
FOR SOUTHERN PLUME
UST SITE 18
NAS PENSACOLA
PENSACOLA, FLORIDA

The southern plume will have seven banks of PermeOx® Plus injection borings installed cross-gradient to the groundwater flow (southeast). These banks will be installed in the areas where total concentrations of the site COCs exceed 1,000 µg/L, as shown on Figure 2-2. Each bank will contain between 9 and 12 injection borings. Three pounds per ft (30 pounds per boring) of PermeOx® Plus will be injected in each of the proposed injection points in southern plume. A detailed plan view of the typical injection point bank for the north and south plumes and a cross-section of a typical injection point are presented on Figure 2-3.

Different PermeOx® Plus injection rates (3 or 4 pounds per ft) are being used in an effort to maximize the effectiveness of this treatability study. The northern plume will have 4 pounds per ft of PermeOx® Plus injected in the source area of the plume where COC concentrations exceed 1,000 µg/L. Four pounds per ft will also be injected around DPT38, which is where the most contaminated groundwater sampled was collected. The remaining areas of the north plume and the entire southern plume, where COC concentrations exceed 1,000 µg/L, will have PermeOx® Plus injected at 3 pounds per ft.

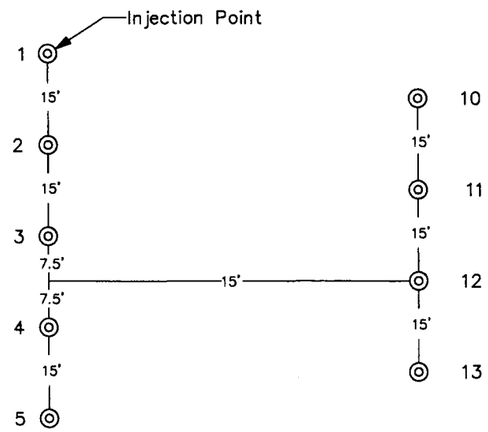
The injection banks are intended to create an oxygen-enriched barrier and an aerobic reaction zone to reduce petroleum hydrocarbon concentrations in the areas where concentrations have been the most elevated. The dry PermeOx® Plus powder (3 to 4 pounds per ft depending on location) will be mixed into a slurry with potable water and injected into the PermeOx® Plus borings for a one-time treatment. The site geochemistry will be monitored for changes in water quality parameters indicative of increased microbial activity along with laboratory analysis of COCs to detect reductions in dissolved petroleum concentrations. Details of the sampling and analysis program are presented in Section 3.0. In addition, the FDEP approval letter included in Appendix D requires monitoring of pH and Total Dissolved Solids (TDS) to verify secondary water quality criteria are met.

2.2 MOBILIZATION/DEMOBILIZATION

Following approval of this work plan, TtNUS will procure the required subcontractors and begin mobilization activities. Mobilization/demobilization includes the following:

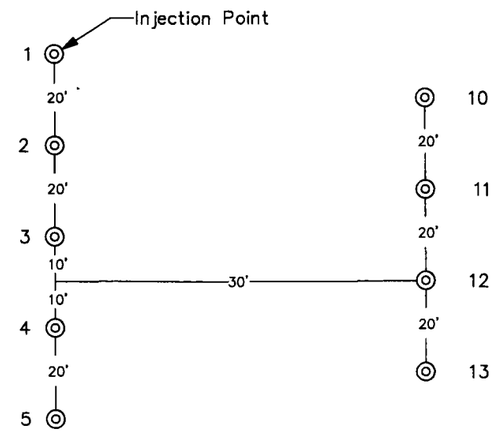
- Obtain utility clearance in the proposed boring areas.
- Mobilize subcontractors, equipment, and materials to the site.
- Obtain drilling and/or well permits via subcontractor.

SOUTHERN PLUME

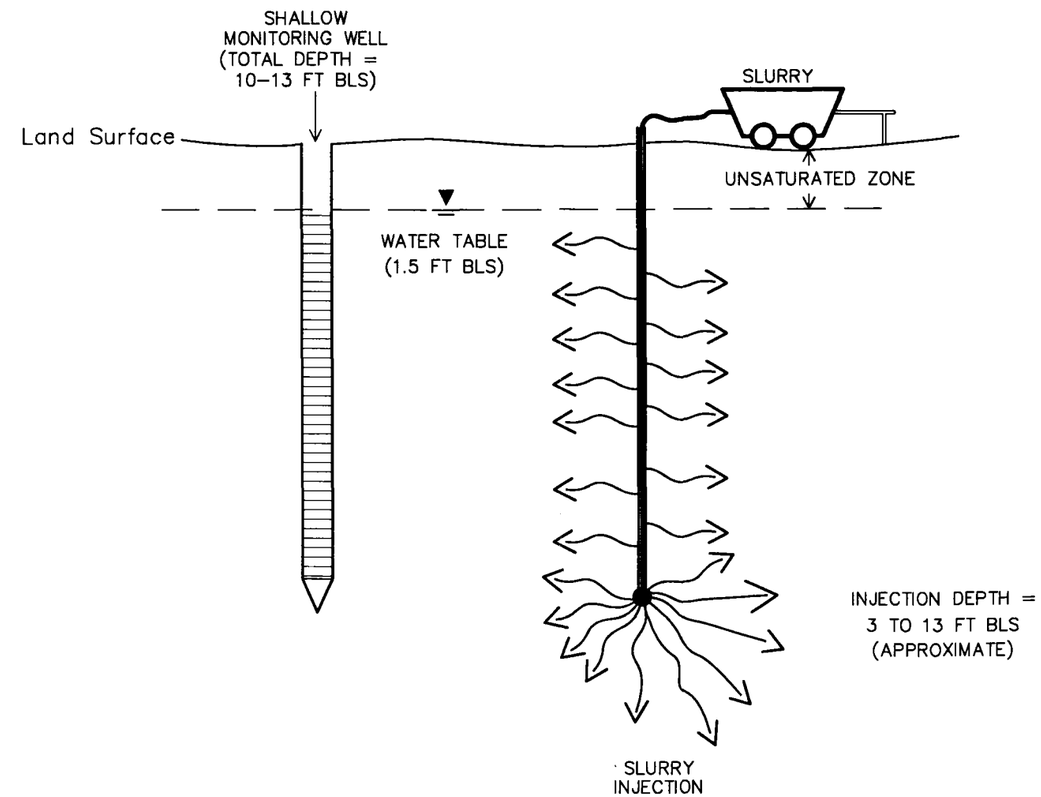


PLAN VIEW SHOWING TYPICAL ADJACENT PAIR OF PROPOSED INJECTION POINT BANKS FOR SOUTHERN PLUME

NORTHERN PLUME



PLAN VIEW SHOWING TYPICAL ADJACENT PAIR OF PROPOSED INJECTION POINT BANKS FOR NORTHERN PLUME



CROSS–SECTIONAL VIEW SHOWING TYPICAL INJECTION POINT AND MONITORING WELL WITHIN TREATMENT ZONE

NOTES:

1) 76 total injection points: 7 banks spaced approximately 15 ft apart
2) See previous figure (Figure 2–2) for proposed locations of injection points relative to monitoring wells, DPT sampling points, and hydrocarbon plume

NOTES:

1) 143 total injection points: 8 banks spaced approximately 30 ft apart
2) See Figure 2–1 for proposed locations of injection points relative to monitoring wells, DPT sampling points, and hydrocarbon plume

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY LLK DATE 10/29/03
CHECKED BY DATE
COST/SCHED–AREA
SCALE NOT TO SCALE

PROPOSED SLURRY INJECTION PLAN
UST SITE 18
NAS PENSACOLA
PENSACOLA, FLORIDA

CONTRACT NO. 0844
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 2–3
REV. 0

FORM CADD NO. SDIV_BH.DWG – REV 0 – 1/20/98

- Conduct an approximately 1-hour long site-specific health and safety review meeting.
- Delineate the work zones (exclusion zone, contamination reduction zone, and support zone) as required by the Health and Safety Plan (HASP) (See Appendix E).
- Arrange an area to perform decontamination procedures.
- Demobilize equipment and materials from the site.
- Perform general site clean-up and removal of trash.

Field team members will review the work plan, the Site Emergency Procedures Plan, and the HASP. Mobilization includes attendance at a site-specific health and safety meeting during the initiation of on-site activities. This meeting will also include field team orientation in order to familiarize personnel with the scope of the field activities.

The Field Operations Leader (FOL) will coordinate the mobilization activities. These include responsibilities such as initiating and conducting equipment inventories to ensure equipment is available, purchasing equipment as required, staging equipment for efficient loading and transport from the TtNUS Tallahassee office to the site, and after field activities are completed, demobilizing the equipment.

The DPT subcontractor will furnish a truck-mounted DPT rig, support crew, all necessary tools required, personal protective equipment (PPE) for their crew, and any miscellaneous equipment and materials required to complete the described activities. The down-hole DPT equipment, sampling tools, and the rear of the DPT rig will be steam-cleaned prior to arrival on site. Safety shut-off equipment will be in full working condition and will be tested by the FOL prior to initiating DPT activities.

2.3 DPT MONITORING WELL INSTALLATION

Six DPT monitoring wells (GS26, GI27, GS28, GI29, GS30, and GI31) will be installed at the site. The monitoring well locations are shown on Figures 2-1 and 2-2. These six new monitoring wells and six previously existing monitoring wells will be used to assess the extent and severity of the contamination previously identified in the aquifer at the site. The six new monitoring wells will be installed in the source areas to monitor contaminant concentrations within the plume over the duration of the treatability study. The monitoring wells will be constructed according to standard monitoring well installation and construction details, except the method of installation is using a DPT rig and the monitoring wells will be constructed of 1.25-inch inside diameter (ID), flush-threaded polyvinyl chloride (PVC) well screen. The well nests will be completed with two wells installed to approximately 12 ft bls (shallow) and 35 ft bls (intermediate) at each location. Each well will contain a 0.010-inch factory-slotted screen. The shallow monitoring well will be screened from 2 to 12 ft bls and the intermediate well will be screened from 30 to 35 ft bls. The depth intervals may vary in some situations and will be determined by the project geologist. The well will be flush mount and grouted with a 12-inch bolt-down traffic bearing cover.

Because no soil samples will be collected or drilling cuttings produced from the installation of the DPT wells, screening of the soils with a flame ionization detector (FID) will not be conducted.

A boring log and monitoring well installation record will be maintained for each DPT well. The groundwater laboratory analytical results will be recorded on each respective boring log upon receipt of the laboratory data. Relative top of casing elevations for all site monitoring wells will be measured by TtNUS field personnel during the injection activities. The top of casing elevations will be used in the post-injection groundwater monitoring reports to create a more accurate groundwater contour map and to better define groundwater flow direction at this site.

2.4 MONITORING WELL DEVELOPMENT

Following installation, each monitoring well will be developed in accordance with the FDEP Standard Operating Procedures (SOPs). Based upon field conditions (i.e., a well goes dry) the site geologist may modify these protocols. The monitoring wells will be developed by the driller no sooner than 24 hours or longer than seven calendar days after well installation, and this will be accomplished by purging, bailing, and/or pumping, as determined by the TtNUS field personnel. The pH, temperature, turbidity, and specific conductivity measurements will be collected for the purged water after each borehole volume is removed or at predetermined intervals. Wells are developed when these readings become stabilized. Water-quality stabilization is determined using the following criteria: temperature ±1.0 degrees Celsius (°C), pH ±0.1 unit, and specific conductivity ±5 percent.

2.5 INJECTION POINT INSTALLATION

The 219 injection points will be installed using DPT (e.g., Geoprobe) and will be divided into banks. Injection points are labeled INJ01 thru INJ219 and should be labeled as such in any field documentation. Each bank will contain between 4 and 28 injection points as depicted on Figures 2-1 and 2-2. Shallow groundwater contamination is assumed to extend to the confining layer which is located between 50 ft and 60 ft. In general, the higher concentrations of COCs are present in the upper 10 ft of the surficial aquifer. Aquifer tests at this site have indicated high hydraulic conductivities, on the order of 10^{+1} to 10^{+2} ft/day (EAH, 1996). Comparison of existing groundwater monitoring well pairs (shallow and deep) indicated a downward flow of groundwater. Therefore, each of the injection points will be installed to a depth of 10 ft below the estimated depth to water (approximately 13 ft bls) and the PermeOx® Plus slurry injected across the wetted depth of the injection point (approximately 10 ft). PermeOx® Plus is anticipated to migrate via groundwater flow to the downgradient and lower portions of the contamination plumes.

2.6 PERMEOX® PLUS MIXING AND INJECTION

The PermeOx® Plus bulk powder will be drop-shipped to the site. For the PermeOx® Plus injection borings, approximately 1.1 gallons of potable water are required per pound of PermeOx® Plus powder for a 10 percent mixture. The 10 percent slurry is intended to create horizontal dispersion of the PermeOx® Plus; however, less water may be used as determined in the field. Appendix F contains tables indicating the proper water to PermeOx® Plus ratios for injection. Mixing will be performed in a 55-gallon drum or equivalent tank and will be injected through a slurry/grout pump. A standard environmental slurry mixer or grout pump will be used to mix the slurry. The PermeOx® Plus slurry must be mixed immediately before and during injection. Material Safety Data Sheets (MSDSs) for the PermeOx® Plus powder are provided in the HASP, Appendix E. The DPT equipment will be used to inject the slurry. Prior to advancing the DPT rod, a post-hole digger will be used to advance the boring the 4 ft bls. Once the hand augering is complete, 6 inches to 1 ft of bentonite will be placed in the boring and hydrated. This bentonite seal will be used to prevent the PermeOx® Plus from discharging out of the boring.

After the bentonite has been properly hydrated (minimum 20 minutes), the DPT boring will be advanced through the bentonite seal. The boring will be advanced to the maximum injection depth and approximately 20 percent of the slurry will be injected. The DPT rods will be extracted approximately 2 ft and another 20 percent will be injected at that depth. This will continue until all the PermeOx® Plus has been injected into the boring.

2.7 WATER LEVEL MEASUREMENTS

Groundwater level measurements will be recorded during each sampling event from all accessible UST Site 18 monitoring wells. Measurements will be taken with an electronic water level indicator or interface probe using the marked location on the top of the well casing as the reference point. Groundwater level measurements will be recorded to the nearest 0.01-ft on the appropriate field log. This information will be used to determine the groundwater elevations throughout the site and determine groundwater flow direction.

2.8 INVESTIGATION-DERIVED WASTE (IDW) MANAGEMENT

IDW accumulated during DPT installation, well purging and sampling, and decontamination proceedings will be collected, containerized, and stored in Department of Transportation (17C)/UN (1A2)-approved, 55-gallon drums. The drums will be labeled as soon as possible after they are filled. The drums will be left on site pending analytical results.

Upon receipt of the analytical results, TtNUS will mobilize a certified waste management contractor, as required, to dispose of the IDW. NAS Pensacola personnel will sign all manifests and bills of lading prior to

transportation off-site. TtNUS will coordinate with station personnel for this activity.

2.9 DECONTAMINATION

The field team's PPE will be disposed as required. These items, such as Tyvek™ suits, disposable latex gloves and paper towels, will be disposed of using procedures required by the HASP. Personnel will also perform decontamination procedures as required by the HASP.

The equipment involved in field sampling activities will be decontaminated prior to and upon completion of drilling and sampling activities. This equipment includes drilling rigs, down-hole tools, augers, and all non-dedicated sampling equipment.

Major Equipment

All down-hole DPT equipment and sampling tools will be decontaminated by the DPT crew prior to beginning work and at the completion of the DPT installation/injection program. During monitoring well installation, all DPT rods and equipment used will be decontaminated after each well is completed and before the next well is started. Due to the nature of this study, the DPT equipment will not be decontaminated between PermeOx® Plus injection points. A decontamination area will be established to contain the decontamination water that is generated and the decontamination water will be stored in a properly labeled 55-gallon IDW drum. The decontamination procedures will comply with the FDEP SOPs.

Sampling Equipment

Sampling equipment used for collecting the groundwater samples will be disposable equipment. Therefore, no decontamination of this equipment will be required. Field analytical equipment such as water level probes will be decontaminated according to FDEP SOP FC1131 (FDEP, 2002).

3.0 ENVIRONMENTAL SAMPLING

3.1 SAMPLE ANALYSIS SUMMARY

Both field and laboratory analyses will be conducted in order to quantify any increase in the rate of microbial activity within the aerobic reaction zones and to determine the contaminant reduction rates.

3.1.1 Laboratory Sample Analysis Summary

A certified laboratory will be subcontracted by TtNUS to perform the routine chemical analyses for the environmental samples collected for UST Site 18 during the treatability study.

The laboratory analytical methods, bottle requirements, preservation requirements, and holding times are as shown in Table 3-1.

TABLE 3-1
LABORATORY GROUNDWATER ANALYSES

Parameter	Analytical Method	Bottle/Preservation Requirements	Holding Time
TOC	US Environmental Protection Agency (USEPA) 415.1	One 250 milliliter (ml) high density polyethylene (HDPE); sulfuric acid (H_2SO_4) < 2; cool to 4°C	28 days to analysis
Iron and Manganese (filtered and unfiltered)	SW-846 6010B	Plastic, nitric acid (HNO_3); cool to 4°C	28 days to analysis
Volatile Organic Compounds (VOCs)	USEPA SW846 8260B	3 - 40ml vials; hydrochloric acid(HCl) pH< 2; cool to 4°C	14 days to analysis
PAHs	USEPA SW846 8310	Two 1-Liter amber jar; H_2SO_4 pH< 2; cool to 4°C	40 days to analysis
TRPH	Florida Petroleum Range Organics (FL-PRO)	Two 1-Liter amber jar; cool to 4°C	28 days to analysis
Methane, Ethane, Ethene	RSK SOP 147/175	3 – 40ml glass vials, HCl; cool to 4°C	14 days to analysis
Alkalinity	USEPA 310.1	Plastic or Glass; cool to 4°C	14 days to analysis
Cations and Anions: N, NO_2, NO_3, SO_4, Cl and PO_4	USEPA 300 series	Plastic; cool to 4°C	48 hours
Total Dissolved Solids (TDS)	USEPA 160.1	250 mL plastic or glass; cool to 4°C	7 days

3.1.2 Field Analysis Summary

Field geochemical analyses will be performed during field sampling activities on the 12 selected monitoring wells for the parameters specified in Table 3-2.

TABLE 3-2
FIELD ANALYSES

Parameter	Analytical Method	Holding Time	Analyze
Carbon dioxide	CHEMetrics K-1910/1920/1925	Analyze immediately	Field
Conductivity	YSI® 556 Water Quality Meter	Analyze immediately	Field
Dissolved oxygen	CHEMetrics K-7501/7512	Analyze immediately	Field
Ferrous iron	HACH DR-890 Colorimeter	Analyze immediately	Field
Hydrogen sulfide	HACH HS-C	Analyze immediately	Field
ORP	YSI® 556 Water Quality Meter	Analyze immediately	Field
pH	YSI® 556 Water Quality Meter	Analyze immediately	Field
Sulfide	HACH DR-890 Colorimeter	Analyze immediately	Field
Temperature	YSI® 556 Water Quality Meter	Analyze immediately	Field
Turbidity	LaMotte Turbidimeter	Analyze immediately	Field

3.2 GROUNDWATER SAMPLING PROCEDURES

Groundwater samples will be obtained from the six newly installed monitoring wells and six previously installed groundwater monitoring wells during the four quarters of post-injection sampling. The following 12 wells will be sampled: GS01, GS02, GS06, GS17, GS18, GM24, GS26, GI27, GS28, GI29, GS30, and GI31. Samples will be collected quarterly for the above laboratory and field groundwater analytical tests. Groundwater sampling will be conducted in general accordance with FDEP SOPs (FDEP, 2002).

The wells will be purged with a peristaltic pump using low flow quiescent purging techniques per FDEP SOPs. The data will be recorded on a low flow purge data sheet (Appendix G). Depending on the groundwater parameters, up to five well volumes may be purged. If wells are purged dry with less than three well volumes removed, the water level in the well will be allowed to recover enough to collect five field readings (pH, temperature, turbidity, dissolved oxygen, and specific conductance) prior to collecting a water sample. If the well does not purge dry using the low flow purging technique, groundwater characteristics will be taken at no less than 2 minute intervals, depending on the flow rate. Stabilization will determined as defined by FDEP SOP FS 2200.

Teflon® or polypropylene or polyethylene and surgical-grade silicon tubing will be used for sample collection. Groundwater samples will be collected using the "purge and trap" method for PAHs and TRPH and the "straw" method for VOCs and discharged into the appropriate sample bottles for analysis. Samples requiring preservation will be collected in prepreserved bottles provided by the laboratory.

Pertinent sampling data will be recorded using the appropriate sample log sheet and field logbook. (See Appendix G for forms to be used during the treatability study.)

3.3 SAMPLE HANDLING

Sample handling including the field-related considerations concerning sample identification, packaging, and shipping will be addressed throughout this section.

3.3.1 Sampling Identification System

Each sample collected will be assigned a unique sample tracking number. The sample tracking number will consist of a four-segment, alphanumeric code that identifies the site, sample location, and sample round. The groundwater samples collected during the additional site assessment and baseline sampling were designated as the first round. Therefore, the quarterly sampling rounds for the PermeOx® Plus Treatability Study will be designated as the second through fifth rounds. Pertinent information regarding sample identification will be recorded in the field logbooks.

The appropriate alphanumeric sample identification code is explained as follows:

(Site Location) - (Site) - (Sample Number) – (Sample round)

Site Location: PEN (NAS Pensacola)

Site: 18 (UST Site 18)

Sample Number: Groundwater sample = well identifier (Monitoring well GS03 = GS03).

Sample Round: For groundwater samples = designated sample round number (e.g., 01, 02, 03, 04, and 05)

For example, a groundwater sample collected from monitoring well GS26 during the baseline sampling before the PermeOx® Plus Treatability Study will be designated as PEN-18-GS26-01.

3.3.2 Sample Packaging and Shipping

The FOL will be responsible for completion of the following forms:

- Sample labels
- Chain-of-custody forms
- Appropriate labels applied to shipping coolers
- Chain-of-custody seals
- Federal Express air bills

All samples will be packaged and shipped in accordance with FDEP SOPs.

3.4 SAMPLE CUSTODY

Custody of samples must be maintained and documented at all times. Chain-of-custody begins with the collection of the samples in the field. TtNUS SOP SA-6.3 (Appendix H) provides a description of the chain-of-custody procedures to be followed.

3.5 QUALITY CONTROL (QC) SAMPLES

Work at UST Site 18 will be conducted under the FDEP SOPs updated in 2002. In addition to regular calibration of field equipment and appropriate documentation, minimal QC samples will be collected during the Treatability Study sampling activities. Certified clean tubing and bottleware will be used for all sampling. Dedicated tubing will be left in each groundwater monitoring well. A trip blank will be included with the VOC sample coolers and a field-cleaned equipment blank will be collected during each sampling event. No duplicate or other QC samples are required or proposed.

3.6 EQUIPMENT CALIBRATION

Several monitoring instruments may be used during field activities including the following:

- Photoionization detector or FID
- YSI® 556 water quality meter/probe
- Electronic water-level meter

Calibration will be documented on an equipment calibration log (Appendix G). During calibration, an appropriate maintenance check will be performed on each piece of equipment. If damaged or defective parts are identified during the maintenance check and it is determined that the damage could have an impact on

the instrument's performance, the instrument will be removed from service until the defective parts are repaired or replaced.

3.7 EQUIPMENT MAINTENANCE

Measuring equipment used in environmental monitoring or analysis and test equipment used for calibration and maintenance shall be maintained by established procedures.

TtNUS maintains an inventory of sampling and measurement equipment. In the event that failed equipment cannot be repaired, replacement equipment will be shipped to the site by overnight carrier to minimize downtime.

3.8 RECORD KEEPING

In addition to chain-of-custody records, certain standard forms will be completed for sample description and documentation. These shall include sample log sheets, daily record of subsurface investigation reports, and logbooks. Field documentation and example field log forms are provided in Appendix G.

A bound/weatherproof site logbook shall be maintained by the FOL. All information related to sampling or field activities will be recorded in the site logbook. This information will include, but is not limited to, sampling time, weather conditions, unusual events, field measurements, descriptions of photographs, etc.

4.0 PROJECT MANAGEMENT

The management and technical aspects of this project are the ultimate responsibility of TtNUS. Each contractor assigned to individual tasks has the responsibility to fulfill the objectives of that task and to ensure the quality of the data generated by the task. At the direction of the United States Navy (Navy), TtNUS has overall responsibility for the investigations to be performed at UST Site 18.

4.1 PROJECT ORGANIZATION

The various quality assurance and management responsibilities of key TtNUS project personnel are defined in the following paragraphs.

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

CLEAN Project Manager - The Project Manager is responsible for project performance, budget, and schedule, and for ensuring the availability of necessary personnel, equipment, subcontractors, and services. He will direct the development of the field program, evaluation of findings, determination of conclusions and recommendations, and preparation of technical reports. The TtNUS Project Manager is Mr. Gerald Walker, P.G.

FOL - The FOL is responsible for providing on-site supervision of day-to-day activities on the project. The FOL serves as the primary on-site contact with the client and subcontractors. In addition, the FOL is responsible for all field QA/QC and safety-related issues as defined in the HASP. The FOL for this project will be designated later by the Project Manager.

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

QA Manager/Sampling Coordinators - The Project Manager/FOL will coordinate the schedule of field sampling activities with the schedule and capacity requirements of the selected analytical laboratory. All sampling will be coordinated to assure that environmental sampling is conducted in a manner that complies with all QA/QC requirements and is in compliance with holding time and analytical procedure requirements. All Program-wide, QA issues are the responsibility of the QA Manager. The TtNUS QA Manager for Navy CLEAN activities is Mr. Paul Frank.

Project Laboratory – The project laboratory has not been selected at this time.

4.2 PROJECT RESPONSIBILITIES

Throughout the field activities, NAS Pensacola personnel, as described below, will provide various support functions:

- Locate and mark underground utilities and issue digging or other required permits prior to the commencement of digging or drilling operations.
- Take custody of all drill cuttings, well development fluids, decontamination fluids, or drill cuttings.
- Secure staging areas for decontamination operations and for storing equipment and supplies. It is anticipated that access can be gained to UST Site 18.
- A supply of electricity and potable water for equipment cleaning, slurry mixing, etc.

4.3 CONTINGENCY PLAN

In the event of problems that may be encountered during the site investigation activities, the TtNUS Project Manager will notify the Navy Remedial Project Manager (RPM) and the NAS Pensacola Point of Contact. The Project Manager will determine a course of action so as to minimize impacts to the project schedule and/or budget. Contingency plans will be approved through the Navy RPM and the NAS Pensacola Point of Contact before being enacted.

4.4 REPORTING

During performance of the PermeOx® Plus Treatability Study, TtNUS will prepare the following reports:

PermeOx® Plus Application and Baseline Monitoring Report

Upon completion of the Baseline Sampling and PermeOx® Plus injection, TtNUS will prepare the PermeOx® Plus Application and Baseline Monitoring Report, which will include the following:

- The results of the pre-installation sampling and PermeOx® Plus injection activities.
- The PermeOx® Plus installation procedures and any other data developed as part of the pilot-scale field activities.
- The groundwater sampling procedures and sample results.
- The groundwater flow conditions.

The Baseline Monitoring Report will be prepared and submitted to NAVFAC EFD SOUTH, NAS Pensacola, and the FDEP.

Quarterly Performance Monitoring Results Reports

Upon completion of each post-injection quarterly monitoring event, TtNUS will prepare a brief letter report presenting the sample results.

Treatability Study Evaluation Report

Upon completion of the fourth quarter of performance monitoring, TtNUS will prepare the Treatability Study Evaluation Report. The report will present information on the groundwater flow conditions, sample results, treatment effectiveness, and any other data collected during the performance of the treatability study. In addition, the report will present conclusions and recommendations for follow up actions for the site. The Treatability Study Evaluation Report will be prepared in draft form for NAVFAC EFD SOUTH and NAS Pensacola review and in final form for NAVFAC EFD SOUTH, NAS Pensacola, and the FDEP.

REFERENCES

CH2MHILL (CH2M Hill Constructors, Inc.), 2003. Groundwater Monitoring Report - Fourth Quarter 2002, UST 18 Naval Air Station Pensacola, Pensacola, Florida. April.

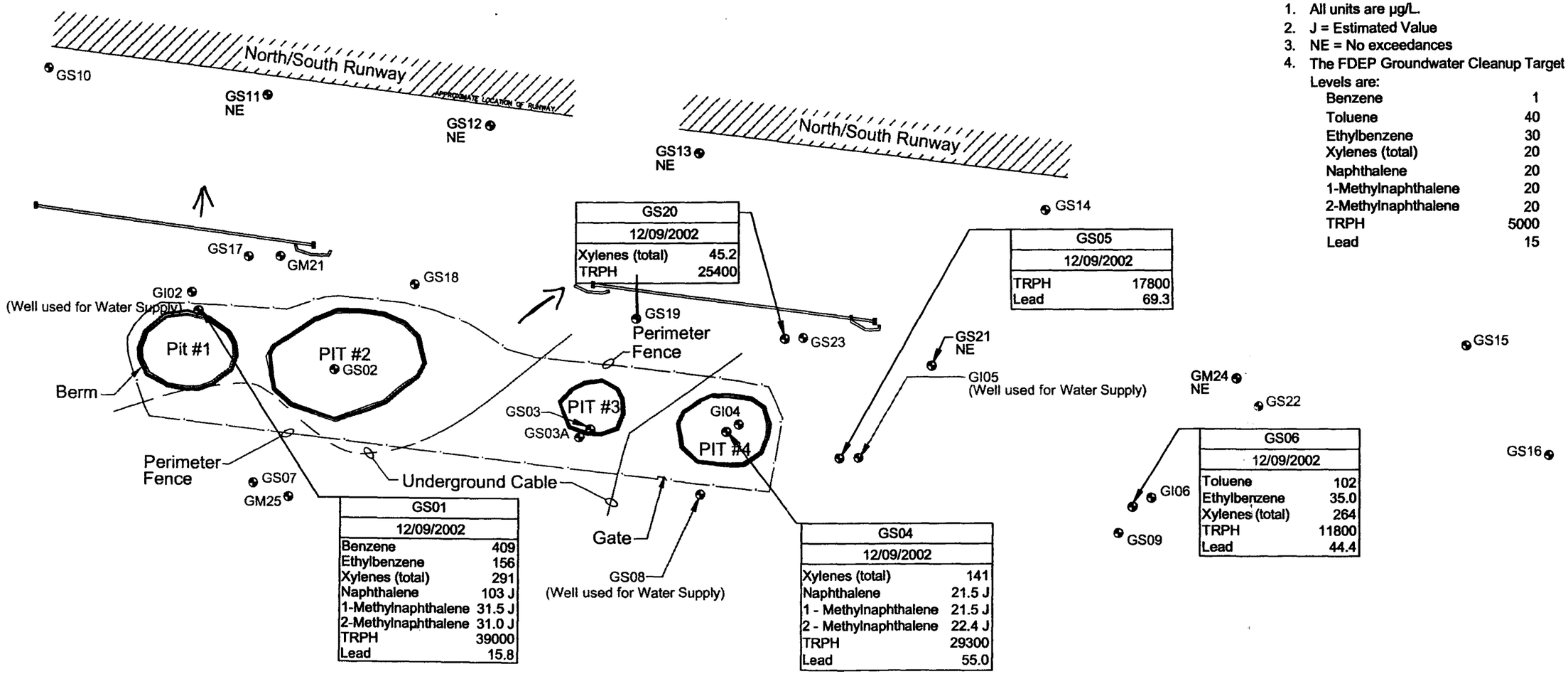
EAH (EnSafe/Allen & Hoshall), 1996. Contamination Assessment Report, UST 18, Naval Air Station, Pensacola, Florida. January.

EnSafe (EnSafe, Inc.), 1997. Remedial Action Plan for UST 18, Naval Air Station, Pensacola, Florida. December.

FDEP (Florida Department of Environmental Protection), 2002. Chapter 62-160 FAC, Standard Operating Procedures. April.

APPENDIX A

HISTORICAL FIGURE



LEGEND

Monitoring Well Location

Notes:

1. All units are µg/L.
2. J = Estimated Value
3. NE = No exceedances
4. The FDEP Groundwater Cleanup Target Levels are:

Benzene	1
Toluene	40
Ethylbenzene	30
Xylenes (total)	20
Naphthalene	20
1-Methylnaphthalene	20
2-Methylnaphthalene	20
TRPH	5000
Lead	15

N

0 150 300 450

Scale: 1" = 150'

FIGURE 2-3

COCs in Groundwater (December 2002)

UST 18, NAS Pensacola

CH2MHILL

rp3_18_f2-3.dwg
4-Feb-2003

APPENDIX B

GROUNDWATER SAMPLING FORMS

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name: UST Site 18 **Project No.:** N0844
Location: NAS Pensacola **Personnel:**
Weather Conditions: **Measuring Device:** Heron Dipper T
Tidally Influenced: Yes ___ No ___ **Remarks:**

Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments
PEN-18-GM21	8-25-03		Destroyed	!!!	—			
PEN-18-GM24				12.7	1.28			
PEN-18-GS01			26.36	11.93	1.12		25.24	56
PEN-18-GS02				46.8	5.58			341/83-2
PEN-18-GS03				59.1	6.37			0
PEN-18-GS04			27.02	11.27	2.11		24.91	0
PEN-18-GS05			27.05	12.88	2.09		24.96	0
PEN-18-GS06			27.79	12.5	2.59		25.20	2523
PEN-18-GS07				6.20	2.44			Ø
PEN-18-GS09				14.7	3.35	10:38		0
PEN-18-GS10				12.72	2.67			Ø
PEN-18-GS11			27.74	12.37	3.09		24.65	Ø
PEN-18-GS12			27.46	12.61	2.94		24.52	Ø
PEN-18-GS13			27.68	13.10	3.32		24.36	Ø
PEN-18-GS17	[illegible]		[illegible]	12.75	2.04			
PEN-18-GS18	*DAMAGED		R	19.75	[illegible] *			microwell
PEN-18-GS19		M		—	— *			Ø microwell
PEN-18-GS20				—	— *			Ø microwell
PEN-18-GS21				—	— *			21 microwell
PEN-18-GS22				17.0				0 microwell
PEN-18-GS05				59.1	7.19			335
PEN-18-GS08				13.52	2.75			Ø
PEN-18-GS03A				2.80	P			Ø
GM24			24.68	12.7	1.28		23.40	
GS02A				10.15	1.12			

* All measurements to the nearest 0.01 foot

Page ___ of ___

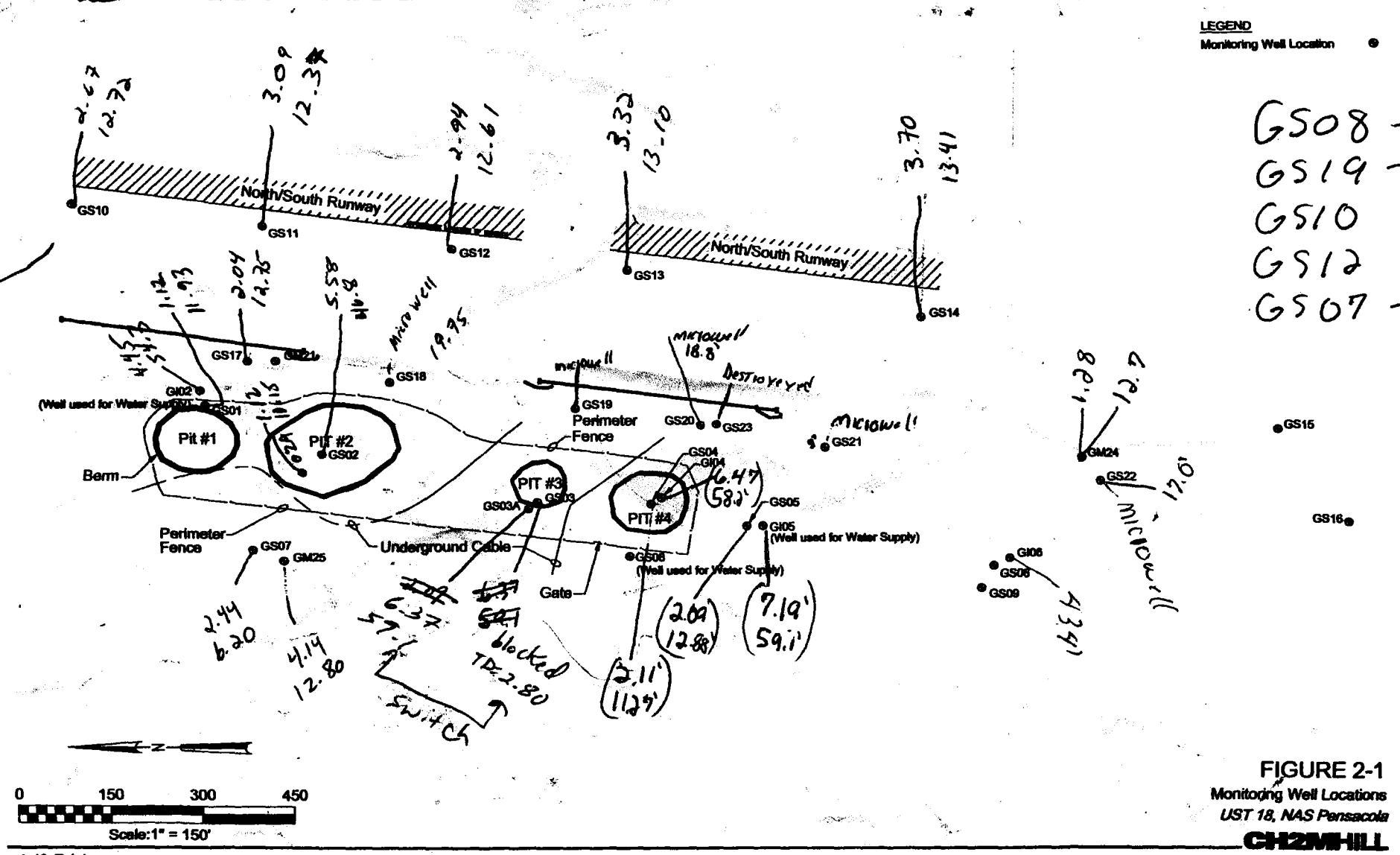


FIGURE 2-1
Monitoring Well Locations
UST 18, NAS Pensacola

CH2MHILL

rp1_18_f2-1.dwg
20-Aug-2002

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Pensacola UST Site 18
Project No.: N0844

[ ] Domestic Well Data
[X] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: PEN-18-GS01-01
Sample Location: PEN-18-GS01
Sampled By: TA
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8/27/03 Time: 1850	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP mV	Other
Method: Low Flow Peristaltic	frothy orange	6.39	1.220	9.24	1.51	25.57	40.7	

PURGE DATA

Date: 8/27/03	Time	pH	S.C.	Turbidity	DO	Temp (°C)	ORP	
Method: Low Flow Peristaltic								
Monitor Reading (ppm):								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 11.9								
Static Water Level (WL): 1.0								
One Casing Volume(gal/L): 6.8 L								
Start Purge (hrs): 1825								
End Purge (hrs): 1850								
Total Purge Time (min): 22								
Total Vol. Purged (gal/L): 20.2 L								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	2 VOC VIALS 3 x 40 mL glass vials	Y
PAH	None	2 - 1L Ambers	Y
TRPH (FL-PRO)	H2SO4	2 - 1L Ambers	Y
MEE	HCl	3 x 40 mL glass vials	Y
TOC	H2SO4	1 - 250 mL glass amber	Y
Iron + Manganese	HNO3	1 - 1L Plastic	Y
Alkalinity	None	1 250mL ?	Y
Select Anions	None	PICKA.S ?	Y

OBSERVATIONS / NOTES

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): TA

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	NAS Pensacola UST Site 18	Sample ID No.:	PEN-18-GS01-01
Project No.:	N0844	Sample Location:	PEN-18-GS01
Sampled By:	DA	Duplicate:	☐
Field Analyst:	DA	Blank:	☐
Field Form Checked as per QA/QC Checklist (initials):	DA		

SAMPLING DATA:

Date: 8/27/03	Color	pH	S.C.	Turbidity	DO	Temp.	ORP
Time: 1850	Visual	Standard	mS/cm	NTU	mg/l	°C	mV
Method: Peristaltic	frothy orange	6.39	1.220	9.24	1.51	25.57	40.7

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Ferrous Iron:

Equipment: HACH DR890 Analysis Time: 1930

Concentration: 0.81 mg/L

Notes:

Alkalinity: Analysis Time: 1925

Equipment: CHEMetrics CHEMetrics (Range: 100 - 1000 mg/L)

CHEMetrics: 710000 mg/L

Notes:

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT CHEMetrics (Range: 100 - 1K mg/L) Analysis Time: 1935

CHEMetrics: 250 mg/L

Notes:

Dissolved Oxygen:

Equipment: CHEMetrics Range ☐ 0 - 1.0 mg/L ☑ 1 - 12 mg/L Analysis Time: 1915

CHEMetrics: 2.0 mg/L

Hydrogen Sulfide (H_2S):

Equipment: HS-C Analysis Time: 1910

Concentration: >5.0 mg/L

Notes: Very Fizzy

Sulfide:

Equipment: HACH DR890 Analysis Time: 1920

Concentration: >0.80 mg/L

QA/QC Checklist:

All data fields have been completed as necessary: ☐
Correct measurement units are cited in the SAMPLING DATA block: ☐
Mulitplication is correct for each *Multiplier* table: ☐
Final calulated concentration is within the appropriate *Range Used* block: ☐
Alkalinity *Relationship* is determined appropriatly as per manufacturer instructions: ☐
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐
Nitrite Interference treatment used for Nitrate test if Nitrite was detected: ☐
Title block is initialized by person who performed the QA/QC Checklist: ☐

9/10 10x5 39

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Pensacola UST Site 18
Project No.: N0844

[ ] Domestic Well Data
[X] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: PEN-18-GS02-01
Sample Location: PEN-18-GS02
Sampled By:
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8-27-03 Time: 1835	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP mV	Other
Method: Low Flow Peristaltic	Clear	5.99	0.316	13.1	0.06	28.26	-100.8	

PURGE DATA

Date: 8-27-03	Time	pH	S.C.	Turbidity	DO	Temp (°C)	ORP	
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 10.2								
Static Water Level (WL): 1.30								
One Casing Volume(gal/L): 5.6								
Start Purge (hrs): 1810								
End Purge (hrs): ~~1820~~ 1832								
Total Purge Time (min): 22								
Total Vol. Purged (gal/L): 6.5								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	2 x 40 mL glass vials	✓
PAH	None	~~2 - 1L Ambers~~	
TRPH (FL-PRO)	~~H2SO4~~ HCl	2 - 1L Ambers	✓
MEE	HCl	2 x 40 mL glass vials	✓
TOC	H2SO4	2 - ~~40~~ mL glass ~~amber~~ vial	✓
Iron + Manganese (Filtered/unfiltered)	HNO3	1 - ~~[illegible]~~ 250mL P	✓
Alkalinity + Anions	None	?	
~~Select Anions~~	None	~~?~~	

OBSERVATIONS / NOTES

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Charles Mos

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Pensacola UST Site 18
PROJECT NUMBER: N0844

WELL ID.: PEN-18-GS02
DATE: 8-27-03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Volume (L)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1810	1.33	300	0	—	—	—	—	—	—	Start Purge
1820	1.38		3	—	—	—	—	—	—	
1823	1.38		4.0	5.99	0.307	17.2	0.06	28.31	-100.4	
1825	1.38		4.5	5.99	0.309	15.9	0.07	28.33	-101.1	
1828	1.37		5.5	5.99	0.311	15.1	0.06	28.33	-102.9	
1830	1.37		6.0	5.99	0.315	14.5	0.06	28.22	-99.4	
1832	1.37		6.5	5.99	0.316	13.1	0.06	28.26	-100.8	End Purge

1835 = Sample Time

SIGNATURE(S): Charles Mc

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	NAS Pensacola UST Site 18	Sample ID No.:	PEN-18-GS02-01
Project No.:	N0844	Sample Location:	PEN-18-GS02
Sampled By:	CM	Duplicate:	☐
Field Analyst:	CM	Blank:	☐
Field Form Checked as per QA/QC Checklist (initials):			

SAMPLING DATA:

Date: 8-27-03 / Time: 1835	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP mV	
Method: Peristaltic	Clear	5.99	0.316	13.1	0.06	28.26	-100.8	

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Ferrous Iron:

Equipment: HACH DR890 Analysis Time: 1845

Concentration: 2.76 mg/L

Notes:

Alkalinity: Analysis Time: 1843

Equipment: CHEMetrics CHEMetrics (Range: 50-500 mg/L)

CHEMetrics: 100 mg/L

Notes:

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT CHEMetrics (Range: 100-1000 mg/L) Analysis Time: 1841

CHEMetrics: 180 mg/L

Notes:

Dissolved Oxygen:

Equipment: CHEMetrics Range ☒ 0 - 1.0 mg/L ☐ 1 - 12 mg/L Analysis Time: 1837

CHEMetrics: 0.2 mg/L

Hydrogen Sulfide (H_2S):

Equipment: HS-C Analysis Time: 1844

Concentration: 75.0 mg/L

Notes:

Sulfide:

Equipment : HACH DR890 Analysis Time: 1849

Concentration: >0.80 mg/L

exceed DR890's range

QA/QC Checklist:

All data fields have been completed as necessary: ☐
Correct measurement units are cited in the SAMPLING DATA block: ☐
Mulitplication is correct for each *Multiplier* table: ☐
Final calulated concentration is within the appropriate *Range Used* block: ☐
Alkalinity *Relationship* is determined appropriatly as per manufacturer instructions: ☐
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐
Nitrite Interference treatment used for Nitrate test if Nitrite was detected: ☐
Title block is initialized by person who performed the QA/QC Ckecklist: ☐

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Pensacola UST Site 18
Project No.: N0844

[ ] Domestic Well Data
[X] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: PEN-18- GS03A01
Sample Location: PEN-18-
Sampled By:
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8-25-03 Time: 1825	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP mV	Other
Method: Low Flow Peristaltic	Clear	4.86	0.041	13.3	0.12	24.16	-7.3	

PURGE DATA

Date: 8-25-03	Time	pH	S.C.	Turbidity	DO	Temp (°C)	ORP	
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 4.8								
Static Water Level (WL): 5.56								
One Casing Volume(gal/L): 3.1								
Start Purge (hrs): 1800								
End Purge (hrs): 1825								
Total Purge Time (min): 25								
Total Vol. Purged (gal/L): 6.5								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 x 40 mL glass vials	✓
PAH	None	2 - 1L Ambers	✓
TRPH (FL-PRO)	H2SO4	2 - 1L Ambers	
~~MEE~~	~~HCl~~	~~3 x 40 mL glass vials~~	
~~TOC~~	~~H2SO4~~	~~1 - 250 mL glass amber~~	
~~Iron + Manganese~~	~~HNO3~~	~~1 - 1L Plastic~~	
~~Alkalinity~~	~~None~~	~~"~~	
~~Select Anions~~	~~None~~	~~"~~	

OBSERVATIONS / NOTES

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): Charles McD

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Pensacola UST Site 18
PROJECT NUMBER: N0844

WELL ID.: PEN-18-G502A
DATE: 8-25-03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Volume (L)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1800	5.56	300	0	—	—	—	—	—	—	—
1810	5.63	300	3	4.86	0.041	26.1	0.20	24.17	4.0	
1812	5.63	300	3.5	4.85	0.041	19.9	0.18	24.16	+0.1	
1815	5.63	300	4.5	4.86	0.041	17.7	0.16	24.17	-3.1	
1818	5.62	300	5.5	4.86	0.041	15.4	0.15	24.17	-4.7	
1820	5.62	300	6	4.86	0.041	14.4	0.13	24.15	-6.6	
1822	5.62	300	6.5	4.86	0.041	13.3	0.12	24.16	-7.3	End Purge

1825 = Sample Time

SIGNATURE(S): Charles Mc

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Pensacola UST Site 18
Project No.: N0844

[ ] Domestic Well Data
[X] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: PEN-18-GS03-01
Sample Location: PEN-18-GS03
Sampled By: CM
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8-27-03 / Time: 1140	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP – mV	Other
Method: Low Flow Peristaltic	Clear	5.47	0.064	6.11	0.04	28.62	-56.3	

PURGE DATA

Date: 8-27-03	Time	pH	S.C.	Turbidity	DO	Temp (°C)	ORP	
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): P*								
Static Water Level (WL): 200								
One Casing Volume(gal/L): P								
Start Purge (hrs): 1115								
End Purge (hrs): 1137								
Total Purge Time (min): 22								
Total Vol. Purged (gal/L): 6.5								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	2 vials ~~3 x 40 mL glass vials~~	✓
PAH	None	~~2 - 1L Ambers~~	—
TRPH (FL-PRO)	H2SO4	2 - 1L Ambers	✓
MEE	HCl	2 x 40 mL glass vials	✓
TOC	H2SO4	2-40 mL glass ~~amber~~ vials	✓
Iron + Manganese	HNO3	2-125mL Plastic	✓
Alkalinity	None	1-250mL P	✓
Select Anions	~~None~~	?	—

OBSERVATIONS / NOTES

* Probe would not go down into well as far as Tubing went.

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Charles Mc

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Pensacola UST Site 18
PROJECT NUMBER: N0844

WELL ID.: PEN-18-GS03
DATE: 8-27-03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Volume (L)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1115	2.00	300	0	—	—	—	—	—	—	Start Purge
1125	2.04		3.0	5.73	0.075	8.89	0.07	28.60	-46.9	
1128	2.04		4.0	5.58	0.067	15.4	0.05	28.58	-50.2	
1130			4.5	5.56	0.067	9.69	0.05	28.57	-51.7	
1133			5.5	5.49	0.064	8.38	0.04	28.57	-54.0	
1135			6	5.48	0.064	7.06	0.04	28.62	-54.7	
1137	✓	✓	6.5	5.47	0.064	6.11	0.04	28.62	-56.3	

1140 = Sample Time

SIGNATURE(S): Charles Metz

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NAS Pensacola UST Site 18
Sample ID No.: PEN-18-GS03-01
Project No.: N0844
Sample Location: PEN-18-GS03
Sampled By: CM
Duplicate: ☐
Field Analyst: CM
Blank: ☐
Field Form Checked as per QA/QC Checklist (initials):

SAMPLING DATA:

Date: 8-26-03 / Time: 1140	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP mV
Method: Peristaltic	Clear	5.47	0.064	6.11	0.04	28.62	-56.3

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Ferrous Iron:
Equipment: HACH DR890
Analysis Time: 1153
Concentration: 2.51 mg/L
Notes:

Alkalinity:
Analysis Time: 1144
Equipment: CHEMetrics
CHEMetrics (Range: 100-1000 mg/L)
CHEMetrics: >1000 mg/L
Notes:

Carbon Dioxide:
Equipment: HACH Digital Titrator CA-DT
CHEMetrics (Range: 10-100 mg/L)
Analysis Time: 1155
CHEMetrics: 70 mg/L
Notes:

Dissolved Oxygen:
Equipment:
CHEMetrics Range ☒ 0 - 1.0 mg/L ☐ 1 - 12 mg/L
Analysis Time: 1147
CHEMetrics: 0.2 mg/L

Hydrogen Sulfide (H_2S):
Equipment: HS-C
Analysis Time: 1145
Concentration: 3.5 mg/L
Notes: between 2 – 5 mg/L

Sulfide:
Equipment: HACH DR890
Analysis Time: 1150
Concentration: 0.32 mg/L

QA/QC Checklist:
All data fields have been completed as necessary: ☐
Correct measurement units are cited in the SAMPLING DATA block: ☐
Mulitplication is correct for each *Multiplier* table: ☐
Final calulated concentration is within the appropriate *Range Used* block: ☐
Alkalinity *Relationship* is determined appropriatly as per manufacturer instructions: ☐
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐
Nitrite Interference treatment used for Nitrate test if Nitrite was detected: ☐
Title block is initialized by person who performed the QA/QC Checklist: ☐

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Pensacola UST Site 18
Project No.: N0844

[ ] Domestic Well Data
[X] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: PEN-18-GS04-01
Sample Location: PEN-18-GS04
Sampled By: [illegible]
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8/26/03 Time: 1810	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP mV	Other
Method: Low Flow Peristaltic	clear	6.49	0.257	17.5	0.06	26.51	-135.6	

PURGE DATA

Date: 8/26/03	Time	pH	S.C.	Turbidity	DO	Temp (°C)	ORP	
Method: Low Flow Peristaltic								
Monitor Reading (ppm):								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 11.27								
Static Water Level (WL): 2.11								
One Casing Volume(gal/L): 5.7 L								
Start Purge (hrs): 1745								
End Purge (hrs): 1806								
Total Purge Time (min): 21								
Total Vol. Purged (gal/L): 10.2 L								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 x 40 mL glass vials	Y
PAH	None	2 - 1L Ambers	Y
TRPH (FL-PRO)	H2SO4	2 - 1L Ambers	Y
MEE	HCl	3 x 40 mL glass vials	Y
TOC	H2SO4	1 - 250 mL glass amber	Y
Iron + Manganese	HNO3	1 - 1L Plastic	Y
Alkalinity	None	?	Y
Select Anions	None	?	Y

OBSERVATIONS / NOTES

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): [illegible]

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Pensacola UST Site 18
PROJECT NUMBER: N0844

WELL ID.: PEN-18-GS04
DATE: 8/26/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Volume (L)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1757	~2	500	5.72	6.52	0.291	41.0	0.18	26.48	-124.9	
1800	↓	↓	7.2	6.49	0.261	19.1	0.08	26.47	-133.5	
1803	↓	↓	8.7	6.49	0.258	18.3	0.07	26.49	-136.4	
1806	✓	500	10.2	6.49	0.257	17.5	0.06	26.51	-135.6	

SIGNATURE(S): [signature]

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	NAS Pensacola UST Site 18	Sample ID No.:	PEN-18-GS04-01
Project No.:	N0844	Sample Location:	PEN-18-GS04
Sampled By:	TA	Duplicate:	☐
Field Analyst:	TA	Blank:	☐
Field Form Checked as per QA/QC Checklist (initials):	TA		

SAMPLING DATA:

Date: 8/26/03 Time: 1810	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP mV	
Method: Peristaltic	clear	6.49	0.257	17.5	0.06	26.51	-135.6	

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Ferrous Iron:

Equipment: HACH DR890 Analysis Time: 1825

Concentration: 0.75 mg/L

Notes: —

Alkalinity: Analysis Time: 1830

Equipment: CHEMetrics CHEMetrics (Range: 100 - 1000 mg/L)

CHEMetrics: 120 mg/L

Notes: —

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT CHEMetrics (Range: 10 - 100 mg/L) Analysis Time: _____

CHEMetrics: 50 mg/L

Notes: —

Dissolved Oxygen:

Equipment: CHEMetrics Range ☑ 0 - 1.0 mg/L ☐ 1 - 12 mg/L Analysis Time: 1828

CHEMetrics: 0.90 mg/L

Hydrogen Sulfide (H_2S):

Equipment: HS-C Analysis Time: 1815

Concentration: — mg/L

Notes: Excessive fizzing, wetted filter, Re-analyzed / Same result.

Sulfide:

Equipment: HACH DR890 Analysis Time: 1820

Concentration: 70.80 mg/L

QA/QC Checklist:

All data fields have been completed as necessary: ☐
Correct measurement units are cited in the SAMPLING DATA block: ☐
Mulitplication is correct for each *Multiplier* table: ☐
Final calulated concentration is within the appropriate *Range Used* block: ☐
Alkalinity *Relationship* is determined appropriatly as per manufacturer instructions: ☐
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐
Nitrite Interference treatment used for Nitrate test if Nitrite was detected: ☐
Title block is initialized by person who performed the QA/QC Checklist: ☐

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Pensacola UST Site 18
Project No.: N0844

[ ] Domestic Well Data
[X] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: PEN-18-GS05-01
Sample Location: PEN-18-GS05
Sampled By: CM
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8-26-03	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP mV	Other
Time: 1810								
Method: Low Flow Peristaltic	Clear	6.25	0.066	2.8	1.21	26.72	+564	

PURGE DATA

Date: 8-26-03	Time	pH	S.C.	Turbidity	DO	Temp (°C)	ORP	
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 1290								
Static Water Level (WL): 2.14								
One Casing Volume(gal): 6.2								
Start Purge (hrs): 1740								
End Purge (hrs): 1800								
Total Purge Time (min): 20								
Total Vol. Purged (gal): 6								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	2 x 40 mL glass vials	✓
PAH	None	~~2 - 1L Ambers~~	✓
TRPH (FL-PRO)	H2SO4	2 - 1L Ambers	
MEE	HCl	2 x 40 mL glass vials	✓
TOC	H2SO4	1 - 40 mL glass (Water Flow mL)	✓
Iron + Manganese	HNO3	1 - Plastic (125mL)	✓
Alkalinity	None	1-250mL P	✓
Select Anions	None	?	

OBSERVATIONS / NOTES

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Charles Mc

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Pensacola UST Site 18
PROJECT NUMBER: N0844

WELL ID.: PEN-18-GS05
DATE: 8-26-03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Volume (L)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1740 ~~1850~~	2.14	300	0	—	—	—	—	—	—	Start Purge
1750	2.17		3	6.28	0.056	12	1.57	26.89	55.9	
1752	2.17		3.5	6.29	0.062	10.7	1.42	26.79	+56.4	
1755	2.16		4.5	6.28	0.064	9.2	1.39	26.78	+56.6	
1758	2.16		5.5	6.26	0.065	8.3	1.27	26.73	+56.9	
1800	2.16	↓	6.0	6.25	0.066	7.8	1.21	26.72	+56.4	

1810 = Sample Time

SIGNATURE(S): Charles Metz

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	NAS Pensacola UST Site 18	Sample ID No.:	PEN-18-GS05-01
Project No.:	N0844	Sample Location:	PEN-18-GS05
Sampled By:	CM	Duplicate:	☐
Field Analyst:	CM	Blank:	☐
Field Form Checked as per QA/QC Checklist (initials):			

SAMPLING DATA:

Date: 8-26-03	Color	pH	S.C.	Turbidity	DO	Temp.	ORP
Time: 1810	Visual	Standard	mS/cm	NTU	mg/l	°C	mV
Method: Peristaltic	Clear	6.25	0.066	7.8	1.21	26.72	+56.4

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Ferrous Iron:

Equipment: HACH DR890 Analysis Time: 1822

Concentration: 0.35 mg/L

Notes:

Alkalinity: Analysis Time: 1830

Equipment: CHEMetrics CHEMetrics (Range: 1g-100 50-500 100-1000 mg/L)

CHEMetrics: >1000 mg/L

Notes: exceed 10-1000 ranges

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT CHEMetrics (Range: 10-100 mg/L) Analysis Time: 1833

CHEMetrics: 30 mg/L

Notes:

Dissolved Oxygen:

Equipment: CHEMetrics Range ☐ 0 - 1.0 mg/L ☒ 1 - 12 mg/L Analysis Time: 1818

CHEMetrics: 1 mg/L *exceeded 0-1 range

Hydrogen Sulfide (H_2S):

Equipment: HS-C Analysis Time: 1815

Concentration: 0.3 mg/L

Notes:

Sulfide:

Equipment: HACH DR890 Analysis Time: 1826

Concentration: 0.0 mg/L

QA/QC Checklist:

All data fields have been completed as necessary: ☐
Correct measurement units are cited in the SAMPLING DATA block: ☐
Mulitplication is correct for each *Multiplier* table: ☐
Final calulated concentration is within the appropriate *Range Used* block: ☐
Alkalinity *Relationship* is determined appropriatly as per manufacturer instructions: ☐
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐
Nitrite Interference treatment used for Nitrate test if Nitrite was detected: ☐
Title block is initialized by person who performed the QA/QC Checklist: ☐

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Pensacola UST Site 18
Project No.: N0844

[ ] Domestic Well Data
[X] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: PEN-18-GS06-01
Sample Location: PEN-18-GS06
Sampled By: CM
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8-26-03 Time: 1415	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP mV	Other
Method: Low Flow Peristaltic	Clear	7.50	0.077	5.7	3.02	26.69	+51.9	

PURGE DATA

Date: 8-26-03	Time	pH	S.C.	Turbidity	DO	Temp (°C)	ORP	
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 12.52								
Static Water Level (WL): 2.60								
One Casing Volume(gal/L): 6.1								
Start Purge (hrs): 1350								
End Purge (hrs): 1412								
Total Purge Time (min): 22								
Total Vol. Purged (gal/L): 6.5								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 x 40 mL glass vials	
PAH	None	2 - 1L Ambers	
TRPH (FL-PRO)	H2SO4	2 - 1L Ambers	
MEE	HCl	3 x 40 mL glass vials	
TOC	H2SO4	1 - 250 mL glass amber	
Iron + Manganese	HNO3	1 - 1L Plastic	
Alkalinity	None	?	
Select Anions	None	?	

OBSERVATIONS / NOTES

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Charles MOO

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Pensacola UST Site 18
PROJECT NUMBER: N0844

WELL ID.: PEN-18-GS06
DATE: 8-26-03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Volume (L)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1350	2.60	300	0	—	—	—	—	—	—	Start Purge
1400	2.67		3	7.99	0.053	16	1.68	26.85	+57.4	
1403	2.68		3.5	7.99	0.065	11.5	2.16	26.80	+56.1	
1405	2.68		4.5	7.73	0.075	7.2	2.66	26.73	+50.4	
1408	2.68		5.5	[illegible]	0.076	6.7	2.76	26.70	+51.9	
1410	2.68		6	7.53	0.077	5.9	2.83	26.69	+52.0	
1412	2.68		6.5	7.50	0.077	5.7	302	26.69	+51.9	
1415 = Sample Time										

SIGNATURE(S): Charles [illegible]

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	NAS Pensacola UST Site 18	Sample ID No.:	PEN-18-GS06-01
Project No.:	N0844	Sample Location:	PEN-18-GS06
Sampled By:	CM	Duplicate:	☐
Field Analyst:	CM	Blank:	☐
Field Form Checked as per QA/QC Checklist (initials):			

SAMPLING DATA:

Date: 8-26-03 Time: 1415	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP mV	
Method: Peristaltic	clear	7.50	0.077	5.7	3.02	26.69	+51.9	

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Ferrous Iron:

Equipment: HACH DR890 Analysis Time: 1445

Concentration: 0.34 mg/L

Notes:

Alkalinity:

Equipment: CHEMetrics CHEMetrics (Range: 10-100 50-500 100-1000 mg/L) Analysis Time: 1455

CHEMetrics: >1000 mg/L

Notes: exceeded All 3 ranges

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT CHEMetrics (Range: 10-100 mg/L) Analysis Time: 1440

CHEMetrics: 25 mg/L

Notes:

Dissolved Oxygen:

Equipment: CHEMetrics Range ☐ 0 - 1.0 mg/L ☒ 1 - 12 mg/L Analysis Time: 1430

CHEMetrics: 4.0 mg/L

Hydrogen Sulfide (H_2S):

Equipment: HS-C Analysis Time: 1434

Concentration: 0 mg/L

Notes:

Sulfide:

Equipment: HACH DR890 Analysis Time: 1448

Concentration: 0.12 mg/L

QA/QC Checklist:

All data fields have been completed as necessary: ☐
Correct measurement units are cited in the SAMPLING DATA block: ☐
Mulitplication is correct for each *Multiplier* table: ☐
Final calulated concentration is within the appropriate *Range Used* block: ☐
Alkalinity *Relationship* is determined appropriatly as per manufacturer instructions: ☐
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐
Nitrite Interference treatment used for Nitrate test if Nitrite was detected: ☐
Title block is initialized by person who performed the QA/QC Ckecklist: ☐

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Pensacola UST Site 18
Project No.: N0844

[ ] Domestic Well Data
[X] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: PEN-18-GM[redacted]07
Sample Location: PEN-18-GM[redacted]07
Sampled By: CM
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8-26-03 Time: 1145	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP mV	Other
Method: Low Flow Peristaltic	Clear	9.64	0.154	15.1	0.08	28.49	-17.6	

PURGE DATA

Date: 8-26-03	Time	pH	S.C.	Turbidity	DO	Temp (°C)	ORP	
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 6.50								
Static Water Level (WL): 2.51								
One Casing Volume(gal/L): 2.5								
Start Purge (hrs): 1115								
End Purge (hrs): 1140								
Total Purge Time (min): 25								
Total Vol. Purged (gal): 7.5								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	Whatever mobile lab provides	✓
PAH	None	Whatever mobile lab provides	✓
TRPH	H2SO4	2 - 1L Ambers	✓

OBSERVATIONS / NOTES

May be damaged, no cap, piping bent in ground

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Charles McG

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Pensacola UST Site 18
PROJECT NUMBER: N0844

WELL ID.: PEN-18-GM07
DATE: 8-26-03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Volume (L)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1115	2.51	300	0	—	—	—	—	~~28.95~~	+25.2	Start Pu...
1125	2.72	300	3.0	6.13	0.148	22.1	0.29	28.95	+25.2	
1128	2.72	300	4.0	8.88	0.150	18.8	0.10	28.64	+20.8	
1130	2.72	300	4.5	9.72	0.150	17.7	0.28	28.60	-5.4	
1132	2.72	300	5.0	9.79	0.153	16.5	0.15	28.46	-6.7	
1135	2.72	300	6.0	9.74	0.154	15.9	0.09	28.47	-16.1	
1138	2.72	300	7.0	9.67	0.154	16.6	0.08	28.48	-18.3	
1140	2.72	300	7.5	9.64	0.154	15.1	0.08	28.49	-17.6	
1145 = Sample Time										

SIGNATURE(S): Charles [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name:	NAS Pensacola UST Site 18	Sample ID No.:	PEN-18-GS08
Project No.:	N0844	Sample Location:	PEN-18-GS08
		Sampled By:	
[ ] Domestic Well Data		C.O.C. No.:	
[X] Monitoring Well Data		Type of Sample:	
[ ] Other Well Type:		[X] Low Concentration	
[ ] QA Sample Type:		[ ] High Concentration	

SAMPLING DATA

Date: 8-26-03	Color	pH	S.C.	Turbidity	DO	Temp.	ORP	Other
Time: 1015	Visual	Standard	mS/cm	NTU	mg/l	°C	mV	
Method: Low Flow Peristaltic	Clear	5.34	0.054	16.2	0.74	27.18	+48.1	

PURGE DATA

Date: 8-26-03	Time	pH	S.C.	Turbidity	DO	Temp (°C)	ORP	
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 13.22								
Static Water Level (WL): 2.75								
One Casing Volume(gal/L): 0.62								
Start Purge (hrs): 0950								
End Purge (hrs): 1010								
Total Purge Time (min): 20								
Total Vol. Purged (gal/L): 6								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	Whatever mobile lab provides	✓
PAH	None	Whatever mobile lab provides	✓
TRPH	H2SO4	2 - 1L Ambers	✓

OBSERVATIONS / NOTES

Circle if Applicable:		Signature(s): Charles [illegible]
MS/MSD	Duplicate ID No.:	

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Pensacola UST Site 18
PROJECT NUMBER: N0844

WELL ID.: PEN-18-GS08
DATE: 8-26-03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Volume (L)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0950	2.75	300	0	—	—	—	—	—	—	Start Purge
1000	2.76	300	3	—	—	—	—	—	—	
1003	2.76	↓	4.0	5.44	0.054	25.4	0.70	27.10	+51.1	
1005	2.76	↓	4.5	5.38	0.054	19.8	0.62	27.15	+49.8	
1008	2.76	↓	5.5	5.36	0.054	17.6	0.69	26.97	+48.7	
1010	2.76	↓	6.0	5.34	0.054	16.2	0.74	27.18	+48.1	End Purge
1015 = Sample Time										Sample Time

SIGNATURE(S): Charles Mott

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Pensacola UST Site 18
Project No.: N0844

[ ] Domestic Well Data
[X] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: PEN-18-GS09-01
Sample Location: PEN-18-GS09
Sampled By:
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8-25-03 / Time:	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP + mV	Other
Method: Low Flow Peristaltic	Clear	4.26	0.040	10.8	4.77	26.94	292.0	

PURGE DATA

Date: 8-25-03	Time	pH	S.C.	Turbidity	DO	Temp (°C)	ORP	
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 14.7								
Static Water Level (WL): 8.35								
700mL One Casing Volume(gal/L): 6.2								
Start Purge (hrs): 1705								
End Purge (hrs): 1727								
Total Purge Time (min): 22								
Total Vol. Purged (gal): 6.5								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	Whatever mobile lab provides	✓
PAH	None	Whatever mobile lab provides	✓
TRPH	H2SO4	2 - 1L Ambers	✓

OBSERVATIONS / NOTES

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Chuck M

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Pensacola UST Site 18
PROJECT NUMBER: N0844

WELL ID.: PEN-18-GS09
DATE: 8-25-03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Volume (L)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1705	3.35	300	0	—	—	—	—	—	—	Start Purge
1715	3.36	300	3	—	—	38.6	—	—	—	
1718	3.36	300	4	4.28	0.040	20.3	4.98	27.02	+272.7	
1720	3.36	300	4.5	4.35	0.040	14.2	4.87	27.05	275.6	
1723	3.36	300	5.5	4.24	0.039	12.8	4.70	26.93	279.0	
1725	3.36	300	6.0	4.25	0.040	11.5	4.73	26.92	286.2	
1727	3.36	300	6.5	4.26	0.040	10.8	4.77	26.94	292.0	
1730 = Sample Time										

SIGNATURE(S): Charla Mc

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Pensacola UST Site 18
Project No.: N0844

[ ] Domestic Well Data
[X] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: PEN-18-GS10-01
Sample Location: PEN-18-GS10
Sampled By:
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8-26-03 / Time: 1105	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP mV	Other
Method: Low Flow Peristaltic	light Brwn	8.66	0.033	16.1	2.68	28.87	+53.0	

PURGE DATA

Date: 8-26-03	Time	pH	S.C.	Turbidity	DO	Temp (°C)	ORP	
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 12.72								
Static Water Level (WL): 2.68								
One Casing Volume(gal/L): 62								
Start Purge (hrs): 1040								
End Purge (hrs): 1102								
Total Purge Time (min): 22								
Total Vol. Purged (gal) 6.5								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	Whatever mobile lab provides	✓
PAH	None	Whatever mobile lab provides	✓
~~TPH~~	~~H_2SO_4~~	~~2-1L Ambers~~	✓

OBSERVATIONS / NOTES

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Charles Meg

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Pensacola UST Site 18
PROJECT NUMBER: N0844

WELL ID.: PEN-18-GS10
DATE: 8-26-03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Volume (L)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1040	2.68	300	—	—	—	—	—	—	—	START Purge
1050	2.70		3	—	—	—	—	—	—	
1053	2.70		4.0	8.60	0.037	21.2	2.60	28.96	+60.2	
1055	2.70		4.5	8.63	0.034	19.4	2.83	28.90	+53.2	
1058	2.70		5.5	8.67	0.034	17.7	2.79	28.89	+52.7	
1100	2.70		6	8.65	0.033	16.8	2.68	28.87	+52.9	
1102	2.70	✓	6.5	8.66	0.033	16.1	2.68	28.87	+53.0	End Purge

1105 = Sample Time

SIGNATURE(S): Charles Mes

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Pensacola UST Site 18
Project No.: N0844

[ ] Domestic Well Data
[X] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: PEN-18-GS11-01
Sample Location: PEN-18-GS11
Sampled By: CM
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8-27-03 Time: 1525	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP mV	Other
Method: Low Flow Peristaltic	Clear	6.33	0.064	17.7	2.94	28.02	+53.3	

PURGE DATA

Date: 8-27-03	Time	pH	S.C.	Turbidity	DO	Temp (°C)	ORP	
Method: Low Flow Péristaltic								
Monitor Reading (ppm): 0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 12.38								
Static Water Level (WL): 2.97								
One Casing Volume(gal): 6.0								
Start Purge (hrs): 1455								
End Purge (hrs): 1520								
Total Purge Time (min): 25								
Total Vol. Purged (gal): 7.5								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 x 40 mL glass vials	✓
PAH	None	~~2 - 1L Ambers~~	
TRPH (FL-PRO)	~~H2SO4~~ HCl	2 - 1L Ambers	✓
MEE	HCl	3 x 40 mL glass vials	✓
TOC	H2SO4	2 - 40 mL glass ~~amber~~ via i-	✓
Iron + Manganese	HNO3	2 - ~~1L~~ 125mL Plastic	✓
Alkalinity + Anions	None	1-250mL P	✓
~~Select Anions~~	None	?	

OBSERVATIONS / NOTES

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Charles Mat

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Pensacola UST Site 18
PROJECT NUMBER: N0844

WELL ID.: PEN-18-GS11
DATE: 8-27-03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Volume (L)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1450	2.92	300	0	—	—	—	—	—	—	START Purge
1505	2.92	300	3.0	—	—	—	—	—	—	
1508	2.92	↓	4.0	6.59	0.068	23.4	3.22	28.40	+42.6	
1510	↓	↓	4.5	6.35	0.065	19.8	2.62	28.10	+48.7	
1513	↓	↓	5.5	6.32	0.064	18.6	2.52	27.69	+48.6	
1515	↓	↓	6.0	6.30	0.064	18.3	2.75	27.68	+51.6	
1518	↓	↓	7.0	6.33	0.064	18.0	2.91	27.78	+51.8	
1520	↓	↓	7.5	6.33	0.064	17.9	2.94	28.02	+53.3	

1525 = Sample Time

SIGNATURE(S): Charles Mes

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: NAS Pensacola UST Site 18
Sample ID No.: PEN-18-GS11-01
Project No.: N0844
Sample Location: PEN-18-GS11
Sampled By: CM
Duplicate: ☐
Field Analyst: CM
Blank: ☐
Field Form Checked as per QA/QC Checklist (initials):

SAMPLING DATA:

Date: 8-27-03	Color	pH	S.C.	Turbidity	DO	Temp.	ORP	
Time: 1525	Visual	Standard	mS/cm	NTU	mg/l	°C	mV	
Method: Peristaltic	Clear	6.33	0.064	17.7	2.94	28.02	+533	

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Ferrous Iron:
Equipment: HACH DR890
Analysis Time: 1540
Concentration: 0.03 mg/L
Notes:

Alkalinity:
Analysis Time: 1539
Equipment: CHEMetrics
CHEMetrics (Range: 100 - 1K mg/L)
CHEMetrics: >1000 mg/L
Notes:

Carbon Dioxide:
Equipment: HACH Digital Titrator CA-DT
CHEMetrics (Range: 10 - 100 mg/L)
Analysis Time: 1535
CHEMetrics: 12 mg/L
Notes:

Dissolved Oxygen:
Equipment:
CHEMetrics Range ☐ 0 - 1.0 mg/L ☒ 1 - 12 mg/L
Analysis Time: 1530
CHEMetrics: 3.5 mg/L

Hydrogen Sulfide (H_2S):
Equipment: HS-C
Analysis Time: 1528
Concentration: 0 mg/L
Notes:

Sulfide:
Equipment: HACH DR890
Analysis Time: 1532
Concentration: 0.02 mg/L

QA/QC Checklist:
All data fields have been completed as necessary: ☐
Correct measurement units are cited in the SAMPLING DATA block: ☐
Mulitplication is correct for each *Multiplier* table: ☐
Final calulated concentration is within the appropriate *Range Used* block: ☐
Alkalinity *Relationship* is determined appropriatly as per manufacturer instructions: ☐
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐
Nitrite Interference treatment used for Nitrate test if Nitrite was detected: ☐
Title block is initialized by person who performed the QA/QC Ckecklist: ☐

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Pensacola UST Site 18
Project No.: N0844

[ ] Domestic Well Data
[X] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: PEN-18-GS12-01
Sample Location: PEN-18-GS12
Sampled By: TA
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8/26/03 Time:	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP mV	Other
Method: Low Flow Peristaltic								

PURGE DATA

Date: 8/26/03	Time	pH	S.C.	Turbidity	DO	Temp (°C)	ORP	
Method: Low Flow Peristaltic								
Monitor Reading (ppm):								
Well Casing Diameter:								
Well Casing Material:								
Total Well Depth (TD): 12.61								
Static Water Level (WL): 2.94								
One Casing Volume(gal/L): 1.5 L								
Start Purge (hrs): 1045								
End Purge (hrs): 1100								
Total Purge Time (min): 15								
Total Vol. Purged (gal/L): 4.2L								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOC	HCl 2 VOC vials	Whatever mobile lab provides	Y
PAH	None	Whatever mobile lab provides	Y
~~TRPH~~ not needed	~~H2SO4~~	~~2 1L Ambers~~	

OBSERVATIONS / NOTES

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	TA

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Pensacola UST Site 18
PROJECT NUMBER: N0844

WELL ID.: PEN-18-GS12
DATE: 8/26/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Volume (L)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1050	~21.9	300	1.5L	6.28	0.079	15.1	2.97	26.94	19.1	
1053	↓	↓	2.4	6.30	0.077	13.9	2.99	27.01	22.9	
1056	↓	↓	3.3	6.30	0.075	14.1	3.00	27.05	26.1	
1059	↓	↓	4.2	6.32	0.073	12.5	2.96	27.10	27.8	

SIGNATURE(S): _____

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Pensacola UST Site 18
Project No.: N0844

[ ] Domestic Well Data
[X] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: PEN-18-GS13-01
Sample Location: PEN-18-GS13
Sampled By: [illegible]
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8/27/03	Color	pH	S.C.	Turbidity	DO	Temp.	ORP	Other
Time: 1511	Visual	Standard	mS/cm	NTU	mg/l	°C	mV	
Method: Low Flow Peristaltic	SLI [illegible] orange	5.90	0.037	32.1	3.60	27.32	91.1	

PURGE DATA

Date: 8/27/03	Time	pH	S.C.	Turbidity	DO	Temp (°C)	ORP	
Method: Low Flow Peristaltic								
Monitor Reading (ppm):								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 13.10								
Static Water Level (WL): 3.32								
One Casing Volume(gal/L): 6 L								
Start Purge (hrs): 1450								
End Purge (hrs): 1511								
Total Purge Time (min): 21								
Total Vol. Purged (gal/L): 10.5 L								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	40 mL ~~3 x 40 mL glass vials~~	Y
PAH	None	N/A ~~2 - 1L Ambers~~	Y
TRPH (FL-PRO)	H2SO4	2 - 1L Ambers	Y
MEE	HCl	3 x 40 mL glass vials	Y
TOC	H2SO4	1 - 250 mL glass amber	Y
Iron + Manganese	HNO3	1 - 1L Plastic	Y
Alkalinity	None	250 mL plastic ?	Y
Select Anions	None	?	Y

OBSERVATIONS / NOTES

500 mL/min

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): [illegible]

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Pensacola UST Site 18
PROJECT NUMBER: N0844

WELL ID.: PEN-18-GS13
DATE: 8/27/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Volume (L)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1502	3.4	500	6L	5.88	0.037	88.1	4.00	27.25	96.9	
1505			7.5	5.90	0.037	88.2	3.73	27.28	93.6	
1508			9.0	5.93	0.037	74.4	3.60	27.32	91.8	
1511			10.5	5.90	0.037	72.1	3.60	27.32	91.1	

SIGNATURE(S): [illegible]

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	NAS Pensacola UST Site 18	Sample ID No.:	PEN-18-GS13-01
Project No.:	N0844	Sample Location:	PEN-18-GS13
Sampled By:	[illegible]	Duplicate:	☐
Field Analyst:	[illegible]	Blank:	☐
Field Form Checked as per QA/QC Checklist (initials):	[illegible]		

SAMPLING DATA:

Date: 8/27/03	Color	pH	S.C.	Turbidity	DO	Temp.	ORP	
Time: 1511	Visual	Standard	mS/cm	NTU	mg/l	°C	mV	
Method: Peristaltic	slightly opaque	5.90	0.033	72.1	3.60	29.32	81.1	

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Ferrous Iron:

Equipment: HACH DR890 Analysis Time: 1559

Concentration: 0.98 mg/L

Notes:

Alkalinity: Analysis Time: 1555

Equipment: CHEMetrics CHEMetrics (Range: 100 - 1K mg/L)

CHEMetrics: >1000 mg/L

Notes:

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT CHEMetrics (Range: 10 - 100 mg/L) Analysis Time: 1540

CHEMetrics: 13 mg/L

Notes:

Dissolved Oxygen:

Equipment: CHEMetrics Range ☐ 0 - 1.0 mg/L ☑ 1 - 12 mg/L Analysis Time: 1535

CHEMetrics: 3.0 mg/L

Hydrogen Sulfide (H_2S):

Equipment: HS-C Analysis Time: 1530

Concentration: Ø mg/L

Notes:

Sulfide:

Equipment: HACH DR890 Analysis Time: 1545

Concentration: 0.31 mg/L

QA/QC Checklist:

All data fields have been completed as necessary: ☐
Correct measurement units are cited in the SAMPLING DATA block: ☐
Mulitplication is correct for each *Multiplier* table: ☐
Final calulated concentration is within the appropriate *Range Used* block: ☐
Alkalinity *Relationship* is determined appropriatly as per manufacturer instructions: ☐
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐
Nitrite Interference treatment used for Nitrate test if Nitrite was detected: ☐
Title block is initialized by person who performed the QA/QC Checklist: ☐

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Pensacola UST Site 18
Project No.: N0844

[ ] Domestic Well Data
[X] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: PEN-18-GS17-01
Sample Location: PEN-18-GS17
Sampled By: [illegible]
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8/27/03 Time: 1145	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP mV	Other
Method: Low Flow Peristaltic	clear	6.09	0.244	1.72	0.27	25.91	35.3	

PURGE DATA

Date: 8/27/03	Time	pH	S.C.	Turbidity	DO	Temp (°C)	ORP	
Method: Low Flow Peristaltic								
Monitor Reading (ppm):								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 12.75								
Static Water Level (WL): 2.09								
One Casing Volume(gal/L): 6.42								
Start Purge (hrs): 1125								
End Purge (hrs): 1145								
Total Purge Time (min): 20 min								
Total Vol. Purged (gal/L): 12 L								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 x 40 mL glass vials	Y
PAH	None	2 - 1L Ambers	Y
TRPH (FL-PRO)	H2SO4	2 - 1L Ambers	Y
MEE	HCl	3 x 40 mL glass vials	Y
TOC	H2SO4	1 - 250 mL glass amber	Y
Iron + Manganese	HNO3	1 - 1L Plastic	Y
Alkalinity	None	1 gal plastic ?	Y
Select Anions	None	1 gal plastic ?	Y
			Y

OBSERVATIONS / NOTES

600 mL/min

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): [illegible]

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Pensacola UST Site 18
PROJECT NUMBER: N0844

WELL ID.: PEN-18-GS17
DATE: 8/27/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Volume (L)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1136	2	600	6.6L	6.12	0.241	2.41	0.51	25.93	47.4	
1139	↓	↓	8.4	6.11	0.243	2.36	0.31	25.95	41.5	
1142			10.2	6.10	0.244	1.97	0.25	25.97	38.6	
1145			12.0	6.09	0.244	1.72	0.27	25.91	35.3	

SIGNATURE(S): TR

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	NAS Pensacola UST Site 18	Sample ID No.:	PEN-18-GS17-01
Project No.:	N0844	Sample Location:	PEN-18-GS17
Sampled By:	[illegible]	Duplicate:	☐
Field Analyst:	[illegible]	Blank:	☐
Field Form Checked as per QA/QC Checklist (initials):	[illegible]		

SAMPLING DATA:

Date: 8/27/03 Time: 1145	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP mV	
Method: Peristaltic	clear	6.09	0.344	1.72	0.27	25.91	35.3	

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Ferrous Iron:

Equipment: HACH DR890 Analysis Time: 1210

Concentration: 0.42 mg/L

Notes:

Alkalinity: Analysis Time: 1205

Equipment: CHEMetrics CHEMetrics (Range: 100 - 1000 mg/L)

CHEMetrics: >1000 mg/L

Notes:

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT CHEMetrics (Range: 100 - 1k mg/L) Analysis Time: 1215

CHEMetrics: 140 mg/L

Notes:

Dissolved Oxygen:

Equipment: CHEMetrics Range ☑ 0 - 1.0 mg/L ☒ 1 - 12 mg/L Analysis Time: 1158

CHEMetrics: 0.80 mg/L

Hydrogen Sulfide (H_2S):

Equipment: HS-C Analysis Time: 1155

Concentration: >5 mg/L

Notes: very fizzy

Sulfide:

Equipment : HACH DR890 Analysis Time: 1215

Concentration: >0.80 mg/L

QA/QC Checklist:

All data fields have been completed as necessary: ☐
Correct measurement units are cited in the SAMPLING DATA block: ☐
Mulitplication is correct for each *Multiplier* table: ☐
Final calulated concentration is within the appropriate *Range Used* block: ☐
Alkalinity *Relationship* is determined appropriatly as per manufacturer instructions: ☐
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐
Nitrite Interference treatment used for Nitrate test if Nitrite was detected: ☐
Title block is initialized by person who performed the QA/QC Checklist: ☐

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Pensacola UST Site 18
Project No.: N0844

[ ] Domestic Well Data
[X] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: PEN-18-GS18-01
Sample Location: PEN-18-GS18
Sampled By: JRA
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8/25/03 Time: 1825	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP mV	Other
Method: Low Flow Peristaltic	dark	6.15	0.148	ERROR	2.14	25.35	3.6	

PURGE DATA

Date: 8/25/03	Time	pH	S.C.	Turbidity	DO	Temp (°C)	ORP
Method: Low Flow Peristaltic							
Monitor Reading (ppm): 0	WENT DRY - ALLOWED TO						
Well Casing Diameter: 1"	RECOVER THEN SAMPLED.						
Well Casing Material: PVC							
Total Well Depth (TD): 18.75							
Static Water Level (WL): 2.0							
One Casing Volume(gal/L): 0.7 gal							
Start Purge (hrs): 1805							
End Purge (hrs): 1823							
Total Purge Time (min): 18							
Total Vol. Purged (gal/L): ~~[illegible]~~							

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	2-40 ml vials Whatever mobile lab provides	Y
PAH	None	Whatever mobile lab provides	Y
TRPH	H2SO4	2 - 1L Ambers	Y

OBSERVATIONS / NOTES

300 mL/min

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	JRA

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Pensacola UST Site 18
PROJECT NUMBER: N0844

WELL ID.: PEN-18-GS18
DATE: 8/25/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Volume (L)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1814	2 ft	300	2.7							
1817			3.6		WENT DRY,		ALLOWED		TO	
1820			4.5		THEN	SAMPLED				RECHARGE,
1823			5.4							

SIGNATURE(S): MA

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Pensacola UST Site 18
Project No.: N0844

[ ] Domestic Well Data
[X] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: PEN-18-GS19-01
Sample Location: PEN-18-GS19
Sampled By: TAR
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8/26/03 Time: 0850	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP mV	Other
Method: Low Flow Peristaltic	clear	5.14	0.125	16.8	0.38	24.00	-70.0	

PURGE DATA

Date: 8/26/03	Time	pH	S.C.	Turbidity	DO	Temp (°C)	ORP	
Method: Low Flow Peristaltic								
Monitor Reading (ppm):								
Well Casing Diameter: 1"								
Well Casing Material: PVC								
Total Well Depth (TD): ~19								
Static Water Level (WL):								
One Casing Volume(gal/L): 2.9L								
Start Purge (hrs): 0830								
End Purge (hrs): 0849								
Total Purge Time (min): 19min								
Total Vol. Purged (gal/L):								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	Whatever mobile lab provides	Y
PAH	None	Whatever mobile lab provides	Y
TRPH	H2SO4	2 - 1L Ambers	Y

OBSERVATIONS / NOTES

Riser damaged; TD is approx. 300 ml/min

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): TAR

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Pensacola UST Site 18
PROJECT NUMBER: N0844

WELL ID.: PEN-18-GS19
DATE: 5/26/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Volume (L)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0840	?	300	2.9	5.24	0.126	19.6	1.33	24.26	-43.7	
0843	↓	↓	3.8	5.15	0.125	18.5	0.42	23.99	-66.5	
0846			4.7	5.15	0.125	17.0	0.38	24.00	-69.7	
0849			5.6	5.14	0.125	16.5	0.38	24.00	-70.0	

SIGNATURE(S): MAC

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Pensacola UST Site 18
Project No.: N0844

[ ] Domestic Well Data
[X] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: PEN-18-GS20-01
Sample Location: PEN-18-GS20
Sampled By:
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8-26-03 Time: 1730	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP mV	Other
Method: Low Flow Peristaltic	light Blue	6.55	0.052	58	0.19	24.23	-29.3	

PURGE DATA

Date: 8-26-03	Time	pH	S.C.	Turbidity	DO	Temp (°C)	ORP	
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0								
Well Casing Diameter: 3/4"								
Well Casing Material: PVC								
Total Well Depth (TD):								
Static Water Level (WL): 3.75								
One Casing Volume(gal/L):								
Start Purge (hrs): 1705								
End Purge (hrs): 1728								
Total Purge Time (min): 23								
Total Vol. Purged (gal/L): 7.0								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	~~6 x 40 mL glass vials~~	✓
PAH	None	~~2 - 1L Ambers~~	✓
TRPH (FL-PRO)	~~H2SO4~~ HCl	2 - 1L Ambers	✓
MEE	HCl	2 x 40 mL glass vials	✓
TOC	H2SO4	2 - 250 mL glass ~~amber~~ vials	✓
Iron + Manganese	HNO3	1 - 4L Plastic (125ml)	✓
Alkalinity	None	1-250mL ? plastic	✓
Select Anions	None	?	

OBSERVATIONS / NOTES

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Charles Mc

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Pensacola UST Site 18
PROJECT NUMBER: N0844

WELL ID.: PEN-18-GS20
DATE: 8-26-03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Volume (L)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1705	3.75	300	0	—	—	—	—	—	—	Start Purge
1715	5.55	300	3	6.72	0.052	80	0.25	24.38	-1.2	
1717	5.28	↓	3.5	6.63	0.053	72	0.26	24.35	-10.1	
1720	↓	↓	4.5	6.65	0.052	70	0.17	24.33	-18.8	
1723	↓	↓	5.5	6.62	0.052	65	0.24	24.30	-22.3	
1725	↓	↓	6.0	6.58	0.052	60	0.23	24.23	-26.3	
1728			7.0	6.55	0.052	58	0.19	24.23	-24.3	

SIGNATURE(S): Charles M

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	NAS Pensacola UST Site 18	Sample ID No.:	PEN-18-GS20-01
Project No.:	N0844	Sample Location:	PEN-18-GS20
Sampled By:	CM	Duplicate:	☐
Field Analyst:	CM	Blank:	☐
Field Form Checked as per QA/QC Checklist (initials):			

SAMPLING DATA:

Date: 8-26-03	Color	pH	S.C.	Turbidity	DO	Temp.	ORP	
Time: 1730	Visual	Standard	mS/cm	NTU	mg/l	°C	mV	
Method: Peristaltic	Light Brn	6.55	0.052	58	0.19	24.23	-29.3	

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Ferrous Iron:

Equipment: HACH DR890 Analysis Time: 1750

Concentration: 0.94 mg/L

Notes:

Alkalinity: Analysis Time: 1750

Equipment: CHEMetrics CHEMetrics (Range: 100-1000 mg/L)

CHEMetrics: >1000 mg/L

Notes:

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT CHEMetrics (Range: 10-100 mg/L) Analysis Time: 1745

CHEMetrics: 45 mg/L

Notes:

Dissolved Oxygen:

Equipment: CHEMetrics Range ☑ 0 - 1.0 mg/L ☐ 1 - 12 mg/L Analysis Time: 1735

CHEMetrics: 0.20 mg/L

Hydrogen Sulfide (H_2S):

Equipment: HS-C Analysis Time: 1740

Concentration: 1.5 mg/L

Notes:

Sulfide:

Equipment: HACH DR890 Analysis Time: 1755

Concentration: >0.80 mg/L

QA/QC Checklist:

All data fields have been completed as necessary: ☐
Correct measurement units are cited in the SAMPLING DATA block: ☐
Mulitplication is correct for each *Multiplier* table: ☐
Final calulated concentration is within the appropriate *Range Used* block: ☐
Alkalinity *Relationship* is determined appropriatly as per manufacturer instructions: ☐
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐
Nitrite Interference treatment used for Nitrate test if Nitrite was detected: ☐
Title block is initialized by person who performed the QA/QC Checklist: ☐

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Pensacola UST Site 18
Project No.: N0844

[ ] Domestic Well Data
[X] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: PEN-18-GS21-01
Sample Location: PEN-18-GS21
Sampled By: MA / CAJ
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8/28/03 Time: 0800	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP mV	Other
Method: Low Flow Peristaltic	clear	4.69	0.056	1.88	0.10	24.34	105.9	

PURGE DATA

Date: 8/28/03	Time	pH	S.C.	Turbidity	DO	Temp (°C)	ORP	
Method: Low Flow Peristaltic								
Monitor Reading (ppm):								
Well Casing Diameter: 1"								
Well Casing Material: PVC								
Total Well Depth (TD): ~~approx~~ 18.0								
Static Water Level (WL): ~~approx~~ 1.0								
One Casing Volume(gal/L): 2.6 L								
Start Purge (hrs): 0740								
End Purge (hrs): 0800								
Total Purge Time (min): 20								
Total Vol. Purged (gal/L): 10L								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 x 40 mL glass vials (2 VOA vials)	Y
PAH	None	2 - 1L Ambers	Y
TRPH (FL-PRO)	H2SO4	2 - 1L Ambers	Y
MEE	HCl	3 x 40 mL glass vials	Y
TOC	H2SO4	1 - 250 mL glass amber	Y
Iron + Manganese	HNO3	1 - 1L Plastic	Y
Alkalinity	None	1 250mL plastic ?	Y
Select Anions	None	?	Y

OBSERVATIONS / NOTES

500 mL/min

Riser constricted - probe won't fit down

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	MA

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Pensacola UST Site 18
PROJECT NUMBER: N0844

WELL ID.: PEN-18-GS21
DATE: 8/28/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Volume (L)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0748	~~[illegible]~~ ft	500	4L	4.60	0.083	7.84	0.51	24.47	119.1	
0751	↓	↓	5.5L	4.64	0.062	3.85	0.15	24.37	111.3	
0754			7.0L	4.61	0.059	2.85	0.12	24.35	110.1	
0757			8.5L	4.69	0.056	1.88	0.10	24.34	105.9	

SIGNATURE(S): [illegible]

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	NAS Pensacola UST Site 18	Sample ID No.:	PEN-18-GS21-01
Project No.:	N0844	Sample Location:	PEN-18-GS21
Sampled By:	TA	Duplicate:	☐
Field Analyst:	TA	Blank:	☐
Field Form Checked as per QA/QC Checklist (initials):	TA		

SAMPLING DATA:

Date: 8/28/03	Color	pH	S.C.	Turbidity	DO	Temp.	ORP
Time: 0800	Visual	Standard	mS/cm	NTU	mg/l	°C	mV
Method: Peristaltic	clear	4.69	0.056	1.98	0.10	24.34	105.9

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Ferrous Iron:

Equipment: HACH DR890 Analysis Time: 0815

Concentration: 0.40 mg/L

Notes:

Alkalinity: Analysis Time: 0810

Equipment: CHEMetrics CHEMetrics (Range: 100-1K mg/L)

CHEMetrics: >1000 mg/L

Notes:

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT CHEMetrics (Range: 10-100 mg/L) Analysis Time: 0815

CHEMetrics: 40 mg/L

Notes:

Dissolved Oxygen:

Equipment: CHEMetrics Range ☑ 0 - 1.0 mg/L ☐ 1 - 12 mg/L Analysis Time: 0820

CHEMetrics: 0.25 mg/L

Hydrogen Sulfide (H_2S):

Equipment: HS-C Analysis Time: 0825

Concentration: ~2.0 mg/L

Notes:

Sulfide:

Equipment: HACH DR890 Analysis Time: 0830

Concentration: ~~70.80~~ 0.61 mg/L

QA/QC Checklist:

All data fields have been completed as necessary: ☐
Correct measurement units are cited in the SAMPLING DATA block: ☐
Mulitplication is correct for each *Multiplier* table: ☐
Final calulated concentration is within the appropriate *Range Used* block: ☐
Alkalinity *Relationship* is determined appropriatly as per manufacturer instructions: ☐
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐
Nitrite Interference treatment used for Nitrate test if Nitrite was detected: ☐
Title block is initialized by person who performed the QA/QC Checklist: ☐

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Pensacola UST Site 18
Project No.: N0844

[ ] Domestic Well Data
[X] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: PEN-18-GS22-01
Sample Location: PEN-18-GS22-01
Sampled By: TAK
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8/25/03 Time: 1720	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP mV	Other
Method: Low Flow Peristaltic	clear	5.02	0.071	7.11	0.47	25.36	90.1	

PURGE DATA

Date: 8/25/03	Time	pH	S.C.	Turbidity	DO	Temp (°C)	ORP	
Method: Low Flow Peristaltic								2.3 L
Monitor Reading (ppm):	— SEE		DATA		SHEET —			
Well Casing Diameter: 4"								
Well Casing Material: PVC								
Total Well Depth (TD): 17.0								
Static Water Level (WL): 2.0								
One Casing Volume(gal/L): 0.60 gal								
Start Purge (hrs): ~~1700~~ 1706								
End Purge (hrs): 1719								
Total Purge Time (min): 13								
Total Vol. Purged (gal/L): 4.1 L								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	2 VOC vials — Whatever mobile lab provides	Y
PAH	None	Whatever mobile lab provides	Y
TRPH	H2SO4	2 - 1L Ambers	Y

OBSERVATIONS / NOTES

started at 600 ml/min — finished @ 200 ml/min
slowed down
murky water

Circle if Applicable:

MS/MSD — Duplicate ID No.:

Signature(s): TAK

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Pensacola UST Site 18
PROJECT NUMBER: N0844

WELL ID.: PEN-18-GS22-01
DATE: 8/25/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Volume (L)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1710	2 ft	200mL/min	2.3 L	5.01	0.070	16.6	0.49	25.24	92.2	
1713			2.9 L	4.99	0.070	7.06	0.47	25.28	91.9	
1716			3.5 L	4.99	0.071	7.18	0.43	25.23	90.9	
1719			4.1 L	5.02	0.071	7.11	0.47	25.36	90.1	

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Pensacola UST Site 18
Project No.: N0844

[ ] Domestic Well Data
[X] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: PEN-18-GM24-01
Sample Location: PEN-18-GM24
Sampled By: TAL
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8/26/03 Time: 1420	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP mV	Other
Method: Low Flow Peristaltic	clear	4.49	0.052	0	3.3	26.02	165.1	

PURGE DATA

Date: 8/26/03	Time	pH	S.C.	Turbidity	DO	Temp (°C)	ORP	
Method: Low Flow Peristaltic								
Monitor Reading (ppm):								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): ~~1.28~~ 12.7								
Static Water Level (WL): 1.28								
One Casing Volume(gal/L): 6.85 L								
Start Purge (hrs): 1354								
End Purge (hrs): 1417								
Total Purge Time (min): 23 min								
Total Vol. Purged (gal/L): 11.4 L								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	3 x 40 mL glass vials	Y
PAH	None	2 - 1L Ambers	Y
TRPH (FL-PRO)	H2SO4	2 - 1L Ambers	Y
MEE	HCl	3 x 40 mL glass vials	Y
TOC	H2SO4	1 - 250 mL glass amber	Y
Iron + Manganese	HNO3	1 - 1L Plastic	Y
Alkalinity	None	1 L 500mL? Plastic ?	Y
Select Anions	None		

OBSERVATIONS / NOTES

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): TAL

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NAS Pensacola UST Site 18
PROJECT NUMBER: N0844

WELL ID.: PEN-18-GM24
DATE: 8/26/03

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Volume (L)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1408	~1.3	500	6.85L	4.49	0.052	Ø	4.00	26.06	190.0	
1411	~1.3	↓	8.35	4.48	0.052	Ø	3.69	26.03	182.5	
1414	~1.3		9.85	4.47	0.052	Ø	3.33	25.99	169.0	
1417	~1.3		11.35	4.49	0.052	Ø	3.30	26.02	165.1	

SIGNATURE(S): JA

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	NAS Pensacola UST Site 18	Sample ID No.:	PEN-18-GM24-01
Project No.:	N0844	Sample Location:	PEN-18-GM24
Sampled By:	TK	Duplicate:	☐
Field Analyst:	TK	Blank:	☐
Field Form Checked as per QA/QC Checklist (initials):	TK		

SAMPLING DATA:

Date: 5/26/03	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP mV	
Time: 1420								
Method: Peristaltic	clear	4.49	0.052	Ø	3.3	26.02	165.1	

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Ferrous Iron:

Equipment: HACH DR890 Analysis Time: 1425

Concentration: Ø mg/L

Notes:

Alkalinity: Analysis Time: 1430

Equipment: CHEMetrics CHEMetrics (Range: 100 - 1000 mg/L)

CHEMetrics: >1000 mg/L

Notes: no change, stayed pink

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT CHEMetrics (Range: 10 - 100 mg/L) Analysis Time: 1435

CHEMetrics: 14 mg/L

Notes:

Dissolved Oxygen:

Equipment: CHEMetrics Range ☐ 0 - 1.0 mg/L ☑ 1 - 12 mg/L Analysis Time: 1440

CHEMetrics: 4.0 mg/L

Hydrogen Sulfide (H_2S):

Equipment: HS-C Analysis Time: 1445

Concentration: 6.10 mg/L

Notes:

Sulfide:

Equipment : HACH DR890 Analysis Time: 1450

Concentration: Ø mg/L

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Mulitplication is correct for each *Multiplier* table: ☑

Final calulated concentration is within the appropriate *Range Used* block: ☑

Alkalinity *Relationship* is determined appropriatly as per manufacturer instructions: ☐

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑

Nitrite Interference treatment used for Nitrate test if Nitrite was detected: ☐

Title block is initialized by person who performed the QA/QC checklist: ☑

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER . 1 PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N0844	NAS PEN	Gerry Walker	850-835-9899	Katahdin / Andrea Colby
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Charles Metz		Chuck Metz	904-636-6125	
		CARRIER/WAYBILL NUMBER 8371-1005-6131 [redacted]		CITY, STATE Westbrook, ME

Charles Metz

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	TRPH	Metals (Unfiltered)	Metals (Filtered)	TOC	M/E/E	Alk + Anions			COMMENTS
		CONTAINER TYPE PLASTIC (P) or GLASS (G)							G	P	P	P	G	P			
		PRESERVATIVE USED							HCl	HNO_3	HNO_3	H_2SO_4	HCl	—			
8-27	1850	PEN-18-GS01-01				GW	G	9	2	1	1	2	2	1			
8-27	1835	PEN-18-GS02-01				GW	G	9	2	1	1	2	2	1			
8-28	0800	PEN-18-GS21-01				GW	G	9	2	1	1	2	2	1			
8-28	0850	PEN-18-EB01-01				QC	G	9	2	1	1	2	2	1			

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	8-28-03		1. RECEIVED BY		
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY) 4/02R

TETRA TECH NUS, INC. | **CHAIN OF CUSTODY** | **NUMBER** | **PAGE ____ OF _____**

PROJECT NO:	**FACILITY:**	**PROJECT MANAGER** GERRY WALKER	**PHONE NUMBER** (850) 385-9899	**LABORATORY NAME AND CONTACT:** KATAHDIN · ANDREA COLBY
SAMPLERS (SIGNATURE) Louis Knight, Charles Mc[illegible]		**FIELD OPERATIONS LEADER** CHUCK NIETZ	**PHONE NUMBER**	**ADDRESS** 340 COUNTY RD #5
		CARRIER/WAYBILL NUMBER 8427 1834 4956 / 8427 1834 4967		**CITY, STATE** WESTBROOK, ME 04092

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): 1 L G | 250 ml | 250 ml | 40 ml vial | 40 ml vial | P
PRESERVATIVE USED: HCL | HNO_3 | HNO_3 | H_2SO_4 | HCL | None

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	TRPH	METALS (F)	METALS (UNF)	TOC	METHANE/ETHANE/ETHENE	NA (ANIONS & ALK)			COMMENTS
8/25	1235	PEN18 · DPT 05				GW	G		2	1	1	2	2				2
	1310	PEN18 · DPT 02				GW	G		2								coolers
	1530	PEN18 · DPT 06				GW	G		2								
	1545	PEN18 · DPT 07				GW	G		2								w/ this
	1615	PEN18 · DPT 08				GW	G		2								
	1825	PEN18 · GS18 · 01				GW	G		2								shipment.
8/26	1145 ~~0850~~	PEN18 GS07 · 01							2								
8/26	1015	PEN18 GS08 · 01							2								
8/26	0850	PEN18 · GS19 · 01							2								
8/26	1415	PEN18 GS06 · 01							2	1	1	2	2	1			
8/26	1420	PEN18 GM24 · 01							2	1	1	2	2	1			

1. RELINQUISHED BY Louis Knight	DATE 8/26/03	TIME 1830	1. RECEIVED BY	DATE / TIME
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE / TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE / TIME
COMMENTS				

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TNNUS-001

TETRA TECH NUS, INC. | **CHAIN OF CUSTODY** | **NUMBER** | **PAGE ____ OF _____**

PROJECT NO:	FACILITY	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
0844	SITE 18/NAS Pensacola	GERRY WALKER	(850) 385-9899	KATAHDIN - ANDREA COLBY
SAMPLERS (SIGNATURE)		**FIELD OPERATIONS LEADER**	**PHONE NUMBER**	**ADDRESS**
[signature]		CHUCK METZ	(904) 813-5431	340 COUNTY RD #5
		CARRIER/WAYBILL NUMBER		**CITY, STATE**
		8427 1834 4978/8427 1834 4989		WESTBROOK, ME 04092

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	TRPH	METALS (unfiltered)	METALS (filtered)	TOC	METHANE/ETHANE/ETHENE	NA [ANIONS + ALK]			COMMENTS
								CONTAINER TYPE PLASTIC (P) or GLASS (G)	G	P	P	40mL vial	40mL vial	P			
								PRESERVATIVE USED	HCL	HNO3	HNO3	H2SO4	HCL	None			
8/26	1730	PEN-18-GS20				GW	G		2	1	1	2	2	1			
8/26	1810	PEN-18-GS04							2	1	1	2	2	1			2 COOLERS
8/26	1810	PEN 18-GS05							2	1	1	2	2	1			IN THIS
																	SHIPMENT
8/27	1610	PEN-18-DPT39							2								
8/27	1140	PEN-18-GS03							2	1	1	2	2	1			
8/27	1145	PEN-18-GS17							2	1	1	2	2	1			
8/27	1511	PEN-18-GS13							2	1	1	2	2	1			
8/27	1525	PEN-18-GS11							2	1	1	2	2	1			
8/27	0000	PEN-18-DUP2							2								

1. RELINQUISHED BY [signature]	DATE 8/27/03	TIME 1815	1. RECEIVED BY	DATE	TIME
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME
COMMENTS					

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

KB LABS
Mobile Laboratory Services
6821 SW Archer Road
Gainesville, FL 32608
TEL (352) 367-0073
FAX (352) 367-0074

CHAIN-OF-CUSTO[illegible] / RECORD

MOBILE UNIT # KB 1

CLIENT NAME: TetraTech

PROJECT NAME & ADDRESS: NAS ~~Jeff~~ Pensacola

SAMPLERS:

CONTACT PERSON: Chuck

BATCH # (Lab Use Only):

PRESERVATION: C Chilled; H HCL; Ot Other (see Remarks)

SAMPLE FIELD ID.\ NUMBER	DATE SAMPLED	TIME SAMPLED	COMP.	GRAB	DATE REC'D	TIME REC'D	STATION LOCATION / No.	SAMPLE MATRIX	NUMBER OF CONTAINERS	VOLATILES				COMMENT
PEN 18 DP 01	082503	1125		✓	082503	1333	Re 1ml	GW	2	✓				HCL pH 4.5
02		1140		✓			Re 1ml							HCL 4.5
03		1155		✓										strong odor pH 4.5
04		1210		✓										pH 4.5
05		1235		✓										pH 4.5
06		1530		✓		1648								pH 5
07		1545		✓			RE 10ml							NO GRIT black water pH 5.5 1:10
08		1615		✓										NO GRIT black water pH 5.5 1:10
09		1655		✓		1803								pH 5
10		1715		✓										Strong N.R. pH 4.5 1:10
11		1725		✓										" pH 4.5 1:10
12		1735		✓										" pH 4.5 1:10
13		1750				1851								pH 6 HOT?
14		1805												pH 6
15		1815												pH 4

Precleaned Containers Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time
[signature]	082503		
Relinquished by: (Signature) [signature]	Date / Time	Received by: (Signature) [signature]	Date / Time 082503

Remarks and Observations

Client requested Non Preserved Vials.

N.R. - Nasal response

pg 1 of 2

Matrix Types S Soil SW Surface Water GW Ground Water SG Soil Gas

CHAIN-OF-CUSTODY RECORD

KB LABS
Mobile Laboratory Services
6821 SW Archer Road
Gainesville, FL 32608
TEL (352) 367-0073
FAX (352) 367-0074

MOBILE UNIT # KB1

CLIENT NAME: T1

PROJECT NAME & ADDRESS: NAS ~~JAX~~ Pensacola

SAMPLERS: PS

CONTACT PERSON: Chuck

BATCH # (Lab Use Only)

PRESERVATION: C Chilled; H HCL; Ot Other (see Remarks)

SAMPLE FIELD ID.\ NUMBER	DATE SAMPLED	TIME SAMPLED	COMP.	GRAB	DATE REC'D	TIME REC'D	STATION LOCATION / No.	SAMPLE MATRIX	NUMBER OF CONTAINERS	VOLATILES				COMMENT
PEN 18 GS22-01	082503	1720		✓	082503	1851		GW	2	✓				pH4
PEN 18 GS09	↓	1730		✓	↓	↓		↓	↓	↓				pH4
PEN 18 GS18-01	↓	1825		✓	↓	↓		↓	↓	↓				pH4
PEN 18 GS02A	↓	1825		✓	↓	↓		↓	↓	↓				pH4

Precleaned Containers Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Remarks and Observations
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time 082503	pg 2 of 2

Matrix Types: S Soil; SW Surface Water; GW Ground Water; SG Soil Gas

CHAIN-OF-CUSTO / RECORD

KB LABS
Mobile Laboratory Services
6821 SW Archer Road
Gainesville, FL 32608
TEL (352) 367-0073
FAX (352) 367-0074

MOBILE UNIT # KB 1

CLIENT NAME: TetraTech

PROJECT NAME & ADDRESS: NAS ~~JAX~~ Pensacola

SAMPLERS: Prosonic

CONTACT PERSON: Chuck

BATCH # (Lab Use Only)

PRESERVATION: C Chilled; H HCL; Ot Other (see Remarks)

SAMPLE FIELD ID.\ NUMBER	DATE SAMPLED	TIME SAMPLED	COMP.	GRAB	DATE REC'D	TIME REC'D	STATION LOCATION / No.	SAMPLE MATRIX	NUMBER OF CONTAINERS	VOLATILES				COMMENT
PEN 18 DP16	082603	0945		✓	082603	1135		GW	2	✓				pH 4
17		0955		✓										pH 4
18		1010		✓										pH 4 1:20
19		1020		✓										pH 4 1:2
20		1030		✓										pH 4
21		1040		✓										pH 4
* 22		1050		✓										pH 4
GS08		1015		✓		1143								pH 4
GS19-01		0850		✓										pH 4
GS12-01		1100		✓										pH 5
GS10		1105		✓										pH 4.5
GM07		1145		✓		1205								pH 4
DP23		1200		✓		1422								pH 4.5
PEN 18 GS06-01		1415		✓		1540								pH 4.5
GM24-01		1420		✓		1540								pH 3.5

Precleaned Containers Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time
[signature]		[signature]	082603

Remarks and Observations

Pg 1 of 2

Matrix Types S Soil SW Surface Water GW Ground Water SG Soil Gas

CHAIN-OF-CUSTODY RECORD

KB LABS
Mobile Laboratory Services
6821 SW Archer Road
Gainesville, FL 32608
TEL (352) 367-0073
FAX (352) 367-0074

MOBILE UNIT # KB~~8~~ 1

CLIENT NAME: TT

PROJECT NAME & ADDRESS: NAS ~~JAX~~ Pensacola

SAMPLERS: PS

CONTACT PERSON: Chuck

[redacted]

PRESERVATION: C Chilled; H HCL; Ot Other (see Remarks)

SAMPLE FIELD ID.\ NUMBER	DATE SAMPLED	TIME SAMPLED	COMP.	GRAB	DATE REC'D	TIME REC'D	STATION LOCATION / No.	SAMPLE MATRIX	NUMBER OF CONTAINERS	VOLATILES				COMMENT
PEN-18-GS00-01	082603	1730		✓	082603	1800		GW	2	✓				pH4
GS04-01	↓	1810		✓	↓	1848		GW	2	✓				pH6
GS05-01	↓	1810		✓	↓	1848		GW	2	✓				pH 4.5
														*

IDENTIFY PARAMETERS DESIRED AND NO. OF CONTAINERS

Precleaned Containers Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time
Relinquished by: (Signature) [signature]	Date / Time	Received by: (Signature) [signature]	Date / Time 0826 03

Remarks and Observations

KS samples ✓

pg 2 of 2

Matrix Types S Soil SW Surface Water GW Ground Water SG Soil Gas

CHAIN-OF-CUSTODY RECORD

KB LABS
Mobile Laboratory Services
6821 SW Archer Road
Gainesville, FL 32608
TEL (352) 367-0073
FAX (352) 367-0074

MOBILE UNIT # KB 1

CLIENT NAME: TetraTech

PROJECT NAME & ADDRESS: NAS ~~FAX~~ w/ Pensacola

SAMPLERS: Prosonic

CONTACT PERSON: Chuck

[redacted]

PRESERVATION: C Chilled; H HCL; Ot Other (see Remarks)

SAMPLE FIELD ID.\ NUMBER	DATE SAMPLED	TIME SAMPLED	COMP.	GRAB	DATE REC'D	TIME REC'D	STATION LOCATION / No.	SAMPLE MATRIX	NUMBER OF CONTAINERS	VOLATILES				COMMENT
PEN 18 DP24	082703	0930		✓	082703	1000		GW	2	✓				pH 4
DP26		0945		✓		1000								pH 4.5
DP25		1035		✓		1100								pH 4.5
DP27		1050		✓		1150								pH 4.5
DP28		1115		✓										pH 4.5
DP29		1125		✓										pH 5
DP30		1135		✓										pH 4.5
DP31		1200		✓		1237								pH 4.5
DP32		1210		✓										pH 4.5
DP33		1220		✓										pH 4.5
GS03-01		1140		✓										pH 4.5
GS17-01		1145		✓										pH 4.5 very Strong Odor
DP34		1230		✓		1240								pH 4.5
GS13-01		1511		✓		1643								pH 4.5
GS11-01		1525		✓		1643								pH 4.5

Precleaned Containers Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Remarks and Observations
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time 082703	

Matrix Types: S Soil; SW Surface Water; GW Ground Water; SG Soil Gas

pg 1 of 2

CHAIN-OF-CUSTODY RECORD

KB LABS
Mobile Laboratory Services
6821 SW Archer Road
Gainesville, FL 32608
TEL (352) 367-0073
FAX (352) 367-0074

MOBILE UNIT # KB 1

CLIENT NAME: TT

PROJECT NAME & ADDRESS: NAS Pensacola

SAMPLERS: RS

CONTACT PERSON: Chuck

SAMPLE FIELD ID.\ NUMBER	DATE SAMPLED	TIME SAMPLED	COMP.	GRAB	DATE REC'D	TIME REC'D	STATION LOCATION / No.	SAMPLE MATRIX	NUMBER OF CONTAINERS	VOLATILES				COMMENT
PEN 18 DP35	08/07/03	1520		✓	08/07/03	1643		GW	2	✓				pH 5
36		1535		✓										pH 5
37		1555		✓				GW	1	✓				~~pH 4.5~~ pH 4.5
38		1545		✓				GW	2					~~4.5~~ pH 5
39		1610		✓										pH 5
PEN 18 DU01		0000		✓										pH 4.5
18 DU02		0000		✓										pH 4.5

IDENTIFY PARAMETERS DESIRED AND NO. OF CONTAINERS

PRESERVATION
C Chilled
H HCL
Ot Other (see Remarks)

Precleaned Containers Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Date / Time
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Date / Time
			08/07/03

Remarks and Observations
22 samples
pg 2 of 2

Matrix Types S Soil SW Surface Water GW Ground Water SG Soil Gas

CHAIN-OF-CUSTODY RECORD

KB LABS
Mobile Laboratory Services
6821 SW Archer Road
Gainesville, FL 32608
TEL (352) 367-0073
FAX (352) 367-0074

MOBILE UNIT # KB 1

CLIENT NAME: TT

PROJECT NAME & ADDRESS: NAS ~~JAX~~ Pensacola

SAMPLERS: Prosonic

CONTACT PERSON: Chuck

BATCH # (Lab Use Only):

PRESERVATION: C Chilled; H HCL; Ot Other (see Remarks)

SAMPLE FIELD ID.\ NUMBER	DATE SAMPLED	TIME SAMPLED	COMP.	GRAB	DATE REC'D	TIME REC'D	STATION LOCATION / No.	SAMPLE MATRIX	NUMBER OF CONTAINERS	VOLATILES				COMMENT
PEN 18 DP10 G19	082803	0750		✓	082803	0851		GW	2	✓				~~pH 4.5~~ pH 6
PEN GS21-01		0800		✓						✓				pH 4.5
PEN 18 DP02 G19		0825		✓						✓				~~pH 6~~ pH 4.5
PEN 18 EB01-01		0850		✓		0910				✓				pH 4
PEN18 DP13-G19		0855		✓		0930				✓				pH 6
PEN18 DUP 01-01	082703	0000		✓	082803	0943				✓				pH 6
PEN 18 GS01-01		1850		✓						✓				pH 6 lots of foam
PEN18 GS02-01		1835		✓						✓				pH 6
DP 40	082803	1425		✓		1556				✓				pH 4.5 extreme odor.
DP 41		1435		✓		1556				✓				pH 6
DP 42		1455		✓		1556				✓				pH 6
PEN 18 DP43	082903	0830		✓	082903	0855				✓				pH 5.5
44		0845		✓						✓				pH 5.5
45		0900		✓						✓				pH 5
46		0910		✓						✓				pH 5

Precleaned Containers Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Remarks and Observations
				11 samples 082803
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	
			082803	

pg 1 of 2 082903

Matrix Types: S Soil; SW Surface Water; GW Ground Water; SG Soil Gas

CHAIN-OF-CUSTODY RECORD

KB LABS
Mobile Laboratory Services
6821 SW Archer Road
Gainesville, FL 32608
TEL (352) 367-0073
FAX (352) 367-0074

MOBILE UNIT # KB1

CLIENT NAME	PROJECT NAME & ADDRESS
TT	NAS ~~Jax~~ Pensacola

SAMPLERS	CONTACT PERSON	BATCH # (Lab Use Only)
PS	Louis	

PRESERVATION: C Chilled; H HCL; Ot Other (see Remarks)

SAMPLE FIELD ID.\ NUMBER	DATE SAMPLED	TIME SAMPLED	COMP.	GRAB	DATE REC'D	TIME REC'D	STATION LOCATION / No.	SAMPLE MATRIX	NUMBER OF CONTAINERS	VOLATILES				COMMENT
PEN 18 DP 47	082903	0915		✓	082903	0920		GW	2	✓				pH 5
48		0920		✓		1028								pH 5
49		0920		✓										5
50		0925		✓										5
51		0935		✓										6
52		0942		✓										pH 5.5
53		0952		✓										pH 4.5
PEN 18 54		1115		✓		1151								pH 4.5
55		1135		✓										
DP 02 G50		1030		✓										
DP02 G 34		1100		✓										1:5
DP10 G 34		1210		✓		1253								pH 6
DP10 G 50		1235		✓		1253								pH 4.5
DP 56		1625				1651								pH 6
PEN 18 DU03		0000												pH 6

Precleaned Containers Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Date / Time
Relinquished by: *(Signature)* Louis Knight	Date / Time	Received by: *(Signature)*	Date / Time 082903

Remarks and Observations
+4
19 Samples
082903
pg 2 of 2

Matrix Types S Soil SW Surface Water GW Ground Water SG Soil Gas

APPENDIX C

LABORATORY REPORTS

KB LABS, INC.
6821 Southwest Archer Road
Gainesville, Florida 32608
***Telephone* (352) 367-0073**
***Fax* (352) 367-0074**
Email: info@kbmobilelabs.com

September 05, 2003

Chuck Metz
Tetra Tech NUS
8640 Phillips Hwy; Suite 16
Jacksonville, Florida 32256

RE: NAS Pensacola CTO313, Pensacola, Florida - Final Data Report
KB Labs Project # 03-106

Dear Mr. Metz:

Enclosed is the final report of samples analyzed by KB Labs, Inc. for the above referenced site. Samples were collected and analyzed from August 25 to 29, 2003. Included are a brief project narrative, a data report narrative, tables listing quality control results, the final analytical results, and sample chain-of-custody forms. This information will also be sent electronically. Including this cover page, the Final Report includes 23 pages.

KB Labs' mobile laboratories have been inspected by the FDOH Bureau of Laboratories and have been approved for NELAP Certification as of April 1, 2003. Our personnel, methodology, proficiency testing, and quality assurance requirements complied with the guidelines of Chapter 64E-1 of the Florida Administrative Code and with the consensus standards adopted at the National Environmental Laboratory Accreditation Conference (NELAC). Data for the site referenced above were determined in accordance with published procedures under Test Methods for Evaluating Solid Waste (EPA SW-846, Update III Revised May 1997). Unless otherwise indicated on the quality control narrative accompanying the data report, the quality assurance and quality control procedures performed in conjunction with analysis of groundwater samples demonstrated that the reported data met our for accuracy and precision under NELAC Standards

If you have any questions, please do not hesitate to call me or Kelly Bergdoll, President of KB Labs, at (352) 367-0073.

Sincerely,

KB Labs, Inc.

Todd Romero
Director of Operations

"KB Labs is a small, woman-owned business enterprise."

KB LABS, INC.

DATA REPORT NARRATIVE

Client:	Tetra Tech NUS	**Driller/Sampler:**	Prosonic	**Analyst:**	Yael Hoogland
Site:	NAS Pensacola CTO313	**KB Labs Project Manager:**	Kelly Bergdoll	**KB Labs Project #:**	03-106
Onsite Dates:	08/25/03-08/29/03	**Client Project Manager:**	Chuck Metz	**Matrix:**	Water

1. All samples have been reviewed and, if required, updated in the Final Data Report for rounding and significant figures.

2. Sample GM07,as identified on chain of custody, was called GS07 on the preliminary data report. It was changed to match the chain of custody.

Signature: _____

Title: Director of Operations Date:_____

KB LABS, INC.

PROJECT NARRATIVE

Client:	Tetra Tech NUS	**Driller/Sampler:**	Prosonic	**Analyst:**	Yael Hoogland
Site:	NAS Pensacola CTO313	**KB Labs Project Manager:**	Kelly Bergdoll	**KB Labs Project #:**	03-106
Onsite Dates:	08/25/03-08/29/03	**Client Project Manager:**	Chuck Metz	**Matrix:**	Water

Project Scope

From August 25 to 29, 2003, a total of 89 water samples were collected at NAS Pensacola in Pensacola,Florida, by Tetra Tech NUS and relinquished to KB Labs' Mobile Laboratory. The samples were analyzed on-site for mtbe, benzene, ethylbenzene, toluene, xylenes, naphthalene, and 1-&2-methylnaphthalene.

NELAP Certification

KB Mobile Labs Unit KB1: FDOH NELAP Certification Number E82815

Analytical Procedure

All water samples were analyzed using SW846 Method 5030/8260 for waters. Ten (10) milliliters (mL) of water were purged with helium and the volatile organic compounds (VOCs) were collected on a solid-phase adsorption trap. The adsorption trap was heated and back-purged with helium and the components were separated by capillary column gas chromatography and measured with a mass spectrometer (GC/MS) operated in the electron impact full-scan mode. The individual VOCs in the samples were measured against corresponding VOC standards.

Analytical Results

Laboratory results were provided to the client on an as-completed or next-day basis. Final results of the on-site analyses are provided in a hardcopy report. The data produced and reported in the field has been reviewed and approved for this final report by the Director of Operations for KB Labs.

Quality Control (QC) Data

Surrogate Recoveries – Table 1 lists the daily analytical sequence and percent recovery results for surrogate compounds, which were added to all analyses, run by Method 8260. The surrogate compounds 1,2-dichloroethane-d4,1,4-difluorobenzene,toluene-d8

and 4-bromofluorobenzene were added to each analysis in order to continually monitor general method performance.

MS/MSD/LCS Spike Recoveries – Table 2 lists the percent recovery results for matrix spike samples and laboratory control spikes. A known amount of each target compound was added to selected field samples and to laboratory reagent water in order to monitor the performance of each of the target compounds in the actual matrix and in laboratory reagent water.

Method Blanks – Daily analysis of laboratory reagent water samples was performed in order to monitor the cleanliness of the analytical system.

Signature: _____

Title: Director of Operations Date: _____

KB LABS, INC.

Final Data Report
NAS Pensacola CTO 313
Pensacola, FL
KB Labs Project # 03-106

Prepared for: Tetra Tech NUS

Well ID	Analysis Date	Matrix	Dilution Factor	MtBE	Benzene	Toluene	Ethylbenzene	m,p-Xylene	o-Xylene	Naphthalene	2-Methylnaphthalene	1-Methylnaphthalene
PEN 18 DP01	82503	GW	1,10	<5.0	<1.0	<1.0	<1.0	**170**	**91.4**	**11.8**	**8.5**	**9.9**
PEN 18 DP02	82503	GW	1,10	<5.0	<1.0	**29.2**	**16.4**	**300**	**140**	**51.3**	**31.7**	**34.9**
PEN 18 DP03	82503	GW	1	<5.0	<1.0	<1.0	<1.0	**3.3**	**1.6**	<5.0	<5.0	<5.0
PEN 18 DP04	82503	GW	1	<5.0	<1.0	<1.0	<1.0	**1.0**	<1.0	<5.0	<5.0	<5.0
PEN 18 DP05	82503	GW	1	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<5.0
PEN 18 DP06	82503	GW	1	<5.0	<1.0	<1.0	<1.0	**34.8**	**11.0**	**16.4**	**18.4**	**21.7**
PEN 18 DP07	82503	GW	1	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<5.0
PEN 18 DP08	82503	GW	10	<50	<10	<10	**20**	**20**	<10	**87**	**100**	**75**
PEN 18 DP09	82503	GW	1	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<5.0
PEN 18 DP10	82503	GW	10,20	<50	<10	**1300**	**190**	**1100**	**580**	**240**	**130**	**130**
PEN 18 DP11	82503	GW	10	<50	<10	**350**	<10	**18**	**45**	<50	<50	<50
PEN 18 DP12	82503	GW	10,50	<50	<10	**10**	**280**	**980**	**250**	**400**	**230**	**200**
PEN 18 DP13	82503	GW	20	<100	**60**	<20	**350**	**820**	<20	**400**	**360**	**250**
PEN 18 DP14	82503	GW	5	<25	**64**	<5.0	**37**	**240**	<5.0	**100**	**150**	**130**
PEN 18 DP15	82503	GW	10	<50	<10	<10	**39**	**180**	<10	**100**	**120**	**100**
PEN 18 GS22-01	82503	GW	1	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<5.0
PEN 18 GS09	82503	GW	1	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<5.0
PEN 18 GS18-01	82503	GW	1,10	<5.0	**41.8**	**16.0**	**120**	**460**	**26.4**	**47.2**	**52.7**	**43.5**
PEN 18 GS02A	82503	GW	1	<5.0	<1.0	<1.0	<1.0	**1.0**	<1.0	<5.0	<5.0	<5.0
PEN 18 DP16	82603	GW	1	<5.0	<1.0	<1.0	<1.0	**1.3**	<1.0	<5.0	<5.0	<5.0
PEN 18 DP17	82603	GW	1	<5.0	<1.0	<1.0	<1.0	**14.8**	**2.8**	<5.0	<5.0	<5.0
PEN 18 DP18	82603	GW	20	<100	<20	**45**	<20	**220**	**85**	<100	<100	<100
PEN 18 DP19	82603	GW	2	<10	<2.0	**17**	**12**	**290**	**94**	**44**	**34**	**38**
PEN 18 DP20	82603	GW	1	<5.0	<1.0	<1.0	<1.0	**2.4**	<1.0	<5.0	<5.0	<5.0
PEN 18 DP21	82603	GW	1	<5.0	<1.0	<1.0	<1.0	**1.3**	<1.0	<5.0	<5.0	<5.0
PEN 18 DP22	82603	GW	20	<100	<20	<20	**28**	**490**	**230**	**140**	**140**	**140**
PEN 18 DP23	82603	GW	100	<500	<100	**320**	**120**	**840**	**460**	<500	<500	<500

Reporting units for waters are ug/L and for soils are mg/Kg.

KB LABS, INC.

Final Data Report
NAS Pensacola CTO 313
Pensacola, FL
KB Labs Project # 03-106

Prepared for: Tetra Tech NUS

Well ID	Analysis Date	Matrix	Dilution Factor	MtBE	Benzene	Toluene	Ethylbenzene	m,p-Xylene	o-Xylene	Naphthalene	2-Methylnaphthalene	1-Methylnaphthalene
PEN 18 GS19-01	82603	GW	1	<5.0	1.7	<1.0	4.3	3.5	6.8	5.7	<5.0	<5.0
PEN 18 GS08	82603	GW	2	<10	<2.0	<2.0	12	11	4.0	14	<10	12
PEN 18 GS12-01	82603	GW	1	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<5.0
PEN 18 GS10	82603	GW	1	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<5.0
PEN 18 GM07	82603	GW	1,20	<5.0	10.0	17.2	78.7	300	72.2	120	57.3	51.4
PEN 18 GS06-01	82603	GW	20	<100	<20	36	<20	140	41	140	140	120
PEN 18 GM24-01	82603	GW	1	<5.0	<1.0	<1.0	2.5	5.4	1.5	<5.0	<5.0	<5.0
PEN 18 GS20-01	82603	GW	1	<5.0	<1.0	<1.0	<1.0	2.1	<1.0	<5.0	<5.0	<5.0
PEN 18 GS04-01	82603	GW	1	<5.0	<1.0	<1.0	2.4	5.5	9.9	5.8	8.4	7.0
PEN 18 GS05-01	82603	GW	1	<5.0	<1.0	<1.0	6.4	45.0	23.4	16.3	16.8	13.9
PEN 18 DP24	82703	GW	1	<5.0	<1.0	1.9	2.1	15.4	7.2	5.4	10.0	8.8
PEN 18 DP25	82703	GW	1	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<5.0
PEN 18 DP26	82703	GW	1	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<5.0
PEN 18 DP27	82703	GW	1	<5.0	3.9	<1.0	<1.0	84.6	42.0	<5.0	<5.0	<5.0
PEN 18 DP28	82703	GW	5	<25	<5.0	<5.0	<5.0	85	10	<25	<25	<25
PEN 18 DP29	82703	GW	1	<5.0	17.7	2.1	3.6	17.0	1.1	14.0	10.7	12.4
PEN 18 DP30	82703	GW	1	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<5.0
PEN 18 DP31	82703	GW	1	<5.0	<1.0	9.5	11.3	127	36.1	19.0	23.5	22.4
PEN 18 DP32	82703	GW	1,20	<5.0	<1.0	7.9	36.9	370	140	90.3	36.3	34.3
PEN 18 DP33	82703	GW	20	<100	<20	87	130	1400	460	290	200	150
PEN 18 DP34	82703	GW	20	<100	<20	45	62	1300	470	200	150	120
PEN 18 GS03-01	82703	GW	1	<5.0	<1.0	40.9	5.5	30.9	21.5	<5.0	9.8	11.7
PEN 18 GS17-01	82703	GW	10	<50	96	<10	22	160	42	71	<50	<50
PEN 18 GS13-01	82703	GW	1	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<5.0
PEN 18 GS11-01	82703	GW	1	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<5.0
PEN 18 DP35	82703	GW	20	<100	<20	55	62	1000	590	<100	<100	100
PEN 18 DP36	82703	GW	1	<5.0	<1.0	<1.0	<1.0	7.6	3.8	<5.0	<5.0	<5.0

Reporting units for waters are ug/L and for soils are mg/Kg.

KB LABS, INC.

Final Data Report
NAS Pensacola CTO 313
Pensacola, FL
KB Labs Project # 03-106

Prepared for: Tetra Tech NUS

Well ID	Analysis Date	Matrix	Dilution Factor	MtBE	Benzene	Toluene	Ethylbenzene	m,p-Xylene	o-Xylene	Naphthalene	2-Methylnaphthalene	1-Methylnaphthalene
PEN 18 DP37	82703	GW	20,100	<100	29	2200	280	1200	680	190	120	130
PEN 18 DP38	82703	GW	100,500	<500	<100	9800	880	3200	1400	<500	<500	<500
PEN 18 DP39	82703	GW	2	<10	<2.0	35	22	150	81	68	70	82
PEN 18 DU01	82703	GW	2,100	<10	34	2500	330	1400	810	170	78	85
PEN 18 DU02	82703	GW	1	<5.0	<1.0	37.3	22.3	160	85.2	63.6	62.6	72.4
PEN 18 DP10 * G19	82803	GW	5	<25	5.5	8.3	54	230	18	63	60	50
PEN 18 DP02 * G19	82803	GW	10	<50	<10	<10	<10	58	20	<50	<50	<50
PEN 18 DUP01-01	82703	GW	5	<25	8.4	140	120	490	200	110	81	76
PEN 18 DP13 * G19	82803	GW	100	<500	<100	<100	160	380	<100	500	720	600
PEN 18 GS01-01	82703	GW	50	<250	510	<50	140	290	<50	270	<250	<250
PEN 18 GS02-01	82703	GW	10	<50	12	190	140	570	240	160	120	120
PEN 18 GS21-01	82803	GW	1	<5.0	<1.0	2.0	<1.0	1.6	<1.0	<5.0	<5.0	<5.0
PEN 18 EB01-01	82803	GW	1	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<5.0
PEN 18 DP 40	82803	GW	1	<5.0	6.2	1.0	<1.0	79.4	27.5	16.6	14.5	10.1
PEN 18 DP 41	82803	GW	1	<5.0	<1.0	<1.0	<1.0	21.6	2.7	6.6	<5.0	<5.0
PEN 18 DP 42	82803	GW	1	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<5.0
PEN 18 DP43	82903	GW	1	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<5.0
PEN 18 DP44	82903	GW	1	<5.0	11.9	<1.0	10.9	35.0	15.4	36.8	32.2	29.6
PEN 18 DP45	82903	GW	1	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<5.0
PEN 18 DP46	82903	GW	1	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<5.0
PEN 18 DP47	82903	GW	1	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<5.0
PEN 18 DP48	82903	GW	1	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0	<5.0
PEN 18 DP49	82903	GW	10	<50	<10	<10	<10	160	32	<50	86	75
PEN 18 DP50	82903	GW	20	<100	<20	<20	110	1200	320	130	190	150
PEN 18 DP51	82903	GW	20	<100	<20	<20	32	640	180	100	160	150
PEN 18 DP52	82903	GW	20	<100	<20	<20	89	2000	440	250	410	360
PEN 18 DP53	82903	GW	1	<5.0	<1.0	<1.0	<1.0	6.6	1.9	<5.0	5.6	<5.0

Reporting units for waters are ug/L and for soils are mg/Kg.

KB LABS, INC.

Final Data Report
NAS Pensacola CTO 313
Pensacola, FL
KB Labs Project # 03-106

Prepared for: Tetra Tech NUS

Well ID	Analysis Date	Matrix	Dilution Factor	MtBE	Benzene	Toluene	Ethylbenzene	m,p-Xylene	o-Xylene	Naphthalene	2-Methylnaphthalene	1-Methylnaphthalene
PEN 18 DP54	82903	GW	1	<5.0	<1.0	<1.0	<1.0	**4.0**	**1.4**	<5.0	<5.0	<5.0
PEN 18 DP55	82903	GW	1	<5.0	<1.0	<1.0	<1.0	**14.3**	**3.3**	**11.5**	**35.3**	**36.4**
PEN 18 DP56	82903	GW	1	<5.0	<1.0	<1.0	**1.1**	**2.0**	<1.0	<5.0	<5.0	<5.0
PEN 18 DP02 G34	82903	GW	5	<25	<5.0	<5.0	<5.0	**60**	**23**	<25	**28**	<25
PEN 18 DP02 G50	82903	GW	1	<5.0	<1.0	**1.4**	**2.0**	**24.4**	**9.7**	**5.2**	**5.7**	**5.4**
PEN 18 DP10 G34	82903	GW	1	<5.0	**1.4**	**16.6**	**8.5**	**48.2**	**26.7**	**14.3**	**16.9**	**16.4**
PEN 18 DP10 G50	82903	GW	1	<5.0	<1.0	**10.3**	**5.1**	**29.9**	**16.3**	**8.8**	**9.0**	**9.6**
PEN 18 DU03	82903	GW	1	<5.0	<1.0	<1.0	**1.2**	**2.2**	<1.0	<5.0	<5.0	<5.0

Reporting units for waters are ug/L and for soils are mg/Kg.

KB LABS, INC.

Table 1: Analytical Run Sequence/Surrogate Percent Recoveries

Client: Tetra Tech NUS	**Driller/Sampler**: Prosonic	**Analyst:** Yael Hoogland
Site: NAS Pensacola CTO 313	**KB Labs Project Manager**: Kelly Bergdoll	**KB Labs Project No:** 03-106
On-site Dates: 08/25/03-08/29/03	**Client Project Manager**: Chuck Metz	**Matrix:** Water

Sample ID	Date of Analysis	Surrogate % Recovery				Surrogate Control Limits: 80%(LCL) to 120%(UCL)			
		S1*	S2*	S3*	S4*	S1*	S2*	S3*	S4*
BFB	08/25/03	95	88	96	97	Pass	Pass	Pass	Pass
VSTD20	08/25/03	93	90	95	92	Pass	Pass	Pass	Pass
LCS	08/25/03	99	91	97	92	Pass	Pass	Pass	Pass
BLANK	08/25/03	105	89	93	90	Pass	Pass	Pass	Pass
PEN 18 DP01	08/25/03	79	83	95	102	< LCL	Pass	Pass	Pass
PEN 18 DP02	08/25/03	104	87	94	111	Pass	Pass	Pass	Pass
PEN 18 DP03	08/25/03	92	83	93	94	Pass	Pass	Pass	Pass
PEN 18 DP04	08/25/03	112	101	92	98	Pass	Pass	Pass	Pass
PEN 18 DP05	08/25/03	99	90	93	93	Pass	Pass	Pass	Pass
PEN 18 DP02 1:10 RE	08/25/03	101	94	93	95	Pass	Pass	Pass	Pass
PEN18 DP01 1:10RE	08/25/03	106	98	93	92	Pass	Pass	Pass	Pass
PEN 18 DP06	08/25/03	89	85	91	98	Pass	Pass	Pass	Pass
PEN 18 DP07 1:10	08/25/03	98	96	94	95	Pass	Pass	Pass	Pass
PEN 18 DP08 1:10	08/25/03	108	100	92	96	Pass	Pass	Pass	Pass
PEN 18 DP09	08/25/03	89	87	97	97	Pass	Pass	Pass	Pass
PEN 18 DP10 1:10	08/25/03	109	97	92	112	Pass	Pass	Pass	Pass
PEN 18DP11 1:10	08/25/03	118	107	93	106	Pass	Pass	Pass	Pass
PEN18 DP12 1:10	08/25/03	110	98	90	105	Pass	Pass	Pass	Pass
PEN18 GS22-01	08/25/03	94	97	94	93	Pass	Pass	Pass	Pass
PEN 18 GS09	08/25/03	108	101	93	95	Pass	Pass	Pass	Pass
PEN18 GS18-01	08/25/03	94	93	96	98	Pass	Pass	Pass	Pass
PEN18 DP14 1:5	08/25/03	111	98	98	100	Pass	Pass	Pass	Pass
PEN18 DP15 1:10	08/25/03	104	102	98	96	Pass	Pass	Pass	Pass
PEN18 DP13 1:20	08/25/03	94	91	98	101	Pass	Pass	Pass	Pass
PEN18 GS02A 1:20	08/25/03	98	99	98	96	Pass	Pass	Pass	Pass
PEN18 DP07 RE	08/25/03	106	101	99	103	Pass	Pass	Pass	Pass
PEN18 DP10 1:20RE	08/25/03	90	96	102	100	Pass	Pass	Pass	Pass
PEN18 DP03MS	08/25/03	97	97	97	103	Pass	Pass	Pass	Pass
PEN18 DP03MSD	08/25/03	90	95	96	106	Pass	Pass	Pass	Pass
CCS	08/25/03	97	95	97	98	Pass	Pass	Pass	Pass
BFB	08/26/03	102	95	98	92	Pass	Pass	Pass	Pass
VSTD20	08/26/03	96	96	97	98	Pass	Pass	Pass	Pass
LCS	08/26/03	102	98	92	94	Pass	Pass	Pass	Pass
BLANK	08/26/03	94	88	95	94	Pass	Pass	Pass	Pass
PEN 18 GS02A RE	08/26/03	91	88	94	96	Pass	Pass	Pass	Pass
PEN 18 DP16	08/26/03	91	87	92	99	Pass	Pass	Pass	Pass
PEN 18 DP17	08/26/03	97	87	92	108	Pass	Pass	Pass	Pass
PEN 18 DP18 1:20	08/26/03	93	87	93	97	Pass	Pass	Pass	Pass

***Surrogate Compounds:**
S1 = 1,2- Dichloroethane-D4
S2 = 1,2-Difluorobenzene
S3 = Toluene-D8
S4 = 4-Bromofluorobenzene

KB LABS, INC.

Table 1: Analytical Run Sequence/Surrogate Percent Recoveries

Client: Tetra Tech NUS	**Driller/Sampler:** Prosonic	**Analyst:** Yael Hoogland
Site: NAS Pensacola CTO 313	**KB Labs Project Manager:** Kelly Bergdoll	**KB Labs Project No:** 03-106
On-site Dates: 08/25/03-08/29/03	**Client Project Manager:** Chuck Metz	**Matrix:** Water

Sample ID	Date of Analysis	Surrogate % Recovery				Surrogate Control Limits: 80%(LCL) to 120%(UCL)			
		S1*	S2*	S3*	S4*	S1*	S2*	S3*	S4*
PEN 18 DP19 1:2	08/26/03	101	89	90	111	Pass	Pass	Pass	Pass
PEN 18 DP20	08/26/03	107	94	90	91	Pass	Pass	Pass	Pass
PEN 18 DP21	08/26/03	94	88	91	97	Pass	Pass	Pass	Pass
PEN 18 DP22 1:100	08/26/03	97	88	90	97	Pass	Pass	Pass	Pass
PEN18 DP23 1:100	08/26/03	89	83	91	91	Pass	Pass	Pass	Pass
PEN 18 GS 19-01	08/26/03	97	90	91	95	Pass	Pass	Pass	Pass
PEN 18 GS08 1:2	08/26/03	91	88	92	93	Pass	Pass	Pass	Pass
PEN18 GS12-01	08/26/03	97	86	91	89	Pass	Pass	Pass	Pass
PEN 18 GS10	08/26/03	102	92	90	93	Pass	Pass	Pass	Pass
PEN 18 GS07	08/26/03	106	94	89	101	Pass	Pass	Pass	Pass
PEN 18 GS06 1:20	08/26/03	100	88	88	92	Pass	Pass	Pass	Pass
PEN 18 GS24-01	08/26/03	112	98	88	90	Pass	Pass	Pass	Pass
PEN 18 GS18-01 1:10RE	08/26/03	110	92	88	92	Pass	Pass	Pass	Pass
PEN 18 GS20-01	08/26/03	101	92	92	91	Pass	Pass	Pass	Pass
PEN 18 GS04-01	08/26/03	102	97	90	94	Pass	Pass	Pass	Pass
PEN 18 GS05-01	08/26/03	101	95	92	93	Pass	Pass	Pass	Pass
PEN 18 DP16MS	08/26/03	104	98	92	96	Pass	Pass	Pass	Pass
PEN 18 DP16MSD	08/26/03	102	99	91	99	Pass	Pass	Pass	Pass
PEN 18 DP22 1:20RE	08/26/03	98	90	94	96	Pass	Pass	Pass	Pass
PEN 18 DP12 1:50RE	08/26/03	101	97	95	92	Pass	Pass	Pass	Pass
PEN 18 DP19 1:10 RE	08/26/03	104	100	95	102	Pass	Pass	Pass	Pass
PEN 18 GS07 1:20RE	08/26/03	99	97	95	96	Pass	Pass	Pass	Pass
CCS	08/26/03	97	96	97	95	Pass	Pass	Pass	Pass
BFB	08/27/03	108	92	98	100	Pass	Pass	Pass	Pass
VSTD20	08/27/03	90	88	99	96	Pass	Pass	Pass	Pass
LCS	08/27/03	94	95	98	94	Pass	Pass	Pass	Pass
BLANK	08/27/03	96	95	96	94	Pass	Pass	Pass	Pass
PEN18 DP24	08/27/03	86	91	96	101	Pass	Pass	Pass	Pass
PEN18 DP26	08/27/03	91	92	96	99	Pass	Pass	Pass	Pass
PEN18 DP25	08/27/03	88	93	98	96	Pass	Pass	Pass	Pass
PEN18 DP27	08/27/03	92	90	110	130	Pass	Pass	Pass	> UCL
PEN18 DP28 1:5	08/27/03	86	85	92	94	Pass	Pass	Pass	Pass
PEN18 DP29 1:20	08/27/03	109	94	93	108	Pass	Pass	Pass	Pass
PEN18 DP30	08/27/03	94	88	94	100	Pass	Pass	Pass	Pass
PEN18 GS03-01	08/27/03	93	87	90	93	Pass	Pass	Pass	Pass
PEN18 GS17-01 1:10	08/27/03	96	83	90	93	Pass	Pass	Pass	Pass
PEN18 DP31	08/27/03	100	89	90	120	Pass	Pass	Pass	Pass
PEN18 DP32	08/27/03	109	88	91	111	Pass	Pass	Pass	Pass

***Surrogate Compounds:**
S1 = 1,2- Dichloroethane-D4
S2 = 1,2-Difluorobenzene
S3 = Toluene-D8
S4 = 4-Bromofluorobenzene

KB LABS, INC.

Table 1: Analytical Run Sequence/Surrogate Percent Recoveries

Client: Tetra Tech NUS	**Driller/Sampler**: Prosonic	**Analyst:** Yael Hoogland
Site: NAS Pensacola CTO 313	**KB Labs Project Manager**: Kelly Bergdoll	**KB Labs Project No:** 03-106
On-site Dates: 08/25/03-08/29/03	**Client Project Manager**: Chuck Metz	**Matrix:** Water

Sample ID	Date of Analysis	Surrogate % Recovery				Surrogate Control Limits: 80%(LCL) to 120%(UCL)			
		S1*	S2*	S3*	S4*	S1*	S2*	S3*	S4*
PEN18 DP33 1:20	08/27/03	95	89	91	102	Pass	Pass	Pass	Pass
PEN18 DP34 1:20	08/27/03	96	88	92	99	Pass	Pass	Pass	Pass
PEN18 DP29 RE	08/27/03	105	85	89	120	Pass	Pass	Pass	Pass
PEN 18 DP32 1:20RE	08/27/03	95	85	91	97	Pass	Pass	Pass	Pass
PEN18 GS13-01	08/27/03	92	82	93	91	Pass	Pass	Pass	Pass
PEN18 GS11-01	08/27/03	103	85	93	92	Pass	Pass	Pass	Pass
PEN18 DP35 1:20	08/27/03	100	86	91	115	Pass	Pass	Pass	Pass
PEN18 DP36	08/27/03	92	87	90	96	Pass	Pass	Pass	Pass
PEN18 DP37 1:20	08/27/03	86	83	91	106	Pass	Pass	Pass	Pass
PEN18 DP38 1:100	08/27/03	95	83	91	99	Pass	Pass	Pass	Pass
PEN18 DP39 1:2	08/27/03	98	86	92	109	Pass	Pass	Pass	Pass
PEN18 DP26MS	08/27/03	98	90	92	94	Pass	Pass	Pass	Pass
PEN18 DP26MSD	08/27/03	94	84	93	98	Pass	Pass	Pass	Pass
PEN18 DUO1 1:2	08/27/03	107	89	95	145	Pass	Pass	Pass	> UCL
PEN18 DU02	08/27/03	96	84	95	120	Pass	Pass	Pass	Pass
CCS	08/27/03	90	87	92	97	Pass	Pass	Pass	Pass
BFB	08/28/03	116	100	95	96	Pass	Pass	Pass	Pass
BFB	08/28/03	84	83	99	94	Pass	Pass	Pass	Pass
VSTD20	08/28/03	88	87	97	96	Pass	Pass	Pass	Pass
LCS	08/28/03	92	92	98	98	Pass	Pass	Pass	Pass
BLANK	08/28/03	94	87	96	96	Pass	Pass	Pass	Pass
PEN18 DU02 1:10RE	08/28/03	103	95	92	92	Pass	Pass	Pass	Pass
PEN18 DU01 1:100 RE	08/28/03	93	95	93	95	Pass	Pass	Pass	Pass
PEN18 DP10 G19 1:5	08/28/03	97	89	91	100	Pass	Pass	Pass	Pass
PEN18 DP02 G19 1:10	08/28/03	103	97	94	94	Pass	Pass	Pass	Pass
PEN18 DUP01-01 1:5	08/28/03	90	84	92	98	Pass	Pass	Pass	Pass
PEN18 DP13 G19 1:100	08/28/03	91	86	90	98	Pass	Pass	Pass	Pass
PEN18 GS01-01 1:50	08/28/03	91	85	91	92	Pass	Pass	Pass	Pass
PEN18 GS02-01 1:10	08/28/03	89	83	89	94	Pass	Pass	Pass	Pass
PEN18 GS21-01	08/28/03	99	89	88	93	Pass	Pass	Pass	Pass
PEN18 EB01-01	08/28/03	107	87	88	90	Pass	Pass	Pass	Pass
PEN18 DP37 1:100RE	08/28/03	92	83	90	92	Pass	Pass	Pass	Pass
PEN18 DP38 1:500RE	08/28/03	91	85	89	97	Pass	Pass	Pass	Pass
PEN18 DP42	08/28/03	87	83	94	104	Pass	Pass	Pass	Pass
PEN18 DP41	08/28/03	86	87	93	90	Pass	Pass	Pass	Pass
PEN18 DP40 1:10	08/28/03	110	90	88	92	Pass	Pass	Pass	Pass
PEN18 GS21-01MS	08/28/03	97	92	91	94	Pass	Pass	Pass	Pass
PEN18 GS21-01MSD	08/28/03	105	94	91	91	Pass	Pass	Pass	Pass

***Surrogate Compounds:**
S1 = 1,2- Dichloroethane-D4
S2 = 1,2-Difluorobenzene
S3 = Toluene-D8
S4 = 4-Bromofluorobenzene

KB LABS, INC.

Table 1: Analytical Run Sequence/Surrogate Percent Recoveries

Client: Tetra Tech NUS	**Driller/Sampler**: Prosonic	**Analyst:** Yael Hoogland
Site: NAS Pensacola CTO 313	**KB Labs Project Manager**: Kelly Bergdoll	**KB Labs Project No:** 03-106
On-site Dates: 08/25/03-08/29/03	**Client Project Manager**: Chuck Metz	**Matrix:** Water

Sample ID	Date of Analysis	Surrogate % Recovery				Surrogate Control Limits: 80%(LCL) to 120%(UCL)			
		S1*	S2*	S3*	S4*	S1*	S2*	S3*	S4*
PEN18 DP40RE	08/28/03	126	98	94	118	> UCL	Pass	Pass	Pass
CCS	08/28/03	102	90	91	95	Pass	Pass	Pass	Pass
BFB	08/29/03	114	102	90	100	Pass	Pass	Pass	Pass
BFB	08/29/03	82	88	98	98	Pass	Pass	Pass	Pass
VSTD20	08/29/03	91	88	95	97	Pass	Pass	Pass	Pass
LCS	08/29/03	91	88	92	95	Pass	Pass	Pass	Pass
BLANK	08/29/03	95	91	89	95	Pass	Pass	Pass	Pass
PEN18 DP43	08/29/03	90	84	92	95	Pass	Pass	Pass	Pass
PEN18 DP45	08/29/03	86	85	94	95	Pass	Pass	Pass	Pass
PEN18 DP46	08/29/03	101	94	92	96	Pass	Pass	Pass	Pass
PEN18 DP47	08/29/03	102	88	94	119	Pass	Pass	Pass	Pass
PEN18 DP52 1:20	08/29/03	109	88	94	118	Pass	Pass	Pass	Pass
PEN18 DP44 RE	08/29/03	98	88	98	120	Pass	Pass	Pass	Pass
PEN18 DP49 1:10	08/29/03	94	82	97	102	Pass	Pass	Pass	Pass
PEN18 DP50 1:20	08/29/03	96	84	92	104	Pass	Pass	Pass	Pass
PEN18 DP51 1:20	08/29/03	101	87	93	100	Pass	Pass	Pass	Pass
PEN18 DP55	08/29/03	94	84	91	104	Pass	Pass	Pass	Pass
PEN18 DP48	08/29/03	99	90	94	96	Pass	Pass	Pass	Pass
PEN18 DP02 G34 1:5	08/29/03	84	80	92	106	Pass	Pass	Pass	Pass
PEN18 DP54	08/29/03	96	86	93	93	Pass	Pass	Pass	Pass
PEN18 DP10 G34	08/29/03	112	96	94	112	Pass	Pass	Pass	Pass
PEN18 DP02 G50	08/29/03	102	88	92	92	Pass	Pass	Pass	Pass
PEN18 DP10 G50	08/29/03	102	94	93	129	Pass	Pass	Pass	> UCL
PEN18 DP53	08/29/03	100	88	93	94	Pass	Pass	Pass	Pass
PEN18 DU03	08/29/03	102	91	93	93	Pass	Pass	Pass	Pass
PEN18 DP56	08/29/03	95	84	92	94	Pass	Pass	Pass	Pass
PEN18 DP43MS	08/29/03	93	82	94	92	Pass	Pass	Pass	Pass
PEN18 DP43MSD	08/29/03	94	85	92	90	Pass	Pass	Pass	Pass
CCS	08/29/03	95	84	91	92	Pass	Pass	Pass	Pass
Comments:	Although some surrogates may be out of the control percent recovery range (80% to 120%), other supporting QC, such as matrix spikes, matrix spike duplicates, method blanks, and laboratory control samples, are performed by KB Labs to further validate								

Signature: _____

Title: Director of Operations

Date: _____

***Surrogate Compounds:**

S1 = 1,2- Dichloroethane-D4
S2 = 1,2-Difluorobenzene
S3 = Toluene-D8
S4 = 4-Bromofluorobenzene

KB LABS, INC.

Table 2: VOC Spike Compound Percent Recoveries

Client: Tetra Tech NUS	**Driller/Sampler:** Prosonic	**Analyst:** Yael Hoogland
Site: NAS Pensacola CTO 313	**KB Labs Project Manager:** Kelly Bergdoll	**KB Labs Project No.:** 03-106
On-site Dates: 08/25/03-08/29/03	**Client Project Manager:** Chuck Metz	**Matrix:**Water

Matrix Spike/Matrix Spike Duplicate (MS/MSD):

Samples: PEN18 DP03MS, PEN18 DP03MSD **Date of Analysis:** 8/25/2003

Matrix Spike Compounds	Control Limits			Percent Recoveries			Control Limit Checks		
	Lower	Upper	RPD	MS	MSD	RPD	MS	MSD	RPD
MTBE	57	175	20	87	82	6	Pass	Pass	Pass
Benzene	63	135	20	95	87	9	Pass	Pass	Pass
Toluene	66	130	20	96	90	6	Pass	Pass	Pass
2-Methyl Naphthalene	53	147	20	67	82	19	Pass	Pass	Pass
1-Methyl Naphthalene	61	139	20	70	80	14	Pass	Pass	Pass
Ethylbenzene	64	136	20	99	93	6	Pass	Pass	Pass
m,p-Xylene	55	143	20	89	91	2	Pass	Pass	Pass
o-Xylene	62	136	20	87	89	2	Pass	Pass	Pass
Naphthalene	0	233	20	72	78	8	Pass	Pass	Pass

Note: Control Limits are based on a semi-annual historical evaluation of mobile unit.

Samples: PEN18 DP16MS, PEN18 DP16MSD **Date of Analysis:** 8/26/2003

Matrix Spike Compounds	Control Limits			Percent Recoveries			Control Limit Checks		
	Lower	Upper	RPD	MS	MSD	RPD	MS	MSD	RPD
MTBE	57	175	20	106	104	2	Pass	Pass	Pass
Benzene	63	135	20	93	92	1	Pass	Pass	Pass
Toluene	66	130	20	90	91	1	Pass	Pass	Pass
2-Methyl Naphthalene	53	147	20	92	88	4	Pass	Pass	Pass
1-Methyl Naphthalene	61	139	20	91	93	2	Pass	Pass	Pass
Ethylbenzene	64	136	20	92	93	1	Pass	Pass	Pass
m,p-Xylene	55	143	20	83	87	5	Pass	Pass	Pass
o-Xylene	62	136	20	88	88	0	Pass	Pass	Pass
Naphthalene	0	233	20	92	92	0	Pass	Pass	Pass

Note: Control Limits are based on a semi-annual historical evaluation of mobile unit.

Samples: PEN18 DP26MS, PEN18 DP26MSD **Date of Analysis:** 8/27/2003

Matrix Spike Compounds	Control Limits			Percent Recoveries			Control Limit Checks		
	Lower	Upper	RPD	MS	MSD	RPD	MS	MSD	RPD
MTBE	57	175	20	99	96	3	Pass	Pass	Pass
Benzene	63	135	20	94	87	7	Pass	Pass	Pass
Toluene	66	130	20	96	98	2	Pass	Pass	Pass
2-Methyl Naphthalene	53	147	20	112	104	7	Pass	Pass	Pass
1-Methyl Naphthalene	61	139	20	115	105	9	Pass	Pass	Pass
Ethylbenzene	64	136	20	97	96	1	Pass	Pass	Pass
m,p-Xylene	55	143	20	89	88	1	Pass	Pass	Pass
o-Xylene	62	136	20	90	91	2	Pass	Pass	Pass
Naphthalene	0	233	20	102	104	2	Pass	Pass	Pass

Note: Control Limits are based on a semi-annual historical evaluation of mobile unit.

KB LABS, INC.

Table 2: VOC Spike Compound Percent Recoveries

Client: Tetra Tech NUS	**Driller/Sampler**: Prosonic	**Analyst:** Yael Hoogland
Site: NAS Pensacola CTO 313	**KB Labs Project Manager:** Kelly Bergdoll	**KB Labs Project No.:** 03-106
On-site Dates: 08/25/03-08/29/03	**Client Project Manager:** Chuck Metz	**Matrix:**Water

Samples: PEN18 GS21-01MS
PEN18 GS21-01MSD
Date of Analysis: 8/28/2003

Matrix Spike Compounds	Control Limits			Percent Recoveries			Control Limit Checks		
	Lower	Upper	RPD	MS	MSD	RPD	MS	MSD	RPD
MTBE	57	175	20	112	117	4	Pass	Pass	Pass
Benzene	63	135	20	84	88	5	Pass	Pass	Pass
Toluene	66	130	20	83	82	1	Pass	Pass	Pass
2-Methyl Naphthalene	53	147	20	123	125	2	Pass	Pass	Pass
1-Methyl Naphthalene	61	139	20	121	118	2	Pass	Pass	Pass
Ethylbenzene	64	136	20	94	94	1	Pass	Pass	Pass
m,p-Xylene	55	143	20	80	78	3	Pass	Pass	Pass
o-Xylene	62	136	20	78	79	1	Pass	Pass	Pass
Naphthalene	0	233	20	101	105	4	Pass	Pass	Pass

Note: Control Limits are based on a semi-annual historical evaluation of mobile unit.

Samples: PEN18 DP43MS
P[EN18 DP43MSD
Date of Analysis: 8/29/2003

Matrix Spike Compounds	Control Limits			Percent Recoveries			Control Limit Checks		
	Lower	Upper	RPD	MS	MSD	RPD	MS	MSD	RPD
MTBE	57	175	20	91	101	10	Pass	Pass	Pass
Benzene	63	135	20	74	77	4	Pass	Pass	Pass
Toluene	66	130	20	85	87	2	Pass	Pass	Pass
2-Methyl Naphthalene	53	147	20	107	121	12	Pass	Pass	Pass
1-Methyl Naphthalene	61	139	20	107	123	13	Pass	Pass	Pass
Ethylbenzene	64	136	20	88	90	3	Pass	Pass	Pass
m,p-Xylene	55	143	20	80	80	1	Pass	Pass	Pass
o-Xylene	62	136	20	78	80	2	Pass	Pass	Pass
Naphthalene	0	233	20	101	100	1	Pass	Pass	Pass

Note: Control Limits are based on a semi-annual historical evaluation of mobile unit.

KB LABS, INC.

Table 2: VOC Spike Compound Percent Recoveries

Client: Tetra Tech NUS	**Driller/Sampler:** Prosonic	**Analyst:** Yael Hoogland
Site: NAS Pensacola CTO 313	**KB Labs Project Manager:** Kelly Bergdoll	**KB Labs Project No.:** 03-106
On-site Dates: 08/25/03-08/29/03	**Client Project Manager:** Chuck Metz	**Matrix:**Water

Laboratory Control Spikes (LCS):

Samples: LCS 1, LCS 2, LCS 3 — **Date of Analysis:** 8/25/2003, 8/26/2003, 8/27/2003

Spike Compounds	Control Limits			Percent Recoveries			Control Limit Checks		
	Lower		Upper	LCS#1	LCS#2	LCS#3	LCS#1	LCS#2	LCS#3
MTBE	70	to	130	107	111	105	Pass	Pass	Pass
Benzene	70	to	130	96	102	96	Pass	Pass	Pass
Toluene	70	to	130	99	98	106	Pass	Pass	Pass
2-Methyl Naphthalene	70	to	130	118	115	106	Pass	Pass	Pass
1-Methyl Naphthalene	70	to	130	114	107	99	Pass	Pass	Pass
Ethylbenzene	70	to	130	97	100	105	Pass	Pass	Pass
m,p-Xylene	70	to	130	90	96	98	Pass	Pass	Pass
o-Xylene	70	to	130	90	97	96	Pass	Pass	Pass
Naphthalene	70	to	130	108	105	103	Pass	Pass	Pass

Note: Control limits are based on method guidance.

Samples: LCS 4, LCS 5 — **Date of Analysis:** 8/28/2003, 8/29/2003

Spike Compounds	Control Limits			Percent Recoveries			Control Limit Checks		
	Lower		Upper	LCS#4	LCS#5		LCS#4	LCS#5	
MTBE	70	to	130	94	106		Pass	Pass	
Benzene	70	to	130	93	97		Pass	Pass	
Toluene	70	to	130	103	107		Pass	Pass	
2-Methyl Naphthalene	70	to	130	109	119		Pass	Pass	
1-Methyl Naphthalene	70	to	130	96	112		Pass	Pass	
Ethylbenzene	70	to	130	106	109		Pass	Pass	
m,p-Xylene	70	to	130	99	100		Pass	Pass	
o-Xylene	70	to	130	95	97		Pass	Pass	
Naphthalene	70	to	130	105	114		Pass	Pass	

Note: Control limits are based on method guidance.

Signature: _____

Title: Director of Operations

Date: _____

PROJ_NO: 0844

SDG: 3131 MEDIA: WATER DATA FRACTION: OVG

nsample	PEN-18-GM24-01	nsample	PEN-18-GS03	nsample	PEN-18-GS04
samp_date	8/26/2003	samp_date	8/27/2003	samp_date	8/26/2003
lab_id	0308588-09A	lab_id	0308588-04A	lab_id	0308588-02A
qc_type	NM	qc_type	NM	qc_type	NM
units	MG/L	units	MG/L	units	MG/L
Pct_Solids	0	Pct_Solids	0	Pct_Solids	0
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
ETHANE	0.01	U	U	
ETHENE	0.01	U	U	
METHANE	0.062			

Parameter	Result	Lab Qual	Val Qual	Qual Code
ETHANE	0.01	U	U	
ETHENE	0.01	U	U	
METHANE	4.3			

Parameter	Result	Lab Qual	Val Qual	Qual Code
ETHANE	0.01	U	U	
ETHENE	0.01	U	U	
METHANE	1.3			

PROJ_NO: 0844

SDG: 3131 MEDIA: WATER DATA FRACTION: OVG

nsample	PEN-18-GS05	nsample	PEN-18-GS06-01	nsample	PEN-18-GS11
samp_date	8/26/2003	samp_date	8/26/2003	samp_date	8/27/2003
lab_id	0308588-03A	lab_id	0308588-08A	lab_id	0308588-07A
qc_type	NM	qc_type	NM	qc_type	NM
units	MG/L	units	MG/L	units	MG/L
Pct_Solids	0	Pct_Solids	0	Pct_Solids	0
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
ETHANE	0.01	U	U	
ETHENE	0.01	U	U	
METHANE	0.42			

Parameter	Result	Lab Qual	Val Qual	Qual Code
ETHANE	0.01	U	U	
ETHENE	0.01	U	U	
METHANE	0.16			

Parameter	Result	Lab Qual	Val Qual	Qual Code
ETHANE	0.01	U	U	
ETHENE	0.01	U	U	
METHANE	0.01	U	U	

PROJ_NO: 0844

SDG: 3131 MEDIA: WATER DATA FRACTION: OVG

nsample	PEN-18-GS13
samp_date	8/27/2003
lab_id	0308588-06A
qc_type	NM
units	MG/L
Pct_Solids	0
DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
ETHANE	0.01	U	U	
ETHENE	0.01	U	U	
METHANE	0.01	U	U	

nsample	PEN-18-GS17
samp_date	8/27/2003
lab_id	0308588-05A
qc_type	NM
units	MG/L
Pct_Solids	0
DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
ETHANE	0.01	U	U	
ETHENE	0.01	U	U	
METHANE	11			

nsample	PEN-18-GS20
samp_date	8/26/2003
lab_id	0308588-01A
qc_type	NM
units	MG/L
Pct_Solids	0
DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
ETHANE	0.01	U	U	
ETHENE	0.01	U	U	
METHANE	0.76			

PROJ_NO: 0844

SDG: 3131 MEDIA: WATER DATA FRACTION: PET

nsample	PEN18-DPT02	nsample	PEN18-DPT05	nsample	PEN18-DPT06
samp_date	8/25/2003	samp_date	8/25/2003	samp_date	8/25/2003
lab_id	WT2073-2DL	lab_id	WT2073-1	lab_id	WT2073-3
qc_type	NM	qc_type	NM	qc_type	NM
units	UG/L	units	UG/L	units	UG/L
Pct_Solids	0	Pct_Solids	0	Pct_Solids	0
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
TOTAL PETROLEUM HYDROCARBONS	7200			

Parameter	Result	Lab Qual	Val Qual	Qual Code
TOTAL PETROLEUM HYDROCARBONS	500	U	U	

Parameter	Result	Lab Qual	Val Qual	Qual Code
TOTAL PETROLEUM HYDROCARBONS	1500			

PROJ_NO: 0844

SDG: 3131 MEDIA: WATER DATA FRACTION: PET

nsample	PEN18-DPT07	nsample	PEN18-DPT08	nsample	PEN-18-DPT39
samp_date	8/25/2003	samp_date	8/25/2003	samp_date	8/27/2003
lab_id	WT2073-4	lab_id	WT2073-5	lab_id	WT2084-7DL
qc_type	NM	qc_type	NM	qc_type	NM
units	UG/L	units	UG/L	units	UG/L
Pct_Solids	0	Pct_Solids	0	Pct_Solids	0
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
TOTAL PETROLEUM HYDROCARBONS	500	U	U	

Parameter	Result	Lab Qual	Val Qual	Qual Code
TOTAL PETROLEUM HYDROCARBONS	1500			

Parameter	Result	Lab Qual	Val Qual	Qual Code
TOTAL PETROLEUM HYDROCARBONS	6800		J	G

PROJ_NO: 0844

SDG: 3131 MEDIA: WATER DATA FRACTION: PET

nsample	PEN-18-DU02	nsample	PEN18-GM24-01	nsample	PEN-18-GS03
samp_date	8/27/2003	samp_date	8/26/2003	samp_date	8/27/2003
lab_id	WT2084-16DL	lab_id	WT2073-11	lab_id	WT2084-8DL
qc_type	NM	qc_type	NM	qc_type	NM
units	UG/L	units	UG/L	units	UG/L
Pct_Solids	0	Pct_Solids	0	Pct_Solids	0
DUP_OF:	PEN-18-DPT39	DUP_OF:		DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
TOTAL PETROLEUM HYDROCARBONS	16000		J	G

Parameter	Result	Lab Qual	Val Qual	Qual Code
TOTAL PETROLEUM HYDROCARBONS	500	U	U	

Parameter	Result	Lab Qual	Val Qual	Qual Code
TOTAL PETROLEUM HYDROCARBONS	7300			

PROJ_NO: 0844

SDG: 3131 MEDIA: WATER DATA FRACTION: PET

nsample	PEN-18-GS04	nsample	PEN-18-GS05	nsample	PEN18-GS06-01
samp_date	8/26/2003	samp_date	8/26/2003	samp_date	8/26/2003
lab_id	WT2084-3	lab_id	WT2084-5	lab_id	WT2073-10
qc_type	NM	qc_type	NM	qc_type	NM
units	UG/L	units	UG/L	units	UG/L
Pct_Solids	0	Pct_Solids	0	Pct_Solids	0
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
TOTAL PETROLEUM HYDROCARBONS	2600			

Parameter	Result	Lab Qual	Val Qual	Qual Code
TOTAL PETROLEUM HYDROCARBONS	900			

Parameter	Result	Lab Qual	Val Qual	Qual Code
TOTAL PETROLEUM HYDROCARBONS	820			

PROJ_NO: 0844

SDG: 3131 MEDIA: WATER DATA FRACTION: PET

nsample	PEN18-GS07-01	nsample	PEN18-GS08-01	nsample	PEN-18-GS11
samp_date	8/26/2003	samp_date	8/26/2003	samp_date	8/27/2003
lab_id	WT2073-7DL	lab_id	WT2073-8	lab_id	WT2084-14
qc_type	NM	qc_type	NM	qc_type	NM
units	UG/L	units	UG/L	units	UG/L
Pct_Solids	0	Pct_Solids	0	Pct_Solids	0
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
TOTAL PETROLEUM HYDROCARBONS	30000			

Parameter	Result	Lab Qual	Val Qual	Qual Code
TOTAL PETROLEUM HYDROCARBONS	620			

Parameter	Result	Lab Qual	Val Qual	Qual Code
TOTAL PETROLEUM HYDROCARBONS	500	U	U	

PROJ_NO: 0844

SDG: 3131 MEDIA: WATER DATA FRACTION: PET

nsample	PEN-18-GS13	nsample	PEN-18-GS17	nsample	PEN18-GS18-01
samp_date	8/27/2003	samp_date	8/27/2003	samp_date	8/25/2003
lab_id	WT2084-12	lab_id	WT2084-10DL	lab_id	WT2073-6DL
qc_type	NM	qc_type	NM	qc_type	NM
units	UG/L	units	UG/L	units	UG/L
Pct_Solids	0	Pct_Solids	0	Pct_Solids	0
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
TOTAL PETROLEUM HYDROCARBONS	500	U	U	

Parameter	Result	Lab Qual	Val Qual	Qual Code
TOTAL PETROLEUM HYDROCARBONS	15000			

Parameter	Result	Lab Qual	Val Qual	Qual Code
TOTAL PETROLEUM HYDROCARBONS	9500			

PROJ_NO: 0844

SDG: 3131 MEDIA: WATER DATA FRACTION: PET

nsample	PEN18-GS19-01	nsample	PEN-18-GS20
samp_date	8/26/2003	samp_date	8/26/2003
lab_id	WT2073-9	lab_id	WT2084-1
qc_type	NM	qc_type	NM
units	UG/L	units	UG/L
Pct_Solids	0	Pct_Solids	0
DUP_OF:		DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
TOTAL PETROLEUM HYDROCARBONS	3000			

Parameter	Result	Lab Qual	Val Qual	Qual Code
TOTAL PETROLEUM HYDROCARBONS	500	U	U	

PROJ_NO: 0844

SDG: 3131 MEDIA: WATER DATA FRACTION: M

nsample	PEN18-GM24-01	nsample	PEN-18-GS03	nsample	PEN-18-GS04
samp_date	8/26/2003	samp_date	8/27/2003	samp_date	8/26/2003
lab_id	WT2073-011	lab_id	WT2084-008	lab_id	WT2084-003
qc_type	NM	qc_type	NM	qc_type	NM
units	UG/L	units	UG/L	units	UG/L
Pct_Solids	0	Pct_Solids	0	Pct_Solids	0
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	666			
MANGANESE	5.6			

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	3000			
MANGANESE	31.4			

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	890			
MANGANESE	22.7			

PROJ_NO: 0844

SDG: 3131 MEDIA: WATER DATA FRACTION: M

nsample	PEN-18-GS05
samp_date	8/26/2003
lab_id	WT2084-005
qc_type	NM
units	UG/L
Pct_Solids	0
DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	494			
MANGANESE	7.4			

nsample	PEN18-GS06-01
samp_date	8/26/2003
lab_id	WT2073-010
qc_type	NM
units	UG/L
Pct_Solids	0
DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	484			
MANGANESE	17.9			

nsample	PEN-18-GS11
samp_date	8/27/2003
lab_id	WT2084-014
qc_type	NM
units	UG/L
Pct_Solids	0
DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	462			
MANGANESE	1.4	B	U	A

PROJ_NO: 0844

SDG: 3131 MEDIA: WATER DATA FRACTION: M

nsample	PEN-18-GS13
samp_date	8/27/2003
lab_id	WT2084-012
qc_type	NM
units	UG/L
Pct_Solids	0
DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	3070			
MANGANESE	7.3			

nsample	PEN-18-GS17
samp_date	8/27/2003
lab_id	WT2084-010
qc_type	NM
units	UG/L
Pct_Solids	0
DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	366			
MANGANESE	8.8			

nsample	PEN-18-GS20
samp_date	8/26/2003
lab_id	WT2084-001
qc_type	NM
units	UG/L
Pct_Solids	0
DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	530			
MANGANESE	10.0			

PROJ_NO: 0844

SDG: 3131 MEDIA: WATER DATA FRACTION: MF

nsample	PEN18-GM24-01	nsample	PEN-18-GS03	nsample	PEN-18-GS04
samp_date	8/26/2003	samp_date	8/27/2003	samp_date	8/26/2003
lab_id	WT2073-013	lab_id	WT2084-009	lab_id	WT2084-004
qc_type	NM	qc_type	NM	qc_type	NM
units	UG/L	units	UG/L	units	UG/L
Pct_Solids	0	Pct_Solids	0	Pct_Solids	0
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	97.9	B	U	A
MANGANESE	5.6			

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	2880			
MANGANESE	29.9			

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	409			
MANGANESE	21.6			

PROJ_NO: 0844

SDG: 3131 MEDIA: WATER DATA FRACTION: MF

nsample	PEN-18-GS05	nsample	PEN18-GS06-01	nsample	PEN-18-GS11
samp_date	8/26/2003	samp_date	8/26/2003	samp_date	8/27/2003
lab_id	WT2084-006	lab_id	WT2073-012	lab_id	WT2084-015
qc_type	NM	qc_type	NM	qc_type	NM
units	UG/L	units	UG/L	units	UG/L
Pct_Solids	0	Pct_Solids	0	Pct_Solids	0
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	443			
MANGANESE	6.8			

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	328			
MANGANESE	19.8			

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	386			
MANGANESE	1.3	B	U	A

PROJ_NO: 0844

SDG: 3131 MEDIA: WATER DATA FRACTION: MF

nsample	PEN-18-GS13	nsample	PEN-18-GS17	nsample	PEN-18-GS20
samp_date	8/27/2003	samp_date	8/27/2003	samp_date	8/26/2003
lab_id	WT2084-013	lab_id	WT2084-011	lab_id	WT2084-002
qc_type	NM	qc_type	NM	qc_type	NM
units	UG/L	units	UG/L	units	UG/L
Pct_Solids	0	Pct_Solids	0	Pct_Solids	0
DUP_OF:		DUP_OF:		DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	1300			
MANGANESE	5.6			

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	371			
MANGANESE	9.6			

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	448			
MANGANESE	8.9			

AIR TOXICS LTD.

SAMPLE NAME: PEN-18-GS03

ID#: 0308588-04A

MODIFIED METHOD RSK-175 GC/FID

[redacted]

Compound	Rpt. Limit (ug/ml)	Amount (ug/ml)
Methane	0.010	4.3
Ethane	0.010	Not Detected
Ethene	0.010	Not Detected

Container Type: VOA Vial-40 mL

AIR TOXICS LTD.

SAMPLE NAME: PEN-18-GS04

ID#: 0308588-02A

MODIFIED METHOD RSK-175 GC/FID

[redacted]

Compound	Rpt. Limit (ug/ml)	Amount (ug/ml)
Methane	0.010	1.3
Ethane	0.010	Not Detected
Ethene	0.010	Not Detected

Container Type: VOA Vial-40 mL

AIR TOXICS LTD.

SAMPLE NAME: PEN-18-GS05

ID#: 0308588-03A

MODIFIED METHOD RSK-175 GC/FID

[redacted]

Compound	Rpt. Limit (ug/ml)	Amount (ug/ml)
Methane	0.010	0.42
Ethane	0.010	Not Detected
Ethene	0.010	Not Detected

Container Type: VOA Vial-40 mL

AIR TOXICS LTD.

SAMPLE NAME: PEN-18-GS06-01

ID#: 0308588-08A

MODIFIED METHOD RSK-175 GC/FID

Compound	Rpt. Limit (ug/ml)	Amount (ug/ml)
Methane	0.010	0.16
Ethane	0.010	Not Detected
Ethene	0.010	Not Detected

Container Type: VOA Vial-40 mL

AIR TOXICS LTD.

SAMPLE NAME: PEN-18-GS11

ID#: 0308588-07A

MODIFIED METHOD RSK-175 GC/FID

[redacted]

Compound	Rpt. Limit (ug/ml)	Amount (ug/ml)
Methane	0.010	Not Detected
Ethane	0.010	Not Detected
Ethene	0.010	Not Detected

Container Type: VOA Vial-40 mL

AIR TOXICS LTD.

SAMPLE NAME: PEN-18-GS13

ID#: 0308588-06A

MODIFIED METHOD RSK-175 GC/FID

Compound	Rpt. Limit (ug/ml)	Amount (ug/ml)
Methane	0.010	Not Detected
Ethane	0.010	Not Detected
Ethene	0.010	Not Detected

Container Type: VOA Vial-40 mL

AIR TOXICS LTD.

SAMPLE NAME: PEN-18-GS17

ID#: 0308588-05A

MODIFIED METHOD RSK-175 GC/FID

[redacted]

Compound	Rpt. Limit (ug/ml)	Amount (ug/ml)
Methane	0.010	11
Ethane	0.010	Not Detected
Ethene	0.010	Not Detected

Container Type: VOA Vial-40 mL

AIR TOXICS LTD.

SAMPLE NAME: PEN-18-GS20

ID#: 0308588-01A

MODIFIED METHOD RSK-175 GC/FID

Compound	Rpt. Limit (ug/ml)	Amount (ug/ml)
Methane	0.010	0.76
Ethane	0.010	Not Detected
Ethene	0.010	Not Detected

Container Type: VOA Vial-40 mL

KATAHDIN ANALYTICAL SERVICES
Report of Analytical Results

Client: Tetra Tech NUS, Inc
Project: CTO 313 NAS PENSACOLA
PO No:
Sample Date: 08/25/03
Received Date: 08/27/03
Extraction Date: 08/28/03
Analysis Date: 09/11/03
Report Date: 09/15/2003
Matrix: WATER
% Solids: NA

Lab ID: WT2073-2DL
Client ID: PEN18-DPT02
SDG: CTO313-1
Extracted by: AZ
Extraction Method: SW846 3510
Analyst: SAW
Analysis Method: SW846 M8100
Lab Prep Batch: WG3320
Units: ug/L

CAS#	Compound	Flags	Results	DF	PQL	Adj.PQL	Adj.MDL
	Petroleum Range Organics		7200	3.0	500	1400	800
	n-Triacontane-D62		96%				
	O-Terphenyl		84%				

KATAHDIN ANALYTICAL SERVICES
Report of Analytical Results

Client: Tetra Tech NUS, Inc
Project: CTO 313 NAS PENSACOLA
PO No:
Sample Date: 08/25/03
Received Date: 08/27/03
Extraction Date: 08/28/03
Analysis Date: 08/30/03
Report Date: 09/15/2003
Matrix: WATER
% Solids: NA

Lab ID: WT2073-1
Client ID: PEN18-DPT05
SDG: CTO313-1
Extracted by: AZ
Extraction Method: SW846 3510
Analyst: SAW
Analysis Method: SW846 M8100
Lab Prep Batch: WG3320
Units: ug/L

CAS#	Compound	Flags	Results	DF	PQL	Adj.PQL	Adj.MDL
	Petroleum Range Organics	U	500	1.0	500	500	270
	n-Triacontane-D62		82%				
	O-Terphenyl		* 67%				

KATAHDIN ANALYTICAL SERVICES
Report of Analytical Results

Client: Tetra Tech NUS, Inc
Project: CTO 313 NAS PENSACOLA
PO No:
Sample Date: 08/25/03
Received Date: 08/27/03
Extraction Date: 08/28/03
Analysis Date: 08/30/03
Report Date: 09/15/2003
Matrix: WATER
% Solids: NA

Lab ID: WT2073-3
Client ID: PEN18-DPT06
SDG: CTO313-1
Extracted by: AZ
Extraction Method: SW846 3510
Analyst: SAW
Analysis Method: SW846 M8100
Lab Prep Batch: WG3320
Units: ug/L

CAS#	Compound	Flags	Results	DF	PQL	Adj.PQL	Adj.MDL
	Petroleum Range Organics		1500	1.0	500	500	270
	n-Triacontane-D62		90%				
	O-Terphenyl		* 74%				

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KATAHDIN ANALYTICAL SERVICES
Report of Analytical Results

Client: Tetra Tech NUS, Inc
Project: CTO 313 NAS PENSACOLA
PO No:
Sample Date: 08/25/03
Received Date: 08/27/03
Extraction Date: 08/28/03
Analysis Date: 08/30/03
Report Date: 09/15/2003
Matrix: WATER
% Solids: NA

Lab ID: WT2073-4
Client ID: PEN18-DPT07
SDG: CTO313-1
Extracted by: AZ
Extraction Method: SW846 3510
Analyst: SAW
Analysis Method: SW846 M8100
Lab Prep Batch: WG3320
Units: ug/L

CAS#	Compound	Flags	Results	DF	PQL	Adj.PQL	Adj.MDL
	Petroleum Range Organics	U	500	1.0	500	500	270
	n-Triacontane-D62		55%				
	O-Terphenyl		* 43%				

KATAHDIN ANALYTICAL SERVICES
Report of Analytical Results

Client: Tetra Tech NUS, Inc
Project: CTO 313 NAS PENSACOLA
PO No:
Sample Date: 08/25/03
Received Date: 08/27/03
Extraction Date: 08/28/03
Analysis Date: 08/30/03
Report Date: 09/15/2003
Matrix: WATER
% Solids: NA

Lab ID: WT2073-5
Client ID: PEN18-DPT08
SDG: CTO313-1
Extracted by: AZ
Extraction Method: SW846 3510
Analyst: SAW
Analysis Method: SW846 M8100
Lab Prep Batch: WG3320
Units: ug/L

CAS#	Compound	Flags	Results	DF	PQL	Adj.PQL	Adj.MDL
	Petroleum Range Organics		1500	1.0	500	500	270
	n-Triacontane-D62		43%				
	O-Terphenyl		* 30%				

KATAHDIN ANALYTICAL SERVICES
Report of Analytical Results

Client: Tetra Tech NUS, Inc
Project: CTO 313 NAS PENSACOLA
PO No:
Sample Date: 08/27/03
Received Date: 08/28/03
Extraction Date: 08/29/03
Analysis Date: 09/11/03
Report Date: 09/15/2003
Matrix: WATER
% Solids: NA

Lab ID: WT2084-7DL
Client ID: PEN-18-DPT39
SDG: CTO313-1
Extracted by: NB
Extraction Method: SW846 3510
Analyst: SAW
Analysis Method: SW846 M8100
Lab Prep Batch: WG3338
Units: ug/L

CAS#	Compound	Flags	Results	DF	PQL	Adj.PQL	Adj.MDL
	Petroleum Range Organics		6800	2.0	500	960	540
	n-Triacontane-D62		94%				
	O-Terphenyl		* 80%				

KATAHDIN ANALYTICAL SERVICES
Report of Analytical Results

Client: Tetra Tech NUS, Inc
Project: CTO 313 NAS PENSACOLA
PO No:
Sample Date: 08/27/03
Received Date: 08/28/03
Extraction Date: 08/29/03
Analysis Date: 09/12/03
Report Date: 09/15/2003
Matrix: WATER
% Solids: NA

Lab ID: WT2084-16DL
Client ID: PEN-18-DU02
SDG: CTO313-1
Extracted by: NB
Extraction Method: SW846 3510
Analyst: SAW
Analysis Method: SW846 M8100
Lab Prep Batch: WG3338
Units: ug/L

CAS#	Compound	Flags	Results	DF	PQL	Adj.PQL	Adj.MDL
	Petroleum Range Organics		16000	5.0	500	2400	1400
	n-Triacontane-D62		106%				
	O-Terphenyl		* 79%				

KATAHDIN ANALYTICAL SERVICES
Report of Analytical Results

Client: Tetra Tech NUS, Inc
Project: CTO 313 NAS PENSACOLA
PO No:
Sample Date: 08/26/03
Received Date: 08/27/03
Extraction Date: 08/28/03
Analysis Date: 08/30/03
Report Date: 09/15/2003
Matrix: WATER
% Solids: NA

Lab ID: WT2073-11
Client ID: PEN18-GM24-01
SDG: CTO313-1
Extracted by: AZ
Extraction Method: SW846 3510
Analyst: SAW
Analysis Method: SW846 M8100
Lab Prep Batch: WG3320
Units: ug/L

CAS#	Compound	Flags	Results	DF	PQL	Adj.PQL	Adj.MDL
	Petroleum Range Organics	U	500	1.0	500	500	270
	n-Triacontane-D62		85%				
	O-Terphenyl		* 69%				

KATAHDIN ANALYTICAL SERVICES
Report of Analytical Results

Client: Tetra Tech NUS, Inc
Project: CTO 313 NAS PENSACOLA
PO No:
Sample Date: 08/27/03
Received Date: 08/28/03
Extraction Date: 08/29/03
Analysis Date: 09/11/03
Report Date: 09/15/2003
Matrix: WATER
% Solids: NA

Lab ID: WT2084-8DL
Client ID: PEN-18-GS03
SDG: CTO313-1
Extracted by: NB
Extraction Method: SW846 3510
Analyst: SAW
Analysis Method: SW846 M8100
Lab Prep Batch: WG3338
Units: ug/L

CAS#	Compound	Flags	Results	DF	PQL	Adj.PQL	Adj.MDL
	Petroleum Range Organics		7300	2.0	500	950	540
	n-Triacontane-D62		101%				
	O-Terphenyl		82%				

KATAHDIN ANALYTICAL SERVICES
Report of Analytical Results

Client: Tetra Tech NUS, Inc
Project: CTO 313 NAS PENSACOLA
PO No:
Sample Date: 08/26/03
Received Date: 08/28/03
Extraction Date: 08/29/03
Analysis Date: 09/10/03
Report Date: 09/15/2003
Matrix: WATER
% Solids: NA

Lab ID: WT2084-3
Client ID: PEN-18-GS04
SDG: CTO313-1
Extracted by: NB
Extraction Method: SW846 3510
Analyst: SAW
Analysis Method: SW846 M8100
Lab Prep Batch: WG3338
Units: ug/L

CAS#	Compound	Flags	Results	DF	PQL	Adj.PQL	Adj.MDL
	Petroleum Range Organics		2600	1.0	500	500	270
	n-Triacontane-D62		99%				
	O-Terphenyl		82%				

KATAHDIN ANALYTICAL SERVICES
Report of Analytical Results

Client: Tetra Tech NUS, Inc
Project: CTO 313 NAS PENSACOLA
PO No:
Sample Date: 08/26/03
Received Date: 08/28/03
Extraction Date: 08/29/03
Analysis Date: 09/11/03
Report Date: 09/15/2003
Matrix: WATER
% Solids: NA

Lab ID: WT2084-5
Client ID: PEN-18-GS05
SDG: CTO313-1
Extracted by: NB
Extraction Method: SW846 3510
Analyst: SAW
Analysis Method: SW846 M8100
Lab Prep Batch: WG3338
Units: ug/L

CAS#	Compound	Flags	Results	DF	PQL	Adj.PQL	Adj.MDL
	Petroleum Range Organics		900	1.0	500	500	270
	n-Triacontane-D62		97%				
	O-Terphenyl		85%				

KATAHDIN ANALYTICAL SERVICES
Report of Analytical Results

Client: Tetra Tech NUS, Inc
Project: CTO 313 NAS PENSACOLA
PO No:
Sample Date: 08/26/03
Received Date: 08/27/03
Extraction Date: 08/28/03
Analysis Date: 08/30/03
Report Date: 09/15/2003
Matrix: WATER
% Solids: NA

Lab ID: WT2073-10
Client ID: PEN18-GS06-01
SDG: CTO313-1
Extracted by: AZ
Extraction Method: SW846 3510
Analyst: SAW
Analysis Method: SW846 M8100
Lab Prep Batch: WG3320
Units: ug/L

CAS#	Compound	Flags	Results	DF	PQL	Adj.PQL	Adj.MDL
	Petroleum Range Organics		820	1.0	500	500	270
	n-Triacontane-D62		90%				
	O-Terphenyl		* 75%				

KATAHDIN ANALYTICAL SERVICES
Report of Analytical Results

Client: Tetra Tech NUS, Inc
Project: CTO 313 NAS PENSACOLA
PO No:
Sample Date: 08/26/03
Received Date: 08/27/03
Extraction Date: 08/28/03
Analysis Date: 09/11/03
Report Date: 09/15/2003
Matrix: WATER
% Solids: NA

Lab ID: WT2073-7DL
Client ID: PEN18-GS07-01
SDG: CTO313-1
Extracted by: AZ
Extraction Method: SW846 3510
Analyst: SAW
Analysis Method: SW846 M8100
Lab Prep Batch: WG3320
Units: ug/L

CAS#	Compound	Flags	Results	DF	PQL	Adj.PQL	Adj.MDL
	Petroleum Range Organics		30000	10	500	4700	2700
	n-Triacontane-D62		D				
	O-Terphenyl		D				

KATAHDIN ANALYTICAL SERVICES
Report of Analytical Results

Client: Tetra Tech NUS, Inc
Project: CTO 313 NAS PENSACOLA
PO No:
Sample Date: 08/26/03
Received Date: 08/27/03
Extraction Date: 08/28/03
Analysis Date: 08/30/03
Report Date: 09/15/2003
Matrix: WATER
% Solids: NA

Lab ID: WT2073-8
Client ID: PEN18-GS08-01
SDG: CTO313-1
Extracted by: AZ
Extraction Method: SW846 3510
Analyst: SAW
Analysis Method: SW846 M8100
Lab Prep Batch: WG3320
Units: ug/L

CAS#	Compound	Flags	Results	DF	PQL	Adj.PQL	Adj.MDL
	Petroleum Range Organics		620	1.0	500	500	270
	n-Triacontane-D62		92%				
	O-Terphenyl		* 76%				

KATAHDIN ANALYTICAL SERVICES
Report of Analytical Results

Client: Tetra Tech NUS, Inc
Project: CTO 313 NAS PENSACOLA
PO No:
Sample Date: 08/27/03
Received Date: 08/28/03
Extraction Date: 08/29/03
Analysis Date: 09/11/03
Report Date: 09/15/2003
Matrix: WATER
% Solids: NA

Lab ID: WT2084-14
Client ID: PEN-18-GS11
SDG: CTO313-1
Extracted by: NB
Extraction Method: SW846 3510
Analyst: SAW
Analysis Method: SW846 M8100
Lab Prep Batch: WG3338
Units: ug/L

CAS#	Compound	Flags	Results	DF	PQL	Adj.PQL	Adj.MDL
	Petroleum Range Organics	U	500	1.0	500	500	270
	n-Triacontane-D62		109%				
	O-Terphenyl		86%				

KATAHDIN ANALYTICAL SERVICES
Report of Analytical Results

Client: Tetra Tech NUS, Inc
Project: CTO 313 NAS PENSACOLA
PO No:
Sample Date: 08/27/03
Received Date: 08/28/03
Extraction Date: 08/29/03
Analysis Date: 09/11/03
Report Date: 09/15/2003
Matrix: WATER
% Solids: NA

Lab ID: WT2084-12
Client ID: PEN-18-GS13
SDG: CTO313-1
Extracted by: NB
Extraction Method: SW846 3510
Analyst: SAW
Analysis Method: SW846 M8100
Lab Prep Batch: WG3338
Units: ug/L

CAS#	Compound	Flags	Results	DF	PQL	Adj.PQL	Adj.MDL
	Petroleum Range Organics	U	500	1.0	500	500	270
	n-Triacontane-D62		99%				
	O-Terphenyl		83%				

KATAHDIN ANALYTICAL SERVICES
Report of Analytical Results

Client: Tetra Tech NUS, Inc
Project: CTO 313 NAS PENSACOLA
PO No:
Sample Date: 08/27/03
Received Date: 08/28/03
Extraction Date: 08/29/03
Analysis Date: 09/11/03
Report Date: 09/15/2003
Matrix: WATER
% Solids: NA

Lab ID: WT2084-10DL
Client ID: PEN-18-GS17
SDG: CTO313-1
Extracted by: NB
Extraction Method: SW846 3510
Analyst: SAW
Analysis Method: SW846 M8100
Lab Prep Batch: WG3338
Units: ug/L

CAS#	Compound	Flags	Results	DF	PQL	Adj.PQL	Adj.MDL
	Petroleum Range Organics		15000	5.0	500	2400	1300
	n-Triacontane-D62		101%				
	O-Terphenyl		82%				

KATAHDIN ANALYTICAL SERVICES
Report of Analytical Results

Client: Tetra Tech NUS, Inc
Project: CTO 313 NAS PENSACOLA
PO No:
Sample Date: 08/25/03
Received Date: 08/27/03
Extraction Date: 08/28/03
Analysis Date: 09/11/03
Report Date: 09/15/2003
Matrix: WATER
% Solids: NA

Lab ID: WT2073-6DL
Client ID: PEN18-GS18-01
SDG: CTO313-1
Extracted by: AZ
Extraction Method: SW846 3510
Analyst: SAW
Analysis Method: SW846 M8100
Lab Prep Batch: WG3320
Units: ug/L

CAS#	Compound	Flags	Results	DF	PQL	Adj.PQL	Adj.MDL
	Petroleum Range Organics		9500	5.0	500	2400	1300
	n-Triacontane-D62		87%				
	O-Terphenyl		* 63%				

KATAHDIN ANALYTICAL SERVICES
Report of Analytical Results

Client: Tetra Tech NUS, Inc
Project: CTO 313 NAS PENSACOLA
PO No:
Sample Date: 08/26/03
Received Date: 08/27/03
Extraction Date: 08/28/03
Analysis Date: 08/30/03
Report Date: 09/15/2003
Matrix: WATER
% Solids: NA

Lab ID: WT2073-9
Client ID: PEN18-GS19-01
SDG: CTO313-1
Extracted by: AZ
Extraction Method: SW846 3510
Analyst: SAW
Analysis Method: SW846 M8100
Lab Prep Batch: WG3320
Units: ug/L

CAS#	Compound	Flags	Results	DF	PQL	Adj.PQL	Adj.MDL
	Petroleum Range Organics		3000	1.0	500	500	270
	n-Triacontane-D62		92%				
	O-Terphenyl		* 73%				

KATAHDIN ANALYTICAL SERVICES
Report of Analytical Results

Client: Tetra Tech NUS, Inc
Project: CTO 313 NAS PENSACOLA
PO No:
Sample Date: 08/26/03
Received Date: 08/28/03
Extraction Date: 08/29/03
Analysis Date: 09/10/03
Report Date: 09/15/2003
Matrix: WATER
% Solids: NA

Lab ID: WT2084-1
Client ID: PEN-18-GS20
SDG: CTO313-1
Extracted by: NB
Extraction Method: SW846 3510
Analyst: SAW
Analysis Method: SW846 M8100
Lab Prep Batch: WG3338
Units: ug/L

CAS#	Compound	Flags	Results	DF	PQL	Adj.PQL	Adj.MDL
	Petroleum Range Organics	U	500	1.0	500	500	270
	n-Triacontane-D62		91%				
	O-Terphenyl		* 79%				

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** PEN18-GM24-01

Matrix: WATER **SDG Name:** CTO313-1

Percent Solids: 0.00 **Lab Sample ID:** WT2073-011

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	666			P	1	100	13.90
7439-96-5	MANGANESE	5.6			P	1	5.0	0.21

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** PEN-18-GS03

Matrix: WATER **SDG Name:** CTO313-1

Percent Solids: 0.00 **Lab Sample ID:** WT2084-008

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	3000			P	1	100	13.90
7439-96-5	MANGANESE	31.4			P	1	5.0	0.21

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** PEN-18-GS04

Matrix: WATER **SDG Name:** CTO313-1

Percent Solids: 0.00 **Lab Sample ID:** WT2084-003

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	890			P	1	100	13.90
7439-96-5	MANGANESE	22.7			P	1	5.0	0.21

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** PEN-18-GS05

Matrix: WATER **SDG Name:** CTO313-1

Percent Solids: 0.00 **Lab Sample ID:** WT2084-005

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	494			P	1	100	13.90
7439-96-5	MANGANESE	7.4			P	1	5.0	0.21

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** PEN18-GS06-01

Matrix: WATER **SDG Name:** CTO313-1

Percent Solids: 0.00 **Lab Sample ID:** WT2073-010

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	484			P	1	100	13.90
7439-96-5	MANGANESE	17.9			P	1	5.0	0.21

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** PEN-18-GS11

Matrix: WATER **SDG Name:** CTO313-1

Percent Solids: 0.00 **Lab Sample ID:** WT2084-014

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	462			P	1	100	13.90
7439-96-5	MANGANESE	1.4	B		P	1	5.0	0.21

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

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INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** PEN-18-GS13

Matrix: WATER **SDG Name:** CTO313-1

Percent Solids: 0.00 **Lab Sample ID:** WT2084-012

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	3070			P	1	100	13.90
7439-96-5	MANGANESE	7.3			P	1	5.0	0.21

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** PEN-18-GS17

Matrix: WATER **SDG Name:** CTO313-1

Percent Solids: 0.00 **Lab Sample ID:** WT2084-010

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	366			P	1	100	13.90
7439-96-5	MANGANESE	8.8			P	1	5.0	0.21

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** PEN-18-GS20

Matrix: WATER **SDG Name:** CTO313-1

Percent Solids: 0.00 **Lab Sample ID:** WT2084-001

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	530			P	1	100	13.90
7439-96-5	MANGANESE	10			P	1	5.0	0.21

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

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INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** PEN18-GM24-01

Matrix: WATER **SDG Name:** CTO313-1

Percent Solids: 0.00 **Lab Sample ID:** WT2073-013

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	97.9	B		P	1	100	13.90
7439-96-5	MANGANESE	5.6			P	1	5.0	0.21

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** PEN-18-GS03

Matrix: WATER **SDG Name:** CTO313-1

Percent Solids: 0.00 **Lab Sample ID:** WT2084-009

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	2880			P	1	100	13.90
7439-96-5	MANGANESE	29.9			P	1	5.0	0.21

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** PEN-18-GS04

Matrix: WATER **SDG Name:** CTO313-1

Percent Solids: 0.00 **Lab Sample ID:** WT2084-004

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	409			P	1	100	13.90
7439-96-5	MANGANESE	21.6			P	1	5.0	0.21

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

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INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** PEN-18-GS05

Matrix: WATER **SDG Name:** CTO313-1

Percent Solids: 0.00 **Lab Sample ID:** WT2084-006

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	443			P	1	100	13.90
7439-96-5	MANGANESE	6.8			P	1	5.0	0.21

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

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INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services | **Client Field ID:** PEN18-GS06-01

Matrix: WATER | **SDG Name:** CTO313-1

Percent Solids: 0.00 | **Lab Sample ID:** WT2073-012

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	328			P	1	100	13.90
7439-96-5	MANGANESE	19.8			P	1	5.0	0.21

Color Before: N/A | Clarity Before: N/A

Color After: N/A | Clarity After: N/A

Comments:

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Lab Name: Katahdin Analytical Services **Client Field ID:** PEN-18-GS11

Matrix: WATER **SDG Name:** CTO313-1

Percent Solids: 0.00 **Lab Sample ID:** WT2084-015

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	386			P	1	100	13.90
7439-96-5	MANGANESE	1.3	B		P	1	5.0	0.21

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

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INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** PEN-18-GS13

Matrix: WATER **SDG Name:** CTO313-1

Percent Solids: 0.00 **Lab Sample ID:** WT2084-013

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	1300			P	1	100	13.90
7439-96-5	MANGANESE	5.6			P	1	5.0	0.21

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

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INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** PEN-18-GS17

Matrix: WATER **SDG Name:** CTO313-1

Percent Solids: 0.00 **Lab Sample ID:** WT2084-011

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	371			P	1	100	13.90
7439-96-5	MANGANESE	9.6			P	1	5.0	0.21

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

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Lab Name: Katahdin Analytical Services **Client Field ID:** PEN-18-GS20

Matrix: WATER **SDG Name:** CTO313-1

Percent Solids: 0.00 **Lab Sample ID:** WT2084-002

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	448			P	1	100	13.90
7439-96-5	MANGANESE	8.9			P	1	5.0	0.21

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

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ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

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

Lab Sample Id: WT2073-11
Report Date: 9/16/03 1:45:16 PM
Client PO: MSA-0402-N4113-05 N0844-WR377
Project: CTO 313 NAS PENSACOLA
SDG: CTO313-1

Sample Description	Matrix	Date Sampled	Date Received
PEN18-GM24-01	AQ	08/26/2003	08/27/2003

Parameter	Result	Adj Pql	Method	Anal Date/Time	By	Prep Method	Prep Date	By	Notes
Alkalinity	U20 mg/L	20	EPA 310.1	09/05/03 10:25	JF	N/A	N/A	N/A	
Chloride	12 mg/L	2.0	EPA 325.2	08/27/03 15:31	KGT	N/A	N/A	N/A	
Nitrate As N	0.08 mg/L	0.050	EPA 353.2	08/27/03 13:47	PAG	N/A	N/A	N/A	
Nitrite As N	U0.050 mg/L	0.050	EPA 353.2	08/27/03 13:47	PAG	N/A	N/A	N/A	
Sulfate-Turbidimetric	4.1 mg/L	1.0	EPA 375.4	08/27/03 16:06	KGT	N/A	N/A	N/A	
Total Organic Carbon	J0.9669 mg/L	1.0	EPA 415.1	09/08/03 20:42	CYD	N/A	N/A	N/A	1

Notes

(1) 'J' flag denotes an estimated value. The analyte was detected in the sample at a concentration greater than the measured detection limit but less than the laboratory's Practical Quantitation Level.

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Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

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

Lab Sample Id: WT2084-8
Report Date: 9/16/03 1:45:16 PM
Client PO: MSA-0402-N4113-05 N0844-WR377
Project: CTO 313 NAS PENSACOLA
SDG: CTO313-1

Sample Description	Matrix	Date Sampled	Date Received
PEN-18-GS03	AQ	08/27/2003	08/28/2003

Parameter	Result	Adj Pql	Method	Anal Date/Time	By	Prep Method	Prep Date	By	Notes
Alkalinity	J15.47 mg/L	20	EPA 310.1	09/05/03 10:05	JF	N/A	N/A	N/A	1
Chloride	3 mg/L	2.0	EPA 325.2	09/08/03 12:20	PAG	N/A	N/A	N/A	
Nitrate As N	U0.050 mg/L	0.050	EPA 353.2	08/28/03 16:06	KGT	N/A	N/A	N/A	
Nitrite As N	U0.050 mg/L	0.050	EPA 353.2	08/28/03 16:06	KGT	N/A	N/A	N/A	
Sulfate-Turbidimetric	U1.0 mg/L	1.0	EPA 375.4	09/09/03 13:58	PAG	N/A	N/A	N/A	
Total Organic Carbon	24 mg/L	1.0	EPA 415.1	09/08/03 21:30	CYD	N/A	N/A	N/A	

Notes

(1) 'J' flag denotes an estimated value. The analyte was detected in the sample at a concentration greater than the measured detection limit but less than the laboratory's Practical Quantitation Level.

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Report of Analytical Results

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

Lab Sample Id: WT2084-3
Report Date: 9/16/03 1:45:16 PM
Client PO: MSA-0402-N4113-05 N0844-WR377
Project: CTO 313 NAS PENSACOLA
SDG: CTO313-1

Sample Description	Matrix	Date Sampled	Date Received
PEN-18-GS04	AQ	08/26/2003	08/28/2003

Parameter	Result	Adj Pql	Method	Anal Date/Time	By	Prep Method	Prep Date	By	Notes
Alkalinity	130 mg/L	20	EPA 310.1	09/05/03 09:53	JF	N/A	N/A	N/A	
Chloride	16 mg/L	2.0	EPA 325.2	09/08/03 12:20	PAG	N/A	N/A	N/A	
Nitrate As N	J0.0255 mg/L	0.050	EPA 353.2	08/28/03 16:02	KGT	N/A	N/A	N/A	1
Nitrite As N	U0.050 mg/L	0.050	EPA 353.2	08/28/03 16:02	KGT	N/A	N/A	N/A	
Sulfate-Turbidimetric	2 mg/L	1.0	EPA 375.4	09/09/03 13:58	PAG	N/A	N/A	N/A	
Total Organic Carbon	42 mg/L	1.0	EPA 415.1	09/08/03 21:06	CYD	N/A	N/A	N/A	

Notes

(1) 'J' flag denotes an estimated value. The analyte was detected in the sample at a concentration greater than the measured detection limit but less than the laboratory's Practical Quantitation Level.

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Report of Analytical Results

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

Lab Sample Id: WT2084-5
Report Date: 9/16/03 1:45:16 PM
Client PO: MSA-0402-N4113-05 N0844-WR377
Project: CTO 313 NAS PENSACOLA
SDG: CTO313-1

Sample Description	Matrix	Date Sampled	Date Received
PEN-18-GS05	AQ	08/26/2003	08/28/2003

Parameter	Result	Adj Pql	Method	Anal Date/Time	By	Prep Method	Prep Date	By	Notes
Alkalinity	J3.771 mg/L	20	EPA 310.1	09/05/03 10:01	JF	N/A	N/A	N/A	1
Chloride	14 mg/L	2.0	EPA 325.2	09/08/03 12:20	PAG	N/A	N/A	N/A	
Nitrate As N	0.07 mg/L	0.050	EPA 353.2	08/28/03 16:03	KGT	N/A	N/A	N/A	
Nitrite As N	U0.050 mg/L	0.050	EPA 353.2	08/28/03 16:03	KGT	N/A	N/A	N/A	
Sulfate-Turbidimetric	5.0 mg/L	1.0	EPA 375.4	09/09/03 13:58	PAG	N/A	N/A	N/A	
Total Organic Carbon	3 mg/L	1.0	EPA 415.1	09/08/03 21:18	CYD	N/A	N/A	N/A	

Notes

(1) 'J' flag denotes an estimated value. The analyte was detected in the sample at a concentration greater than the measured detection limit but less than the laboratory's Practical Quantitation Level.

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Report of Analytical Results

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

Lab Sample Id: WT2073-10
Report Date: 9/16/03 1:45:16 PM
Client PO: MSA-0402-N4113-05 N0844-WR377
Project: CTO 313 NAS PENSACOLA
SDG: CTO313-1

Sample Description	Matrix	Date Sampled	Date Received
PEN18-GS06-01	AQ	08/26/2003	08/27/2003

Parameter	Result	Adj Pql	Method	Anal Date/Time	By	Prep Method	Prep Date	By	Notes
Alkalinity	J1.378 mg/L	20	EPA 310.1	09/05/03 10:21	JF	N/A	N/A	N/A	1
Chloride	18 mg/L	2.0	EPA 325.2	08/27/03 15:31	KGT	N/A	N/A	N/A	
Nitrate As N	0.06 mg/L	0.050	EPA 353.2	08/27/03 13:50	PAG	N/A	N/A	N/A	
Nitrite As N	U0.050 mg/L	0.050	EPA 353.2	08/27/03 13:50	PAG	N/A	N/A	N/A	
Sulfate-Turbidimetric	5.5 mg/L	1.0	EPA 375.4	08/27/03 16:06	KGT	N/A	N/A	N/A	
Total Organic Carbon	2 mg/L	1.0	EPA 415.1	09/08/03 20:30	CYD	N/A	N/A	N/A	

Notes

(1) 'J' flag denotes an estimated value. The analyte was detected in the sample at a concentration greater than the measured detection limit but less than the laboratory's Practical Quantitation Level.

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Report of Analytical Results

Client: Amy Thomson
Tetra Tech NUS, Inc.
661 Andersen Drive
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Pittsburgh, PA 15220

Lab Sample Id: WT2084-14
Report Date: 9/16/03 1:45:16 PM
Client PO: MSA-0402-N4113-05 N0844-WR377
Project: CTO 313 NAS PENSACOLA
SDG: CTO313-1

Sample Description	Matrix	Date Sampled	Date Received
PEN-18-GS11	AQ	08/27/2003	08/28/2003

Parameter	Result	Adj Pql	Method	Anal Date/Time	By	Prep Method	Prep Date	By	Notes
Alkalinity	30 mg/L	20	EPA 310.1	09/05/03 10:17	JF	N/A	N/A	N/A	
Chloride	3 mg/L	2.0	EPA 325.2	09/08/03 12:20	PAG	N/A	N/A	N/A	
Nitrate As N	0.1 mg/L	0.050	EPA 353.2	08/28/03 16:08	KGT	N/A	N/A	N/A	
Nitrite As N	U0.050 mg/L	0.050	EPA 353.2	08/28/03 16:08	KGT	N/A	N/A	N/A	
Sulfate-Turbidimetric	1 mg/L	1.0	EPA 375.4	09/09/03 13:58	PAG	N/A	N/A	N/A	
Total Organic Carbon	1 mg/L	1.0	EPA 415.1	09/08/03 23:28	CYD	N/A	N/A	N/A	

Notes

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Report of Analytical Results

Client: Amy Thomson
Tetra Tech NUS, Inc.
661 Andersen Drive
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Pittsburgh, PA 15220

Lab Sample Id: WT2084-12
Report Date: 9/16/03 1:45:16 PM
Client PO: MSA-0402-N4113-05 N0844-WR377
Project: CTO 313 NAS PENSACOLA
SDG: CTO313-1

Sample Description	Matrix	Date Sampled	Date Received
PEN-18-GS13	AQ	08/27/2003	08/28/2003

Parameter	Result	Adj Pql	Method	Anal Date/Time	By	Prep Method	Prep Date	By	Notes
Alkalinity	J11.02 mg/L	20	EPA 310.1	09/05/03 10:13	JF	N/A	N/A	N/A	1
Chloride	18 mg/L	2.0	EPA 325.2	09/08/03 12:20	PAG	N/A	N/A	N/A	
Nitrate As N	0.40 mg/L	0.050	EPA 353.2	08/28/03 16:07	KGT	N/A	N/A	N/A	
Nitrite As N	U0.050 mg/L	0.050	EPA 353.2	08/28/03 16:07	KGT	N/A	N/A	N/A	
Sulfate-Turbidimetric	9.0 mg/L	1.0	EPA 375.4	09/09/03 13:58	PAG	N/A	N/A	N/A	
Total Organic Carbon	3 mg/L	1.0	EPA 415.1	09/08/03 23:16	CYD	N/A	N/A	N/A	

Notes

(1) 'J' flag denotes an estimated value. The analyte was detected in the sample at a concentration greater than the measured detection limit but less than the laboratory's Practical Quantitation Level.

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Report of Analytical Results

Client: Amy Thomson
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661 Andersen Drive
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Pittsburgh, PA 15220

Lab Sample Id: WT2084-10
Report Date: 9/16/03 1:45:16 PM
Client PO: MSA-0402-N4113-05 N0844-WR377
Project: CTO 313 NAS PENSACOLA
SDG: CTO313-1

Sample Description	Matrix	Date Sampled	Date Received
PEN-18-GS17	AQ	08/27/2003	08/28/2003

Parameter	Result	Adj Pql	Method	Anal Date/Time	By	Prep Method	Prep Date	By	Notes
Alkalinity	76 mg/L	20	EPA 310.1	09/05/03 10:09	JF	N/A	N/A	N/A	
Chloride	22 mg/L	2.0	EPA 325.2	09/08/03 12:20	PAG	N/A	N/A	N/A	
Nitrate As N	J0.0172 mg/L	0.10	EPA 353.2	08/28/03 16:26	KGT	N/A	N/A	N/A	1 2
Nitrite As N	U0.10 mg/L	0.10	EPA 353.2	08/28/03 16:09	KGT	N/A	N/A	N/A	1
Sulfate-Turbidimetric	U1.0 mg/L	1.0	EPA 375.4	09/09/03 13:58	PAG	N/A	N/A	N/A	
Total Organic Carbon	47 mg/L	1.0	EPA 415.1	09/08/03 21:42	CYD	N/A	N/A	N/A	

Notes

(1) The laboratory's Practical Quantitation Level could not be achieved for this parameter due to sample composition, matrix effects, sample volume, or quantity used for analysis.

(2) 'J' flag denotes an estimated value. The analyte was detected in the sample at a concentration greater than the measured detection limit but less than the laboratory's Practical Quantitation Level.

340 County Road No. 5
P.O. Box 720, Westbrook, ME 04098
Tel:(207) 874-2400 Fax:(207) 775-4029

http://katahdinlab.com
sales@katahdinlab.com

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

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

Lab Sample Id: WT2084-1
Report Date: 9/16/03 1:45:16 PM
Client PO: MSA-0402-N4113-05 N0844-WR377
Project: CTO 313 NAS PENSACOLA
SDG: CTO313-1

Sample Description	Matrix	Date Sampled	Date Received
PEN-18-GS20	AQ	08/26/2003	08/28/2003

Parameter	Result	Adj Pql	Method	Anal Date/Time	By	Prep Method	Prep Date	By	Notes
Alkalinity	J3.845 mg/L	20	EPA 310.1	09/05/03 09:45	JF	N/A	N/A	N/A	1
Chloride	14 mg/L	2.0	EPA 325.2	09/08/03 12:20	PAG	N/A	N/A	N/A	
Nitrate As N	U0.050 mg/L	0.050	EPA 353.2	08/28/03 16:01	KGT	N/A	N/A	N/A	
Nitrite As N	U0.050 mg/L	0.050	EPA 353.2	08/28/03 16:01	KGT	N/A	N/A	N/A	
Sulfate-Turbidimetric	3.5 mg/L	1.0	EPA 375.4	09/09/03 13:58	PAG	N/A	N/A	N/A	
Total Organic Carbon	3.3 mg/L	1.0	EPA 415.1	09/08/03 20:54	CYD	N/A	N/A	N/A	

Notes

(1) 'J' flag denotes an estimated value. The analyte was detected in the sample at a concentration greater than the measured detection limit but less than the laboratory's Practical Quantitation Level.

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W120 03

TETRA TECH NUS, INC. | **CHAIN OF CUSTODY** | **NUMBER** | **PAGE ___ OF ___**

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
		GERRY WALKER	(850) 385 9879	KATAHDIN · ANDREA COLBY
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Louis Knight		CHUCK METZ		340 COUNTY RD #5
Charles Metz		CARRIER/WAYBILL NUMBER		CITY, STATE
		8427 1834 4956 / 8427 1834 4967		WESTBROOK, ME 04092

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G G G G G P
PRESERVATIVE USED: HCL HNO3 HNO3 H2SO4 NCL NONE
TYPE OF ANALYSIS: TRPH | METALS (F) | METALS (UNF) | TOC | METHANE/ETHANE/ETHENE | NA (ANIONS & ALK)

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TRPH	METALS (F)	METALS (UNF)	TOC	METHANE/ETHANE/ETHENE	NA (ANIONS & ALK)			COMMENTS
8/25	1235	PEN18 · DPT05				GW	G		2	1	1	2	2				2
	1310	PEN18 · DPT02				GW	G		2								COOLERS
	1530	PEN18 · DPT06				GW	G		2								W/ THIS
	1545	PEN18 · DPT07				GW	G		2								shipment
	1615	PEN18 · DPT08				GW	G		2								
	1825	PEN18 · GS18 · 01				GW	G		2								
8/26	1145 ~~0850~~	PEN18 · GS07 · 01							2								
8/26	1015	PEN18 · GS08 · 01							2								
8/26	0850	PEN18 · GS19 · 01							2								
8/26	1415	PEN18 · GS06 · 01							2	1	1	2	2	1			
8/26	1420	PEN18 · GM24 · 01							2	1	1	2	2	1			

1. RELINQUISHED BY: Louis Knight	DATE 8/26/03	TIME 1830	1. RECEIVED BY: Ray Brandt	DATE 8/27/03	TIME 0940
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

000009

WT2064

TETRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER | PAGE ___ OF ___

PROJECT NO: 0844	FACILITY: SITE 18/NAS Pensacola	PROJECT MANAGER: GERRY WALKER	PHONE NUMBER: (850) 385-9899	LABORATORY NAME AND CONTACT: KATAHDIN - ANDREA COLBY
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER: CHUCK METZ	PHONE NUMBER: (904) 813-5431	ADDRESS: 340 COUNTY RD #5
		CARRIER/WAYBILL NUMBER: 8427 1834 4978/8427 1834 4989		CITY, STATE: WESTBROOK, ME 04092

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): 1LG, P, P, 40mL vial, 40mL vial, P
PRESERVATIVE USED: HCL, HNO3, HNO3, H2SO4, HCL, NONE

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	TRPH	METALS (unfiltered)	METALS (filtered)	TOC	METHANE/ETHANE/ETHENE	NA [anions + alk]			COMMENTS
8/26	1730	PEN.18.GS20				GW	G		2	1	1	2	2	1			
8/26	1810	PEN.18.GS04							2	1	1	2	2	1			2 COOLERS
8/26	1810	PEN.18.GS05							2	1	1	2	2	1			IN THIS
																	SHIPMENT
8/27	1610	PEN.18.DPT39							2								
8/27	1140	PEN.18.GS03							2	1	1	2	2	1			
8/27	1145	PEN.18.GS17							2	1	1	2	2	1			
8/27	1511	PEN.18.GS13							2	1	1	2	2	1			
8/27	1525	PEN.18.GS11							2	1	1	2	2	1			
8/27	0000	PEN.18.DU02							2								

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	8/27/03	1815	1. RECEIVED BY		
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

010000

PROJ_NO: 0844

SDG: 3132 MEDIA: WATER DATA FRACTION: OVG

nsample	PEN-18-DUP01-01	nsample	PEN-18-EB01-01	nsample	PEN-18-GS01-01
samp_date	8/27/2003	samp_date	8/28/2003	samp_date	8/27/2003
lab_id	0309035-05A	lab_id	0309035-04A	lab_id	0309035-01A
qc_type	NM	qc_type	NM	qc_type	NM
units	MG/L	units	MG/L	units	MG/L
Pct_Solids	0	Pct_Solids	0	Pct_Solids	0
DUP_OF:	PEN-18-GS02-01	DUP_OF:		DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
ETHANE	0.01	U	U	
ETHENE	0.01	U	U	
METHANE	13			

Parameter	Result	Lab Qual	Val Qual	Qual Code
ETHANE	0.01	U	U	
ETHENE	0.01	U	U	
METHANE	0.01	U	U	

Parameter	Result	Lab Qual	Val Qual	Qual Code
ETHANE	0.011			
ETHENE	0.01	U	U	
METHANE	15			

PROJ_NO: 0844

SDG: 3132 MEDIA: WATER DATA FRACTION: OVG

nsample	PEN-18-GS02-01	nsample	PEN-18-GS21-01
samp_date	8/27/2003	samp_date	8/28/2003
lab_id	0309035-02A	lab_id	0309035-03A
qc_type	NM	qc_type	NM
units	MG/L	units	MG/L
Pct_Solids	0	Pct_Solids	0
DUP_OF:		DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
ETHANE	0.01	U	U	
ETHENE	0.01	U	U	
METHANE	13			

Parameter	Result	Lab Qual	Val Qual	Qual Code
ETHANE	0.01	U	U	
ETHENE	0.01	U	U	
METHANE	0.1			

PROJ_NO: 0844

SDG: 3132 MEDIA: WATER DATA FRACTION: PET

nsample	PEN-18-DUP01-01
samp_date	8/27/2003
lab_id	WT2097-9DL
qc_type	NM
units	UG/L
Pct_Solids	0
DUP_OF:	PEN-18-GS02-01

Parameter	Result	Lab Qual	Val Qual	Qual Code
TOTAL PETROLEUM HYDROCARBONS	18000			

nsample	PEN-18-EB01-01
samp_date	8/28/2003
lab_id	WT2097-7
qc_type	NM
units	UG/L
Pct_Solids	0
DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
TOTAL PETROLEUM HYDROCARBONS	500	U	U	

nsample	PEN-18-GS01-01
samp_date	8/27/2003
lab_id	WT2097-1DL
qc_type	NM
units	UG/L
Pct_Solids	0
DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
TOTAL PETROLEUM HYDROCARBONS	38000			

PROJ_NO: 0844

SDG: 3132 MEDIA: WATER DATA FRACTION: PET

nsample	PEN-18-GS02-01	nsample	PEN-18-GS21-01
samp_date	8/27/2003	samp_date	8/28/2003
lab_id	WT2097-3DL	lab_id	WT2097-5
qc_type	NM	qc_type	NM
units	UG/L	units	UG/L
Pct_Solids	0	Pct_Solids	0
DUP_OF:		DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
TOTAL PETROLEUM HYDROCARBONS	19000			

Parameter	Result	Lab Qual	Val Qual	Qual Code
TOTAL PETROLEUM HYDROCARBONS	500	U	U	

PROJ_NO: 0844

SDG: 3132 MEDIA: WATER DATA FRACTION: M

nsample	PEN-18-DUP01-01	nsample	PEN-18-EB01-01	nsample	PEN-18-GS01-01
samp_date	8/27/2003	samp_date	8/28/2003	samp_date	8/27/2003
lab_id	WT2097-009	lab_id	WT2097-007	lab_id	WT2097-001
qc_type	NM	qc_type	NM	qc_type	NM
units	UG/L	units	UG/L	units	UG/L
Pct_Solids	0	Pct_Solids	0	Pct_Solids	0
DUP_OF:	PEN-18-GS02-01	DUP_OF:		DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	4280			
MANGANESE	114			

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	13.9	U	U	
MANGANESE	0.90	U	U	

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	446			
MANGANESE	13.9		U	A

PROJ_NO: 0844

SDG: 3132 MEDIA: WATER DATA FRACTION: M

nsample	PEN-18-GS02-01	nsample	PEN-18-GS21-01
samp_date	8/27/2003	samp_date	8/28/2003
lab_id	WT2097-003	lab_id	WT2097-005
qc_type	NM	qc_type	NM
units	UG/L	units	UG/L
Pct_Solids	0	Pct_Solids	0
DUP_OF:		DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	4360			
MANGANESE	113			

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	462			
MANGANESE	4.9	B	U	A

PROJ_NO: 0844

SDG: 3132 MEDIA: WATER DATA FRACTION: MF

nsample	PEN-18-DUP01-01	nsample	PEN-18-EB01-01	nsample	PEN-18-GS01-01
samp_date	8/27/2003	samp_date	8/28/2003	samp_date	8/27/2003
lab_id	WT2097-010	lab_id	WT2097-008	lab_id	WT2097-002
qc_type	NM	qc_type	NM	qc_type	NM
units	UG/L	units	UG/L	units	UG/L
Pct_Solids	0	Pct_Solids	0	Pct_Solids	0
DUP_OF:	PEN-18-GS02-01	DUP_OF:		DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	4380			
MANGANESE	123			

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	13.9	U	U	
MANGANESE	1.4	B		

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	418			
MANGANESE	14.0		U	A

PROJ_NO: 0844

SDG: 3132 MEDIA: WATER DATA FRACTION: MF

nsample	PEN-18-GS02-01	nsample	PEN-18-GS21-01
samp_date	8/27/2003	samp_date	8/28/2003
lab_id	WT2097-004	lab_id	WT2097-006
qc_type	NM	qc_type	NM
units	UG/L	units	UG/L
Pct_Solids	0	Pct_Solids	0
DUP_OF:		DUP_OF:	

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	4670			
MANGANESE	127			

Parameter	Result	Lab Qual	Val Qual	Qual Code
IRON	368			
MANGANESE	6.4		U	A

PROJ_NO: 0844

SDG: 3132 MEDIA: WATER DATA FRACTION: MISC

nsample	PEN-18-DUP01-01	nsample	PEN-18-EB01-01	nsample	PEN-18-GS01-01
samp_date	8/27/2003	samp_date	8/28/2003	samp_date	8/27/2003
lab_id	WT2097-9	lab_id	WT2097-7	lab_id	WT2097-1
qc_type	NM	qc_type	NM	qc_type	NM
Pct_Solids	0	Pct_Solids	0	Pct_Solids	0
DUP_OF:	PEN-18-GS02-01	DUP_OF:		DUP_OF:	

Parameter	units	Result	Lab Qual	Val Qual	Qual Code
ALKALINITY	MG/L	140			
CHLORIDE	MG/L	6.6			
NITRATE-N	MG/L	0.0136	J	J	P
NITRITE-N	MG/L	0.05	U	U	
SULFATE	MG/L	16			
TOTAL ORGANIC CARBON	MG/L	44			

Parameter	units	Result	Lab Qual	Val Qual	Qual Code
ALKALINITY	MG/L	20	U	U	
CHLORIDE	MG/L	2	U	U	
NITRATE-N	MG/L	0.05	U	U	
NITRITE-N	MG/L	0.05	U	U	
SULFATE	MG/L	1	U	U	
TOTAL ORGANIC CARBON	MG/L	0.57	J	U	A

Parameter	units	Result	Lab Qual	Val Qual	Qual Code
ALKALINITY	MG/L	320			
CHLORIDE	MG/L	130			
NITRATE-N	MG/L	0.05	U	U	
NITRITE-N	MG/L	0.05	U	U	
SULFATE	MG/L	1			
TOTAL ORGANIC CARBON	MG/L	210			

PROJ_NO: 0844

SDG: 3132 MEDIA: WATER DATA FRACTION: MISC

nsample	PEN-18-GS02-01	nsample	PEN-18-GS21-01
samp_date	8/27/2003	samp_date	8/28/2003
lab_id	WT2097-3	lab_id	WT2097-5
qc_type	NM	qc_type	NM
Pct_Solids	0	Pct_Solids	0
DUP_OF:		DUP_OF:	

Parameter	units	Result	Lab Qual	Val Qual	Qual Code
ALKALINITY	MG/L	140			
CHLORIDE	MG/L	15			
NITRATE-N	MG/L	0.0106	J	J	P
NITRITE-N	MG/L	0.05	U	U	
SULFATE	MG/L	3			
TOTAL ORGANIC CARBON	MG/L	44			

Parameter	units	Result	Lab Qual	Val Qual	Qual Code
ALKALINITY	MG/L	20	U	U	
CHLORIDE	MG/L	11			
NITRATE-N	MG/L	0.05	U	U	
NITRITE-N	MG/L	0.05	U	U	
SULFATE	MG/L	5			
TOTAL ORGANIC CARBON	MG/L	2		U	A

AIR TOXICS LTD.

SAMPLE NAME: PEN-18-Dup01-01

ID#: 0309035-05A

MODIFIED METHOD RSK-175 GC/FID

Compound	Rpt. Limit (ug/ml)	Amount (ug/ml)
Methane	0.010	13
Ethane	0.010	Not Detected
Ethene	0.010	Not Detected

Container Type: VOA Vial-40 mL

AIR TOXICS LTD.

SAMPLE NAME: PEN-18-EB01-01

ID#: 0309035-04A

MODIFIED METHOD RSK-175 GC/FID

Compound	Rpt. Limit (ug/ml)	Amount (ug/ml)
Methane	0.010	Not Detected
Ethane	0.010	Not Detected
Ethene	0.010	Not Detected

Container Type: VOA Vial-40 mL

AIR TOXICS LTD.

SAMPLE NAME: PEN-18-GS01-01

ID#: 0309035-01A

MODIFIED METHOD RSK-175 GC/FID

Compound	Rpt. Limit (ug/ml)	Amount (ug/ml)
Methane	0.010	15
Ethane	0.010	0.011
Ethene	0.010	Not Detected

Container Type: VOA Vial-40 mL

AIR TOXICS LTD.

SAMPLE NAME: PEN-18-GS02-01

ID#: 0309035-02A

MODIFIED METHOD RSK-175 GC/FID

Compound	Rpt. Limit (ug/ml)	Amount (ug/ml)
Methane	0.010	13
Ethane	0.010	Not Detected
Ethene	0.010	Not Detected

Container Type: VOA Vial-40 mL

AIR TOXICS LTD.

SAMPLE NAME: PEN-18-GS21-01

ID#: 0309035-03A

MODIFIED METHOD RSK-175 GC/FID

[redacted]

Compound	Rpt. Limit (ug/ml)	Amount (ug/ml)
Methane	0.010	0.10
Ethane	0.010	Not Detected
Ethene	0.010	Not Detected

Container Type: VOA Vial-40 mL

AIR TOXICS LTD.

SAMPLE NAME: PEN-18-GS21-01 Duplicate

ID#: 0309035-03AA

MODIFIED METHOD RSK-175 GC/FID

Compound	Rpt. Limit (ug/ml)	Amount (ug/ml)
Methane	0.010	0.10
Ethane	0.010	Not Detected
Ethene	0.010	Not Detected

Container Type: VOA Vial-40 mL

KATAHDIN ANALYTICAL SERVICES
Report of Analytical Results

Client: Tetra Tech NUS, Inc
Project: CTO 313 NAS PENSACOLA
PO No:
Sample Date: 08/27/03
Received Date: 08/29/03
Extraction Date: 09/03/03
Analysis Date: 09/12/03
Report Date: 09/16/2003
Matrix: WATER
% Solids: NA

Lab ID: WT2097-9DL
Client ID: PEN-18-DUP01-01
SDG: CTO313-2
Extracted by: NB
Extraction Method: SW846 3510
Analyst: SAW
Analysis Method: SW846 M8100
Lab Prep Batch: WG3350
Units: ug/L

CAS#	Compound	Flags	Results	DF	PQL	Adj.PQL	Adj.MDL
	Petroleum Range Organics		18000	5.0	500	2400	1400
	n-Triacontane-D62		95%				
	O-Terphenyl		* 75%				

KATAHDIN ANALYTICAL SERVICES
Report of Analytical Results

Client: Tetra Tech NUS, Inc
Project: CTO 313 NAS PENSACOLA
PO No:
Sample Date: 08/28/03
Received Date: 08/29/03
Extraction Date: 09/03/03
Analysis Date: 09/11/03
Report Date: 09/16/2003
Matrix: WATER
% Solids: NA

Lab ID: WT2097-7
Client ID: PEN-18-EB01-01
SDG: CTO313-2
Extracted by: NB
Extraction Method: SW846 3510
Analyst: SAW
Analysis Method: SW846 M8100
Lab Prep Batch: WG3350
Units: ug/L

CAS#	Compound	Flags	Results	DF	PQL	Adj.PQL	Adj.MDL
	Petroleum Range Organics	U	500	1.0	500	500	270
	n-Triacontane-D62		91%				
	O-Terphenyl		* 75%				

KATAHDIN ANALYTICAL SERVICES
Report of Analytical Results

Client: Tetra Tech NUS, Inc
Project: CTO 313 NAS PENSACOLA
PO No:
Sample Date: 08/27/03
Received Date: 08/29/03
Extraction Date: 09/03/03
Analysis Date: 09/12/03
Report Date: 09/16/2003
Matrix: WATER
% Solids: NA

Lab ID: WT2097-1DL
Client ID: PEN-18-GS01-01
SDG: CTO313-2
Extracted by: NB
Extraction Method: SW846 3510
Analyst: SAW
Analysis Method: SW846 M8100
Lab Prep Batch: WG3350
Units: ug/L

CAS#	Compound	Flags	Results	DF	PQL	Adj.PQL	Adj.MDL
	Petroleum Range Organics		38000	10	500	4900	2800
	n-Triacontane-D62		D				
	O-Terphenyl		D				

KATAHDIN ANALYTICAL SERVICES
Report of Analytical Results

Client: Tetra Tech NUS, Inc
Project: CTO 313 NAS PENSACOLA
PO No:
Sample Date: 08/27/03
Received Date: 08/29/03
Extraction Date: 09/03/03
Analysis Date: 09/12/03
Report Date: 09/16/2003
Matrix: WATER
% Solids: NA

Lab ID: WT2097-3DL
Client ID: PEN-18-GS02-01
SDG: CTO313-2
Extracted by: NB
Extraction Method: SW846 3510
Analyst: SAW
Analysis Method: SW846 M8100
Lab Prep Batch: WG3350
Units: ug/L

CAS#	Compound	Flags	Results	DF	PQL	Adj.PQL	Adj.MDL
	Petroleum Range Organics		19000	10	500	4700	2700
	n-Triacontane-D62		D				
	O-Terphenyl		D				

KATAHDIN ANALYTICAL SERVICES
Report of Analytical Results

Client: Tetra Tech NUS, Inc
Project: CTO 313 NAS PENSACOLA
PO No:
Sample Date: 08/28/03
Received Date: 08/29/03
Extraction Date: 09/03/03
Analysis Date: 09/11/03
Report Date: 09/16/2003
Matrix: WATER
% Solids: NA

Lab ID: WT2097-5
Client ID: PEN-18-GS21-01
SDG: CTO313-2
Extracted by: NB
Extraction Method: SW846 3510
Analyst: SAW
Analysis Method: SW846 M8100
Lab Prep Batch: WG3350
Units: ug/L

CAS#	Compound	Flags	Results	DF	PQL	Adj.PQL	Adj.MDL
	Petroleum Range Organics	U	500	1.0	500	500	270
	n-Triacontane-D62		96%				
	O-Terphenyl		* 80%				

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** PEN-18-DUP01-01

Matrix: WATER **SDG Name:** CTO313-2

Percent Solids: 0.00 **Lab Sample ID:** WT2097-009

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	4280			P	1	100	13.90
7439-96-5	MANGANESE	114			P	1	5.0	0.90

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** PEN-18-EB01-01

Matrix: WATER **SDG Name:** CTO313-2

Percent Solids: 0.00 **Lab Sample ID:** WT2097-007

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	13.90	U		P	1	100	13.90
7439-96-5	MANGANESE	0.90	U		P	1	5.0	0.90

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** PEN-18-GS01-01

Matrix: WATER **SDG Name:** CTO313-2

Percent Solids: 0.00 **Lab Sample ID:** WT2097-001

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	446			P	1	100	13.90
7439-96-5	MANGANESE	13.9			P	1	5.0	0.90

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** PEN-18-GS02-01

Matrix: WATER **SDG Name:** CTO313-2

Percent Solids: 0.00 **Lab Sample ID:** WT2097-003

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	4360			P	1	100	13.90
7439-96-5	MANGANESE	113			P	1	5.0	0.90

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** PEN-18-GS21-01

Matrix: WATER **SDG Name:** CTO313-2

Percent Solids: 0.00 **Lab Sample ID:** WT2097-005

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	462			P	1	100	13.90
7439-96-5	MANGANESE	4.9	B		P	1	5.0	0.90

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services | **Client Field ID:** PEN-18-DUP01-01

Matrix: WATER | **SDG Name:** CTO313-2

Percent Solids: 0.00 | **Lab Sample ID:** WT2097-010

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	4380			P	1	100	13.90
7439-96-5	MANGANESE	123			P	1	5.0	0.90

Color Before: N/A | Clarity Before: N/A

Color After: N/A | Clarity After: N/A

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** PEN-18-EB01-01

Matrix: WATER **SDG Name:** CTO313-2

Percent Solids: 0.00 **Lab Sample ID:** WT2097-008

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	13.90	U		P	1	100	13.90
7439-96-5	MANGANESE	1.4	B		P	1	5.0	0.90

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** PEN-18-GS01-01

Matrix: WATER **SDG Name:** CTO313-2

Percent Solids: 0.00 **Lab Sample ID:** WT2097-002

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	418			P	1	100	13.90
7439-96-5	MANGANESE	14.0			P	1	5.0	0.90

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** PEN-18-GS02-01

Matrix: WATER **SDG Name:** CTO313-2

Percent Solids: 0.00 **Lab Sample ID:** WT2097-004

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	4670			P	1	100	13.90
7439-96-5	MANGANESE	127			P	1	5.0	0.90

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

FORM I - IN

INORGANIC ANALYSIS DATA SHEET

Lab Name: Katahdin Analytical Services **Client Field ID:** PEN-18-GS21-01

Matrix: WATER **SDG Name:** CTO313-2

Percent Solids: 0.00 **Lab Sample ID:** WT2097-006

Concentration Units : ug/L

CAS No.	Analyte	Concentration	C	Q	M	DF	Adjusted PQL	Adjusted IDL
7439-89-6	IRON	368			P	1	100	13.90
7439-96-5	MANGANESE	6.4			P	1	5.0	0.90

Color Before: N/A Clarity Before: N/A

Color After: N/A Clarity After: N/A

Comments:

FORM I - IN

Katahdin
ANALYTICAL SERVICES

Accredited in accordance with nelac Cert No E87604

Report of Analytical Results

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

Lab Sample Id: WT2097-9
Report Date: 9/17/03 10:10:43 AM
Client PO: MSA-0402-N4113-05 N0844-WR377
Project: CTO 313 NAS PENSACOLA
SDG: CTO313-2

Sample Description	Matrix	Date Sampled	Date Received
PEN-18-DUP01-01	AQ	08/27/2003	08/29/2003

Parameter	Result	Adj Pql	Method	Anal Date/Time	By	Prep Method	Prep Date	By	Notes
Alkalinity	140 mg/L	20	EPA 310.1	09/03/03 15:37	JF	N/A	N/A	N/A	
Chloride	6.6 mg/L	2.0	EPA 325.2	09/10/03 10:14	KGT	N/A	N/A	N/A	
Nitrate As N	J0.0136 mg/L	0.050	EPA 353.2	08/29/03 14:49	KGT	N/A	N/A	N/A	1
Nitrite As N	U0.050 mg/L	0.050	EPA 353.2	08/29/03 14:49	KGT	N/A	N/A	N/A	
Sulfate-Turbidimetric	16 mg/L	1.0	EPA 375.4	09/09/03 14:05	PAG	N/A	N/A	N/A	
Total Organic Carbon	44 mg/L	1.0	EPA 415.1	09/08/03 00:28	CYD	N/A	N/A	N/A	

Notes

(1) 'J' flag denotes an estimated value. The analyte was detected in the sample at a concentration greater than the measured detection limit but less than the laboratory's Practical Quantitation Level.

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P.O. Box 720, Westbrook, ME 04098
Tel:(207) 874-2400 Fax:(207) 775-4029

http://katahdinlab.com
sales@katahdinlab.com

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

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

Lab Sample Id: WT2097-7
Report Date: 9/17/03 10:10:43 AM
Client PO: MSA-0402-N4113-05 N0844-WR377
Project: CTO 313 NAS PENSACOLA
SDG: CTO313-2

Sample Description	Matrix	Date Sampled	Date Received
PEN-18-EB01-01	AQ	08/28/2003	08/29/2003

Parameter	Result	Adj Pql	Method	Anal Date/Time	By	Prep Method	Prep Date	By	Notes
Alkalinity	U20 mg/L	20	EPA 310.1	09/03/03 15:33	JF	N/A	N/A	N/A	
Chloride	U2.0 mg/L	2.0	EPA 325.2	09/10/03 10:14	KGT	N/A	N/A	N/A	
Nitrate As N	U0.050 mg/L	0.050	EPA 353.2	08/29/03 14:48	KGT	N/A	N/A	N/A	
Nitrite As N	U0.050 mg/L	0.050	EPA 353.2	08/29/03 14:48	KGT	N/A	N/A	N/A	
Sulfate-Turbidimetric	U1.0 mg/L	1.0	EPA 375.4	09/09/03 14:05	PAG	N/A	N/A	N/A	
Total Organic Carbon	J0.57 mg/L	1.0	EPA 415.1	09/08/03 00:16	CYD	N/A	N/A	N/A	1

Notes

(1) 'J' flag denotes an estimated value. The analyte was detected in the sample at a concentration greater than the measured detection limit but less than the laboratory's Practical Quantitation Level.

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Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

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

Lab Sample Id: WT2097-1
Report Date: 9/17/03 10:10:43 AM
Client PO: MSA-0402-N4113-05 N0844-WR377
Project: CTO 313 NAS PENSACOLA
SDG: CTO313-2

Sample Description	Matrix	Date Sampled	Date Received
PEN-18-GS01-01	AQ	08/27/2003	08/29/2003

Parameter	Result	Adj Pql	Method	Anal Date/Time	By	Prep Method	Prep Date	By	Notes
Alkalinity	320 mg/L	20	EPA 310.1	09/03/03 15:21	JF	N/A	N/A	N/A	
Chloride	130 mg/L	20	EPA 325.2	09/08/03 12:20	PAG	N/A	N/A	N/A	
Nitrate As N	U0.050 mg/L	0.050	EPA 353.2	08/29/03 14:43	KGT	N/A	N/A	N/A	
Nitrite As N	U0.050 mg/L	0.050	EPA 353.2	08/29/03 14:43	KGT	N/A	N/A	N/A	
Sulfate-Turbidimetric	1 mg/L	1.0	EPA 375.4	09/09/03 14:05	PAG	N/A	N/A	N/A	
Total Organic Carbon	210 mg/L	1.0	EPA 415.1	09/08/03 23:40	CYD	N/A	N/A	N/A	

Notes

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Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

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

Lab Sample Id: WT2097-3
Report Date: 9/17/03 10:10:43 AM
Client PO: MSA-0402-N4113-05 N0844-WR377
Project: CTO 313 NAS PENSACOLA
SDG: CTO313-2

Sample Description	Matrix	Date Sampled	Date Received
PEN-18-GS02-01	AQ	08/27/2003	08/29/2003

Parameter	Result	Adj Pql	Method	Anal Date/Time	By	Prep Method	Prep Date	By	Notes
Alkalinity	140 mg/L	20	EPA 310.1	09/03/03 15:25	JF	N/A	N/A	N/A	
Chloride	15 mg/L	2.0	EPA 325.2	09/08/03 12:20	PAG	N/A	N/A	N/A	
Nitrate As N	J0.0106 mg/L	0.050	EPA 353.2	08/29/03 14:44	KGT	N/A	N/A	N/A	1
Nitrite As N	U0.050 mg/L	0.050	EPA 353.2	08/29/03 14:44	KGT	N/A	N/A	N/A	
Sulfate-Turbidimetric	3 mg/L	1.0	EPA 375.4	09/09/03 14:05	PAG	N/A	N/A	N/A	
Total Organic Carbon	44 mg/L	1.0	EPA 415.1	09/08/03 23:52	CYD	N/A	N/A	N/A	

Notes

(1) 'J' flag denotes an estimated value. The analyte was detected in the sample at a concentration greater than the measured detection limit but less than the laboratory's Practical Quantitation Level.

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Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

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

Lab Sample Id: WT2097-5
Report Date: 9/17/03 10:10:43 AM
Client PO: MSA-0402-N4113-05 N0844-WR377
Project: CTO 313 NAS PENSACOLA
SDG: CTO313-2

Sample Description	Matrix	Date Sampled	Date Received
PEN-18-GS21-01	AQ	08/28/2003	08/29/2003

Parameter	Result	Adj Pql	Method	Anal Date/Time	By	Prep Method	Prep Date	By	Notes
Alkalinity	U20 mg/L	20	EPA 310.1	09/03/03 15:29	JF	N/A	N/A	N/A	
Chloride	11 mg/L	2.0	EPA 325.2	09/08/03 12:20	PAG	N/A	N/A	N/A	
Nitrate As N	U0.050 mg/L	0.050	EPA 353.2	08/29/03 14:45	KGT	N/A	N/A	N/A	
Nitrite As N	U0.050 mg/L	0.050	EPA 353.2	08/29/03 14:45	KGT	N/A	N/A	N/A	
Sulfate-Turbidimetric	5.0 mg/L	1.0	EPA 375.4	09/09/03 14:05	PAG	N/A	N/A	N/A	
Total Organic Carbon	2 mg/L	1.0	EPA 415.1	09/08/03 00:04	CYD	N/A	N/A	N/A	

Notes

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CWT2097

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N0844	NAS PEN	Gerry Walker	850-835-9899	Katahdin / Andrea Colby
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Charles Metz		Chuck Metz	904-636-6125	
		CARRIER/WAYBILL NUMBER		CITY, STATE
		8371-1005-6142	8371-1005-6131	Westbrook, ME

Charles Metz

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G P P P G P

PRESERVATIVE USED: HCl, HNO_3, HNO_3, H_2SO_4, HCl, —

DATE YEAR 2003	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAP (G) COMP (C)	No. OF CONTAINERS	TRPH	Metals (unfiltered)	Metals (filtered)	TOC	MEE	Alk + Anions			COMMENTS
8-27	1850	PEN-18-GS01-01				GW	G	9	2	1	1	2	2	1			
8-27	1835	PEN-18-GS02-01				GW	G	9	2	1	1	2	2	1			
8-28	0800	PEN-18-GS21-01				GW	G	9	2	1	1	2	2	1			
8-28	0850	PEN-18-EB01-01				QC	G	9	2	1	1	2	2	1			

2 Coolers 1/1

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	8-28-03		1. RECEIVED BY Amy Breedlove	8/28/03	8:45
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS

000007

Fax (207) 775-4029

COOLER: 1 OF 2

CLIENT: Tetra tech

COC#:
SDG#:
DATE / TIME RECEIVED: 8/29/03 0915
DELIVERED BY: Fedex
RECEIVED BY: Amos
LIMS ENTRY BY: AMB
LIMS REVIEW BY / PM: RL

PROJECT: NAS Pensacola

	YES	NO	EXCEPTIONS	COMMENTS	RESOLUTION
1. CUSTODY SEALS PRESENT / INTACT?	✓				
2. CHAIN OF CUSTODY PRESENT IN THIS COOLER?	✓				
3. CHAIN OF CUSTODY SIGNED BY CLIENT?		✓			
4. CHAIN OF CUSTODY MATCHES SAMPLES?	✓				
5. TEMPERATURE BLANKS PRESENT?	✓			TEMP BLANK TEMP (°C)= 0.8	AJC notified Jenny Walker by V.M. 8/29/03
6. SAMPLES RECEIVED AT 4°C +/- 2? ICE / ICE PACKS PRESENT (Y) or N?		✓		COOLER TEMP (°C)= NA (RECORD COOLER TEMP ONLY IF TEMP BLANK IS NOT PRESENT)	
7. VOLATILES FREE OF HEADSPACE?	✓		NA		
8. TRIP BLANK PRESENT IN THIS COOLER		✓			
9. PROPER SAMPLE CONTAINERS AND VOLUME?	✓				
10. SAMPLES WITHIN HOLD TIME UPON RECEIPT?	✓				
11. SAMPLES PROPERLY PRESERVED[1]?	✓				
12. CORRECTIVE ACTION REPORT FILED?		✓	N/A		

13. ANALYTICAL PROGRAMS (CIRCLE ONE) COMMERCIAL CLP HAZWRAP (NFESC) ACOE AFCEE OTHER (STATE OF ORIGIN):

LOG - IN NOTES[1]: Received PBN18-Dupol-01 for all parameters, Not on COC - tg
AJC notified Jenny Walker by voicemail 8/29/03, will run sample unless we hear other wise.

[1] Use this space (and additional sheets if necessary) to document samples that are received broken or compromised, C-O-C discrepancies, radiation checks, residual chlorine check, results of pH check if required. If samples required pH adjustment, record volume and type of preservative added.

000006

APPENDIX D

FDEP APPROVAL LETTER

Department of
Environmental Protection

Jeb Bush
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

David B. Struhs
Secretary

May 17, 2002

Mr. Peter J. Palko, P.E.
Panther Technologies, Inc.
220 Route 70 East, Suite B
Medford, New Jersey 08055

Re: **PermeOx Plus**

Dear Mr. Palko:

The Bureau of Petroleum Storage Systems hereby accepts PermeOx Plus as a product for in situ and ex situ bioremediation of petroleum and other suitable contaminants in groundwater and soil. PermeOx Plus is a granular calcium peroxide-based product that slowly releases oxygen when wetted, for the purpose of accelerating the growth of microbes that biodegrade contaminants. The chemical composition of PermeOx Plus is shown in enclosure 1.

For vadose remediation where the underlying groundwater will not be affected by leaching of this product, there are no special concerns beyond those which would normally need to be addressed in preparing a Remedial Action Plan and conducting a cleanup in accordance with the petroleum cleanup requirements of Chapter 62-770, Florida Administrative Code (F.A.C.). For ex situ groundwater treatment, where an aboveground treatment system produces effluent meeting the petroleum cleanup criteria of Chapter 62-770, F.A.C., and the drinking water standards of Chapter 62-550, F.A.C., for disposal via recharge gallery or NPDES permit, there are no special concerns. But for in situ groundwater remediation, via direct injection of PermeOx Plus into an aquifer, there are underground injection control (UIC) regulations that must be observed. Since in situ aquifer remediation via injection is likely to be the most common application of this product, the bulk of the regulatory requirements discussed herein will be directed to that topic.

The bureau recognizes PermeOx Plus as a viable product for the bioremediation of petroleum contaminated sites in Florida. There are no objections to its use provided: (a) the considerations of this letter are taken into account; (b) a Remedial Action Plan is approved by the Department; and (c) applicable and appropriate underground injection control regulations are observed when the product is used for injection-type in situ aquifer remediation. For PermeOx Plus, the major environmental and regulatory considerations are set forth in enclosure 2.

While the Department of Environmental Protection does not provide endorsement of specific or brand name remediation products or processes, it does recognize the need to determine their acceptability from an environmental standpoint with respect to applicable rules and regulations, and the interests of public health, safety, and welfare. Vendors must then market the products and processes on their own merits regarding performance, cost and safety in comparison to competing alternatives in the marketplace. In no way, however, shall this regulatory letter of acceptance be construed as certification of

product performance. Additionally, the Department emphasizes a distinction between regulatory "acceptance" and approval. Products and processes are accepted; they are not approved.

Those who prepare Remedial Action Plans may include a copy of this letter in the appendix of plans they submit, and call attention to it in the text of their document. In this way, technical reviewers throughout the state will be informed that you have contacted the Department of Environmental Protection to inquire about PermeOx Plus's environmental acceptability. To aid those reviewers, the Bureau of Petroleum Storage Systems provides supplemental information as enclosure 3.

The Department reserves the right to revoke its acceptance of a product or process if its nature or performance has been falsely represented. Additionally, Department acceptance of any product or process does not imply it has been deemed applicable for all cleanup situations, or that it is preferred over other treatment or cleanup techniques in any particular case. A site-specific evaluation of applicability and cost-effectiveness must be considered for any product or process, whether conventional or innovative, and adequate site-specific design details must be provided in Remedial Action Plans prescribing the product or process. You may contact me at 850/487-3299 if there are any questions.

Sincerely,

Rick Ruscito, P.E.
Bureau of Petroleum Storage Systems

c: T. Conrardy - FDEP/Tallahassee

ppl #181
inn_083.doc
5/16/2002

ENCLOSURE 1

PERMEOX PLUS* CHEMICAL COMPOSITION †

Calcium Peroxide‡ [CaO_2]	75% by weight §
Calcium Hydroxide [$Ca(OH)_2$]	25% by weight §

† Information from Material Safety Data Sheet dated March 19, 2002 by FMC Corporation, Philadelphia, Pennsylvania.

‡ Active ingredient.

§ Percent by weight for product as shipped by the manufacturer: dry, granular solid particles in the size range of 70 to 90 microns with a bulk density of 27 pounds per cubic foot. The specific gravity of the solids alone is 2.92.

* For in situ injection-type remediation projects, Panther Technologies Incorporated indicates that PermeOx will be applied as a 25%-60% aqueous slurry. Since solutions of 1% calcium peroxide can have a pH as high as 11.5 to 12 units, and the total dissolved solids content of the injected slurry is likely to be in excess of 500 milligrams per liter, the Bureau of Petroleum Storage Systems hereby provides a reminder that Rule 62-522.300(2)(c), Florida Administrative Code, applies.

For in situ injection-type aquifer remediation using calcium peroxide, to comply with the rule, a department-approved Remedial Action Plan must: (a) indicate that the fluid to be injected will not meet the secondary drinking water standard of 6.5-8.5 for pH, and that it will not meet the 500 milligrams per liter secondary drinking water standard for total dissolved solids; (b) indicate a zone of discharge size (i.e. a radius of influence for each injection point); (c) indicate the period of time during which the injected fluid could temporarily exceed the secondary drinking water standards for pH and total dissolved solids; and (d) propose adequate groundwater monitoring of pH and total dissolved solids.

ENCLOSURE 2

ENVIRONMENTAL AND REGULATORY INFORMATION

For PermeOx Plus, the major environmental and regulatory concerns are listed below.

a. Groundwater cleanup standards: The onus shall be on users of PermeOx Plus to ensure that all applicable groundwater contaminant standards will be met at the time of project completion, for the contaminants of concern, any residuals associated with the ingredients of PermeOx Plus, and any byproducts produced as a result of chemical or biochemical reactions involving those ingredients. The following chapters of the Florida Administrative Code are cited: Chapter 62-550, F.A.C., for primary and secondary water quality standards; Chapter 62-520, F.A.C. for groundwater classes and standards; Chapter 62-522, F.A.C., for groundwater permitting and monitoring requirements; Chapter 62-528, F.A.C., for underground injection control, particularly Part V, for Class V, Group 4 aquifer remediation projects; Chapter 62-770, F.A.C., for petroleum cleanup criteria; and Chapter 62-777, F.A.C., for cleanup target levels.

   A noteworthy aspect of the minimum criteria set forth in Chapter 62-520, F.A.C., is that it requires groundwater to be free from substances that are harmful to plants, animals, and organisms, and free from substances that are carcinogenic, mutagenic, teratogenic or toxic to human beings. In effect, these "free from" requirements form a catchall. They close what would otherwise be a loophole in the regulations by preventing injection of a potentially harmful product in the event that any of its ingredients is not regulated as a specific primary or secondary drinking water contaminant.

b. Injection well permit: The issuance of a site-specific Remedial Action Plan Approval Order by either the Bureau of Petroleum Storage Systems or the Bureau of Waste Cleanup, for remediation via injection of PermeOx Plus into an aquifer, constitutes the granting of a Class V injection well permit.

c. Groundwater injection standards: For in situ aquifer remediation, pursuant to Chapter 62-528, F.A.C., the composition of an injected fluid must meet the drinking water standards set forth in Chapter 62-550, F.A.C., and the minimum groundwater criteria described in Chapter 62-520, F.A.C. The minimum groundwater criteria set forth in Chapter 62-777, F.A.C., also apply. The Bureau of Petroleum Storage Systems knows that the chemical analysis of enclosure 1 for PermeOx Plus will not meet the secondary drinking water standards of 500 mg/L for total dissolved solids and the 6.5 to 8.5 range for pH. <u>Therefore, in order to use PermeOx Plus for injection-type in situ aquifer remediation, rule 62-522.300(2)(c), F.A.C., must be applied to these secondary drinking water parameters that do not meet injection requirements</u>.

   Rule 62-522.300(2)(c), F.A.C., effective August 27, 2001, allows a temporary zone of discharge for aquifer remediation purposes, within which a temporary exceedance of the primary and secondary drinking water parameters is tolerated when PermeOx Plus is injected. In order to comply with the rule, a Department-approved site-specific remediation plan proposing PermeOx Plus must: (a) identify the secondary parameters pH and total dissolved solids, whose standards are exceeded by the composition of the fluid to be injected; (b) indicate the size and duration of the temporary zone of discharge; and (c) propose groundwater

monitoring of the secondary parameters in the fluid that do not meet injection requirements.

d. Utilization of wells: If a remediation site happens to have an abundance of monitoring wells, then the Department has no objection to the use of some wells for the application of PermeOx Plus. However, no "designated" monitoring well, dedicated to the tracking of remediation progress (by sampling) shall be used to apply PermeOx Plus. This will avoid premature conclusions that the entire site meets cleanup goals. By making sure that designated tracking wells are not also used for treatment, there will be more assurance that the treatment process has permeated the entire site and that it did not remain localized to the area immediately surrounding each injection well.

e. Groundwater monitoring:

1. Active remediation monitoring of petroleum: During the period of active remediation, groundwater shall be monitored for petroleum contaminants of concern in accordance with the requirements set forth in Section 62-770.700, F.A.C. For non-petroleum cleanups, the monitoring should be conducted in accordance with the provisions of an approved Remedial Action Plan.

2. Post remediation monitoring of petroleum: During the period of post active remediation, groundwater monitoring for petroleum contaminants of concern shall be conducted in accordance with the requirements set forth in Section 62-770.750, F.A.C. For non-petroleum cleanups, the monitoring should be conducted in accordance with the provisions of an approved Remedial Action Plan.

3. Monitoring for underground injection control purposes: Pursuant to rule 62-522.300(2)(c), F.A.C., groundwater monitoring of the primary and secondary drinking parameters set forth in Chapter 62-550, F.A.C., that are not met by a fluid injected for aquifer remediation must be addressed in a Department-approved Remedial Action Plan. Additionally, if an injected fluid does not meet the minimum groundwater criteria of Chapters 62-520 and 62-777, F.A.C., then groundwater monitoring must be conducted for the specific parameters associated with the necessary temporary zone of discharge variance for the injection of such a fluid. In the case of PermeOx Plus, only secondary drinking water parameters for pH and total dissolved solids are not met by the fluid to be injected, so the groundwater monitoring of those two parameters must be addressed in a Department-approved Remedial Action Plan.

f. Underground injection control inventory: Remedial Action Plans prescribing in situ aquifer injection-type remediation shall include information pursuant to Rule 62-528.630(2)(c)1 through 6, F.A.C., for the inventory purposes of underground injection control. Per Rule 62-528.630(2)(c), F.A.C., aquifer remediation projects involving injection wells may be authorized under the provisions of a Remedial Action Plan, provided the construction, operation, and monitoring requirements of Chapter 62-528, F.A.C., are met. A memorandum outlining the inventory information about injection-type aquifer remediation plans, to be transmitted by Department reviewers, to the Underground Injection Control Section is provided as enclosure 4.

g. Avoidance of migration: For in situ injection-type aquifer remediation projects, injection of PermeOx Plus shall be performed in such a way, and at such a rate and volume, that no undesirable migration of either the

product's ingredients or the contaminants of concern in the aquifer results, pursuant to Rule 62-528.630(3), F.A.C.

h. Operating parameters: Section 62-770.700, F.A.C., sets forth frequency requirements for the measurement of bioremediation operating parameters such as dissolved oxygen levels, rates of nutrient addition, temperature, etc. It also includes an option for reduction in the frequency or discontinuation of some measurements in situations when appropriate.

i. Abandonment of wells: Upon issuance of a petroleum Site Rehabilitation Completion Order, or a declaration of "No Further Action", injection wells shall be abandoned pursuant to Section 62-528.645, F.A.C. The Underground Injection Control Section of the Department shall be notified so that the injection wells can be removed from the inventory-tracking list.

ENCLOSURE 3

SUPPLEMENTAL INFORMATION

The information below, compiled from several sources, may be helpful to reviewers of Remedial Action Plans prescribing bioremediation.

a. Department of Environmental Protection reviewers of injection-type in situ aquifer remediation plans, regardless of whether in Tallahassee or district offices, must fill in the blanks on the enclosure 4 memorandum, whose subject is "Proposed Injection Well(s) for In situ Aquifer Remediation at a Petroleum Remedial Action Site". The completed form must be submitted to the Underground Injection Control Section at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400.

   Only the appropriate bureau chiefs and division directors within the Department and its district offices may sign in situ injection-type remediation plan approval orders that constitute the granting of a Class V injection permit. Local program staff may review such plans but are not authorized to sign the approval orders. Reason: Although an arrangement between the Environmental Protection Agency and the Department delegates underground injection control authority to the Department, it does not allow the Department to delegate that authority any further. This includes delegation to the Department's contracted remediation review agencies such as those operated by the counties and other local governments.

b. Pilot study: For bioremediation, per Section 62-770.700, F.A.C., a pilot study proposal shall be submitted for review, and a pilot test shall be performed prior to designing a treatment system. If conditions or the situation at a site do not warrant a pilot study, then a proposal explaining the rationale for the decision not to perform a pilot study shall be submitted for review. The state's technical reviewers are encouraged to use judgment in balancing cost and the need for technical information to be obtained from a pilot study.

c. Bacteria: It is generally reported (on a total weight basis) that bacteria are approximately 70 to 80 percent water. On a dry weight basis, approximately 95 percent of the composition is represented by 5 elements: carbon, oxygen, nitrogen, hydrogen, and phosphorus. At a petroleum remediation site, it is intended that the source of carbon for the growth of bacteria will come from the petroleum hydrocarbons themselves. Natural-occurring organic carbon at a site can also serve as a carbon source for bacteria. Depending on site's specific conditions, the remaining four elements must either be available naturally, or added as macronutrients in order to stimulate bioremediation. Micronutrients must also be present for bacteria to grow.

d. Degradation products: Carbon dioxide and water are the ultimate products of aerobic and most anaerobic biodegradations of hydrocarbons. In the case of methanogenesis, an anaerobic process, carbon dioxide and methane are produced. The intermediate products of aerobic degradation may include simple acids, alcohols, and fatty acids. Aerobic processes use oxygen as an electron acceptor to produce carbon dioxide and water.

e. Parameters: The following parameters may be useful in determining the potential for bioremediation at a site, or whether bioremediation is already occurring. They were selected from a list that appears in the publication "In situ Treatment Technology" by E. Nyer et al., Lewis

Publishers, 1996. The parameters are dissolved oxygen; redox potential; pH; temperature; specific conductance; volatile organic compounds; nitrate; nitrite; ammonia nitrogen; manganese (total and dissolved); iron (total, dissolved, and ferrous); sulfate; sulfide; and total organic carbon. Gaseous parameters include carbon dioxide, oxygen, nitrogen, and methane. Other parameters that may be helpful are chemical oxygen demand, biochemical oxygen demand, and total organic carbon. Those who prepare bioremediation plans and their reviewers should determine which parameters, if any should be investigated on a site-specific basis.

f. Chemical reactions: The chemical reactions that occur when calcium peroxide is mixed with water are shown below. This mechanism of reactions shows how calcium peroxide increases the groundwater's concentration of dissolved oxygen. The notation used is as follows: calcium peroxide, CaO_2; calcium hydroxide, $Ca(OH)_2$; hydrogen peroxide, H_2O_2; water, H_2O; and oxygen, O_2.

$$CaO_2 + 2H_2O \rightarrow Ca(OH)_2 + H_2O_2$$

$$2\ H_2O_2 \rightarrow O_2 + 2\ H_2O$$

g. Vendor information: Below is some of the information included in the submittal by Panther Technologies for PermeOx that the Bureau of Petroleum Storage Systems would like to pass along to readers of this letter.

Calcium Peroxide (dry grannules) Molecular Weight of CaO_2	75% by weight, minimum 72.8
Calcium Hydroxide (dry granules) Molecular Weight of $Ca(OH)_2$	25% by weight 74
Active Oxygen	18.2%, minimum (i.e. there are 18.2 pounds of active oxygen in every 100 pounds of PermeOx Plus)
Solubility	Slightly soluble in water (soluble in acid)
pH of a 1% slurry at 25°C, approximate	11.5 to 12.2
Loose Bulk Density, approximate lb/cu.ft.	45-65
Odor/Appearance	None/Yellow/White granules
Soil Moisture Required for Activation	5%-10%
Theoretical weight ratio of oxygen to hydrocarbon for aerobic degradation	3:1
Factor recommended to apply to theoretical ratio to account for unknown oxygen demands by non-target compounds	Multipy theoretical by up to 8 (therefore provide up to 24 pounds of oxygen for every pound of hydrocarbon to be degraded)
Typical Application Rate	0.1%-1.0% by weight on soil (approx. 2-6 pounds/cubic yard

	of soil)
Injection Applications	Inject as a 25%-60% slurry

g. Limitations: Not recommended for free product. Not recommended for chlorinated ethenes and other situations where the contaminant is better suited for anaerobic degradation rather than aerobic.

ENCLOSURE 4

Florida Department of

Memorandum **Environmental Protection**

TO: Richard Deuerling, Mail Station 3530
Division of Water Facilities
Underground Injection Control Section
Florida Department of Environmental Protection
2600 Blair Stone Road, Tallahassee, FL 32399-2400

FROM: _____ (Note 1.)
_____
_____

DATE: _____

SUBJ: **Proposed Injection Well(s) for In situ Aquifer Remediation at a Petroleum Remedial Action Site**

Pursuant to Rule 62-528.630(2)(c), F.A.C, inventory information is hereby provided regarding the proposed construction of temporary injection well(s) for the purpose of in situ aquifer remediation at a petroleum-contaminated site.

Site name: _____
Site address: _____
City/County: _____
Latitude/Longitude: _____
FDEP Facility Number: _____

Site owner's name: _____
Site owner's address: _____
_____
_____
_____

Well contractor's name: _____ (Note 2.)
Well contractor's address: _____
_____
_____
_____

Brief description of the in situ injection-type aquifer remediation project:
_____
_____

Summary of major design considerations and features of the project:

Areal extent of contamination (square feet): _____
Number of injection wells: _____
Composition of injected fluid (Note 3)
(ingredient, wt. %): _____
_____

Injection volume per well (gallons): _____
Single or multiple injection events: _____
Injection volume total (all wells, all events): _____

A site map showing the areal extent of the groundwater contamination plume, and the location and spacing of injection wells and associated monitoring wells is attached.

The following is a summary description of the affected aquifer:

Name of aquifer: _____
Depth to groundwater (feet): _____
Aquifer thickness (feet): _____

The injection well(s) features are summarized below, and/or a schematic of the injection well(s) is attached.

Direct-push or Conventional *(circle the appropriate well type)*
Diameter of well(s) (i.e., riser pipe & screen)(inches): ____
Total depth of well(s) (feet): _____
Screened interval: _____ to _____ feet below surface
Grouted interval: _____ to _____ feet below surface
Casing diameter, if applicable (inches): _____
Cased depth, if applic.: _____ to _____ feet below surface
Casing material, if applic.: _____

The in situ injection-type aquifer remediation plan for this petroleum contaminated site is intended to meet the groundwater petroleum cleanup criteria set forth in Chapter 62-770, F.A.C. Additionally, all other groundwater standards will be met at the time of project completion for any residuals associated with the ingredients of the injected remediation products, and any by-products or intermediates produced as a result of the chemical or biochemical transformation of those ingredients or the contaminating petroleum during their use. Applicable primary and secondary drinking water standards are set forth in Chapter 62-550, F.A.C., and additional groudwater quality criteria are set forth in Chapter 62-520, F.A.C.

The remediation plan estimates that site remediation will take _____ months. We will notify you if there are any modifications to the remediation strategy which will affect the injection well design or the chemical composition and volume of the injected remediation product(s).

The proposed remediation plan was approved on _____ by an enforceable approval order. A copy is attached. The remediation system installation is expected to commence within 60 days. Please call me at _____ if you require additional information.

Note 1. Local programs are not authorized to approve underground injections into aquifers. Reason: Per agreement with EPA, the FDEP cannot delegate this authority. Local programs, after reviewing a Remedial Action Plan or an injection proposal document, should follow the instructions in a March 16, 2000 memorandum to arrange for Department headquarters' execution of an approval order, and then complete this form. This form is primarily for use by state and local program technical reviewers, but petroleum remediation contractors may fill in all blanks except those labeled "FROM", "DATE", and "approval date", and "telephone number" blanks in the last paragraph. Those blanks should be completed only by a state or local program reviewer.

Note 2. If an injection well installation contractor has not yet been selected, then indicate the name and address of the project's general remediation contractor/consultant.

Note 3. Complete chemical analysis of injected fluid is required by Chapter 62-528, Florida Administrative Code. Proprietary formulations shall make confidential disclosure. Injected fluids must meet drinking water standards of Chapter 62-550, F.A.C., unless an exemption or variance has been granted.

APPENDIX E

HEALTH AND SAFETY PLAN (HASP) UST SITE 18

Health and Safety Plan

Treatability Study for UST Site 18

for

Naval Air Station Pensacola

Pensacola, Florida

Southern Division
Naval Facilities Engineering Command

Contract No. N62467-94-D-0888
Contract Task Order 0313

July 2003

HEALTH AND SAFETY PLAN

TREATABILITY STUDY FOR UST SITE 18

FOR
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

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

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

Submitted by:
Tetra Tech NUS, Inc.
661 Andersen Drive
Pittsburgh, Pennsylvania 15222

CONTRACT NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0313

JULY 2003

PREPARED UNDER THE
SUPERVISION OF:

GERALD WALKER
TASK ORDER MANAGER
TETRA TECH NUS, INC.
TALLAHASSEE, FLORIDA

APPROVED FOR SUBMITTAL BY:

MATTHEW M. SOLTIS, CIH, CSP
CLEAN HEALTH & SAFETY MANAGER
TETRA TECH NUS, INC.
PITTSBURGH, PENNSYLVANIA

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1.0 INTRODUCTION

This Health and Safety Plan (HASP) has been written to encompass activities associated with a Treatability Study at UST Site 18. The intent of this project is to assess the effectiveness of Oxygen Enhancement Technologies in remediating the groundwater at Site 18 on the Naval Air Station Pensacola (NAS Pensacola), Pensacola, Florida as part of Contract Task Order (CTO) 0313. Specifically, this HASP addresses the additional investigation activities that will monitor and assess the success of natural attenuation of the contamination present in the groundwater at this site. This HASP is part of an overall effort conducted under Comprehensive Long-Term Environmental Action Navy (CLEAN III) administered through the U.S. Navy Southern Division Naval Facilities Engineering Command (NAVFAC), as defined under Contract Number N62467-94-D-0888. In addition to the HASP, a copy of the Tetra Tech NUS, Inc. (TtNUS) Environmental Health and Safety Guidance Manual must be present at the site during the performance of site activities. The Guidance Manual provides detailed information pertaining to the HASP, as well as TtNUS Standard Operating Procedures (SOP's). Both documents must be present at the site to comply with the requirements stipulated in the Occupational Safety and Health Administration (OSHA) standard 29 CFR 1910.120.

This HASP has been developed using the latest available information regarding known or suspected chemical contaminants and potential physical hazards associated with the proposed work and site. The HASP will be modified if new information becomes available. Changes to the HASP will be made by the Project Health & Safety Officer (PHSO) and approved by the TtNUS Health and Safety Manager (HSM) and the Task Order Manager (TOM). The TOM will notify affected personnel of changes.

The elements of this HASP are in compliance with the requirements established by OSHA 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response" (HAZWOPER), and sections of 29 CFR 1926, "Safety and Health Regulations for Construction". The information contained in this plan, as well as policies on conducting onsite operations, have been obtained from the TtNUS Health and Safety Program.

1.1 KEY PROJECT PERSONNEL AND ORGANIZATION

This section defines responsibility for site safety and health for TtNUS and subcontractor employees engaged in onsite activities. Personnel assigned to these positions will exercise the primary responsibility for onsite health and safety. These persons will be the primary points of contact for any questions regarding the safety and health procedures and the selected control measures that are to be implemented for onsite activities.

- The TtNUS TOM is responsible for the overall direction of health and safety for this project.

- The PHSO is responsible for developing this HASP in accordance with applicable OSHA regulations. Specific responsibilities include:

  i. Providing information regarding site contaminants and physical hazards associated with the site.
  ii. Establishing air monitoring and decontamination procedures.
  iii. Assigning personal protective equipment based on task and potential hazards.
  iv. Determining emergency response procedures and emergency contacts.
  v. Stipulating training requirements and reviewing appropriate training and medical surveillance certificates.
  vi. Providing standard work practices to minimize potential injuries and exposures associated with hazardous waste work.
  vii. Modify this HASP, as it becomes necessary.

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

- The SSO supports site activities by advising the FOL on the aspects of health and safety on-site. These duties may include:

  i. Coordinates health and safety activities with the FOL.
  ii. Selects, applies, inspects, and maintains personal protective equipment.
  iii. Establishes work zones and control points in areas of operation.
  iv. Implements air monitoring program for onsite activities.
  v. Verifies training and medical clearance of onsite personnel status in relation to site activities.
  vi. Implements Hazard Communication, Respiratory Protection Programs, and other associated health and safety programs as they may apply to site activities.
  vii. Coordinates emergency services.
  viii. Provides site-specific training for onsite personnel.
  ix. Investigates accidents and injuries (see Attachment I - Illness/Injury Procedure and Report Form)
  x. Provides input to the PHSO regarding the need to modify, this HASP, or applicable health and safety associated documents as per site-specific requirements.

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

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

1.2 SITE INFORMATION AND PERSONNEL ASSIGNMENTS

Site Name: Naval Air Station Pensacola Address: Pensacola, Florida

Navy Remedial Project Manager: Byas Glover Phone Number: (843) 820-5651

Navy Environmental Coordinator: Greg Campbell Phone Number: (850) 452-4611 ext. 103

Purpose of Site Visit: This activity is divided into a multi-task operation (see Section 4.0), including soil boring (drilling), groundwater sampling, ORC Injections, and other related activities.

Proposed Dates of Work: July 2003 until completion

Project Team:

TtNUS Personnel:	**Discipline/Tasks Assigned:**
Gerald Walker	Task Order Manager (TOM)
TBD	Field Operations Leader (FOL)
Matthew M. Soltis, CIH, CSP	CLEAN Health and Safety Manager (HSM)
Clyde J. Snyder	Project Health and Safety Officer (PHSO)
TBD	Site Safety Officer (SSO)

Non-TtNUS Personnel	**Affiliation/Discipline/Tasks Assigned**
TBD	Drilling Subcontractor(s)
TBD	

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

TBD - To be determined

2.0 EMERGENCY ACTION PLAN

2.1 INTRODUCTION

This section is part of a preplanning effort to direct and guide field personnel in the event of an emergency. Site activities will be coordinated with NAS Pensacola fire protection and emergency services prior to commencement. In the event of an emergency, which cannot be mitigated using onsite resources, personnel will evacuate to a safe place of refuge and the FOL will call 911 and report the emergency. Site personnel may transport ill workers or those who have non-serious injuries to medical facilities, provided that such transport can be done safely. The emergency response agencies listed in this plan are capable of providing the most effective response, and as such, will be designated as the primary responders. These agencies are located within a reasonable distance from the area of site operations, which ensures adequate emergency response time. NAS Pensacola Emergency Dispatch will be notified anytime outside response agencies are contacted. This Emergency Action Plan conforms to the requirements of 29 CFR 1910.38(a), as allowed in 29 CFR 1910.120(l)(1)(ii).

TtNUS will, through necessary services, include initial response measures for incidents such as:

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

2.2 EMERGENCY PLANNING

Through the initial hazard/risk assessment effort, injury or illness resulting from exposure to chemical or physical hazards or fire are the most probable emergencies that can be encountered during site activities. To minimize and eliminate these potential emergency situations, pre-emergency planning activities associated with this project include the following. The SSO and/or the FOL are responsible for:

- Coordinating response actions with NAS Pensacola Emergency Services personnel to ensure that TtNUS emergency action activities are compatible with existing facility emergency response procedures.
- Establishing and maintaining information at the project staging area (Support Zone) for easy access in the event of an emergency. This information includes the following:

  - Chemical Inventory (for substances used onsite), with Material Safety Data Sheets.

- Onsite personnel medical records (medical data sheets).
- A logbook identifying personnel onsite each day.
- Emergency notification phone numbers in site vehicles

- Identifying a chain or command for emergency action.
- Educating site workers to the hazards and control measures associated with planned activities at the site, and providing early recognition and prevention, where possible.

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

2.3 EMERGENCY RECOGNITION AND PREVENTION

2.3.1 Recognition

Foreseeable emergency situations that may be encountered during site activities will generally be recognizable by visual observation. A clear knowledge of the signs and symptoms of overexposure to contaminants of concern may alert personnel of the potential hazards concerning themselves or their fellow workers. These potential hazards, the activities with which they have been associated, and the recommended control methods are discussed in detail in sections 5.0 and 6.0 of this document. Additionally, early recognition will be supported by periodic site surveys to eliminate any conditions that may predispose site personnel or properties to an emergency. The FOL and the SSO will constitute the site evaluation committee responsible for these periodic surveys. Site surveys will be conducted at least once a week during the initiation of this effort.

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

2.3.2 Prevention

TtNUS and subcontractor personnel will minimize the potential for emergencies by ensuring compliance with the HASP, the Health and Safety Guidance Manual, applicable OSHA regulations, and through periodic site surveys of work areas.

2.4 SAFE DISTANCES AND PLACES OF REFUGE

In the event that the site must be evacuated, personnel will immediately stop activities and report to the FOL at the place of safe refuge. Safe places of refuge will be determined prior to commencement of site

activities and will be conveyed to personnel as part of the daily safety meeting conducted each morning. Upon reporting to the refuge location, personnel will remain there until directed otherwise by the TtNUS FOL. The FOL or the SSO will take a head count at this location to confirm the location of site personnel. The site logbook will be used to take the head count. Places of refuge will ideally be selected which offer a point for communication purposes should this be required.

2.5 EVACUATION ROUTES AND PROCEDURES

Once an evacuation is initiated, personnel will proceed immediately to the designated place of refuge, unless doing so would further jeopardize the welfare of workers. In such an event, personnel will proceed to a designated alternate location (to be identified) and remain there until further notification from the FOL. The use of these locations as assembly points provides communication and a direction point for emergency services, should they be needed.

Evacuation procedures will be discussed prior to the initiation of any work at the site. This shall include identifying primary and secondary evacuation routes and assembly points. Evacuation routes from the site are dependent upon the location at which work is being performed and the circumstances under which an evacuation is required. Additionally, site location and meteorological conditions (i.e., wind speed and direction) will influence the designation of evacuation routes. As a result, assembly points at NAS Pensacola will be selected, and in the event of an emergency, field personnel will proceed to these points by the most direct route possible without further endangering themselves.

2.6 EMERGENCY ALERTING AND ACTION/RESPONSE PROCEDURES

Since TtNUS personnel will not always be working in the proximity of each other, hand signals, voice commands, air horns, and/or two-way radios may comprise the mechanisms to alert site personnel of an emergency.

If an incident occurs, site personnel will initiate the following procedures:

- Initiate incident alerting procedures (if needed) verbally, by air horn, or using two-way radios.
- Evacuate non-essential personnel.
- Initiate initial response procedures.
- Describe to the FOL (who will serve as the Incident Commander) what has occurred in as much detail as possible.

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

- Call 911 for outside emergency service and report the emergency to the NAS Pensacola Emergency Dispatch (See Table 2-1)
- Give the emergency operator the location of the emergency and a brief description of what has occurred.
- Stay on the phone follow the instructions given by the operator
- The appropriate agency will be notified and dispatched

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

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

2.7 EMERGENCY CONTACTS

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

TABLE 2-1

EMERGENCY CONTACTS
NAS PENSACOLA

AGENCY	TELEPHONE
EMERGENCY (outside Police, Fire, and Ambulance Services)	**911**
NAS Pensacola - Emergency Dispatch	(850) 452-3333
Navy Engineer-in-Charge Byas Glover	(843) 820-5651
Facility Point of Contact Greg Campbell	(850) 452-4611 ext 103
Navy Hospital	(850) 505-6600
Baptist Hospital	(850) 469-2313)
Poison Control Center	(800) 222-1222
Florida Game and Fresh Water Fish Commission Northwest Region	(850) 265-3676
WorkCare	(800) 229-3674
TtNUS Tallahassee Office and Task Order Manager (Gerry Walker)	(850) 385-9899
CLEAN Health and Safety Manager Matthew M. Soltis, CIH, CSP	(412) 921-8912
TtNUS Human Resources Manager Marilyn Duffy	(412) 921-8475
TtNUS Project Health and Safety Officer Clyde J. Snyder	(412) 921-8904

2.8 ROUTE TO HOSPITALS

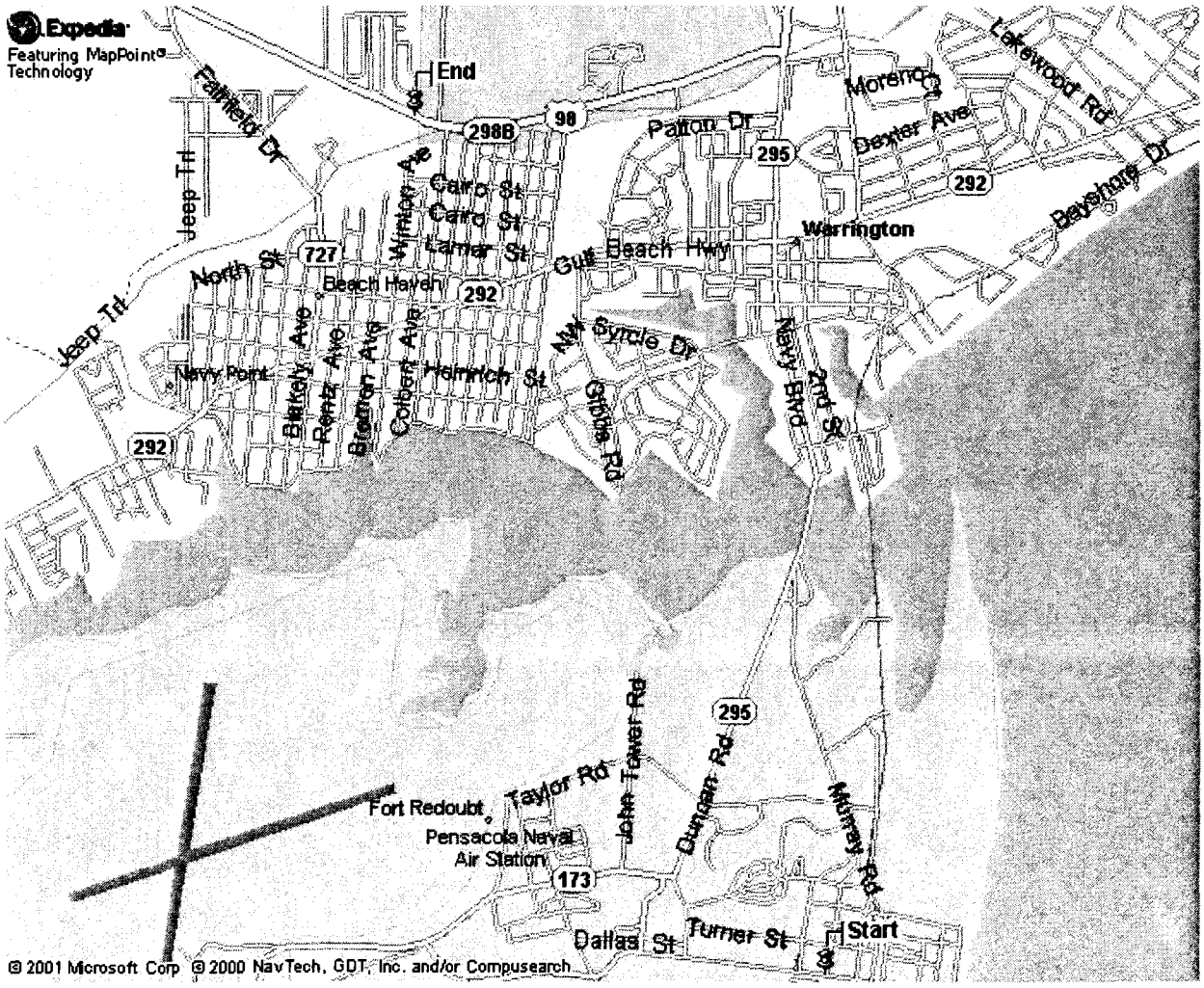
Two hospitals could potentially be used during this project depending on the circumstances. For emergency situations the Naval Hospital Pensacola (NHP) should be utilized. The hospital is closer to the site and is fully prepared to accept chemically contaminated patients. Baptist Hospital will be used for non-emergency care services. Routes and directions to these hospitals are provided below.

Navy Hospital
6000 W. Highway 98
Pensacola, Florida 32512
(850) 505-6600

Directions to the Navy Hospital from the site are as follows:

Proceed out of Main Gate (Navy Blvd) heading north to US Highway 98. Turn left (heading west) on US 98 and proceed approximately 1 mile. Hospital will be on the right (Building 2268).

Figure 2-1
Route to Naval Hospital Pensacola

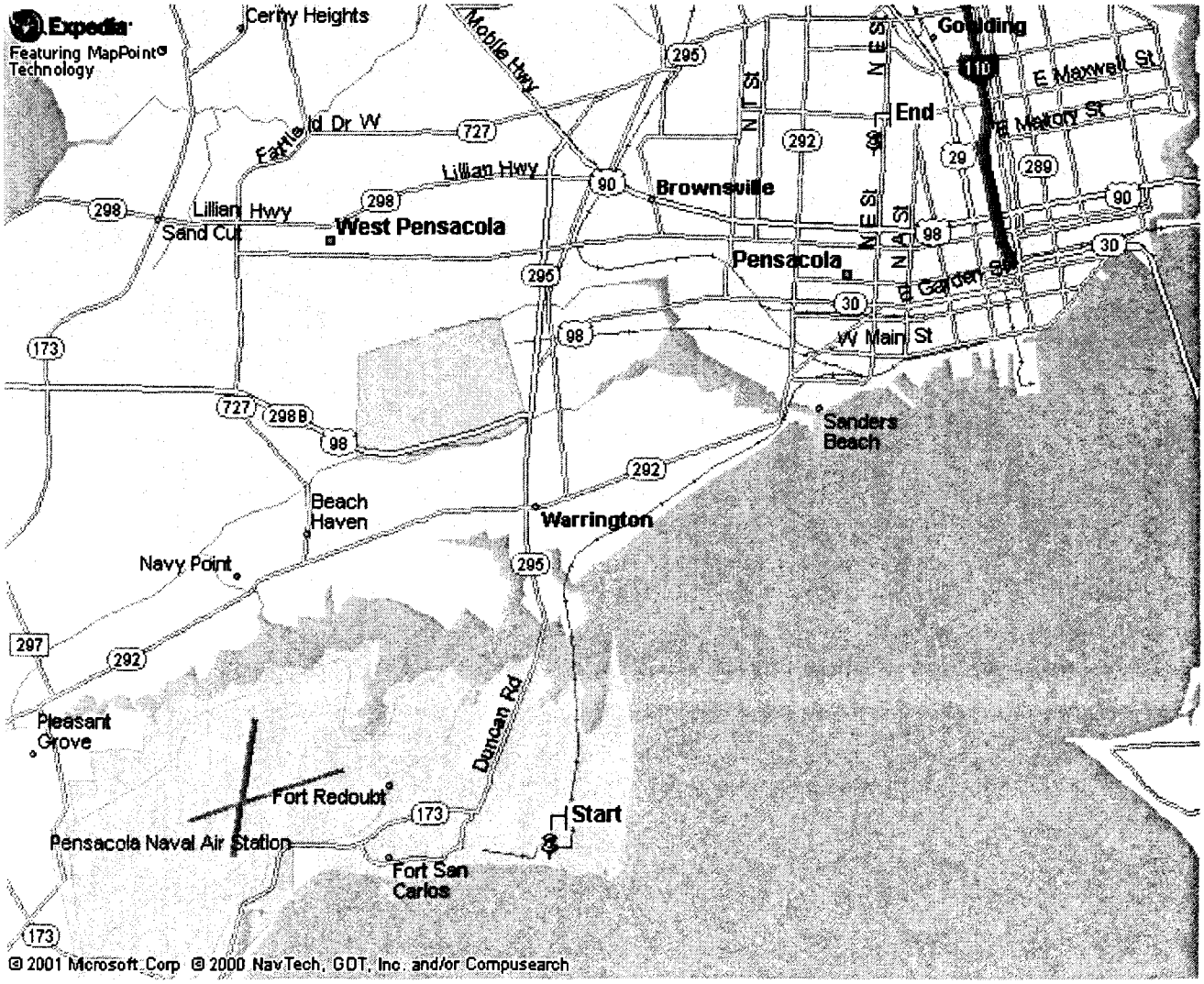


Baptist Hospital
1000 West Moreno Blvd.
Pensacola, FL 32508
(850-469-2313)

Directions to this Hospital from the Main Gate of NAS Pensacola are:

Proceed out of Main Gate (Navy Blvd) heading north to Hwy 292. Turn right (heading east) on Hwy 292 until it turns into Garden Street (approx. 3 miles). Take Garden Street to intersection with "E" Street. Turn left onto "E" Street and proceed approximately 1 mile to Hospital on left.

Figure 2-1-1
Route to Baptist Hospital



2.9 DECONTAMINATION PROCEDURES/EMERGENCY MEDICAL TREATMENT

During any site evacuation, decontamination procedures will be performed only if doing so does not further jeopardize the welfare of site workers. Decontamination will not be performed if the incident warrants immediate evacuation. However, it is unlikely that an evacuation would occur which would require workers to evacuate the site without first performing the necessary decontamination procedures.

TtNUS personnel will perform removal of personnel from emergency situations and may provide initial medical support for injury/illnesses requiring only first-aid level support. Medical attention above that level will require assistance and support from the designated emergency response agencies. **If the emergency involves personnel exposures to chemicals, follow the steps provided in Figure 2-2.**

2.10 INJURY/ILLNESS REPORTING

If any TtNUS personnel are injured or develop an illness as a result of working on site, the TtNUS "Injury/Illness Procedure" (Attachment I) must be followed. Following this procedure is necessary for documenting the information obtained at the time of the incident. Also, as soon as possible Navy contact Greg Campbell must be informed of any incident or accident that requires medical attention.

Any pertinent information regarding allergies to medications or other special conditions will be provided to medical services personnel. This information is listed on Medical Data Sheets filed onsite (See Attachment II). If an exposure to hazardous materials has occurred, provide information on the chemical, physical, and toxicological properties of the subject chemical(s) to medical service personnel.

FIGURE 2-2
EMERGENCY RESPONSE PROTOCOL

The purpose of this protocol is to provide guidance for the medical management of injury situations.

In the event of a personnel injury or accident:

- Rescue, when necessary, employing proper equipment and methods.
- Give attention to emergency health problems -- breathing, cardiac function, bleeding, and shock.
- Transfer the victim to the medical facility designated in this HASP by suitable and appropriate conveyance (i.e. ambulance for serious events)
- Obtain as much exposure history as possible (a Potential Exposure report is attached).
- If the injured person is a Tetra Tech NUS employee, call the medical facility and advise them that the patient(s) is/are being sent and that they can anticipate a call from the WorkCare physician. WorkCare will contact the medical facility and request specific testing which may be appropriate. WorkCare physicians will monitor the care of the victim. Site officers and personnel should not attempt to get this information, as this activity leads to confusion and misunderstanding.
- Call WorkCare at 1-800-455-6155 and enter Extension 109 or follow the voice prompt for after hours and weekend notification and be prepared to provide:
  - Any known information about the nature of the injury.
  - As much of the exposure history as was feasible to determine in the time allowed.
  - Name and phone number of the medical facility to which the victim(s) has/have been taken.
  - Name(s) of the involved Tetra Tech NUS, Inc. employee(s).
  - Name and phone number of an informed site officer who will be responsible for further investigations.
  - Fax appropriate information to WorkCare at (714) 456-2154.
  - Contact Corporate Health and Safety Department (Matt Soltis) and Human Resources Manager Marilyn Duffey at 1-800-245-2730.

As data is gathered and the scenario becomes more clearly defined, this information should be forwarded to WorkCare. WorkCare will compile the results of the data and provide a summary report of the incident. A copy of this report will be placed in each victim's medical file in addition to being distributed to appropriately designated company officials.

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

FIGURE 2-2 (continued)

POTENTIAL EXPOSURE REPORT

Name: _____ Date of Exposure: _____

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

Client Contact: _____ Phone No.: _____

Company Name: _____

I. Exposing Agent

Name of Product or Chemicals (if known): _____

_____

Characteristics (if the name is not known)

Solid Liquid Gas Fume Mist Vapor

II. Dose Determinants

What was individual doing? _____

How long did individual work in area before signs/symptoms developed? _____

Was protective gear being used? If yes, what was the PPE? _____

Was there skin contact? _____

Was the exposing agent inhaled? _____

Were other persons exposed? If yes, did they experience symptoms? _____

III. Signs and Symptoms (check off appropriate symptoms)

Immediately With Exposure:

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

Delayed Symptoms:

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

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

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

Have symptoms: (please check off appropriate response and give duration of symptoms)

Improved: _____ Worsened: _____ Remained Unchanged: _____

V. Treatment of Symptoms (check off appropriate response)

None: _____ Self-Medicated: _____ Physician Treated: _____

3.0 SITE BACKGROUND

3.1 NAS PENSACOLA

NAS Pensacola is approximately 5,800 acres and is located on a peninsula bounded on the east and south by Pensacola Bay and Big Lagoon and on the north by Bayou Grande.

3.1.1 UST 18

UST 18 is located on NAS Pensacola in Escambia County, Florida, and occupies approximately 900 feet by 2,300 feet of open land along the southwestern border of Forrest Sherman Field. The site is bordered on the east by aircraft Runway 19, to the north by a paved taxiway, to the west by scattered brush and woods, and to the south by an open field.

Between 1955 and 1997, the UST 18 area was used to train fire fighters for aircraft crash responses, using available fuel as a combustion source. Historically, during training exercises, approximately 30 to 50 gallons of fuel were poured into unlined pits or onto various pieces of equipment, and then ignited to simulate aircraft crashes. The northernmost pit, which was lined and filled with water, contained a mock aircraft cockpit. Several other burn pits contained miscellaneous pieces of equipment, including a fuel trailer, various airplane parts, and metal and non-metallic debris of unknown, but presumably of aircraft origin. However, the district fire chief reported that up to 700 gallons of fuel may have been used per event. Most recently, only the northernmost pit was used for fire training. Fire training ceased at UST 18 in May 1997.

4.0 SCOPE OF WORK

The following is a list of activities that are covered in this HASP for the CTO 0313 project:

- Mobilization/demobilization
- Groundwater sampling
- Installation of temporary monitoring wells/preliminary groundwater investigation
- Preliminary groundwater investigation using Direct Push Technology (DPT)
- Soil boring injection utilizing DPT of ORC© (Oxygen Release Compound) injection.
- Decontamination of sampling equipment
- IDW management

The above listing represents a summarization of the tasks as they may apply to the scope and application of this HASP. For more detailed description of the associated tasks, refer to the Sampling and Analysis Plan (SAP). Any tasks to be conducted outside of the elements listed here will be considered a change in scope requiring modification of this document. The TOM or a designated representative will submit requested modifications to this document to the HSM.

5.0 TASKS/HAZARDS/ASSOCIATED CONTROL MEASURES SUMMARIZATION

Table 5-1 of this section serves as the primary portion of the site-specific HASP which identifies the tasks that are to be performed as part of the scope of work. This table will be modified and incorporated into this document as new or additional tasks are performed at the site. The anticipated hazards, recommended control measures, air monitoring recommendations, required Personal Protective Equipment (PPE), and decontamination measures for each site task are discussed in detail. This table and the associated control measures shall be changed, if the scope of work, contaminants of concern or other conditions change.

Through using the table, site personnel can determine which hazards are associated with each task and at each site, and what associated control measures are necessary to minimize potential exposure or injuries related to those hazards. The table also assists field team members in determining which PPE and decontamination procedures to use based on proper air monitoring techniques and site-specific conditions.

A Health and Safety Guidance Manual accompanies this table and HASP. The manual is designed to further explain supporting programs and elements for other site-specific aspects as required by 29 CFR 1910.120. The Guidance Manual should be referenced for additional information regarding air monitoring instrumentation, decontamination activities, emergency response, hazard assessments, hazard communication and hearing conservation programs, medical surveillance, PPE, respiratory protection, site control measures, standard work practices, and training requirements. Many of Tetra Tech NUS' SOPs are also provided in this Guidance Manual.

Safe Work Permits issued for Exclusion Zone activities (See Section 9.4 and Attachment V) will use elements defined in Table 5-1 as it's primary reference. The FOL and/or the SSO completing the Safe Work Permit will add additional site-specific information. In situations where the Safe Work Permit is more conservative than the direction provided in Table 5-1 due to the incorporation of site-specific elements, the Safe Work Permit will be followed.

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TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES FOR NAVAL AIR STATION PENSACOLA, FLORIDA

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment *(Items in italics are deemed optional as conditions or the FOL or SSO dictate.)*	Decontamination Procedures
Groundwater sampling/ soil sampling	*Chemical hazards:* 1) Primary types of contaminants include VOCs associated with petroleum products and SVOCs in the form of diesel fuel and TPH. Based on historical analytical data, none of the VOCs of concern (benzene,chlorobenzene, dichlorobenzene, ethylbenzene, MTBE, napthalene, styrene, toluene and xylene) are at concentrations that would pose an inhalation hazard to site personnel. Refer to Table 6-1 for additional information on site contaminants of concern. 2) Transfer of contamination into clean areas *Physical hazards:* 3) Lifting (strain/muscle pulls) 4) Slip, trips, and falls 5) Ambient temperature extremes (heat stress) 6) Vehicular and foot traffic *Natural hazards:* 7) Insect/animal bites and stings, poisonous plants, etc. 8) Inclement weather	1) Use real-time monitoring instrumentation, action levels, and identified PPE to control exposures to potentially contaminated media (air, water, etc.). 2) Decontaminate equipment and supplies between sampling locations and prior to leaving the site. 3) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques particularly when lifting or handling heavy or awkward objects (drums, sample coolers, etc.) 4) Preview work locations for unstable/uneven terrain. 5 Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding cold/heat stress concerns is available in the Health and Safety Guidance Manual. 6) Traffic and equipment considerations are to include the following: - Establish safe zones of approach. - Activities are to be conducted consistent with the Base requirements. - If working near roadways or other traffic areas, wear high visibility vests. 7) Avoid nesting areas, use repellents. Report potential hazards to the SSO. Follow guidance presented in Section 4 of the Health and Safety Guidance Manual. 8) Suspend or terminate operations until directed otherwise by the SSO.	**It is not anticipated that potential contaminant concentrations at outdoor sample locations will present an inhalation hazard.** A direct reading Photoionization Detector (PID), with at least a 10.2 eV lamp, will be used to screen samples and to detect the presence of any potential volatile organics. Source monitoring of the monitoring well will be conducted at regular intervals to be determined by the SSO. Positive sustained results at a source or downwind location(s) which may impact operations crew will require the following actions: - Monitor the breathing zone of at-risk and downwind employees. Any sustained readings (greater than 1 minute in duration) above 1 ppm in the breathing zone of the at-risk employees requires site activities to be suspended and site personnel to report to an unaffected area. Sustained readings at any concentration will be reported to the PHSO/HSM so that additional guidance can be provided. - Work may only resume if airborne readings in worker breathing zone return to below 1 ppm levels. If elevated readings in worker breathing zone persist, the PHSO and HSM will be contacted to determine necessary actions and levels of protection. This action level has been selected based on the fact that no VOCs should be present in the worker breathing zones based on existing analytical data from this site. Any sustained elevated readings should be viewed as a potential hazard until the source can be determined.	Level D protection will be utilized for the initiation of sampling activities. Level D - (Minimum Requirements) - Standard field attire (Sleeved shirt; long pants) - Safety shoes (steel toe/shank) - Safety glasses - Surgical style gloves (double-layered if necessary) - Reflective vest for high traffic areas - *Hardhat (when overhead hazards exists, or identified as a operation requirement)* - *Tyvek coveralls and disposable boot covers if surface contamination is present or if the potential for soiling work attire exists.* - *Hearing protection for high noise areas, or as directed on an operation by operation scenario.* **Note:** The Safe Work Permit(s) for this task (see Attachment IV) will be issued at the beginning of each day to address the tasks planned for that day. As part of this task, additional PPE may be assigned to reflect site-specific conditions or special considerations or conditions associated with any identified task.	**Personnel Decontamination** will consist of a removal and disposal of non-reusable PPE (gloves, coveralls, etc., as applicable). The decon function will take place at an area adjacent to the site activities. This procedure will consist of: - Equipment drop - Outer coveralls, boot covers, and/or outer glove removal (as applicable) - Removal, segregation, and disposal of non-reusable PPE in bags/containers provided - Soap/water wash and rinse of reusable PPE (e.g., hardhat) if potentially contaminated - Wash hands and face, leave contamination reduction zone.

TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES FOR
NAVAL AIR STATION PENSACOLA, FLORIDA

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment *(Items in italics are deemed optional as conditions or the FOL or SSO dictate.)*	Decontamination Procedures
Mobilization/ Demobilization	*Physical hazards:* 1) Lifting (strain/muscle pulls) 2) Pinches and compressions 3) Slip, trips, and falls 4) Heavy equipment hazards (rotating equipment, hydraulic lines, etc.) 5) Vehicular and foot traffic 6) Ambient temperature extremes (heat stress) *Natural hazards:* 7) Insect/animal bites and stings, poisonous plants, etc.	1) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques. 2) Keep any machine guarding in place. Avoid moving parts. Use tools or equipment where necessary to avoid contacting pinch points. 3) Preview work locations for unstable/uneven terrain. 4) Equipment will be - Inspected in accordance with OSHA and manufacturer's design. - Operated by knowledgeable operators and ground crew. 5) Traffic and equipment considerations are to include the following: - Establish safe zones of approach (i.e. Boom + 3 feet). - Drill rig and other self-propelled equipment shall be equipped with movement warning systems. - Activities are to be conducted consistent with the Base requirements. 6) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding heat stress concerns is provided in the Health and Safety Guidance Manual. 7) Avoid nesting areas, use repellents. Report potential hazards to the SSO. Follow guidance presented in Section 4 of the Health and Safety Guidance Manual.	Not required	Level D - (Minimum Requirements) - Standard field attire (Sleeved shirt; long pants) - Safety shoes (Steel toe/shank) - *Safety glasses* - *Hardhat (when overhead hazards exists, or identified as a operation requirement)* - *Reflective vest for high traffic areas* - *Hearing protection for high noise areas, or as directed on an operation by operation scenario.*	Not required
Decontamination of Sampling and Heavy Equipment (DPT rig)	*Chemical hazards:* 1) Primary types of contaminants include VOCs associated with petroleum products and SVOCs in the form of diesel fuel and TPH. Based on historical analytical data, none of the VOCs of concern (benzene,chlorobenzene, dichlorobenzene, ethylbenzene, MTBE, napthalene, styrene, toluene and xylene) are at concentrations that would pose an inhalation hazard to site personnel. Refer to Table 6-1 for additional information on site contaminants of concern. 2) Decontamination fluids - Liquinox (detergent), acetone or isopropanol *Physical hazards:* 3) Lifting (strain/muscle pulls) 4) Noise in excess of 85 dBA 5) Flying projectiles 6) Vehicular and foot traffic 7) Ambient temperature extremes (heat stress) 8) Slips, trips, and falls *Natural hazards:* 9) Inclement weather	1) and 2) Employ protective equipment to minimize contact with site contaminants and hazardous decontamination fluids. Obtain manufacturer's MSDS for any decontamination fluids used onsite. These must be used in well-ventilated areas, such as outdoors. Use appropriate PPE as identified on MSDS. Chemicals used must be listed on the Chemical Inventory for the site, and site activities must be consistent with the Hazard Communication section of the Health and Safety Guidance Manual (Section 5). 3) Use multiple persons where necessary for lifting and handling sampling equipment for decontamination purposes. 4) Wear hearing protection when operating pressure washer. 5) Use eye and face protective equipment when operating pressure washer (if applicable). Other personnel must be restricted from the area. 6) Traffic and equipment considerations are to include the following: - Establish safe zones of approach. - Self-propelled equipment shall be equipped with movement warning systems. - Activities are to be conducted consistent with the Base requirements. 7) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding heat stress concerns is provided in the Health and Safety Guidance Manual. 8) Preview work locations for unstable/uneven terrain. 9) Suspend or terminate operations until directed otherwise by SSO.	Use visual observation, and real-time monitoring instrumentation to ensure equipment has been properly cleaned of contamination and dried. After decon is completed, screen equipment with a PID. If any elevated readings (i.e., above background) are observed, perform decon again and re-screen. Repeat until no elevated PID readings are noted.	For Heavy Equipment (if applicable) This applies to high pressure soap/water, steam cleaning wash and rinse procedures. Level D Minimum requirements - - Standard field attire (Sleeved shirt; long pants) - Safety shoes (Steel toe/shank) - Chemical resistant boot covers - Nitrile outer gloves - *PVC Rainsuits or PE or PVC coated Tyvek* - *Safety glasses underneath a splash shield* - *Hearing protection (plugs or muffs)* For sampling equipment (trowels, MacroCore Samplers, bailers, etc.), the following PPE is required Note: Consult MSDS for PPE guidance. Otherwise, observe the following. Level D Minimum requirements - - Standard field attire (Sleeved shirt; long pants) - Safety shoes (Steel toe/shank) - Nitrile outer gloves - Safety glasses In the event of overspray of chemical decontamination fluids employ PVC Rainsuits or PE or PVC coated Tyvek as necessary.	**Personnel Decontamination** will consist of a soap/water wash and rinse for reusable outer protective equipment (boots, gloves, PVC splash suits, as applicable). The decon function will take place at an area adjacent to the site activities. This procedure will consist of: - Equipment drop - Soap/water wash and rinse of outer boots and gloves, as applicable - Soap/water wash and rinse of the outer splash suit, as applicable - Disposable PPE will be removed and bagged. **Equipment Decontamination** - Heavy equipment decontamination will take place at a centralized decontamination pad utilizing steam or pressure washers. Heavy equipment will have the wheels and tires cleaned along with any loose debris removed, prior to transporting to the central decontamination area. Site vehicles will have restricted access to exclusion zones, and have their wheels/tires sprayed off as not to track mud onto the roadways servicing this installation. Roadways shall be cleared of any debris resulting from the onsite activity. **Sampling Equipment Decontamination** Sampling equipment will be decontaminated as per the requirements in the Sampling and Analysis Plan and/or Work Plan. MSDS for any decon solutions (Alconox, isopropanol, etc.) will be obtained and used to determine proper handling / disposal methods and protective measures (PPE, first-aid, etc.). Equipment used in the exclusion zone will require a complete decontamination between locations and prior to removal from the site. The FOL or the SSO will be responsible for evaluating equipment arriving onsite and leaving the site. No equipment will be authorized access or exit without this evaluation.

TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES FOR
NAVAL AIR STATION PENSACOLA, FLORIDA

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment *(Items in italics are deemed optional as conditions or the FOL or SSO require.)*	Decontamination Procedures
IDW management and moving IDW drums to storage areas	*Chemical hazards:* 1) Primary types of contaminants include VOCs associated with petroleum products and SVOCs in the form of diesel fuel and TPH. Based on historical analytical data, none of the VOCs of concern (benzene,chlorobenzene, dichlorobenzene, ethylbenzene, MTBE, napthalene, styrene, toluene and xylene) are at concentrations that would pose an inhalation hazard to site personnel. Refer to Table 6-1 for additional information on site contaminants of concern. See Table 6-1 for more information on the chemicals of concern. 2) Transfer of contamination into clean areas *Physical hazards:* 3) Noise in excess of 85 dBA 4) Lifting (strain/muscle pulls) 5) Pinches and compressions 6) Slip, trips, and falls 7) Vehicular and foot traffic 8) Ambient temperature extremes (heat stress) *Natural hazards:* 9) Insect/animal bites and stings, poisonous plants, etc.	1) Employ real-time monitoring instrumentation, action levels, and identify PPE to control exposures to potentially contaminated media (e.g. air, water, soils). 2) Decontaminate equipment and supplies, if they become contaminated, between locations and prior to leaving the site. 3) When working near heavy equipment, use hearing protection. 4) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques. 5) Keep any machine guarding in place. Avoid moving parts. Use tools or equipment where necessary to avoid contacting pinch points. 6) Preview work locations for unstable/uneven terrain. 7) Traffic and equipment considerations are to include the following: - Establish safe zones of approach (i.e. Boom + 3 feet). - Self-propelled equipment shall be equipped with movement warning systems. - Activities are to be conducted consistent with the Base requirements. 8) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding heat stress concerns is provided in the Health and Safety Guidance Manual. 9) Avoid nesting areas, use repellents. Report potential hazards to the SSO. Follow guidance presented in Section 4 of the Health and Safety Guidance Manual.	**It is not anticipated that potential contaminant concentrations at IDW management locations will present an inhalation hazard.** A direct reading Photoionization Detector (PID), with at least a 10.2 eV lamp, will be used to screen samples and to detect the presence of any potential volatile organics. Source monitoring of the borehole will be conducted at regular intervals to be determined by the SSO. Positive sustained results at a source or downwind location(s) which may impact operations crew will require the following actions: - Monitor the breathing zone of at-risk and downwind employees. Any sustained readings (greater than 1 minute in duration) above 1 ppm in the breathing zone of the at-risk employees requires site activities to be suspended and site personnel to report to an unaffected area. - Work may only resume if airborne readings in worker breathing zone return to below 25 ppm levels. If elevated readings in worker breathing zone persist, the PHSO and HSM will be contacted to determine necessary actions and levels of protection. Site contaminants may adhere to or be part of airborne dusts or particulates generated during site activities. Generation of dusts should be minimized to avoid inhalation of contaminated dusts or particulates. Evaluation of dust concentrations will be performed by observing work conditions for visible dust clouds. Potential exposure to contaminated dust will be controlled using water suppression, by avoiding dust plumes, or evacuating the operation area until dust subsides, or area wetting to control dusts are completed.	Level D protection will be utilized for the initiation of sampling activities. Level D - (Minimum Requirements) - Standard field attire (Sleeved shirt; long pants) - Nitrile or cotton/leather work gloves with surgical style inner gloves - Safety shoes (steel toe/shank) - Safety glasses - *Hardhat (when overhead hazards exists, or identified as a operation requirement)* - *Reflective vest for high traffic areas* - *Tyvek coveralls and disposable boot covers if surface contamination is present or if the potential for soiling work attire exists.* - *Hearing protection for high noise areas, or as directed on an operation by operation scenario.*	**Personnel Decontamination** will consist of a soap/water wash and rinse for reusable outer protective equipment (boots, gloves, PVC splash suits, as applicable). The decon function will take place at an area adjacent to the site activities. This procedure will consist of: - Equipment drop - Soap/water wash and rinse of outer boots and gloves, as applicable - Soap/water wash and rinse of the outer splash suit, as applicable - Disposable PPE will be removed and bagged.

TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES FOR
NAVAL AIR STATION PENSACOLA, FLORIDA

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment *(Items in italics are deemed optional as conditions or the FOL or SSO require.)*	Decontamination Procedures
RC® Well Injection – Bioremediation Product. Installation of temporary monitoring wells	*Chemical Hazards* 1) Primary types of contaminants include VOCs associated with petroleum products and SVOCs in the form of diesel fuel and TPH. Based on historical analytical data, none of the VOCs of concern (benzene, chlorobenzene, dichlorobenzene, ethylbenzene, MTBE, napthalene, styrene, toluene and xylene) are at concentrations that would pose an inhalation hazard to site personnel. Refer to Table 6-1 for additional information on site contaminants of concern. 2) Transfer of contamination into clean areas or onto persons *Physical hazards* 3) Heavy equipment hazards (pinch/compression points, rotating equipment, hydraulic lines, etc.) 4) Noise in excess of 85 dBA 5) Energized systems (contact with underground or overhead utilities) 6) Lifting (strain/muscle pulls) 7) Slip, trips, and falls 8) Vehicular and foot traffic 9) Ambient temperature extremes (heat stress) 10) Flying projectiles *Natural hazards* 11) Insect/animal bites and stings, poisonous plants, etc. 12) Inclement weather	1) Use real-time monitoring instrumentation, action levels, and identified PPE to control exposures to potentially contaminated media (air, water, soils, etc.). Generation of dusts should be minimized. If airborne dusts are observed, area wetting methods may be used. If area wetting methods are not feasible, termination of activities may be used to minimize exposure to excessive airborne dusts. Review contents of the ORC MSDS prior to use. Review appropriate warning provided in Section 6.1.1, regarding potential health effects. - Minimize dust when dispensing and mixing - When dispensing do so from an upwind position - Mix ORC® into water to control reaction - As this material is slightly alkali (pH 10.0 in solution) immediately remove any material on the skin or in the eyes using copius amounts of water. A portable eyewash should be maintained on-site for this purpose. 2) Decontaminate equipment and supplies between boreholes and prior to leaving the site. 3) Equipment to be used will be - Inspected in accordance with Federal safety and transportation guidelines, OSHA (1926.600,.601,.602), and manufacturers design and documented as such using Equipment Inspection Sheet (see Attachment IV of this HASP). - Operated by knowledgeable operators and ground crew. - Repaired using only manufacturer approved parts and equipment. In addition to the equipment considerations, the following standard operating procedures will be employed: - Personnel not directly supporting the drilling operation will remain at least 25 feet from the point of operation. - Loose clothing/protective equipment will be secured to avoid possible entanglement. - Hand signals will be established prior to the commencement of drilling activities. - A remote sampling device must be used to sample drill cuttings near rotating tools. - Work areas will be kept clear of clutter. - Personnel will be instructed in the location and operation of the emergency shut off device(s). This device will be tested initially (and then periodically) to insure its operational status. - Areas will be inspected prior to the movement of drill rigs and support vehicles to eliminate any physical hazards. This will be the responsibility of the FOL and/or SSO. 4) Hearing protection will be used during subsurface activities. 5) Utility clearances must be obtained, in writing, prior to subsurface activities. Also, prior to any subsurface investigations, the locations of underground utilities must be identified and marked. (See Attachment III of this HASP) 6) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques. 7) Preview work locations for unstable/uneven terrain. 8) Traffic and equipment considerations are to include the following: - Establish safe zones of approach (i.e. Boom + 3 feet). - Secure loose articles to avoid possible entanglement. - Equipment shall be equipped with movement warning systems. - Activities are to be conducted consistent with the Base requirements. 9) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding heat stress concerns is provided Section 4.0 of the TtNUS Health and Safety Guidance Manual. 10) Wear eye protection (safety glasses) when drill rig is operating. Other personnel must be restricted from the area. 11) Avoid nesting areas, use repellents. Wear appropriate clothing. Report potential hazards to the SSO. Follow guidance presented in Section 4.0 of the TtNUS Health and Safety Guidance Manual. 12) Suspend or terminate operations until directed otherwise by SSO.	**It is not anticipated that potential contaminant concentrations at outdoor sample locations will present an inhalation hazard.** A direct reading Photoionization Detector (PID) with a 10.2 eV lamp or higher, or a Flameionization Detector (FID), will be used to screen samples and to detect the presence of any potential volatile organics. Source monitoring of the borehole will be conducted at regular intervals to be determined by the SSO. Positive sustained results at a source or downwind location(s) which may impact operations crew will require the following actions: - Monitor the breathing zone of at-risk and downwind employees. Any sustained readings (greater than 1 minute in duration) above 1 ppm in the breathing zone areas of the at-risk employees requires site activities to be suspended and site personnel to retreat to an unaffected area. - Work may only resume if airborne readings in worker breathing zone areas return to below 10 ppm. If elevated readings in worker breathing zone persist, the PHSO and HSM will be contacted to determine necessary actions and levels of protection. Site contaminants may adhere to or be part of airborne dusts or particulates generated during site activities. Generation of dusts should be minimized to avoid inhalation of contaminated dusts or particulates. Evaluation of dust concentrations will be performed by observing work conditions for visible dust clouds. Potential exposure to contaminated dust will be controlled using water suppression, by avoiding dust plumes, or evacuating the operation area until dust subsides. Where the utility clearance cannot be determined, subsurface activities shall proceed with extreme caution using hand digging to at least below the frost-line depth (no less than 4 ft. BGS). Also, a magnetometer must be used for periodic down-hole surveys every 2 feet to a depth of at least 10 feet.	ORC® Injection operations are to be initiated in Level D protection. Level D protection constitutes the following minimum protection: - Standard field attire (Sleeved shirt; long pants) - Steel toe safety shoes - Chemical Safety Goggles - Nitrile inner and outer gloves - If there is potential for soiling or saturation of clothing use also a rubber apron *- A filtering face-piece for nuisance dust may be used at the wearers discretion* *- Hearing protection during soil boring activities and for other high noise areas as directed by the SSO.* **Note:** The Safe Work Permit(s) for this task (see Attachment V) will be issued at the beginning of each day to address the tasks planned for that day. As part of this task, additional PPE may be assigned to reflect site-specific conditions or special considerations or conditions associated with any identified task.	**Personnel Decontamination** - Will consist of a soap/water wash and rinse for reusable protective equipment (e.g., gloves). This function will take place at an area adjacent to the drilling operations bordering the support zone. This decontamination procedure for Level D protection will consist of: - Equipment drop - Soap/water wash and rinse of reusable outer gloves, as applicable - Outer coveralls, boot covers, and/or outer glove removal - Removal, segregation, and disposal of non-reusable PPE in bags/containers provided - Wash hands and face, leave contamination reduction zone. To decontaminate equipment of ORC® residue - Flush with soap and water - Then flush again with water To remove ORC® from the skin - Flush with copius amounts of water to remove gross contamination. - Flush with a vinegar 10% and water mix, followed by a water rinse. Seek medical attention for blistered or irritated skin. To remove ORC® from the eyes - Flush with copius amounts of water to remove gross contamination. - Seek medical attention

6.0 HAZARD ASSESSMENT

The following section provides information regarding the chemical, physical, and natural hazards associated with the sites to be investigated and the activities that are to be conducted as part of the scope of work. Table 6-1, which is included as part of this HASP, provides various information, exposure limits, symptoms of exposure, physical properties, and air monitoring and sampling data. Section 6.1 provides general information regarding contaminants that may be present at the sites.

6.1 CHEMICAL HAZARDS

The potential health hazards associated with work to be conducted at NAS Pensacola include inhalation, ingestion, and dermal contact of various contaminants that may be present in shallow and deep soils and groundwater. Based on the site history and prior sampling efforts, the types of contaminants anticipated include petroleum products and associated compounds. The following have been identified as the primary contaminants of interest:

- Volatile Organic Compounds (VOCs), specifically Benzene, Dichlorobenzene, 1,2-Dichloroethene, methyl-t-butyl ether (MTBE), Napthalene, Styrene, Toluene, Xylene and Ethylbenzene.
- Semi-Volatile Organic Compounds (SVOCs), including Total Petroleum Hydrocarbons (TPHs) such as diesel fuel.

Table 6-1 provides information on the compounds and individual substances likely to be present at the site to be investigated. Included is information on the toxicological, chemical, and physical properties of these substances. It is anticipated that the greatest potential for exposure to site contaminants is during intrusive activities (drilling, sampling, etc.). Exposure to these compounds is most likely to occur through ingestion and inhalation of contaminated soil or water, or hand-to-mouth contact during soil disturbance activities. For this reason, PPE and basic hygiene practices (washing face and hands before leaving site) will be extremely important. Inhalation exposure will be avoided by using appropriate PPE and engineering controls where necessary. Significant exposure via inhalation is not anticipated during the planned scope of work.

6.1.1 Oxygen Release Compound (ORC®)

ORC® will be injected into specified soil borings using a pump and tremie method. This method introduces the ORC® from the bottom of the boring in a retracting up-ward fashion. The Material Safety Data Sheet is provided in Attachment VI.

ORC® Physical Hazards

Contact with incompatible materials such as acids, certain bases and interhalogen compounds (i.e., maleic anhydride, sodium hydroxide, bromine pentafluoride, chlorine trifluoride) may result in a violent reaction and possible ignition. This material should be maintained and used away from potential ignition sources because of the potential violent reaction (i.e., oxidizer + any fuel source/combustible material = fire and/or explosion) given suitable conditions (i.e., closed container; insufficient media to absorb the heat of reaction). This material will intensify a fire.

This material (25-35% Magnesium peroxide) will react with water to release oxygen. The magnesium oxide component will react with water to create magnesium hydroxide, both of which will slowly release oxygen to the water. To control the release of oxygen and the reaction, it is recommended when mixing this material be added slowly to the prescribed amount of water. Upon completing the mixture and the injection, flush the container and pump with copius amounts of water.

Specified control measures have been provided in Table 5-1 and the Safe Work Permit for this task (See Attachment V).

TABLE 6-1
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA
NAVAL AIR STATION PENSACOLA

Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Chlorobenzene	108-90-7	PID: I.P. 9.07 eV, High response with PID and 10.2 eV lamp. FID: Relative response ratio for FID detection is unknown, however, is considered to be detectable as this substance will burn.	Air sample using charcoal sorbent tube; carbon disulfide desorption with gas chromatography-flame ionization detector. Sampling and analytical protocol in accordance with NIOSH Method #1003	OSHA: 75 ppm NIOSH: ACGIH: 10 ppm IDLH: 1000 pp	Adequate - Odor threshold 1.3 ppm. Can use air-purifying respirator with organic vapor cartridge up to 500 ppm. **Recommended glove:** Viton - >8.00 hrs PV Alcohol >8.00 hrs	**Boiling Pt:** 268°F; 131°C **Melting Pt:** -49°F; -45°C **Solubility:** 0.05% **Flash Pt:** 82°F; 28°C **LEL/LFL:** 1.3% **UEL/UFL:** 9.6% **Vapor Density:** 3.88 **Vapor Pressure:** 10 mmHg @ 72°F; 22°C **Specific Gravity:** 1.11 **Incompatibilities:** Strong oxidizers **Appearance and Odor:** Colorless liquid with an almond-like odor.	Regulated primarily because of it potential to cause sleepiness and incoordination. Irritating to the eyes, nose, and skin. Chronic exposure may cause liver, kidney, and lung damage.
Benzene	71-43-2	PID: I.P 9.24 eV, 100% response with PID and 10.2 eV lamp. FID: 150% relative response ratio with FID.	Air sample using 2 mil Tedlar sample bags or charcoal tube with carbon disulfide desorption. Sampling and analytical protocol in accordance with NIOSH Method # 3700 or #1500 and OSHA 07.	OSHA: 1 ppm 5 ppm (STEL) *See 29 CFR 1910.1028* ACGIH: 10 ppm NIOSH: 0.1 ppm IDLH: 500 ppm	Inadequate - Odor threshold 1.4-120 ppm. The use of half-face air-purifying respirators with organic vapor cartridge up to 10 ppm is acceptable despite the inadequate warning properties, providing cartridges are changed at the beginning of each shift. **Recommended gloves:** Butyl/neoprene blend - >8.00 hrs; Silver shield as a liner - >8.00 hrs; Viton - >8.00 hrs	**Boiling Pt:** 176°F; 80°C **Melting Pt:** 42°F; 5.5°C **Solubility:** 0.07% **Flash Pt:** 12°F; -11°C **LEL/LFL:** 1.2% **UEL/UFL:** 7.8% **Vapor Density:** 2.77 **Vapor Pressure:** 75 mmHg **Specific Gravity:** 0.88 **Incompatibilities:** Strong oxidizers, fluorides, perchlorates, and acids **Appearance and Odor:** Colorless to a light yellow liquid with an aromatic odor	Overexposure may result in irritation to the eyes, nose, throat, and respiratory system. CNS effects include giddiness, lightheadedness, headaches, staggered gait, fatigue, and lassitude and depression. Additional effects may include nausea, difficulty breathing, and intoxification. Long duration exposures may result in respiratory collapse. May cause damage to the blood forming organs and may cause a form of cancer called leukemia. The ACGIH, IARC, and OSHA list benzene as a carcinogen.
Diesel Fuel No.2-D	Mixture	Components of this substance will be detected readily however no documentation exists as to the relative response ratio of either PID or FID.	Air sample using charcoal tube as a collection media; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol in accordance with NIOSH Method #1550.	OSHA; NIOSH; ACGIH: 5 mg/m^3 as mineral oil mist. In addition NIOSH and ACGIH establish 10 mg/m^3 as a STEL.	Kerosene odor **Recommended Air Purifying cartridges:** Organic vapor **Recommended gloves:** Nitrile	**Boiling Pt:** <170-400°F; 77-204°C **Melting Pt:** Not available **Solubility:** Negligible **Flash Pt:** 125°F; 52°C **LEL/LFL:** 0.6% **UEL/UFL:** 7.5% **Vapor Density:** >5 **Vapor Pressure:** <1 mmHg @ 70°F; 21°C **Specific Gravity:** 0.86 **Incompatibilities:** strong oxidizers, halogens, and hypochlorites **Appearance and odor:** Colorless to amber with a kerosene odor	Prolonged or repeated exposures to this product may cause skin and eye irritation. Due to the defatting capabilities this exposure may lead to a dermatitis condition. High vapor concentrations are irritating to the eyes and respiratory tract. Exposure to high airborne concentrations may result in narcotic effects including dizziness, headaches, and anesthetic to unconsciousness. High concentrations in a confined space may adequately displace oxygen thereby resulting in suffocation.

TABLE 6-1
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA
NAVAL AIR STATION PENSACOLA

Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Ethylbenzene	100-41-4	PID: I.P 8.76, High response with PID and 10.2 eV lamp. FID: 100% response with FID.	Air sample using charcoal tube; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol in accordance with OSHA Method #07 or NIOSH Method #1501 Aromatic Hydrocarbon.	ACGIH; NIOSH: 100 ppm; 125 ppm STEL OSHA: 100 ppm IDLH: 800 ppm	Adequate - Can use air-purifying respirator with organic vapor cartridge up to 800 ppm. **Recommended gloves:** Neoprene or nitrile w/ silver shield when potential for saturation; Teflon >3.00 hrs	**Boiling Pt:** 277°F; 136°C **Melting Pt:** -139°F; -95°C **Solubility:** 0.01% **Flash Pt:** 55°F; 13°C **LEL/LFL:** 1.0% **UEL/UFL:** 6.7% **Vapor Density:** 3.66 **Vapor Pressure:** 10 mmHg @ 79°F; 26°C **Specific Gravity:** 0.87 **Incompatibilities:** Strong oxidizers **Appearance and odor:**Colorless liquid with an aromatic odor. Odor Threshold of 0.092-0.60.	Regulated primarily because of its potential to irritate the eyes and respiratory system. In addition, effects of overexposure may include headaches, narcotic effects, CNS changes (i.e., coordination impairment, impaired reflexes, tremoring) difficulty in breathing, possible chemical pneumonia, and potentially respiratory failure or coma.
Dichlorobenzene	o-95-50-1 p-106-46-7	PID: o-I.P. 9.06 eV, p-I.P. 8.98 High response with PID and 10.2 eV lamp FID: 50% relative response ratio with FID.	Air sample using charcoal sorbent tube; and carbon disulfide desorption with gas chromatography-flame ionization detector; Sampling and analytical protocol in accordance with OSHA Method #07, and NIOSH Method #1003.	ACGIH: o- 25 ppm; 50 ppm STEL p- 10 ppm OSHA: o- 50 ppm Ceiling p- 75 ppm IDLH: 150 ppm	Adequate - Odor threshold o- 0.70 ppm (pleasant aromatic odor); p- 0.12 ppm (mothball odor). Can use air-purifying respirator with organic vapor cartridge/dusts and mists for concentrations up to 1000 ppm. Recommended glove: Viton - >4.00 hrs; Nitrile - 0.35 hrs	**Boiling Pt: 345-357°F; 174-181°C** **Melting Pt: o- 2°F; -17°C; p- 128° F; 53°C** **Solubility: 0.008-0.01%** **Flash Pt: 150°F; 66°C** **LEL/LFL: 2.2%** **UEL/UFL: 9.2%** **Vapor Density: 3.88** **Vapor Pressure: 1 mmHg @ 72°F; 22°C** **Specific Gravity: o- 1.3; p- 1.25** **Incompatibilities: Strong oxidizers, halogens, acids, and acid fumes** **Appearance and Odor: o- Colorless to pale yellow liquid with a pleasant aromatic odor. p- Colorless to white crystalline solid with a mothball like odor.**	Overexposure to either of these isomers may cause irritation to the eyes, nose, throat, and respiratory tract. Symptoms associated with the o- dichlorobenzene may also include skin blisters. Prolonged or repeated exposures may result in chronic effects including damage to the liver and kidneys. Additionally, overexposure to p-Dichlorobenzene may result in headache, nausea, vomiting, swelling of the area around the eyes, and profuse runny nose. Chronically symptoms may include anorexia, jaundice, cirrhosis of the liver. This substance has demonstrated kidney and liver cancer causing capabilities.
Naphthalene	91-20-3	PID: I.P. 8.12 eV, relative response ratio unknown. No information was found as to the relative response for FID, however it is certain it is detectable at a high response.	Air sample using charcoal tube; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol in accordance with OSHA Method #35 or NIOSH Method #1501.	OSHA; NIOSH; ACGIH: 10 ppm NIOSH; ACGIH: have established a STEL of 15 ppm. IDLH: 250 ppm	Odor Threshold 0.038 ppm, Adequate - Use an air purifying respirator with organic vapors and dust/mists cartridges for concentrations up to 250 ppm. Recommended glove: Nitrile >6.00 hrs; Neoprene >6.00 hrs	**Boiling Pt: 424°F; 218°C** **Melting Pt: 176°F; 80°C** **Solubility: 0.003%** **Flash Pt: 174°F; 79°C** **LEL/LFL: 0.9%** **UEL/UFL: 5.9%** **Vapor Density: Not available** **Vapor Pressure: 1 mmHg** **Specific Gravity: 1.15** **Incompatibilities: Strong oxidizers, chromic anhydride** **Appearance and odor: Colorless to brown solid with and odor of mothballs**	Overexposure to this substance may result in irritation to the eyes, headache, confusion, excitement, nausea, vomiting, abdominal pain, irritation of the bladder, profuse sweating, jaundice, blood in the urine, renal (kidney shutdown), and dermatitis. Prolonged or chronic exposure may further cause optical neuritis, and corneal damage. Target organs are listed as eyes, blood, liver, kidneys, skin, red blood cells, and central nervous system.

TABLE 6-1
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA
NAVAL AIR STATION PENSACOLA

Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Methyl-t-butyl ether	1634-04-4	PID: 80% Relative response ratio for 10.6 eV PID detection FID: 200% Relative response ratio for FID detection.	Charcoal filter collection; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol shall be in accordance with NIOSH Method #1501.	ACGIH: 40 ppm AIHA WEEL: 100 ppm	Respiratory Protection: Odor threshold 0.7 ppm, adequate air purifying respirator with organic vapor cartridges up to 25 ppm. Recommended Gloves: Nitrile >6.00 hrs; PV alcohol >6.00 hrs; Viton/neoprene >8.00 hrs	**Boiling Pt: 132°F; 55°C** **Melting Pt: -148°F; -100°C** **Solubility: 4.8 g/100 g water** **Flash Pt: 82°F; 28°C** **LEL/LFL: 1.65%** **UEL/UFL: 8.4%** **Vapor Density: 3.0** **Vapor Pressure: 245 mmHg @ 77 °F; 25°C** **Specific Gravity: 0.74 @ 20/20°C** **Incompatibilities: Strong oxidizers, peroxides, and strong acids** **Appearance and Odor: Colorless liquid with a terpene like odor.**	Overexposure to this substance may result in irritation to the eyes, skin, and mucous membranes. Systemically, CNS effects manifests in confusion, sleepiness, coma, and possible kidney damage.
Styrene	100-42-5	PID: I.P. 8.40 eV, relative response ratio is 200%. FID: 85% relative response ratio for FID detection.	Charcoal filter collection; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol shall be in accordance with NIOSH Method #1501.	NIOSH & ACGIH: 50 ppm; 100 STEL OSHA: 100 ppm; 200 ppm (Ceiling)	Odor threshold 0.14 ppm. An air purifying respirator equipped with a combination filter for organic vapors filter is acceptable. Recommended glove: PV Alcohol >6.00 hrs; Nitrile 0.50 hrs; Teflon >4.00 hrs.	**Boiling Pt: 293°F; 145°C** **Melting Pt: -23°F; -30°C** **Solubility: 0.03%** **Flash Pt: 88°F; 31°C** **LEL/LFL: 0.9%** **UEL/UFL: 6.8%** **Vapor Density: Not available** **Vapor Pressure: 5 mmHg** **Specific Gravity: 0.91** **Incompatibilities: Strong oxidizers, catalysts for vinyl polymers, peroxides, strong acids, and aluminum chloride** **Appearance and Odor: Colorless to a light yellow oily liquid with a penetrating sweet floral odor.** **Note: Subjected to light and air this substance may begin to polymerize to form peroxides.**	Overexposure to this substance may result in irritation to the eyes, skin, nose, throat, and respiratory system. CNS effects include giddiness,lightheadedness, headaches, staggered gait, fatigue, and lassitude and depression. Additional effects may include nausea. Long duration exposures may result in defatting dermatitis, possible liver and reproductive effects.

TABLE 6-1
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA
NAVAL AIR STATION PENSACOLA

Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Toluene	108-88-3	PID: I.P 8.82 eV, High response with PID and 10.2 eV lamp. FID: 110% response with FID.	Air sample using charcoal tube; carbon disulfide desorption. Sampling and analytical protocol shall proceed in accordance with OSHA Method #07, or NIOSH Method #1500.	OSHA: 200 ppm 300 ppm (Ceiling) ACGIH: 50 ppm (skin) NIOSH: 100 ppm 150 ppm STEL IDLH: 500 ppm	Adequate - Odor threshold 1.6 ppm is considered good. Can use air-purifying respirator with organic vapor cartridge up to 1,000 ppm. Recommended gloves: Teflon >15.00 hrs; Viton >16.00 hrs; silver shield >6,00 hrs; supported nitrile (Useable time limit 0.5 hr, complete submersion for the nitrile selection); PV alcohol >25.00 hrs	**Boiling Pt: 232°F; 111°C** **Melting Pt: -139°F; -95°C** **Solubility: 0.05% (61°F;16°C)** **Flash Pt: 40°F; 4°C** **LEL/LFL: 1.2%** **UEL/UFL: 7.1%** **Vapor Density: 3.14** **Vapor Pressure: 20 mmHg @ 65° F; 18°C** **Specific Gravity: 0.87** **Incompatibilities: Strong oxidizers** **Appearance and odor: Colorless liquid with a sweet pungent aromatic odor.**	Overexposure to this substance may result in mild to moderate irritation at all points of contact, and CNS changes including euphoria, confusion, nervousness, and possibly paresthesia characterized by an abnormal burning sensation, pricking, or numbness. At 200-500 ppm exposure has resulted in headaches, nausea, eye irritation, loss of appetite, bad taste, impair coordination, fatigue, and weariness. Chronically, toluene overexposure may result in dermatitis, liver, and kidney damage.
Xylene All isomers o-,m-, p-	1330-20-7	PID: I.P. 8.56 eV, High response with PID and 10.2 eV lamp. FID: 110% response with FID.	Air sample using charcoal tube; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol shall proceed in accordance with OSHA 07, or NIOSH Method 1500.	ACGIH, & NIOSH: 100 ppm, 150 ppm STEL OSHA: 100 ppm IDLH: 900 ppm	Adequate - Odor thresholds for the following isomers: 0.6 m-; 5.4 p-; 20 o-ppm. Can use air-purifying respirator with organic vapor cartridge up to 1,000 ppm concentrations. **Recommended gloves:** PV Alcohol >12.67 hrs; Viton >8.00 hrs; CPE >1.00 hr; Butyl 0.87 hrs; Nitrile is acceptable for limited operations and contact (>0.20 hrs)	**Boiling Pt:** 269-281°F; 132-138°C **Melting Pt:** -13o/-54m/56p°F; -25o/-48m/13p °C **Solubility:** 0.02 % **Flash Pt:** 81-90°F;27-32°C **LEL/LFL:** 0.9% **UEL/UFL:** 7.0% **Vapor Density:** 3.66 **Vapor Pressure:** 7-9 mmHg @ 70° F; 21°C **Specific Gravity:** 0.86-0.88 **Incompatibilities:** Strong oxidizers and strong acids **Appearance and odor:** Colorless liquid with an aromatic odor.	Effects may of overexposure include irritation at all points of contact, CNS changes (i.e. dizziness, excitement, drowsiness, incoherent, staggering gait), difficulty in breathing, pulmonary edema, and possibly respiratory failure. Chronic effects may include dermatitis and cornea vacuolization.

6.2 PHYSICAL HAZARDS

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

- Slips, trips, and falls
- Energized systems (contact with underground or overhead utilities)
- Lifting (strain/muscle pulls)
- Ambient temperature extremes (heat stress)
- Pinches and compressions
- Vehicular and foot traffic

These physical hazards are discussed in Table 5-1 as applicable to each site task. Further, many of these hazards are discussed in detail in Section 4.0 of the Health and Safety Guidance Manual. Specific discussions on some of these hazards are presented below.

6.2.1 Energized Systems (Contact with Underground or Overhead Utilities)

Underground utilities such as pressurized lines, water lines, telephone lines, buried utility lines, and high voltage power lines may be present throughout the facility. **Therefore, subsurface activities must be conducted following the requirements of the Tetra Tech NUS SOP for "Utility Locating and Excavation Clearance (HS-1.0)".** A copy of this SOP is provided as Attachment III. Clearance of underground and overhead utilities for each sample location will be coordinated with NAS Pensacola personnel. Greg Campbell is the point-of-contact for NAS Pensacola and can be reached at (850) 452-4611 ext 103. Additionally, drilling operations will be conducted at a safe distance from overhead power lines. In certain cases, NAS Pensacola personnel may need to de-energize electrical cables using facility lockout/tagout procedures to insure electrical hazards are eliminated.

6.2.2 Ambient Temperature Extremes (Heat Stress)

Overexposure to high ambient temperatures (heat stress) may exist during performance of this work depending on the project schedule. Work performed when ambient temperatures exceed 70°F may result in varying levels of heat stress (heat rash, heat cramps, heat exhaustion, and/or heat stroke) depending on variables such as wind speed, humidity, and percent sunshine, as well as physiological factors such as metabolic rate and skin moisture content. Additionally, workload and level of protective equipment will affect the degree of exposure. Site personnel will be encouraged to drink plenty of fluids to replace those lost through perspiration. The SSO will recommend additional heat stress control measures as they are deemed necessary as per ACGIH guidelines.

6.3 NATURAL HAZARDS

Insect/animal bites and stings, poisonous plants, and inclement weather are natural hazards that may be present given the location of activities to be conducted. In general, avoidance of areas of known infestation or growth will be the preferred exposure control for insects/animals and poisonous plants. Specific discussion on principle hazards of concern follows:

6.3.1 Insect/Animal Bites and Stings

Site personnel who are allergic to stinging insects such as bees, wasps, and hornets must be particularly careful since severe illness and death may result from allergic reactions. As with any medical condition or allergy, information regarding the condition must be listed on the Medical Data Sheet (See Attachment II) and the FOL and SSO notified. There are several species indigenous to Florida that may be found on site and should be considered.

Alligators

Alligators live in all Florida counties but are most common in the major river drainage basins and large lakes in the central and southern portions of the state. They also can be found in marshes, swamps, ponds, drainage canals, phosphate-mine settling ponds, and ditches. Alligators are tolerant of poor water-quality and occasionally inhabit brackish marshes along the coast. A few even venture into salt water.

Mature alligators seek open water areas during the April-to-May courtship and breeding season. After mating, the females move into marsh areas to nest in June and early July where they remain until the following spring. Males generally prefer open and deeper water year-round. Alligators less than four feet long typically inhabit the marshy areas of lakes and rivers. Dense vegetation in these habitats provides protective cover and many of the preferred foods of young alligators.

- Most human attacks associated with alligators occur when they have been fed by humans or when defending their nests.

- Under no circumstances should you approach an alligator closely. They are quite agile, even on land. As with any wild animal, alligators merit a measure of respect.

- Alligators are classified as a threatened species and thus enjoy the protection of state and federal law. Only representatives of the Florida Game and Fresh Water Fish Commission are empowered to handle nuisance alligators.

- It is illegal to feed, tease, harass, molest, capture or kill alligators.

- If a serious problem does exist, contact the Florida Game and Fresh Water Fish Commission.

Snakes

Areas to be investigated on this project could be prime nesting and/or hiding locations for snakes. Personnel should avoid reaching into areas that are not visibly clear of snakes or insects. Snake chaps will be worn in areas of known or anticipated snake infestation.

Although 45 species of snakes are found in Florida, only the 6 are poisonous and a danger to humans. If you find a snake and you do not know whether or not it is poisonous, the safest thing to do is leave it alone. Florida snakes are not aggressive and, unless they are cornered, most will flee when humans approach. Occasionally, you might encounter one that is reluctant to leave because it is basking in the sun to get warm. Among snakebite victims, an unacceptably high number are bitten on the hands and arms when they are handling the snake. **Do not catch a snake and do not handle one unless you are sure it is not poisonous.** In addition, for a short time after a snake is killed, its reflexes may continue to work. Those reflexes typically cause the body to writhe slowly for awhile, but they can cause a convulsive contraction and a bite, so you should not handle a freshly killed venomous snake.

Copperhead - Average adult size is 22-36 inches (56-91 cm), record is 53 inches (135 cm). It is a stout-bodied snake with broad, light brown to gray cross bands, alternating with dark brown to reddish-brown cross bands. Constrictions along the backbone give the dark bands an hourglass shape. On the sides of the body the dark bands usually have light centers, and occasionally one dark spot. Southern copperheads sometimes have an overall pinkish tint. The top of head in front of the eyes is covered with large plate-like scales. The pupil is elliptical, a catlike vertical slit. There is a deep facial pit between the nostril and the eye. The preferred habitat is low, wet areas around swamps, streambeds, river bottoms, and damp ravines, but it also occurs on the hillsides above the wet areas. It also is found in suburban neighborhoods near people. Copperhead bites are extremely painful but usually are not life-threatening for healthy adults. As with poisonous snakebites, the victim should seek immediate medical care from a physician or hospital experienced in treating snakebite

Cottonmouth - Average adult size is 20-48 inches (51-121 cm), record is 74.5 inches (189 cm) and is a dark-colored, heavy-bodied snake. Juveniles are brightly colored with reddish-brown cross bands on a brown ground color. The dark cross bands contain many dark spots and speckles. The pattern darkens with age so adults retain only a hint of the former banding or are a uniform black. The eye is camouflaged by a broad, dark, facial stripe. The head is thick and distinctly broader than the neck, and when viewed from above, the eyes cannot be seen. The top of head in front of the eyes is covered with large plate-like scales. The pupil is vertical (catlike). There is a deep facial pit between the nostril and the eye. Its habitat is any wetlands or waterway in the state. Cottonmouths can be found along streams, springs, rivers, lakes, ponds, marshes, swamps, sloughs, reservoirs, retention pools, canals, and roadside ditches. It occasionally wanders far from water, and has been found in bushes and trees. Cottonmouth bites can be quite dangerous. The victim should seek immediate medical care from a physician or hospital experienced in treating snakebite.

Eastern Diamondback Rattlesnake - Average adult size is 36-72 inches (91-183 cm), record is 96 inches (244 cm). It is a large, heavy-bodied snake with a row of large dark diamonds with brown centers and cream borders down its back. The ground color of the body is brownish. The tail ends in a rattle. The tail is usually a different shade, brownish or gray, and toward the end of the tail the diamonds fade out or break into bands. The large and thick head has a light bordered dark stripe running diagonally through the eye and there are vertical light stripes on the snout. The pupil is vertical (catlike) and there is a deep facial pit between the nostril and the eye. Diamondbacks are often found in pine flat woods, longleaf pine and turkey oak, and sand pine scrub areas. These habitats contain palmetto thickets and gopher tortoise burrows in which the Diamondback may seek refuge. This is a large and potentially dangerous snake. It can strike up to 2/3 its body length; a 6-foot (183 cm) specimen may strike 4 feet (122 cm).

Timber Rattlesnake - Average adult size is 36-60 inches (76-152 cm), record is 74.5 inches (189 cm). Can be a large, heavy-bodied snake. The reddish brown stripe running down the center of the back is disrupted by a series of large, black, chevron-like cross bands on the pinkish gray or tan body. The tail is uniform black. The head is large and sometimes with a dark diagonal line through the eye or just behind the eye. The pupil is vertical (catlike) and there is a facial pit between the nostril and the eye. The tail ends in a rattle. Timber rattlesnakes in Florida prefer low bottomlands where it is fairly damp, river beds, hammocks pine flat woods, swamps, and cane thickets. This snake should be given a wide berth and left alone. Because of its cryptic coloration (camouflage), it can be easily overlooked, especially if it does not rattle.

Dusky Pygmy Rattlesnake - Average adult size is 12-24 inches (30-61 cm), record is 31 inches (79 cm). This is a small snake, but very thick for its size. The top of the triangular shaped head is covered with 9

large scales. The body color is light to dark gray. A longitudinal row of black or charcoal transverse blotches disrupts a reddish brown stripe running down the middle of the back. Dark spots on the side line up with the blotches. The tail is slender and ends in a miniature rattle. The belly is heavily mottled with black and white. The pupil of the eye is vertical (catlike), and there is a deep facial pit between the nostril and the eye. This snake is common in lowland pine flat woods, prairies, around lakes and ponds, and along the borders of many freshwater marshes and cypress swamps. This small snake has a reputation for being very aggressive. Its bite, while usually not life threatening, is extremely painful and can result in the loss of a digit. However, In some cases it can be fatal. The rattle is so small it is seldom heard. When it is heard, it sounds like an insect buzzing. Florida's two hognose snakes occasionally are confused with the Pygmy Rattlesnake. It is easy to distinguish between the harmless hognose snakes and the Pygmy Rattlesnake. The harmless hognose snakes defend themselves against potential predators by spreading (flattening) their heads and necks. If this does not scare the threat away, the hognose snakes will turn onto their backs and play dead. The hognose snakes have upturned noses and round pupils, and they also have no facial pits or rattles.

Eastern Coral Snake - Average adult size is 20-30 inches (51-76 cm), record is 47.5 inches (121 cm). Body ringed with black, yellow, and red; narrow yellow rings separating the wider red and black rings. The rings continue across the belly of the snake. From tip of snout to just behind the eye the head is black. The tail is black and yellow, without any red rings. The red rings usually contain black flecks or spots. The pupil is round. This snake occupies a variety of habitats, from dry, well-drained flat woods and scrub areas to low, wet hammocks and the borders of swamps. They are quite secretive and are usually found under debris and in the ground, but occasionally they are found in the open, and have even been seen climbing the trunks of live oaks. Good numbers of them are turned up when pine flat woods are bulldozed. Because they also are ringed with red, black, and yellow or white, two harmless snakes in Florida, the Scarlet Kingsnake and the Scarlet Snake, often are confused with the Coral Snake. Both of these mimics (look-a-likes) can be distinguished from the Coral Snake by their red snouts and red on their tails. In addition, the red bands of the Scarlet Kingsnake and the Scarlet Snake never touch the yellow bands (the red and yellow are separated by the black). Also, on both the Coral Snake and the Scarlet Kingsnake the rings go all the way around the body, but not on the Scarlet Snake which has a white belly. If you have difficulty separating the harmless mimics from the Coral Snake, the following mnemonic rhymes will identify the Coral Snake for you: 'If red touches yellow, it can kill a fellow,' and 'If its nose is black, it's bad for jack.' Because the Coral Snake is a relative of the cobras, people believe its bite nearly always is fatal. While its bite is serious and should receive immediate medical attention, statistics suggest that the bite of the Coral Snake is less threatening than the bite of a Diamondback Rattlesnake.

Mosquito-Borne Illness

The Florida Department of Agriculture and Consumer Services (FDACS), Florida Fish and Wildlife Conservation Commission and Florida Department of Health Bureau of Epidemiology monitor mosquitoes in the state and takes actions to control their populations. There have been nine reported cases of West Nile Virus (WNV) in Florida. Escambia County is one of the 49 Florida Counties under a Medical Alert from the Florida Department of Health for WNV.

West Nile Virus

Encephalitis caused by WNV is transmitted to humans by mosquitoes. The mosquito becomes infected by feeding on birds infected with the WNV. Infected mosquitoes then transmit the WNV to humans and animals when biting (or taking a blood-meal).

Mosquitoes become infected after biting infected birds. The symptoms for mosquito-borne illnesses may include headache, moderate to high fever, stiff neck and confusion. In serious cases coma, seizures or paralysis can result. Symptoms usually appear between 5 to 15 days after exposure to infected mosquitoes. Mosquito-borne illnesses may be mild or serious and can lead to death. WNV encephalitis is NOT transmitted from person-to-person. There is no evidence that a person can get the virus from handling live or dead infected birds. However, avoid bare-handed contact when handling any dead animals, including dead birds. Ticks have not been implicated as vectors of West Nile-like virus.

Mild infections are common and include fever, headache, and body aches, often with skin rash and swollen lymph glands. More severe infection is marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, occasional convulsions, paralysis and, rarely, and death (especially in the elderly and very young). The incubation period of WNV encephalitis is usually 3 to 12 days. There is no specific therapy or vaccine against WNV encephalitis. The Florida Department of Health has tracked nine human encephalitis case caused by the WNV.

Eastern Equine Encephalitis

Eastern Equine Encephalitis (EEE) virus circulates in nature primarily in a bird-mosquito cycle with man, horses and exotic gamebirds (Pheasants and Chukar partridges) as dead end hosts. The virus appears to be confined primarily to states along the Atlantic and Gulf coasts causing clinical cases in unvaccinated equines every summer. Epidemics in humans are quite rare; occurring only four time in the past 62 years in Massachusetts, Louisiana and New Jersey. The virus is usually circulated throughout the year in fresh-water swamps by mosquitoes that prefer feeding on wild birds. An incubation period of 3 to 7 days is

usually followed by acute onset of fever, headache, stiff neck, disorientation, and lethargy, convulsions, and other signs of encephalitis sometimes followed by coma and death.

Precautions include:

- Limit outdoor activities during peak mosquito times – at dusk and dawn.
- Avoid standing water
- Wear long-sleeved shirts and long pants whenever you are outdoors.
- Apply insect repellent according to manufacturers instruction to exposed skin. An effective repellent will contain 20% to 30% DEET (N,N-diethyl-meta-toluamide). Avoid products containing more than 30% DEET.
- Spray clothing with repellents containing permethrin or DEET, mosquitoes may bite through thin clothing.

Ticks

There are various areas throughout the U.S. where Lyme Disease is endemic. Fortunately, Florida is not one of these areas. Nonetheless, personnel should be aware of the hazards of tick bites and Lyme Disease. The longer a disease carrying tick remains attached to the body, the greater the potential for contracting the disease. Wearing long sleeved shirts and long pants (tucked into boots). As well as performing frequent body checks will prevent long term attachment. Site first aid kits should be equipped with medical forceps and rubbing alcohol to assist in tick removal. For information regarding tick removal procedures, and symptoms of exposure consult Section 4.0 of the Health and Safety Guidance Manual.

Fire Ants

Fire ants present a unique situation when working outdoors in Florida. Their aggressive behavior and their ability to sting repeatedly can pose a unique health threat. The sting injects venom (formic acid) that causes an extreme burning sensation. Pustules form which can become infected if scratched. Allergic reactions of people sensitive to the venom include dizziness, swelling, shock and in extreme cases unconsciousness and death. People exhibiting such symptoms should see a physician. Fire ants can be identified by their habitat. They build mounds in open sunny areas sometimes supported by a wall or shrub. The mound has no external opening. The size of the mound can range from a few inches across

to some which are in excess of two feet or more in height and diameter. When disturbed they defend it by swarming out and over the mound, even running up grass blades and sticks.

An Office of Natural Resources or similar entity on NAS Pensacola should be contacted for further direction on the hazards and precautions of naturally occurring wildlife and insects.

Site personnel who are allergic to stinging insects such as bees, wasps, and hornets must be particularly careful since severe illness and death may result from allergic reactions. As with any medical condition or allergy, information regarding the condition must be listed on the Medical Data Sheet (See Attachment II) and the FOL and SSO notified.

6.3.2 Inclement Weather

As the Florida Panhandle is located in a tropical storm, hurricane prone area, the following information is supplied to explain the potential severity of these natural hazards. The decision to curtail operations and evacuate the area should be made by the FOL, PM, and the HSM.

Tropical Storms and Hurricanes

During the months of June through November, the State of Florida is subject to threat of tropical and extra tropical cyclones. Occasionally during the winter months, low pressure systems; either migrating northward from the Carolinas or form off the New England coast; will deepen in the Atlantic and produce high winds and surf along the coastline, resulting in coastal and inland flooding. The decision to curtail operations and evacuate the area should be made by the FOL, PM, and the HSM. There are three main threats associated with tropical storms and hurricanes:

- High winds
- Excessive rainfall
- Storm surge

The impacts of high winds and excessive rainfall occur hours, maybe days, before the tropical storm or hurricane makes landfall. However, the storm surge accompanies the storm or hurricane at the time that landfall occurs.

High Winds

Sustained winds vary greatly from storm to storm, but can range from 39 to 73 miles per hour (wind speeds associated with a tropical storm) to greater than 74 miles per hour (minimal wind speed for a

Category 1 hurricane). The table below compares the type of storm or hurricane and the corresponding wind speed.

Table 6-2
Tropical Storm/Hurricane Rating Scale

TYPE	CATEGORY*	WINDS (MPH)
Tropical Depression	NA	>35-38
Tropical Storm	NA	39 – 73
Hurricane	1	74 – 95
Hurricane	2	96 – 110
Hurricane	3	111 – 130
Hurricane	4	131 – 155
Hurricane	5	>155

NA – Not Applicable

* Based on the Saffir-Simpson scale

In addition to strong winds, there is the threat of debris (i.e. building material, trees, etc.) becoming airborne projectiles as they are carried by the high winds. Thunderstorms and tornadoes embedded within the tropical storm or hurricane can further increase the wind speeds on a localized level.

Excessive Rainfall

Heavy rains associated with tropical storms and hurricanes also vary greatly from storm to storm. On average, an inch of rainfall an hour is not uncommon with major hurricanes, somewhat lesser amounts with tropical storms. However, the primary threat is not the intensity of rain, but the duration of rainfall. Since many tropical storms and hurricanes are slow-movers, they are capable of producing sustained heavy rainfall over a long period of time. It is not uncommon for an area to receive nearly 20 inches of rain in 24 hours. Under these conditions, street; stream and creek flooding is inevitable only to be exacerbated by locally heavier rains from thunderstorms.

Storm Surge

The storm surge is an abnormal rise in sea level accompanying a hurricane or tropical storm. The height of the storm surge (usually measured in feet) is the difference in sea level from the observed level (during the storm) and the level that would have occurred in the absence of the storm or hurricane. The more intense the storm or hurricane the higher the storm surge. Storm surges become even higher if they

occur during periods of high tide. The following table defines some of the terminology and possible calls to action regarding tropical cyclones:

Table 6-3
TROPICAL STORM/HURRICANE
WATCH AND WARNING

STORM DESCRIPTION	DEFINITION	CALL TO ACTION
Tropical Storm Watch	Tropical storm conditions are possible in the specified area of the watch, usually within 36 hours	Weather conditions should be monitored for further advisories. *Prepare for possible evacuation by local officials*
Tropical Storm Warning	Tropical storm conditions are expected in the specified area of the warning, usually within 24 hours.	Work should be suspended in areas where lightning, high winds and rainfall could pose a threat to life. *Mandatory evacuations may be enforced by local officials.*
Hurricane Watch	Hurricane conditions are possible in the specified area of the watch, usually within 36 hours.	Weather conditions should be monitored for further advisories. *Prepare for possible evacuation by local officials*
Hurricane Warning	Hurricane conditions are expected in the specified area of the warning, usually within 24 hours.	*Mandatory evacuations will most likely be enforced by local officials.*

A NOAA Weather Radio is the best means to receive watches and warnings from the National Weather Service. The National Weather Service continuously broadcasts updated hurricane advisories that can be received by widely available NOAA Weather Radios.

7.0 AIR MONITORING

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

7.1 INSTRUMENTS AND USE

Instruments will be used primarily to monitor source points and worker breathing zone areas, while observing instrument action levels. Action levels are discussed in Table 5-1 as they may apply to a specific task or location.

7.1.1 Photoionization Detector or Flame Ionization Detector

In order to accurately monitor for any substances that may present an exposure potential to site personnel, a Photoionization Detector (PID) using a lamp energy of 10.2 eV or higher will be used. This instrument will be used to monitor potential source areas and to screen the breathing zones of employees during site activities. The PID with this lamp strength has been selected because it is capable of detecting the organic vapors of concern.

Prior to the commencement of any field activities, the background levels of the site must be determined and noted. Daily background readings will be taken away from any areas of potential contamination. These readings, any influencing conditions (i.e., weather, temperature, humidity) and site location must be documented in the field operations logbook or other site documentation (e.g., sample log sheet).

7.1.2 Hazard Monitoring Frequency

Table 5-1 presents the frequencies that hazard monitoring will be performed as well as the action levels that will initiate the use of elevated levels of protection. The SSO may decide to increases these frequencies based on instrument responses and site observations. The frequency at which monitoring is performed will not be reduced without the prior consent of the PHSO or HSM.

7.2 INSTRUMENT MAINTENANCE AND CALIBRATION

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

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

FIGURE 7-1
DOCUMENTATION OF FIELD CALIBRATION

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

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

8.0 TRAINING/MEDICAL SURVEILLANCE REQUIREMENTS

8.1 INTRODUCTORY/REFRESHER/SUPERVISORY TRAINING

This section is included to specify health and safety training and medical surveillance requirements for both TtNUS and subcontractor personnel participating in site activities.

8.1.1 Requirements for TtNUS Personnel

TtNUS personnel must complete 40 hours of introductory hazardous waste site training prior to performing work at the NAS Pensacola facility. Additionally, TtNUS personnel who have had introductory training more than 12 months prior to site work must have completed 8 hours of refresher training in the past 12 months before being cleared for site work. In addition, 8-hour supervisory training in accordance with 29 CFR 1910.120 (e)(4) will be required for site supervisory personnel.

Documentation of TtNUS introductory, supervisory, and refresher training as well as site-specific training will be maintained at the project. Copies of certificates or other official documentation will be used to fulfill this requirement.

8.1.2 Requirements for Subcontractors

TtNUS subcontractor personnel must have completed introductory hazardous waste site training or equivalent work experience as defined in OSHA Standard 29 CFR 1910.120 (e). Additionally, personnel who have had the introductory training more than 12 months ago, are required to have 8 hours of refresher training meeting the requirements of 29 CFR 1910.120 (e)(8) prior to performing field work at the NAS Pensacola facility if required. TtNUS subcontractors must certify that each employee has had such training by sending TtNUS a letter, on company letterhead, containing the information in the example letter provided as in Figure 8-1 and by providing copies of certificates for subcontractor personnel participating in site activities.

FIGURE 8-1
TRAINING LETTER

The following statements must be typed on company letterhead and signed by an officer of the company and accompanied by copies of personnel training certificates:

LOGO
XYZ CORPORATION
555 E. 5th Street
Nowheresville, Kansas 55555

Month, day, year

Mr. Gerry Walker
Tetra Tech NUS, Inc.
Task Order Manager
1401 Oven Park Drive, Suite 201
Tallahassee, Florida, 32312

Subject: HAZWOPER Training for NAS Pensacola, Pensacola, Florida

Dear Mr. Walker:

As an officer of XYZ Corporation, I hereby state that I am aware of the potential hazardous nature of the subject project. I also understand that it is our responsibility to comply with applicable occupational safety and health regulations, including those stipulated in Title 29 of the Code of Federal Regulations (CFR), Parts 1900 through 1910 and Part 1926.

I also understand that Title 29 CFR 1910.120, entitled "Hazardous Waste Operations and Emergency Response," requires appropriate level of training for certain employees engaged in hazardous waste operations. In this regard, I hereby state that the following employees have had 40 hours of introductory hazardous waste site training or equivalent work experience as requested by 29 CFR 1910.120(e) and have had 8 hour of refresher training as applicable and as required by 29 CFR 1910.120(e)(8) and that site supervisory personnel have had training in accordance with 29 CFR 1910.120(e)(4).

LIST FULL NAMES OF EMPLOYEES AND THEIR SOCIAL SECURITY NUMBERS HERE.

Should you have any questions, please contact me at (555) 555-5555

Sincerely,

(Name and Title of Company Officer)

Enclosed: Training Certificates

8.2 SITE-SPECIFIC TRAINING

TtNUS will provide site-specific training to TtNUS employees and subcontractor personnel who will perform work on this project. Site-specific training will also be provided to personnel (U.S. Department of Defense, EPA, etc.) who may enter the site to perform functions that may or may not be directly related to site operations. Site-Specific training will include:

- Names of designated personnel and alternates responsible for site safety and health
- Safety, health, and other hazards present at the sites
- Use of personal protective equipment
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- Contents of the Health and Safety Plan
- Emergency response procedures (evacuation and assembly points)
- Initial response procedures
- Review of the contents of relevant Material Safety Data Sheets
- Review of the use of Safe Work Permits

Site-specific documentation will be established through the use of Figure 8-2. Site personnel and visitors must sign this document upon receiving site-specific training.

8.3 MEDICAL SURVEILLANCE

8.3.1 Medical Surveillance Requirements for TtNUS Personnel

TtNUS personnel participating in project field activities will have had a physical examination meeting the requirements of TtNUS's medical surveillance program and will be medically qualified to perform hazardous waste site work using respiratory protection.

Documentation for medical clearances will be maintained in the TtNUS Tallahassee office and made available, as necessary.

FIGURE 8-2

SITE-SPECIFIC TRAINING DOCUMENTATION

My signature below indicates that I am aware of the potential hazardous nature of performing remedial investigation activities at NAS Pensacola, Pensacola, Florida and that I have received site-specific training which included the elements presented below:

- Names of designated personnel and alternates responsible for site safety and health
- Safety, health, and other hazards present at the sites
- Use of personal protective equipment
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- Contents of the Health and Safety Plan
- Emergency response procedures (evacuation and assembly points)
- Initial response procedures
- Review of the contents of relevant Material Safety Data Sheets
- Review of the use of Safe Work Permits

I have been given the opportunity to ask questions and they have been answered to my satisfaction. I further state, that the dates of my training (introductory, refresher, and supervisory, as applicable) and my medical surveillance requirements are accurate and correct to the best of my knowledge.

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

8.3.2 Medical Surveillance Requirements for Subcontractors

Subcontractors are required to obtain a certificate of their ability to perform hazardous waste site work and to wear respiratory protection. The "Subcontractor Medical Approval Form" provided in Figure 8-3 shall be used to satisfy this requirement, providing it is properly completed and signed by a licensed physician.

Subcontractors who have a company medical surveillance program meeting the requirements of paragraph (f) of OSHA 29 CFR 1910.120 can substitute "Subcontractor Medical Approval Form" (See Figure 8-3) with a letter, on company letterhead, containing the information in the example letter presented in Figure 8-4 of this HASP.

8.3.3 Requirements for Field Personnel

Each field team member (including subcontractors) and visitors entering the Exclusion Zone(s) shall be required to complete and submit a copy of Medical Data Sheet found in Attachment II of this HASP. This shall be provided to the SSO, prior to participating in site activities. The purpose of this document is to provide site personnel and emergency responders with additional information that may be necessary in order to administer medical attention.

8.4 SUBCONTRACTOR EXCEPTIONS

Subcontractors who will not enter the Exclusion Zone during operation, and whose activities involve no potential for exposure to site contaminants, will not be required to meet the requirements for training/medical surveillance other than site-specific training as stipulated in Section 8.2. This exception may only be granted by the CLEAN Health and Safety Manager, Matt Soltis.

FIGURE 8-3

SUBCONTRACTOR MEDICAL APPROVAL FORM

For employees of _____
Company Name

Participant Name: _____ Date of Exam: _____

Part A

The above-named individual has:

1. Undergone a physical examination in accordance with OSHA Standard 29 CFR 1910.120, paragraph (f) and found to be medically -

   ( ) qualified to perform work at the NAS Pensacola, work site
   ( ) not qualified to perform work at the NAS Pensacola, work site

and,

2. Undergone a physical examination as per OSHA 29 CFR 1910.134(b)(10) and found to be medically -

   ( ) qualified to wear respiratory protection
   ( ) not qualified to wear respiratory protection

My evaluation has been based on the following information, as provided to me by the employer.

( ) A copy of OSHA Standard 29 CFR 1910.120 and appendices.
( ) A description of the employee's duties as they relate to the employee's exposures.
( ) A list of known/suspected contaminants and their concentrations (if known).
( ) A description of any personal protective equipment used or to be used.
( ) Information from previous medical examinations of the employee which is not readily available to the examining physician.

Part B

I, _____, have examined _____
Physician's Name (print) Participant's Name (print)

and have determined the following information:

FIGURE 8-3
SUBCONTRACTOR MEDICAL APPROVAL FORM
PAGE TWO

1. Results of the medical examination and tests (excluding finding or diagnoses unrelated to occupational exposure):

   _____
   _____
   _____

2. Any detected medical conditions which would place the employee at increased risk of material impairment of the employee's health:

   _____
   _____
   _____

3. Recommended limitations upon the employee's assigned work:

   _____
   _____
   _____

I have informed this participant of the results of this medical examination and any medical conditions which require further examination of treatment.

Based on the information provided to me, and in view of the activities and hazard potentials involved at the NAS Pensacola work site, this participant

( ) may
( ) may not

perform his/her assigned task.

Physician's Signature _____

Address _____

Phone Number _____

NOTE: Copies of test results are maintained and available at:

_____
Address

FIGURE 8-4

MEDICAL SURVEILLANCE LETTER

The following statements must be typed on company letterhead and signed by an officer of the company:

LOGO
XYZ CORPORATION
555 E. 5th Street
Nowheresville, Kansas 55555

Month, day, year

Mr. Gerry Walker
Tetra Tech NUS, Inc.
Task Order Manager
1401 Oven Park Drive, Suite 201
Tallahassee, Florida, 32312

Subject: HAZWOPER Training for NAS Pensacola, Pensacola, Florida

Dear Mr. Walker:

As an officer of XYZ Corporation, I hereby state that the persons listed below participate in a medical surveillance program meeting the requirements contained in paragraph (f) of Title 29 of the Code of Federal Regulations (CFR) Part 1910.120, entitled "Hazardous Waste Operations and Emergency Response. I further state that the persons listed below have had physical examinations under this program within the past 12 months and that they have been cleared, by a license physician, to perform hazardous waste site work and to wear positive- and negative-pressure respiratory protection. I also state that, to my knowledge, no person listed below has any medical restriction that would preclude him/her from working at the NAS Pensacola facility.

LIST OF FULL NAMES OF EMPLOYEES AND THEIR SOCIAL SECURITY NUMBERS HERE.

Should you have any questions, please contact me at (555) 555-5555

Sincerely,

(Name and Title of Company Officer)

9.0 SITE CONTROL

This section outlines the means by which TtNUS will delineate work zones and use these work zones in conjunction with decontamination procedures to prevent the spread of contaminants into previously unaffected areas of the site. It is anticipated that a three-zone approach will be used during work at this site: Exclusion Zone, Contamination Reduction Zone, and Support Zone. It is also anticipated that this control measure will be used to control access to site work areas. Use of such controls will restrict the general public, minimize potentials for the spread of contaminants and to protect individuals who are not cleared to enter the work areas.

9.1 EXCLUSION ZONE

The Exclusion Zone will be considered those areas of the site of known or suspected contamination. It is not anticipated that significant amounts of surface contamination are in the proposed work areas of this site. It is anticipated that this will remain so until/unless contaminants are brought to the surface by intrusive activities such as drilling. Furthermore, once such activities have been completed and surface contamination has been removed, the potential for exposure is again diminished and the area can then be reclassified as part of the Contamination Reduction Zone. Therefore, the Exclusion Zones for this project will be limited to those areas if the site where active work is being performed plus so many feet surrounding the point of operation (See Table 5-1 for specific operation). The Exclusion Zone for this activity will represent the areas where the soils are disturbed through soil borings and sampling activities. Exclusion Zones will be delineated (as necessary) using barrier tape, cones and/or drive poles, and postings to inform and direct facility personnel.

9.1.1 Exclusion Zone Clearance

A pre-startup site visit will be conducted by members of the field team in an effort to identify proposed subsurface investigation locations, conduct utility clearances, and provide up-front notices concerning scheduled activities within the facility. Subsurface activities will only proceed with proper utility clearance. In the event that a utility is struck during a subsurface investigative activity, the Navy Engineer-in-Charge identified in Section 2.7, Table 2-1 will be notified.

When base personnel are working within the proximity of this investigation, they will be moved or their operation temporarily discontinued to protect them from potential hazards associated with this operation.

9.2 CONTAMINATION REDUCTION ZONE

The Contamination Reduction Zone (CRZ) will be a buffer area between the Exclusion Zone and any area of the site where contamination is not suspected. This area will also serve as a focal point in supporting Exclusion Zone activities. This area may be delineated using barrier tape, cones, and postings to inform and direct facility personnel. Decontamination will be conducted at a central location. Equipment potentially contaminated will be bagged and taken to that location for decontamination.

9.3 SUPPORT ZONE

The Support Zone for this project will include a staging area where site vehicles will be parked, equipment will be unloaded, and where food and drink containers will be maintained. The Support Zones will be established at areas of the site where exposure to site contaminants would not be expected during normal working conditions or foreseeable emergencies.

9.4 SAFE WORK PERMITS

Exclusion Zone work conducted in support of this project will be performed using Safe Work Permits to guide and direct field crews on a task by task basis. An example of the Safe Work Permit to be used is illustrated in Figure 9-1. Partially completed Permits for the work to be performed are included in Attachment V. The daily meetings conducted at the site will further support these work permits. This effort will ensure that site-specific considerations and changing conditions are incorporated into the planning effort. Permits will require the signature of the FOL and/or the SSO.

Use of these permits will provide the communication line for reviewing protective measures and hazards associated with each operation. This HASP will be used as the primary reference for selecting levels of protection and control measures. The work permit will take precedence over the HASP when more conservative measures are required based on specific site conditions.

Permits will be turned into the FOL and/or the SSO upon reaching their termination period or upon completion of the task for which the permit was issued.

FIGURE 9-1
SAFE WORK PERMIT

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

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

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

II. Names: _____

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

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

IV. Protective equipment required
Level D ☐ Level B ☐
Level C ☐ Level A ☐
Detailed on Reverse

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

Modifications/Exceptions: _____

V.

Chemicals of Concern	Action Level(s)	Response Measures

VI. Additional Safety Equipment/Procedures

Hard-hat	☐ Yes	☐ No	Hearing Protection (Plugs/Muffs)	☐ Yes	☐ No
Safety Glasses	☐ Yes	☐ No	Safety belt/harness	☐ Yes	☐ No
Chemical/splash goggles	☐ Yes	☐ No	Radio	☐ Yes	☐ No
Splash Shield	☐ Yes	☐ No	Barricades	☐ Yes	☐ No
Splash suits/coveralls	☐ Yes	☐ No	Gloves (Type)	☐ Yes	☐ No
Steel toe Work shoes or boots	☐ Yes	☐ No	Work/rest regimen	☐ Yes	☐ No

Modifications/Exceptions: _____

VII. Procedure review with permit acceptors

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

VIII. Site Preparation

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

IX. Additional Permits required (Hot work, confined space entry, excavation etc.). ☐ Yes ☐No
If yes, complete permit required or contact Health Sciences, Pittsburgh Office

X. Special instructions, precautions: _____

Permit Issued by: _____ Permit Accepted by: _____

9.5 SITE VISITORS

Site visitors for the purpose of this document are identified as representing the following groups of individuals:

- Personnel invited to observe or participate in operations by TtNUS
- Regulatory personnel (DOD, OSHA, etc.)
- Southern Division Navy Personnel
- Other authorized visitors

It is not anticipated that this operation will result in a large number of site visitors. However, as some visitors can reasonably be expected, the following requirements will be enforced:

- Site visitors will be directed to the FOL, who will sign them in to the field logbook. Information to be recorded in the logbook will include the individual's name (proper identification required), who they represent, and purpose for the visit.

- Site visitors will be required to produce the necessary information supporting clearance onto the site. This includes information attesting to applicable training (40-hours of HAZWOPER training required for Southern Division Navy personnel) and medical surveillance, as stipulated in Section 8 of this document. In addition, to enter the site's operational zones during planned activities, visitors will be required to first go through site-specific training covering the topics stipulated in Section 8.2 of this document.

NOTE: Site visitors will be escorted while at the site.

Following this, the site visitor will be permitted to enter the site and applicable operational areas. Visitors are required to observe the protective equipment and site restrictions in effect at the area of their visit. Visitors must meet the requirements as stipulated in this plan for site clearance to be permitted to enter the site operational zones during planned activities. Any incidence of unauthorized site visitation will cause onsite activities to be terminated until that visitor can be removed. Removal of unauthorized visitors will be accomplished with support from the Base Contact, if necessary. At a minimum, the Navy On-site Representative will be notified of any unauthorized visitors.

9.6 SITE SECURITY

Site security will be accomplished using TtNUS field personnel. TtNUS will retain complete control over active operational areas. As this activity takes place at Navy facilities open to public access, and along

public highways, the first line of security will take place using traffic permit restrictions, Exclusion Zone barriers, and any existing barriers at the sites to restrict the general public. The second line of security will take place at the work site referring interested parties to the FOL or designee. The FOL will serve as a focal point for non-project interested parties, and serve as the final line of security and the primary enforcement contact.

9.7 SITE MAP

Once the areas of contamination, access routes, topography, and dispersion routes are determined, a site map will be generated and adjusted as site conditions change. When possible, these maps will be posted to illustrate up-to-date collection of contaminants and adjustment of zones and access points.

9.8 BUDDY SYSTEM

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

9.9 MATERIAL SAFETY DATA SHEET (MSDS) REQUIREMENTS

TtNUS and subcontractor personnel will provide MSDSs for chemicals brought on-site. The contents of these documents will be reviewed by the SSO with the user(s) of the chemical substances prior to any actual use or application of the substances on-site. A chemical inventory of chemicals used at the sites will be developed using the Health and Safety Guidance Manual. The MSDSs will then be maintained in a central location (i.e., temporary office) and will be available for anyone to review upon request.

9.10 COMMUNICATION

As personnel will be working in proximity to one another during field activities, a supported means of communication between field crews members will not be necessary. External communication will be accomplished by using the telephones at predetermined and approved locations. External communication will primarily be used for the purpose of resource and emergency resource communications. Prior to the commencement of activities, the FOL will determine and arrange for telephone communications.

10.0 SPILL CONTAINMENT PROGRAM

10.1 SCOPE AND APPLICATION

It is not anticipated that bulk hazardous materials (over 55-gallons) will be handled at any given time as part of this scope of work. It is also not anticipated that such spillage would constitute a danger to human health or the environment. However, as the job progresses, the potential may exist for accumulating Investigative Derived Wastes (IDW) such as decontamination fluids, soil cuttings, and purge and well development waters, in a central staging area. Once these fluids and other materials have been characterized, they can be removed from this area and properly disposed.

10.2 POTENTIAL SPILL AREAS

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

- Resource deployment
- Waste transfer
- Central staging

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

10.3 LEAK AND SPILL DETECTION

To establish an early detection of potential spills or leaks, a periodic walk-around by the personnel staging or disposing of drums or in the Resource Deployment area will be conducted during working hours to visually determine that storage vessels are not leaking. If a leak is detected, the contents will be transferred, using a hand pump, into a new vessel. The leak will be collected and contained using absorbents such as Oil-Dry, vermiculite, or sand, which are stored at the vulnerable areas in a conspicuously marked drum. This used material, too, will be containerized for disposal pending analysis. Inspections will be documented in the project logbook.

10.4 PERSONNEL TRAINING AND SPILL PREVENTION

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

10.5 SPILL PREVENTION AND CONTAINMENT EQUIPMENT

The following represents the minimum equipment that may be maintained (depending on anticipated need) at the staging areas for the purpose of supporting this Spill Prevention/Containment Program.

- Sand, clean fill, vermiculite, or other non combustible absorbent (Oil-dry)
- Drums (55-gallon U.N 1A2)
- Shovels, rakes, and brooms
- Container labels

10.6 SPILL CONTROL PLAN

This section describes the procedures the TtNUS field crew members will employ upon the detection of a spill or leak.

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

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

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

- Recontainerize spills, including 2-inch of top cover impacted by the spill. Await test results for treatment or disposal options.

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

11.0 CONFINED-SPACE ENTRY

It is not anticipated, under the proposed scope of work, that confined space and permit-required confined space activities will be conducted. Therefore, personnel under the provisions of this HASP are not allowed, under any circumstances, to enter any confined spaces. A confined space is defined as an area which has one or more of the following characteristics:

- Is large enough and so configured that an employee can bodily enter and perform assigned work.
- Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry).
- Is not designed for continuous employee occupancy.

A Permit-Required Confined Space is one that:

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

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

12.0 MATERIALS AND DOCUMENTATION

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

- A complete copy of this HASP
- Health and Safety Guidance Manual
- Incident Reports
- Medical Data Sheets
- Material Safety Data Sheets for chemicals brought on-site, including decon solution, fuels, sample preservations, calibration gases, etc.
- A full size OSHA Job Safety and Health Poster
- Training/Medical Surveillance Documentation Form (blank)
- Emergency Reference Form (Section 2.0, extra copy for posting)

12.1 MATERIALS TO BE POSTED OR MAINTAINED AT THE SITE

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

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

Material Safety Data Sheets (MSDS) (maintained) - The MSDSs should also be in a central area accessible to site personnel. These documents should match the listings on the chemical inventory list for substances employed on-site. It is acceptable to have these documents within a central folder and the chemical inventory as the table of contents.

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

Site Clearance (maintained) - This list is found within the training section of the HASP (See Figure 8-2). This list identifies site personnel, dates of training (including site-specific training), and medical surveillance. The lists indicates not only clearance but also status. If personnel do not meet these requirements, they do not enter the site while site personnel are engaged in activities.

Emergency Phone Numbers and Directions to the Hospital(s) (posted) - This list of numbers and directions will be maintained at phone communications points and in each site vehicle.

Medical Data Sheets/Cards (maintained) - Medical Data Sheets will be filled out by on-site personnel and filed in a central location. The Medical Data Sheet will accompany any injury or illness requiring medical attention to the medical facility. A copy of this sheet or a wallet card will be given to personnel to be carried on their person (see Attachment II)

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

Personnel Monitoring (maintained) - Results generated through personnel sampling (levels of airborne toxins, noise levels, etc.) will be posted to inform individuals of the results of that effort.

Placards and Labels (maintained) - Where chemical inventories have been separated because of quantities and incompatibilities, these areas will be conspicuously marked using DOT placards and acceptable (Hazard Communication 29 CFR 1910.1200(f)) labels.

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

13.0 GLOSSARY

ACGIH	American Conference of Governmental Industrial Hygienists
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-term Environmental Action - Navy
CNS	Central Nervous System
CTO	Contract Task Order
CZR	Contamination Reduction Zone
DOD	United States Department of Defense
eV	electron Volts
FOL	Field Operations Leader
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HSM	Health and Safety Manager
IDLH	Immediate Dangerous to Life or Health
IDW	Investigative-Derived Wastes
LEL/LFL	Lower Explosive Limit / Lower Flammable Limit
MSDS	Material Safety Data Sheets
N/A	Not Available
NAS	Naval Air Station
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicity Program
ORC	Oxygen Release Compound
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor)
PEL	Permissible Exposure Limit
PID	Photoionization Detector
PPE	Personal Protective Equipment
SAP	Sampling and Analyses Plan
SOPs	Standard Operating Procedures
SSO	Site Safety Officer
TBD	To be determined
TLV	Threshold Limit Value
TOM	Task Order Manager
TWA	Time-Weighted Average
WP	Work Plan

ATTACHMENT I

INJURY/ILLNESS PROCEDURE AND REPORT FORM

TETRA TECH NUS, INC.

INJURY/ILLNESS PROCEDURE
WORKER'S COMPENSATION PROGRAM

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

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

ADDITIONAL QUESTIONS REGARDING WORKER'S COMPENSATION:

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

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

WHO IS COVERED:

All employees of Tetra Tech, whether they are on a full-time, part-time or temporary status, working in an office or in the field, are entitled to worker's compensation benefits. All

employees must follow the above injury/illness reporting procedures. Consultants, independent contractors, and employees of subcontractors are not covered by Tetra Tech's Worker's Compensation plan.

WHAT IS COVERED:

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

TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT

To: _____
Subsidiary Health and Safety Representative

cc: _____
Workers Compensation Administrator

Project name: _____

Project number: _____

Prepared by: _____

Position: _____

Office: _____

Telephone number: _____

Fax number: _____

Information Regarding Injured or Ill Employee

Name: _____

Home address: _____

_____

Home telephone number: _____

Occupation (regular job title): _____

Department: _____

Office: _____

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

Marital status: _____

Date of birth: _____

Social security number: _____

Date of Accident: _____

Time Employee Began Work: _____

Time of Accident: _____ a.m. ☐ p.m. ☐

☐ Check if time cannot be determined

Location of Incident

Street address: _____

City, state, and zip code: _____

County: _____

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

Information About the Incident

What was the employee doing just before the incident occurred? Describe the activity as well as the tools, equipment, or material the employee was using. Be specific. Examples: "Climbing a ladder while carrying roofing materials"; "Spraying chlorine from hand sprayer"; "Daily computer key-entry"

What Happened? Describe how the injury occurred. Examples: "When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time"

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.

TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)

Information About the Incident (Continued)

What was the injury or illness? Describe the part(s) of the body affected and how it was affected. Be more specific than "hurt," "pain," or "sore." Examples "Strained back"; "Chemical burn, right hand"; "Carpal tunnel syndrome, left wrist"

Describe the Object or Substance that Directly Harmed the Employee: Examples: "Concrete floor"; "Chlorine"; "Radial arm saw." If this question does not apply to the incident, write "Not applicable."

Did the employee die? Yes ☐ No ☐ Date of death: _____

Was employee performing regular job duties? Yes ☐ No ☐

Was safety equipment provided? Yes ☐ No ☐ Was safety equipment used? Yes ☐ No ☐

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

Witness (Attach additional sheets for other witnesses.)

Name: _____

Company: _____

Street address: _____

City: _____ State: _____ Zip code: _____

Telephone number: _____

Medical Treatment Required? ☐ Yes ☐ No ☐ First aid only

Name of physician or health care professional: _____

If treatment was provided away from the work site, provide the information below.

Facility name: _____

Street address: _____

City: _____ State: _____ Zip code: _____

Telephone number: _____

Was the employee treated in an emergency room? ☐ Yes ☐ No

Was the employee hospitalized over night as an in-patient? ☐ Yes ☐ No

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.

TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)

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

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

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

Date of Report: _____ **Time of Report:** _____

I have reviewed this investigation report and agree, to the best of my recollection, with its contents.

Printed Name of Injured Employee _____ Telephone Number _____

Signature of Injured Employee _____ Date _____

The signatures provided below indicate that appropriate personnel have been notified of the incident.

Title	Printed Name	Signature	Telephone Number	Date
Office Manager				
Project Manager				
Site Safety Coordinator or Office Health and Safety Representative				

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.

TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)

To Be Completed by the Subsidiary Health and Safety Representative

Classification of Incident:

☐ Injury ☐ Illness

Result of Incident:

☐ First aid only

☐ Days away from work

☐ Remained at work but incident resulted in job transfer or work restriction

☐ Incident involved days away and job transfer or work restriction

☐ Medical treatment only

No. of days away from work _____

Date employee left work _____

Date employee returned to work _____

No. of days placed on restriction or job transfer: _____

OSHA Recordable Case Number _____

To Be Completed by Human Resources

Social security number: _____

Date of hire: _____ Hire date for current job: _____

Wage information: $ _____ per ☐ Hour ☐ Day ☐ Week ☐ Month

Position at time of hire: _____

Current position: _____ Shift hours: _____

State in which employee was hired: _____

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

Temporary job end date: _____

To Be Completed during Report to Workers Compensation Carrier

Date reported: _____ Reported by: _____

Confirmation number: _____

Name of contact: _____

Field office of claims adjuster: _____

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.

ATTACHMENT II
MEDICAL DATA SHEET

MEDICAL DATA SHEET

This Medical Data Sheet must be completed by all on-site personnel and kept in the command post during the conduct of site operations. This data sheet will accompany any personnel when medical assistance is needed or if transport to hospital facilities is required.

Project _____

Name _____ Home Telephone _____

Address _____

City/State _____

Age _____ Height _____ Weight _____

Name of Next Kin _____

Drug or other Allergies _____

Particular Sensitivities _____

Do You Wear Contacts?_____

Provide a Checklist of Previous Illnesses or Exposure to Hazardous Chemicals _____

_____

_____

What medications are you presently using? _____

_____

_____

Do you have any medical restrictions? _____

_____

_____

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

_____

_____

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

_____ _____

Signature Date

ATTACHMENT III
STANDARD OPERATING PROCEDURE
FOR
UTILITY LOCATING AND EXCAVATION CLEARANCE

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1.0 PURPOSE

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

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

2.0 SCOPE

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

3.0 GLOSSARY

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

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

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

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

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

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

4.0 RESPONSIBILITIES

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

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

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

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

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

5.0 PROCEDURES

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

5.1 Buried Utilities

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

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

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

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

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

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

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

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

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

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

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

5.2 Overhead Power Lines

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

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

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

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

6.0 UNDERGROUND LOCATING TECHNIQUES

6.1 Geophysical Methods

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

Electromagnetic Induction

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

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

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

Magnetics

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

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

Ground Penetrating Radar

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

6.2 Passive Detection Surveys

Acoustic Surveys

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

Thermal Imaging

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

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

6.3 Intrusive Detection Surveys

Vacuum Excavation

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

Hand-auger Surveys

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

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

Tile Probe Surveys

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

7.0 INTRUSIVE ACTIVITIES SUMMARY

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

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

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

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

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

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

8.0 REFERENCES

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

ATTACHMENT 1
LISTING OF UNDERGROUND UTILITY CLEARANCE RESOURCES

ALABAMA
Alabama Line Location (800) 292-8525

Tucson Blue Stake Center (800) 782-5348

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

Arizona
Arizona Blue Stake Inc. (800) 782-5348

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

California
Underground Service Alert North (800) 227-2600

Underground Service Alert South (800) 227-2600

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

Connecticut
Call Before You Dig (800) 922-4455

Delaware
Miss Utility of Delmarva
(800) 282-8555

District of Columbia
Miss Utility (800) 257-7777

Florida
Call Sunshine (800) 432-4770

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

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

Utilities Underground Location Center
(800) 424-5555

Kootenai Country Utility Coordinating Council
(800) 428-4950

Shoshone County One Call (800) 398-3285

Dig Line (800) 342-1585

One Call Concepts (800) 626-4950

Illinois
Julie Inc. (800) 892-0123

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

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

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

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

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

Louisiana
Louisiana One Call (800) 272-3020

Maine
Dig Safe – Maine (800) 225-4977

Maryland
Miss Utility (800) 257-777

Miss Utility of Delmarva (800) 282-8555

Massachusetts
Dig Safe – Massachusetts (800) 322-4844

Michigan
Miss Dig System (800) 482-7171

Minnesota
Gopher State One Call (800) 252-1166

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

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

Montana
Utilities Underground Location Center
(800) 424-5555

Montana One Call Center (800) 551-8344

Nebraska
Diggers Hotline of Nebraska (800) 331-5666

Nevada
Underground Service Alert North (800) 227-2600

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

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

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

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

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

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

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

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

Ohio
Ohio Utilities Protection Service
(800) 362-2764

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

Oklahoma
Call Okie (800) 522-6543

Oregon
Utilities Underground Location Center
(800) 424-5555

Douglas Utilities Coordinating Council
(503) 673-6676

Josephine Utilities Coordinating Council
(503) 476-6676

Rogue Basin Utility Coordinating Council
(503) 779-6676

Utilities Notification Center
(800) 332-2344

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

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

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

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

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

Texas
Texas One Call System (800) 245-4545

Texas Excavation Safety System (800) 344-8377

Lone Star Notification Center (800) 669-8344

Utah
Blue Stakes Location Center (800) 662-4111

Vermont
Dig Safe – Vermont (800) 225-4977

Virginia
Miss Utility of Virginia (800) 552-7001

Miss Utility (800) 257-7777

Miss Utility of Delmarva (800) 441-8355

Washington
Utilities Underground Location Center
(800) 424-5555

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

Utilities County of Cowlitz County
(360) 425-2506

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

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

Inland Empire Utility Coordinating Council
(509) 456-8000

Palouse Empire Utilities Coordinating Council
(800) 822-1974

Utilities Notification Center (800) 332-2344

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

Wisconsin
Diggers Hotline Inc. (800) 242-8511

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

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

Fremont County Utility Coordinating Council
(800) 489-8023

Central Wyoming Utilities Coordinating Council
(800) 759-8035

Southwest Wyoming One Call (307) 362-8888

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

Albany County Utility Coordinating Council
(307) 742-3615

Southeast Wyoming Utilities Coordinating Council
(307) 638-6666

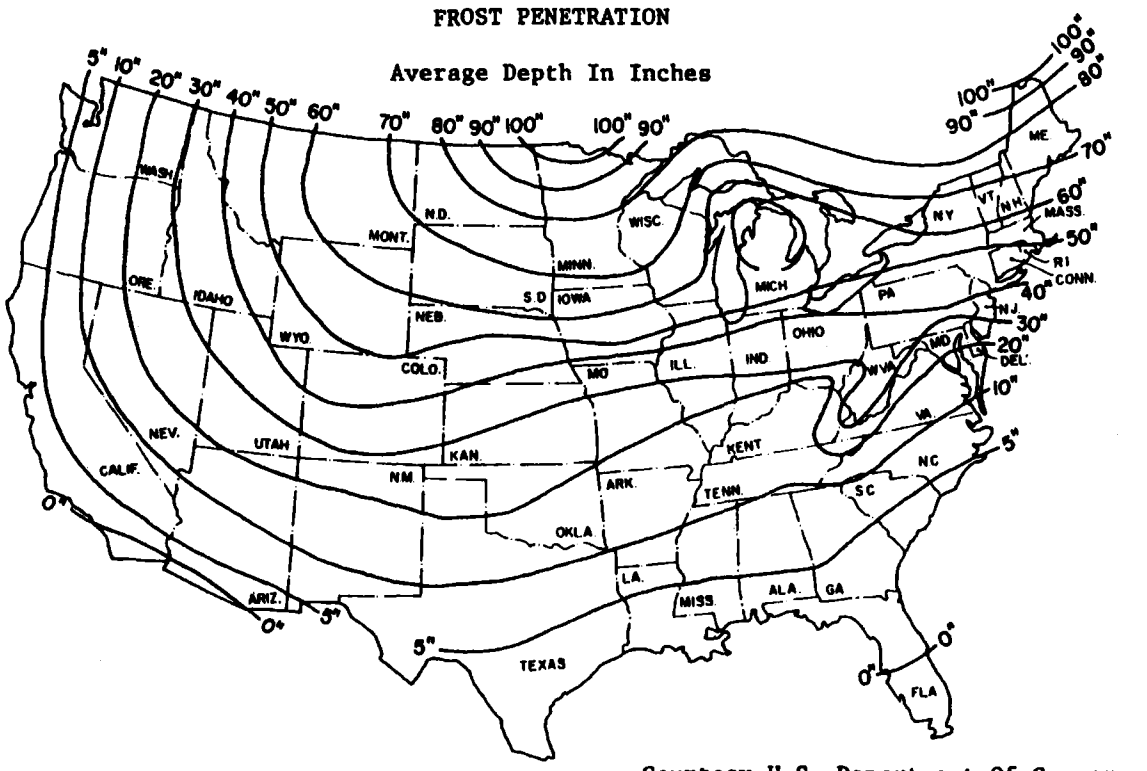
Wyoming One-Call
(800) 348-1030

Utilities Underground Location Center
(800) 454-5555

Converse County Utility Coordination Council
(800) 562-5561

ATTACHMENT 2

FROST LINE PENETRATION DEPTHS BY GEOGRAPHIC LOCATION



Courtesy U.S. Department Of Commerce

ATTACHMENT 3
UTILITY CLEARANCE FORM

Client: _____ Project Name: _____

Project No.: _____ Completed By: _____

Location Name: _____ Work Date: _____

Excavation Method/Overhead Equipment: _____

1. Underground Utilities — Circle One

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

2. Overhead Utilities — Present Absent

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

3. Notes:

_____

_____

_____

Approval:

_____ _____

Site Manager/Field Operations Leader Date

c: PM/Project File
Program File

ATTACHMENT IV
EQUIPMENT INSPECTION CHECKLIST

EQUIPMENT INSPECTION

COMPANY:_____ **UNIT NO.**_____

FREQUENCY: Inspect daily, document prior to use and as repairs are needed.

Inspection Date: ____/____/____ Time: _____ Equipment Type:_____
(e.g., bulldozer)

	Good	Need Repair	N/A
Tires or tracks	❒	❒	❒
Hoses and belts	❒	❒	❒
Cab, mirrors, safety glass	❒	❒	❒
- Turn signals, lights, brake lights, etc. (front/rear) for equipment approved for highway use?	❒	❒	❒
- Is the equipment equipped with audible back-up alarms and back-up lights?	❒	❒	❒
Horn and gauges	❒	❒	❒
Brake condition (dynamic, park, etc.)	❒	❒	❒
Fire extinguisher (Type/Rating -_____)	❒	❒	❒
Fluid Levels:			
- Engine oil	❒	❒	❒
- Transmission fluid	❒	❒	❒
- Brake fluid	❒	❒	❒
- Cooling system fluid	❒	❒	❒
- Windshield wipers	❒	❒	❒
- Hydraulic oil	❒	❒	❒
Oil leak/lube	❒	❒	❒
Coupling devices and connectors	❒	❒	❒
Exhaust system	❒	❒	❒
Blade/boom/ripper condition	❒	❒	❒
Accessways: Frame, hand holds, ladders, walkways (non-slip surfaces), guardrails?	❒	❒	❒
Power cable and/or hoist cable	❒	❒	❒
Steering (standard and emergency)	❒	❒	❒

Safety Guards:	Yes	No
– Around rotating apparatus (belts, pulleys, sprockets, spindles, drums, flywheels, chains) all points of operations protected from accidental contact?_____	❒	❒
– Hot pipes and surfaces exposed to accidental contact?_____	❒	❒
– All emergency shut offs have been identified and communicated to the field crew?_____	❒	❒
– Have emergency shutoffs been field tested? _____	❒	❒
– Results?_____	❒	❒
– Are any structural members bent, rusted, or otherwise show signs of damage?_____	❒	❒
– Are fueling cans used with this equipment approved type safety cans?_____	❒	❒
– Have the attachments designed for use (as per manufacturer's recommendation) with this equipment been inspected and are considered suitable for use?_____	❒	❒
Portable Power Tools:		
– Tools and Equipment in Safe Condition?_____	❒	❒
– Saw blades, grinding wheels free from recognizable defects (grinding wheels have been sounded)?	❒	❒

- Portable electric tools properly grounded? ❒ ❒
- Damage to electrical power cords? ❒ ❒
- Blade guards in place? ❒ ❒
- Components adjusted as per manufacturers recommendation? ❒ ❒

Cleanliness:

- Overall condition (is the decontamination performed prior to arrival on-site considered acceptable)?_____
- Where was this equipment used prior to its arrival on site?_____
- Site Contaminants of concern at the previous site?_____
- Inside debris (coffee cups, soda cans, tools and equipment) blocking free access to foot controls?_____

Operator Qualifications (as applicable for all heavy equipment):

- Does the operator have proper licensing where applicable, (e.g., CDL)?_____
- Does the operator, understand the equipments operating instructions?_____
- Is the operator experienced with this equipment? _____
- Does the operator have emotional and/or physical limitations which would prevent him/her from performing this task in a safe manner?_____
- Is the operator 21 years of age or more?_____

Identification:

- Is a tagging system available, for positive identification, for tools removed from service?___

Additional Inspection Required Prior to Use On-Site

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

- Results of noise dosimetry:_____
- Defects and repairs needed:_____
- General Safety Condition: _____
- Operator or mechanic signature:_____

Approved for Use: ❒ Yes ❒ No

_____
Site Safety Officer Signature

ATTACHMENT V
SAFE WORK PERMITS

SAFE WORK PERMIT FOR DECONTAMINATION ACTIVITIES NAVAL AIR STATION PENSACOLA

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

SECTION I: General Job Scope

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

II. Required Monitoring Instrument(s): PID w/ 10.2 eV lamp or FID

III. Field Crew: _____

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

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

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

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

Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, safety shoes, and surgical style gloves and safety glasses.

VI.

Chemicals of Concern	Action Level(s)	Response Measures
Site contaminants include VOC and SVOCs (from diesel fuel)	Any sustained reading >1 ppm above background in worker breathing zones.	Suspend site activities and report to an unaffected area.

VII. Additional Safety Equipment/Procedures

Hard-hat	☐ Yes	☒ No	Hearing Protection (Plugs/Muffs)	☐ Yes	☒ No
Safety Glasses	☒ Yes	☐ No	Safety belt/harness	☐ Yes	☒ No
Chemical/splash goggles	☐ Yes	☒ No	Radio	☐ Yes	☒ No
Splash Shield	☐ Yes	☒ No	Barricades	☐ Yes	☒ No
Splash suits/coveralls	☐ Yes	☒ No	Gloves (Type - Nitrile)	☒ Yes	☐ No
Steel toe Work shoes or boots	☒ Yes	☐ No	Work/rest regimen	☐ Yes	☒ No

Modifications/Exceptions: Tyvek coveralls if there is a potential for soiling work cloths and/or chemical-resistant coveralls (Saranex) if the potential for saturating work cloths exists. Face shield if heavy equipment is decontaminated. Face shield and hearing protection if pressure washers are used.

VIII.

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

IX. Site Preparation

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

X. Additional Permits required (Hot work, confined space entry, excavation etc.) ☐ Yes ☒ No
If yes, complete permit required or contact Health Sciences, Pittsburgh Office

XI. Special instructions, precautions: Potential exposures via skin contact and hand to mouth activities will be prevented through the use of PPE and appropriate decontamination and personal hygiene practices.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT FOR
IDW HANDLING ACTIVITIES
NAVAL AIR STATION PENSACOLA

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

SECTION I: General Job Scope

I. Work limited to the following (description, area, equipment used): IDW handling activities.

II. Required Monitoring Instrument(s): PID w/ 10.2 eV lamp or FID

III. Field Crew: _____

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

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

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

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

Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, safety shoes, surgical style gloves and safety glasses.

VI.

Chemicals of Concern	Action Level(s)	Response Measures
Site contaminants include VOC and SVOCs (from diesel fuel)	Any sustained reading >1 ppm above background in worker breathing zones.	Suspend site activities and report to an unaffected area.

VII. Additional Safety Equipment/Procedures

Hard-hat	☐ Yes	☒ No	Hearing Protection (Plugs/Muffs)	☐ Yes	☒ No
Safety Glasses	☒ Yes	☐ No	Safety belt/harness	☐ Yes	☒ No
Chemical/splash goggles	☐ Yes	☒ No	Radio	☐ Yes	☒ No
Splash Shield	☐ Yes	☒ No	Barricades	☐ Yes	☒ No
Splash suits/coveralls	☐ Yes	☒ No	Gloves (Type - Nitrile)	☒ Yes	☐ No
Steel toe Work shoes or boots	☒ Yes	☐ No	Work/rest regimen	☐ Yes	☒ No

Modifications/Exceptions: Tyvek coveralls if there is a potential for soiling work cloths and/or chemical-resistant coveralls (Saranex) if the potential for saturating work cloths exists. Hard hat and hearing protection if heavy equipment is decontaminated.

VIII. Procedure review with permit acceptors

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

IX. Site Preparation

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

X. Additional Permits required (Hot work, confined space entry, excavation etc.). ☐ Yes ☒ No
If yes, complete permit required or contact Health Sciences, Pittsburgh Office

XI. Special instructions, precautions: Potential exposures via skin contact and hand to mouth activities will be prevented through the use of PPE and appropriate decontamination and personal hygiene practices. Use proper lifting techniques particularly when handling heavy and awkward objects like drums. Appropriately label all IDW containers.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT FOR
MOBILIZATION AND DEMOBILIZATION ACTIVITES
NAVAL AIR STATION PENSACOLA

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

SECTION I: General Job Scope

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

II. Required Monitoring Instrument(s): None required.

III. Field Crew: _____

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

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

V. Protective equipment required

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

Respiratory equipment required

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

Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, safety shoes, and safety glasses.

VI.

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

VII. Additional Safety Equipment/Procedures

Hard-hat	☐ Yes	☒ No	Hearing Protection (Plugs/Muffs)	☐ Yes	☒ No
Safety Glasses	☒ Yes	☐ No	Safety belt/harness	☐ Yes	☒ No
Chemical/splash goggles	☐ Yes	☒ No	Radio	☐ Yes	☒ No
Splash Shield	☐ Yes	☒ No	Barricades	☐ Yes	☒ No
Splash suits/coveralls	☐ Yes	☒ No	Gloves (Type - Nitrile)	☐ Yes	☐ No
Steel toe Work shoes or boots	☒ Yes	☐ No	Work/rest regimen	☐ Yes	☒ No

Modifications/Exceptions: Safety glasses will be required if eye hazard are present. Reflective vests for high traffic areas. Tyvek coverall if there is a potential for soiling work cloths.

VIII.

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

IX. Site Preparation

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

X. Additional Permits required (Hot work, confined space entry, excavation etc.). ☐ Yes ☒ No
If yes, complete permit required or contact Health Sciences, Pittsburgh Office

XI. Special instructions, precautions: Obtain MSDS for chemicals brought on site and review them for any additional PPE requirements. Use safe lifting practices. Preview work locations for slip, trip, fall and other hazards that need to be communicated to field personnel.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT FOR
MULTI-MEDIA SAMPLING
NAVAL AIR STATION PENSACOLA

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

SECTION I: General Job Scope

I. Work limited to the following (description, area, equipment used): Groundwater sampling and associated activities

II. Required Monitoring Instrument(s): PID w/ 10.2 eV lamp or FID

III. Field Crew: _____

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

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

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

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

Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, safety shoes, and surgical style gloves. Coveralls and snake chaps will be worn near insect/snake areas

VI.

Chemicals of Concern	Action Level(s)	Response Measures
Site contaminants include VOC and SVOCs (from diesel fuel)	Any sustained reading >1 ppm above background in worker breathing zones.	Suspend site activities and report to an unaffected area.

VII. Additional Safety Equipment/Procedures

Hard-hat	☐ Yes	☒ No	Hearing Protection (Plugs/Muffs)	☐ Yes	☒ No
Safety Glasses	☐ Yes	☐ No	Safety belt/harness	☐ Yes	☒ No
Chemical/splash goggles	☐ Yes	☒ No	Radio	☐ Yes	☒ No
Splash Shield	☐ Yes	☒ No	Barricades	☐ Yes	☒ No
Splash suits/coveralls	☐ Yes	☒ No	Gloves (Type - Nitrile)	☒ Yes	☐ No
Steel toe Work shoes or boots	☒ Yes	☐ No	Work/rest regimen	☐ Yes	☒ No

Modifications/Exceptions: Safety glasses will be required if eye hazard are present. Reflective vests for high traffic areas. Tyvek coverall if there is a potential for soiling work cloths.

VIII.

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

IX.

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

X. Additional Permits required (Hot work, confined space entry, excavation etc.). ☐ Yes ☒ No
If yes, complete permit required or contact Health Sciences, Pittsburgh Office

XI. Special instructions, precautions: Based on available data, site contaminants are not anticipated to be present at detectable concentrations in worker breathing zones. Potential exposures via skin contact and hand to mouth activities will be prevent through the use of PPE and appropriate decontamination and personal hygiene practices. Avoid areas of known or suspected insect/animal nesting or habitat.

Permit Issued by: _____ Permit Accepted by: _____

Job Completed by: _____ Date: _____

SAFE WORK PERMIT FOR
ORC© INJECTION
NAVAL AIR STATION PENSACOLA

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

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

I. Work limited to the following (description, area, equipment used): ORC®Monitoring Well Injection – This process will employ a trash pump and tremie pipe to inject ORC® bioremediation product into selected monitoring wells. The material will be mixed in a suitable container withdrawn using the pump suction and discharged through the tremie pipe from the bottom of the well upward.

II. Names: _____

III. Onsite Inspection conducted ☒ Yes ☐ No Initials of Inspector _____ _____
TtNUS

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

IV. Protective equipment required

Level D ☒ Level B ☐
Level C ☐ Level A ☐

Respiratory equipment required

Full face APR	☐	Escape Pack	☐
Half face APR	☐	SCBA	☐
Escape Pack- SAR	☐	Bottle Trailer	☐
PAPR	☐	None	☒

Modifications/Exceptions: _____

V.

Chemicals of Concern	Action Level(s)	Response Measures
Nuisance Dusts	Visible dust cloud (>2 $\mu g/m^3$)	Employ dust suppression
		Area wetting

VI. Additional Safety Equipment/Procedures – Check appropriate box for ALL entries

Hardhat	☐ Yes	☒ No	Hearing Protection (Plugs or Muffs)	☒ Yes	☐ No
Safety Glasses	☒ Yes	☐ No	Safety belt/harness	☐ Yes	☒ No
Chemical/splash goggles	☒ Yes	☐ No	Radio	☐ Yes	☐ No
Splash Shield	☒ Yes	☐ No	Barricades	☐ Yes	☐ No
Splash suit/coveralls	☒ Yes	☐ No	Gloves (Type- Nitrile) Inner&outer	☒ Yes	☐ No
Steel toe Work-boots	☒ Yes	☐ No	Work/rest regimen	☐ Yes	☒ No

Modifications/Exceptions: Safety glasses and splash shield may be used in lieu of chemical splash goggles at the SSO's discretion. A rubber apron may be used in lieu of the splash suit to prevent soiling and saturation of work clothes. Hearing protection should be worn when working around the motorized pump. Use insect repellants. Work-boots should have aggressive lug to control slip, trip, and fall hazards when traversing or coming up and down steep terrain.

VII. Procedure review with permit acceptors

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

VIII. Site Preparation

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

X. Additional Permits required (Hot work, Confined Space Entry, Excavation etc.) ☐ Yes ☒ No
If yes, contact the Health Sciences Department, Pittsburgh Office (412/921-7090)

XI. Special instructions, precautions: The above selected PPE and safety control measures are intended to protect individuals from hazards associated with this task. Rope handrails shall be used for traversing, ascending, and descending hillside angles greater than 45° slope (Dike walls) as applicable.

Permit Issued by: _____ Permit Accepted by: _____

SAFE WORK PERMIT
SOIL BORING ACTIVITIES
NAS PENSACOLA, FLORIDA

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

SECTION I: General Job Scope

I. Work limited to the following (description, area, equipment used): Soil Boring using DPT

II. Required Monitoring Instrument(s): FID or PID with 10.2 eV (or higher) lamp

III. Field Crew: _____

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

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

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

Respiratory equipment required

Full face APR	☐	Escape Pack	☐
Half face APR	☐	SCBA	☐
Escape Pack- SAR	☐	Bottle Trailer	☐
PAPR	☐	None	☒

Modifications/Exceptions: None

VI. Chemicals of Concern	Action Level(s)	Response Measures
Site contaminants include VOC and SVOCs (from diesel fuel)	Any sustained reading >1 ppm above background in worker breathing zones.	Suspend site activities and report to an unaffected area.

VII. Additional Safety Equipment/Procedures

Hard-hat	☒ Yes	☐ No	Hearing Protection (Plugs/Muffs)	☐ Yes	☐ No
Safety Glasses	☒ Yes	☐ No	Safety belt/harness	☐ Yes	☒ No
Chemical/splash goggles	☐ Yes	☒ No	Radio	☐ Yes	☐ No
Splash Shield	☐ Yes	☒ No	Barricades	☐ Yes	☒ No
Splash suits/coveralls	☐ Yes	☐ No	Gloves (Type - Nitrile)	☒ Yes	☐ No
Steel toe Work shoes or boots	☒ Yes	☐ No	Work/rest regimen	☐ Yes	☒ No
Chemical Resistant Boot Covers	☒ Yes	☐ No	Impermeable apron	☒ Yes	☐ No

Modifications/Exceptions: Tyvek coverall if there is a potential for soiling work clothes and PVC or PE coated Tyvek if saturation or work clothes may occur.

VIII. Procedure review with permit acceptors

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

IX. Site Preparation

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

X. Additional Permits required (Hot work, confined space entry, excavation etc.). ☐ Yes ☐ No
If yes, complete permit required or contact Health Sciences, Pittsburgh Office

XI. Special instructions, precautions: Avoid potential nesting areas. The SSO shall preview work areas for signs of habitation, nesting, or foraging in remote areas where sampling is to be conducted. Wear light colored clothing so that ticks and other biting insects can be easily visible and can be removed. Inspect clothing and body for ticks upon exiting wooded areas and high brush. Minimize contact with potentially contaminated media. Suspend site activities in the event of inclement weather. Use proper lifting techniques as described on Table 5-1 for mobilization/demobilization.

Permit Issued by: _____ Permit _____
Accepted by: _____

ATTACHMENT VI

PermeOx© Plus

MATERIAL SAFETY DATA SHEET

MATERIAL SAFETY DATA SHEET

PermeOx® Plus

MSDS Ref. No: 1305-79-9-2
Version: US/Canada
Date Approved: 06/06/2002
Revision No: 8

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: PermeOx® Plus
SYNONYM(s): PermeOx-Solid Peroxygen, Calcium Superoxide, Calcium Peroxide
GENERAL USE: Permeox is a solid peroxygen chemical designed for environmental applications. The product provides controlled release of oxygen in-situ which permeates throughout the substrate.

MANUFACTURER

FMC Corporation
Active Oxidant Division
1735 Market Street
Philadelphia, PA 19103
General Information: (866) 860-4760

Emergency Telephone Numbers:

CHEMTREC (U.S.): (800) 424-9300
Emergency Phone (303) 595-9048
(Medical) Call Collect
Emergency Phone (716) 879-0400
(Plant/Other) Call Collect

2. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name	CAS#	Wt.%
Calcium Peroxide	1305-79-9	>75
Calcium Hydroxide	1305-62-0	<25

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

IMMEDIATE CONCERNS: Oxidizer. Contact with combustibles may cause fire. Under fire conditions product may decompose releasing oxygen that intensifies fire. Deluge container with water at safe distance or in protected area.

POTENTIAL HEALTH EFFECTS: Airborne dust may be irritating to eyes, nose, throat

and lungs. No significant long term inhalation hazard; irritation usually subsides after exposure ceases.

4. FIRST AID MEASURES

EYES: Immediately flush with water for at least 15 minutes, lifting the upper and lower eyelids intermittently. See a medical doctor or ophthalmologist immediately.

SKIN: Wash with plenty of soap and water. Get medical attention if irritation occurs and persists.

INGESTION: Rinse mouth with water. Dilute by giving 1 or 2 glasses of water. Do not induce vomiting. Never give anything by mouth to an unconscious person. See a medical doctor immediately.

INHALATION: Remove to fresh air. If breathing difficulty or discomfort occurs and persists, obtain medical attention.

NOTES TO MEDICAL DOCTOR: Modest irritation is the only expected effect, and should have no serious consequences except perhaps in the case of direct eye contact. Contaminated external surfaces should be flooded with water, and direct eye contact deserves ophthalmologic evaluation. If ingested, gastrointestinal irritation but not caustic burns are to be expected; dilution with water indicated as may be gastric evacuation via emesis or lavage if large doses or severe irritation is evident. Demulcents should be helpful. No systemic effects are expected though human toxicity data is sparse.

5. FIRE FIGHTING MEASURES

FLAMMABLE LIMITS: Non-combustible

EXTINGUISHING MEDIA: Deluge with plenty of water.

FIRE / EXPLOSION HAZARDS: Under fire conditions may decompose and release oxygen gas. Mixtures with polysulfide polymers may ignite.

FIRE FIGHTING PROCEDURES: Use flooding quantities of water. Use water spray to keep fire exposed containers cool.

AUTOIGNITION TEMPERATURE: Non-combustible

FLASH POINT: Not applicable

SENSITIVITY TO STATIC DISCHARGE: Not available

SENSITIVITY TO IMPACT: Oxidizable materials can be ignited by grinding and may become explosive.

HAZARDOUS DECOMPOSITION PRODUCTS: Oxygen that supports combustion and calcium hydroxide.

6. ACCIDENTAL RELEASE MEASURES

RELEASE NOTES: Confine spill and place into container; dilute with a large quantity of water for disposal. Do not return product to the original container. Runoff to sewer may create fire or explosion hazard (do not flush powdered material to sewer).

7. HANDLING AND STORAGE

HANDLING: Avoid contact by using personal protective equipment. Use respiratory protective equipment when release of airborne dust is expected. If compounded with organics or combustible materials be sure to exclude moisture.

STORAGE: Keep material dry. Store in a clean cool place. Do not store near or expose to heat sources i.e., steam pipes, radiant heaters, hot hair vents or welding sparks. Avoid contact with reducing agents. Reacts with moisture. Keep container tightly closed when not in use.

COMMENTS: VENTILATION:
Provide mechanical general and/or local exhaust ventilation to prevent release of dust into work environment. If ventilation is inadequate or not available, use dust respirator and eye protection.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMITS

Chemical Name	TWA (ACGIH)	STEL/Ceiling (ACGIH)	PEL (OSHA)	STEL/Ceiling (OSHA)
Calcium Hydroxide	5 mg/m³		5 mg/m3	

ENGINEERING CONTROLS: Provide mechanical local exhaust ventilation to prevent release of dust into the work area. If release is expected use respiratory protection.

PERSONAL PROTECTIVE EQUIPMENT

EYES AND FACE: Chemical goggles or face shield.

RESPIRATORY: Use approved dust respirator with full face piece.

PROTECTIVE CLOTHING: Rubber or neoprene gloves. Long sleeve shirt, impervious apron or clothing. Rubber or neoprene footwear.

---

9. PHYSICAL AND CHEMICAL PROPERTIES

ODOR: None

APPEARANCE: Off-white fine granular solid

pH: (1% solution) @ 25°C: Slurry 10.5 - 11.8

PERCENT VOLATILE: Not applicable

VAPOR PRESSURE: Not applicable

VAPOR DENSITY: (Air = 1): Not applicable

BOILING POINT: No data available

MELTING POINT: Decomposes on heating (About 275°C)

SOLUBILITY IN WATER: Slightly soluble

EVAPORATION RATE: (Butyl Acetate = 1): Not applicable

DENSITY: Not available

SPECIFIC GRAVITY: (H_2O=1): Approx. 2.92 bulk density 27 lbs/cu. ft.

COEFF. OIL/WATER: Not available

ODOR THRESHOLD: Not available

OXIDIZING PROPERTIES: Oxidizer

---

10. STABILITY AND REACTIVITY

CONDITIONS TO AVOID: Heat (decomposes at 275°C), moisture, reducing agents. Grinding with organics.

STABILITY: Stable (decomposition could occur when exposed to heat or moisture)

POLYMERIZATION: Will not occur

HAZARDOUS DECOMPOSITION PRODUCTS: Oxygen which supports combustion.

INCOMPATIBLE MATERIALS: Grinding mixtures with organics (oxidizable materials can be ignited by grinding and may become explosive); heavy metals.

---

11. TOXICOLOGICAL INFORMATION

EYE EFFECTS: Severely irritating to unwashed eyes. Minimally irritating to washed eyes. (rabbit) [Ref. FMC I88-1053]

SKIN EFFECTS: Non-irritating (rabbit) [Ref. FMC I88-1054]

DERMAL LD_{50}: >10 g/kg (rat) [Ref. FMC ICG/T-79.026]

ORAL LD_{50}: >5 g/kg (rat) [Ref. FMC I88-1052]

INHALATION LC_{50}: >17 mg/L (1 hr.) (rat) [Ref. FMC ICG/T-79.026]

TARGET ORGANS: Eyes and respiratory passages

ACUTE EFFECTS FROM OVEREXPOSURE: Dust is irritating to eyes, nose, throat, and lungs.

CHRONIC EFFECTS FROM OVEREXPOSURE: No data available for the product.

CARCINOGENICITY:

IARC: Not listed

NTP: Not listed

OSHA: Not listed

OTHER: ACGIH: Not listed

---

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION: Effect of low concentrations on aquatic life are unknown. [Ref. NIOSH RTECS No. 79-100]

CHEMICAL FATE INFORMATION: As indicated by chemical properties oxygen is released into the environment.

---

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD: Dissolve in water to allow the release of oxygen and dispose via a treatment system in accordance with governmental agencies regulations. Contact appropriate regulatory agency prior to disposal.

---

14. TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION (DOT)

PROPER SHIPPING NAME: Calcium Peroxide

PRIMARY HAZARD CLASS/DIVISION: 5.1 (Oxidizer)

UN/NA NUMBER: UN 1457

PACKING GROUP: II

PLACARDS: 5.1 (Oxidizer)

LABEL: 5.1 (Oxidizer)

OTHER SHIPPING INFORMATION:
DOT Marking: Calcium Peroxide, UN 1457
Hazardous Substance/RQ: Not applicable
49 STCC Number: 49187717

This material is shipped in 100 lb. fiber drums

SPECIAL SHIPPING NOTES: IMDG: Calcium Peroxide
IATA: Calcium Peroxide

Place spilled product in suitable container and wash residue with plenty of water.

---

15. REGULATORY INFORMATION

UNITED STATES

SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT)

SECTION 311 HAZARD CATEGORY (40 CFR 370): Fire Hazard, Immediate (Acute) Health Hazard

SECTION 312 THRESHOLD PLANNING QUANTITY (40 CFR 370): 10,000 lbs.

SECTION 313 REPORTABLE INGREDIENTS (40 CFR 372): Not listed

CERCLA (COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT)

CERCLA REGULATORY (40 CFR 302.4): Not applicable

TSCA (TOXIC SUBSTANCE CONTROL ACT)

TSCA STATUS (40 CFR 710): Listed

RCRA STATUS: Calcium Peroxide: Waste No. D001

CANADA

WHMIS (WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM):
Product Identification No.: 1457
Hazard Classification: Class D, Div 2, Subdiv. B, Class C (Oxidizer)
Ingredient Disclosure List: Listed (calcium hydroxide)

---

16. OTHER INFORMATION

REVISION SUMMARY

This MSDS replaces Revision #7, dated March 19, 2002. Changes in information are as follows:

Section 16 (Other Information): HMIS Headings

HMIS RATING

HEALTH:	2

NFPA RATING

HEALTH:	2

FLAMMABILITY	0
PHYSICAL HAZARD:	1
PERSONAL PROTECTION (PPE):	J

FLAMMABILITY	0
REACTIVITY:	1
SPECIAL:	OX

Key
4 = Severe
3 = Serious
2 = Moderate
1 = Slight
0 = Minimal

HMIS RATINGS NOTES:

Protection = J (Safety goggles, gloves, apron & combination dust & vapor respirator)

The contents and format of this MSDS are in accordance with OSHA Hazard Communication Standard and Canada's Workplace Hazardous Information System (WHMIS).

National Fire Protection Association (NFPA)

SPECIAL = OX (Oxidizer)

Hazardous Materials Identification System (HMIS)

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APPENDIX F

PermeOx® Plus SLURRY TABLES

Sample Calculations for PermeOx Plus Slurry Mixtures

Slurry Mixture	Lbs of POP	Lbs of Water	Weight of Water	Gals of Water per 30 lbs POP	Cubic feet of space needed to mix	Gallons of Water per lb POP
5%	30	570	8.34	68	10.25	2.28
10%	30	270	8.34	32	5.44	1.08
15%	30	170	8.34	20	3.84	0.68
20%	30	120	8.34	14	3.03	0.48
25%	30	90	8.34	11	2.55	0.36
30%	30	70	8.34	8	2.23	0.28
35%	30	56	8.34	7	2.00	0.22
40%	30	45	8.34	5	1.83	0.18
45%	30	37	8.34	4	1.70	0.15
50%	30	30	8.34	4	1.59	0.12
55%	30	25	8.34	3	1.50	0.10
60%	30	20	8.34	2	1.43	0.08

Conversion Factors

All items can be mixed in a 55-gallon drum

POP=		PermeOx Plus
POP Density =	27	pounds per cubic foot
Water =	7.48	gallons per cubic foot
Volume of 55-gal drum =	7.35	cubic feet
Volume of 85-gal drum =	11.36	cubic feet

Slurry Mixture	Lbs of POP	Lbs of Water	Weight of Water	Gals of Water per 40 lbs POP	Cubic feet of space needed to mix	Gallons of Water per lb POP
5%	40	760	8.34	91	13.66	2.28
10%	40	360	8.34	43	7.25	1.08
15%	40	227	8.34	27	5.11	0.68
20%	40	160	8.34	19	4.05	0.48
25%	40	120	8.34	14	3.41	0.36
30%	40	93	8.34	11	2.98	0.28
35%	40	74	8.34	9	2.67	0.22
40%	40	60	8.34	7	2.44	0.18
45%	40	49	8.34	6	2.27	0.15
50%	40	40	8.34	5	2.12	0.12
55%	40	33	8.34	4	2.01	0.10
60%	40	27	8.34	3	1.91	0.08

Conversion Factors

All items can be mixed in a 55-gallon drum

POP=		PermeOx Plus
POP Density =	27	pounds per cubic foot
Water =	7.48	gallons per cubic foot
Volume of 55-gal drum =	7.35	cubic feet
Volume of 85-gal drum =	11.36	cubic feet

APPENDIX G

FIELD FORMS

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name: UST Site 18 Treatability Study **Project No.:** N0844
Location: NAS Pensacola **Personnel:**
Weather Conditions: **Measuring Device:**
Tidally Influenced: Yes ___ No ___ **Remarks:**

Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments

* All measurements to the nearest 0.01 foot

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: UST Site 18
Project No.: N0844

[ ] Domestic Well Data
[X] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: PEN-18-
Sample Location: MW
Sampled By:
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: / Time:	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP mV	Other
Method: Low Flow Peristaltic								

PURGE DATA

Date:	Time	pH	S.C.	Turbidity	DO	Temp (°C)	ORP	
Method: Low Flow Peristaltic								
Monitor Reading (ppm):								
Well Casing Diameter:								
Well Casing Material:								
Total Well Depth (TD):								
Static Water Level (WL):								
One Casing Volume(gal/L):								
Start Purge (hrs):								
End Purge (hrs):								
Total Purge Time (min):								
Total Vol. Purged (gal/L):								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
PAH	None	2 - 1 litre amber bottle	
VOCs	HCl	3 - 40 mL vials	
TRPH	H2SO4	2 - 1 litre amber bottle	
TOC	H2SO4	1 - 250 mL HDPE bottle	
Sulfate	None	1 - 250 mL HDPE bottle	

OBSERVATIONS / NOTES

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: UST Site 18
PROJECT NUMBER: N0844

WELL ID.: PEN-18-
DATE: _____

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Volume (L)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments

SIGNATURE(S): _____

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: UST Site 18

Project No.: N0844

Sampled By:

Field Analyst:

Field Form Checked as per QA/QC Checklist (initials):

Sample ID No.:

Sample Location:

Duplicate: ☐

Blank: ☐

SAMPLING DATA:

Date: / Time:	Color Visual	pH Standard	S.C. mS/cm	Turbidity NTU	DO mg/l	Temp. °C	ORP mV	
Method: Peristaltic								

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Ferrous Iron:

Equipment: HACH IR-18C Test Kit

Analysis Time: _____

Concentration: _____ mg/L

Notes:

Hydrogen Sulfide (H_2S):

Equipment: HS-C

Analysis Time: _____

Concentration: _____ mg/L

Notes:

Alkalinity:

Analysis Time: _____

Equipment:

CHEMetrics (Range: _____mg/L)

Filtered: ☐

CHEMetrics: _____mg/L

Notes:

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT

CHEMetrics (Range: _____mg/L)

Analysis Time: _____

CHEMetrics: _____mg/L

Notes:

Dissolved Oxygen:

Equipment:

CHEMetrics Range ☐ 0 - 1.0 mg/L ☐ 1 - 12 mg/L

Analysis Time: _____

CHEMetrics: _____mg/L

QA/QC Checklist:

All data fields have been completed as necessary: ☐

Correct measurement units are cited in the SAMPLING DATA block: ☐

Mulitplication is correct for each *Multiplier* table: ☐

Final calulated concentration is within the appropriate *Range Used* block: ☐

Alkalinity *Relationship* is determined appropriatly as per manufacturer instructions: ☐

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐

Nitrite Interference treatment used for Nitrate test if Nitrite was detected: ☐

Title block is initialized by person who performed the QA/QC Checklist: ☐

Tetra Tech NUS, Inc.

PROJECT:	UST Site 18 Treatability Study	**LOCATION:**	NAS Pensacola
JOB & CTO #:	N0844, CTO 313	**DEPART:**	
TOM:		**RETURN:**	

SAMPLING FIELD CHECKLIST

EQUIPMENT

- ___ Well Key/ Gate Key
- ___ Submersible Pump
- ___ Peristaltic Pump
- ___ Horiba
- ___ Umbrella
- ___ Chair
- ___ Measuring cup
- ___ Clips
- ___ Well Tool (9/16)
- ___ Drum Wrench (15/16)
- ___ Buckets/lids
- ___ Water Level Indicator
- ___ Hach Kit Tests for NA
- ___ Box cutter knife
- ___ Machete
- ___ Batteries
- ___ Charger
- ___ Car Adaptor for batteries
- ___ Scrub Brush
- ___ OVA/FID
- ___ Bungee cords
- ___ Drum/Pallets
- ___ Cell Phone/charger
- ___ Secondary Spill pans
- ___ Sampling Filters

DOCS

- ___ Work Plan
- ___ HASP Addendum
- ___ EISOPQAM
- ___ COMPQAP

EXPENDABLES

- ___ Silicone Tubing
- ___ Teflon Tubing
- ___ DI Cube
- ___ DI Sprayer
- ___ Paper Towels
- ___ Gloves
- ___ Trash Bags
- ___ Liquinox
- ___ Bottleware (extra VOA vials)
- ___ Isopropyl
- ___ Ziplock Bags
- ___ Tape/dispenser
- ___ Bubblewrap
- ___ Ice
- ___ Sharpie Pens
- ___ Drinks
- ___ Small cups (if water in wells)
- ___

FORMS

- ___ Labels
- ___ COC's
- ___ Low Flow Purge Sheet
- ___ Development sheet
- ___ Field Book
- ___ Drum Labels
- ___ Custody seals
- ___ Fed Ex Air bill
- ___ Field Calibration Sheet
- ___ Groundwater Sample sheet
- ___ Site Map

EQUIPMENT CALIBRATION LOG

INSTRUMENT NAME/MODEL : _____ PROJECT NAME : UST Site 18

MANUFACTURER : _____ PROJECT NUMBER : N0844

CALIBRATION DATE	INSTRUMENT/ SERIAL #	INITIAL SETTINGS	STANDARDS USED	PROCEDURE	ADJUSTMENTS MADE	FINAL SETTINGS	SIGNATURE	COMMENTS

APPENDIX H

TtNUS SOP SA-6.3

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1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to identify and designate the field data record forms, logs and reports generally initiated and maintained for documenting Tetra Tech NUS field activities.

2.0 SCOPE

Documents presented within this procedure (or equivalents) shall be used for all Tetra Tech NUS field activities, as applicable. Other or additional documents may be required by specific client contracts or project planning documents.

3.0 GLOSSARY

None

4.0 RESPONSIBILITIES

Project Manager (PM) - The Project Manager is responsible for obtaining hardbound, controlled-distribution logbooks (from the appropriate source), as needed. In addition, the Project Manager is responsible for placing all field documentation used in site activities (i.e., records, field reports, sample data sheets, field notebooks, and the site logbook) in the project's central file upon the completion of field work.

Field Operations Leader (FOL) - The Field Operations Leader is responsible for ensuring that the site logbook, notebooks, and all appropriate and current forms and field reports illustrated in this guideline (and any additional forms required by the contract) are correctly used, accurately filled out, and completed in the required time-frame.

5.0 PROCEDURES

5.1 Site Logbook

5.1.1 General

The site logbook is a hard-bound, paginated, controlled-distribution record book in which all major onsite activities are documented. At a minimum, the following activities/events shall be recorded or referenced (daily) in the site logbook:

- All field personnel present
- Arrival/departure of site visitors
- Arrival/departure of equipment
- Start and/or completion of borehole, trench, monitoring well installation, etc.
- Daily onsite activities performed each day
- Sample pickup information
- Health and Safety issues (level of protection observed, etc.)
- Weather conditions

A site logbook shall be maintained for each project. The site logbook shall be initiated at the start of the first onsite activity (e.g., site visit or initial reconnaissance survey). Entries are to be made for every day that onsite activities take place which involve Tetra Tech NUS or subcontractor personnel. Upon completion of the fieldwork, the site logbook must become part of the project's central file.

The following information must be recorded on the cover of each site logbook:

- Project name
- Tetra Tech NUS project number
- Sequential book number
- Start date
- End date

Information recorded daily in the site logbook need not be duplicated in other field notebooks (see Section 5.2), but must summarize the contents of these other notebooks and refer to specific page locations in these notebooks for detailed information (where applicable). An example of a typical site logbook entry is shown in Attachment A.

If measurements are made at any location, the measurements and equipment used must either be recorded in the site logbook or reference must be made to the field notebook in which the measurements are recorded (see Attachment A).

All logbook, notebook, and log sheet entries shall be made in indelible ink (black pen is preferred). No erasures are permitted. If an incorrect entry is made, the data shall be crossed out with a single strike mark, and initialed and dated. At the completion of entries by any individual, the logbook pages used must be signed and dated. The site logbook must also be signed by the Field Operations Leader at the end of each day.

5.1.2 Photographs

When movies, slides, or photographs are taken of a site or any monitoring location, they must be numbered sequentially to correspond to logbook/notebook entries. The name of the photographer, date, time, site location, site description, and weather conditions must be entered in the logbook/notebook as the photographs are taken. A series entry may be used for rapid-sequence photographs. The photographer is not required to record the aperture settings and shutter speeds for photographs taken within the normal automatic exposure range. However, special lenses, films, filters, and other image-enhancement techniques must be noted in the logbook/notebook. If possible, such techniques shall be avoided, since they can adversely affect the accuracy of photographs. Chain-of-custody procedures depend upon the subject matter, type of film, and the processing it requires. Film used for aerial photography, confidential information, or criminal investigation require chain-of-custody procedures. Once processed, the slides of photographic prints shall be consecutively numbered and labeled according to the logbook/notebook descriptions. The site photographs and associated negatives must be docketed into the project's central file.

5.2 Field Notebooks

Key field team personnel may maintain a separate dedicated field notebook to document the pertinent field activities conducted directly under their supervision. For example, on large projects with multiple investigative sites and varying operating conditions, the Health and Safety Officer may elect to maintain a separate field notebook. Where several drill rigs are in operation simultaneously, each site geologist assigned to oversee a rig must maintain a field notebook.

5.3 Sample Forms

A summary of the forms illustrated in this procedure is shown as the listing of Attachments in the Table of Contents for this SOP. Forms may be altered or revised for project-specific needs contingent upon client

approval. Care must be taken to ensure that all essential information can be documented. Guidelines for completing these forms can be found in the related sampling SOP.

5.3.1 Sample Collection, Labeling, Shipment, Request for Analysis, and Field Test Results

5.3.1.1 Sample Log Sheet

Sample Log Sheets are used to record specified types of data while sampling. Attachments B-1 to B-4 are examples of Sample Log Sheets. The data recorded on these sheets are useful in describing the waste source and sample as well as pointing out any problems, difficulties, or irregularities encountered during sampling. A log sheet must be completed for each sample obtained, including field quality control (QC) samples.

5.3.1.2 Sample Label

A typical sample label is illustrated in Attachment B-5. Adhesive labels must be completed and applied to every sample container. Sample labels can usually be obtained from the appropriate Program source electronically generated in-house, or are supplied from the laboratory subcontractor.

5.3.1.3 Chain-of-Custody Record Form

The Chain-of-Custody (COC) Record is a multi-part form that is initiated as samples are acquired and accompanies a sample (or group of samples) as they are transferred from person to person. This form must be used for any samples collected for chemical or geotechnical analysis whether the analyses are performed on site or off site. One carbonless copy of the completed COC form is retained by the field crew, one copy is sent to the Project Manager, while the original is sent to the laboratory. The original (top, signed copy) of the COC form shall be placed inside a large Ziploc-type bag and taped inside the lid of the shipping cooler. If multiple coolers are sent but are included on one COC form, the COC form should be sent with the first cooler. The COC form should then state how many coolers are included with that shipment. An example of a Chain-of-Custody Record form is provided as Attachment B-6. Once the samples are received at the laboratory, the sample cooler and contents are checked and any problems are noted on the enclosed COC form (any discrepancies between the sample labels and COC form and any other problems that are noted are resolved through communication between the laboratory point-of-contact and the Tetra Tech NUS Project Manager). The COC form is signed and copied. The laboratory will retain the copy while the original becomes part of the samples' corresponding analytical data package.

5.3.1.4 Chain-of-Custody Seal

Attachment B-7 is an example of a custody seal. The Custody seal is an adhesive-backed label. It is part of a chain-of-custody process and is used to prevent tampering with samples after they have been collected in the field and sealed in coolers for transport to the laboratory. The COC seals are signed and dated by the samplers and affixed across the opening edges of each cooler containing environmental samples. COC seals may be available from the laboratory; these seals may also be purchased from a supplier.

5.3.1.5 Field Analytical Log Sheets for Geochemical Parameters

Field Analytical Log Sheets (Attachment B-8) are used to record geochemical and/or natural attenuation field test results. Attachments B-8 (3-page form) should be used when applicable.

5.3.2 Hydrogeological and Geotechnical Forms

5.3.2.1 Groundwater Level Measurement Sheet

A groundwater level measurement sheet, shown in Attachment C-1 must be filled out for each round of water level measurements made at a site.

5.3.2.2 Data Sheet for Pumping Test

During the performance of a pumping test (or an in-situ hydraulic conductivity test), a large amount of data must be recorded, often within a short time period. The pumping test data sheet (Attachment C-2) facilitates this task by standardizing the data collection format, and allowing the time interval for collection to be laid out in advance.

5.3.2.3 Packer Test Report Form

A packer test report form shown in Attachment C-3 must be completed for each well upon which a packer test is conducted.

5.3.2.4 Summary Log of Boring

During the progress of each boring, a log of the materials encountered, operation and driving of casing, and location of samples must be kept. The Summary Log of Boring, or Boring Log, (Attachment C-4) is used for this purpose and must be completed for each soil boring performed. In addition, if volatile organics are monitored on cores, samples, cuttings from the borehole, or breathing zone, (using a PID or FID), these results must be entered on the boring log at the appropriate depth. The "Remarks" column can be used to subsequently enter the laboratory sample number, the concentration of key analytical results, or other pertinent information. This feature allows direct comparison of contaminant concentrations with soil characteristics.

5.3.2.5 Monitoring Well Construction Details Form

A Monitoring Well Construction Details Form must be completed for every monitoring well, piezometer, or temporary well point installed. This form contains specific information on length and type of well riser pipe and screen, backfill, filter pack, annular seal and grout characteristics, and surface seal characteristics. This information is important in evaluating the performance of the monitoring well, particularly in areas where water levels show temporal variation, or where there are multiple (immiscible) phases of contaminants. Depending on the type of monitoring well (in overburden or bedrock), different forms are used (see Attachments C-5 through C-9). Similar forms are used for flush-mount well completions.

5.3.2.6 Test Pit Log

When a test pit or trench is constructed for investigative or sampling purposes, a Test Pit Log (Attachment C-10) must be filled out by the responsible field geologist or sampling technician.

5.3.2.7 Miscellaneous Monitoring Well Forms

Monitoring Well Materials Certificate of Conformance (Attachment C-11) should be used as the project directs to document all materials utilized during each monitoring well installation.

The Monitoring Well Development Record (Attachment C-12) should be used as the project directs to document all well development activities.

5.3.3 Equipment Calibration and Maintenance Form

The calibration or standardization of monitoring, measuring or test equipment is necessary to assure the proper operation and response of the equipment, to document the accuracy, precision or sensitivity of the measurement, and determine if correction should be applied to the readings. Some items of equipment require frequent calibration, others infrequent. Some are calibrated by the manufacturer, others by the user.

Each instrument requiring calibration has its own Equipment Calibration Log (Attachment D) which documents that the manufacturer's instructions were followed for calibration of the equipment, including frequency and type of standard or calibration device. An Equipment Calibration Log must be maintained for each electronic measuring device used in the field; entries must be made for each day the equipment is used.

5.4 Field Reports

The primary means of recording onsite activities is the site logbook. Other field notebooks may also be maintained. These logbooks and notebooks (and supporting forms) contain detailed information required for data interpretation or documentation, but are not easily useful for tracking and reporting of progress. Furthermore, the field logbook/notebooks remain onsite for extended periods of time and are thus not accessible for timely review by project management.

5.4.1 Daily Activities Report

To provide timely oversight of onsite contractors, Daily Activities Reports are completed and submitted as described below.

5.4.1.1 Description

The Daily Activities Report (DAR) documents the activities and progress for each day's field work. This report must be filled out on a daily basis whenever there are drilling, test pitting, well construction, or other related activities occurring which involve subcontractor personnel. These sheets summarize the work performed and form the basis of payment to subcontractors (Attachment E is an example of a Daily Activities Report).

5.4.1.2 Responsibilities

It is the responsibility of the rig geologist to complete the DAR and obtain the driller's signature acknowledging that the times and quantities of material entered are correct.

5.4.1.3 Submittal and Approval

At the end of the shift, the rig geologist must submit the Daily Activities Report to the Field Operations Leader (FOL) for review and filing. The Daily Activities Report is not a formal report and thus requires no further approval. The DAR reports are retained by the FOL for use in preparing the site logbook and in preparing weekly status reports for submission to the Project Manager.

5.4.2 Weekly Status Reports

To facilitate timely review by project management, photocopies of logbook/notebook entries may be made for internal use.

It should be noted that in addition to the summaries described herein, other summary reports may also be contractually required. Attachment F is an example of a Field Trip Summary Report form.

6.0 ATTACHMENTS

Attachment A	TYPICAL SITE LOGBOOK ENTRY
Attachment B-1	EXAMPLE GROUNDWATER SAMPLE LOG SHEET
Attachment B-2	EXAMPLE SURFACE WATER SAMPLE LOG SHEET
Attachment B-3	EXAMPLE SOIL/SEDIMENT SAMPLE LOG SHEET
Attachment B-4	CONTAINER SAMPLE LOG SHEET FORM
Attachment B-5	SAMPLE LABEL
Attachment B-6	CHAIN-OF-CUSTODY RECORD FORM
Attachment B-7	CHAIN-OF-CUSTODY SEAL
Attachment B-8	FIELD ANALYTICAL LOG SHEET
Attachment C-1	EXAMPLE GROUNDWATER LEVEL MEASUREMENT SHEET
Attachment C-2	EXAMPLE PUMPING TEST DATA SHEET
Attachment C-3	PACKER TEST REPORT FORM
Attachment C-4	EXAMPLE BORING LOG
Attachment C-5	EXAMPLE OVERBURDEN MONITORING WELL SHEET
Attachment C-5A	EXAMPLE OVERBURDEN MONITORING WELL SHEET (FLUSHMOUNT)
Attachment C-6	EXAMPLE CONFINING LAYER MONITORING WELL SHEET
Attachment C-7	EXAMPLE BEDROCK MONITORING WELL SHEET - OPEN HOLE WELL
Attachment C-8	EXAMPLE BEDROCK MONITORING WELL SHEET - WELL INSTALLED IN BEDROCK
Attachment C-9	EXAMPLE BEDROCK MONITORING WELL SHEET - WELL INSTALLED IN BEDROCK (FLUSHMOUNT)
Attachment C-10	EXAMPLE TEST PIT LOG
Attachment C-11	MONITORING WELL MATERIALS CERTIFICATE OF CONFORMANCE
Attachment C-12	MONITORING WELL DEVELOPMENT RECORD
Attachment D	EXAMPLE EQUIPMENT CALIBRATION LOG
Attachment E	EXAMPLE DAILY ACTIVITIES RECORD
Attachment F	FIELD TRIP SUMMARY REPORT

ATTACHMENT A
TYPICAL SITE LOGBOOK ENTRY

START TIME: _____ DATE: _____

SITE LEADER: _____

PERSONNEL:

TtNUS	DRILLER	SITE VISITORS
_____	_____	_____
_____	_____	_____
_____	_____	_____

WEATHER: Clear, 68°F, 2-5 mph wind from SE

ACTIVITIES:

1. Steam jenney and fire hoses were set up.
2. Drilling activities at well ____ resumes. Rig geologist was _____. See Geologist's Notebook, No. 1, page 29-30, for details of drilling activity. Sample No. 123-21-S4 collected; see sample logbook, page 42. Drilling activities completed at 11:50 and a 4-inch stainless steel well installed. See Geologist's Notebook, No. 1, page 31, and well construction details for well _____.
3. Drilling rig No. 2 steam-cleaned at decontamination pit. Then set up at location of well _____.
4. Well _____ drilled. Rig geologist was _____. See Geologist's Notebook, No. 2, page ____ for details of drilling activities. Sample numbers 123-22-S1, 123-22-S2, and 123-22-S3 collected; see sample logbook, pages 43, 44, and 45.
5. Well _____ was developed. Seven 55-gallon drums were filled in the flushing stage. The well was then pumped using the pitcher pump for 1 hour. At the end of the hour, water pumped from well was "sand free."
6. EPA remedial project manger arrives on site at 14:25 hours.
7. Large dump truck arrives at 14:45 and is steam-cleaned. Backhoe and dump truck set up over test pit _____.
8. Test pit _____ dug with cuttings placed in dump truck. Rig geologist was _____. See Geologist's Notebook, No. 1, page 32, for details of test pit activities. Test pit subsequently filled. No samples taken for chemical analysis. Due to shallow groundwater table, filling in of test pit ___ resulted in a very soft and wet area. A mound was developed and the area roped off.
9. Express carrier picked up samples (see Sample Logbook, pages 42 through 45) at 17:50 hours. Site activities terminated at 18:22 hours. All personnel off site, gate locked.

_____

Field Operations Leader

ATTACHMENT B-1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: _____
Project No.: _____

[] Domestic Well Data
[] Monitoring Well Data
[] Other Well Type: _____
[] QA Sample Type: _____

Sample ID No.: _____
Sample Location: _____
Sampled By: _____
C.O.C. No.: _____
Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

Date:	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time:	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	
Method:								

PURGE DATA:

Date:	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method:								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type:								
Total Well Depth (TD):								
Static Water Level (WL):								
One Casing Volume(gal/L):								
Start Purge (hrs):								
End Purge (hrs):								
Total Purge Time (min):								
Total Vol. Purged (gal/L):								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:	Signature(s):

ATTACHMENT B-2

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: _____
Project No.: _____

[] Stream
[] Spring
[] Pond
[] Lake
[] Other: _____
[] QA Sample Type: _____

Sample ID No.: _____
Sample Location: _____
Sampled By: _____
C.O.C. No.: _____

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date:								
Time:								
Depth:								
Method:								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

ATTACHMENT B-3

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: _____
Project No.: _____

[] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other: _____
[] QA Sample Type: _____

Sample ID No.: _____
Sample Location: _____
Sampled By: _____
C.O.C. No.: _____

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date:	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

ATTACHMENT B-4

Tetra Tech NUS, Inc.

CONTAINER SAMPLE & INSPECTION SHEET

Page____ of ____

Project Site Name: _____
Project Number: _____
Site Identification: _____
Container Number(s): _____
Sample Type: 0 Grab
0 Composite

Sample ID No. _____
Sampled By: _____
C.O.C. No. _____
Concentration: 0 High
0 Medium
0 Low

CONTAINER SOURCE	CONTAINER DESCRIPTION
DRUM: 0 Bung Top 0 Lever Lock 0 Bolted Ring 0 Other _____	**COLOR:** _____ **CONDITION:** _____
TANK: 0 Plastic 0 Metal 0 Other _____	**MARKINGS:** _____ **VOL. OF CONTENTS:** _____
OTHER: _____	**OTHER:** _____

CONTAINER DISPOSITION	CONTENTS DESCRIPTION
SAMPLED: _____ **OPENED BUT NOT SAMPLED:** Reason _____ **NOT OPENED:** Reason _____	**SINGLE PHASED:** _____ **MULTIPHASE :** Layer 1 / Layer 2 / Layer 3 Phase (Sol. or Liq.) _____ _____ _____ Color _____ _____ _____ Viscosity L, M or H L, M or H L, M orH % of Total Volume _____ _____ _____
MONITOR READING:	**SAMPLE and /or INSPECTION DATE & TIME:** _____HRS. **METHOD:**_____
SAMPLER(S) and / or INSPECTOR(S) SIGNATURE:	**ANALYSIS:**

ATTACHMENT B-5

Tetra Tech NUS, Inc. 661 Andersen Drive Pittsburgh, 15220 (412)921-7090	**Project:** **Site:** **Location:**		
Sample No:			**Matrix:**
Date:	**Time:**	**Preserve:**	
Analysis:			
Sampled by:	**Laboratory:**		

ATTACHMENT B-6

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER | PAGE ____ OF _____

PROJECT NO:	SITE NAME:	PROJECT MANAGER AND PHONE NUMBER	LABORATORY NAME AND CONTACT:
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER AND PHONE NUMBER	ADDRESS
		CARRIER/WAYBILL NUMBER	CITY, STATE

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G)
PRESERVATIVE USED
TYPE OF ANALYSIS

DATE YEAR	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS									COMMENTS

1. RELINQUISHED BY	DATE	TIME	1. RECEIVED BY	DATE	TIME
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

3/99
FORM NO. TtNUS-001

ATTACHMENT B-7

CHAIN-OF-CUSTODY SEAL

CUSTODY SEAL	**CUSTODY SEAL**
Date	**Date**
Signature	**Signature**

ATTACHMENT B-8

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Page __ of __

Project Site Name: _____ Sample ID No.: _____

Project No.: _____ Sample Location: _____

Sampled By: _____ Duplicate: ☐

Field Analyst: _____ Blank: ☐

Field Form Checked as per QA/QC Checklist (initials): _____

SAMPLING DATA:

Date:	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time:	(Visual)	(S.U.)	(mS/cm)	(°C)	(NTU)	(mg/l)	(%)	
Method:								

SAMPLE COLLECTION/ANALYSIS INFORMATION:

ORP (Eh) (+/- mv):_____ Electrode Make & Model:_____

Reference Electrode (circle one): Silver-Silver Chloride / Calomel / Hydrogen

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT CHEMetrics (Range: _____mg/L) Analysis Time: _____

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier		Concentration
_____	x 0.01	=	mg/L
_____	x 0.02	=	mg/L

CHEMetrics: _____mg/L

Notes:

Alkalinity: Analysis Time: _____

Equipment: HACH Digital Titrator AL-DT CHEMetrics (Range: _____mg/L) Filtered: ☐

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier		Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	_____ & _____	x 0.1	=	mg/L
☐	40-160 mg/L	25 ml	0.1600 N	0.4	_____ & _____	x 0.4	=	mg/L
☐	100-400 mg/L	100 ml	1.600 N	1.0	_____ & _____	x 1.0	=	mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	_____ & _____	x 2.0	=	mg/L
☐	500-2000 mg/L	20 ml	1.600 N	5.0	_____ & _____	x 5.0	=	mg/L
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	_____ & _____	x 10.0	=	mg/L

Parameter:	Hydroxide	Carbonate	Bicarbonate
Relationship:			

CHEMetrics: _____mg/L

Notes:

Standard Additions: ☐ Titrant Molarity:_____ Digits Required: 1st.:_____ 2nd.:_____ 3rd.:_____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT CHEMetrics (Range: _____mg/L) Analysis Time: _____

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	10-50 mg/L	200 ml	0.3636 N	0.1
☐	20-100 mg/L	100 ml	0.3636 N	0.2
☐	100-400 mg/L	200 ml	3.636 N	1.0
☐	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count			Concentration
_____	x 0.1	=	mg/L
_____	x 0.2	=	mg/L
_____	x 1.0	=	mg/L
_____	x 2.0	=	mg/L

CHEMetrics: _____mg/L

Notes:

Standard Additions: ☐ Titrant Molarity:_____ Digits Required: 1st.:_____ 2nd.:_____ 3rd.:_____

ATTACHMENT B-8 (Continued)

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Page __ of __

Project Site Name: _____ Sample ID No.: _____

Project No.: _____ Sample Location: _____

Sampled By: _____ Duplicate: ☐

Field Analyst: _____ Blank: ☐

Field Form Checked as per QA/QC Checklist (initials): ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Sulfide (S^{2-}):

Equipment: DR-700 DR-8 __ HS-WR Color Wheel Other: _____ Analysis Time: _____

Program/Module: 610nm 93

Concentration: _____ mg/L Filtered: ☐

Notes:

Sulfate (SO_4^{2-}):

Equipment: DR-700 DR-8 __ Other: _____ Analysis Time: _____

Program/Module: 91

Concentration: _____ mg/L Filtered: ☐

Standard Solution: ☐ Results: _____

Standard Additions: ☐ Digits Required: 0.1ml:_____ 0.2ml:_____ 0.3ml:_____

Notes:

Nitrite (NO_2^--N): Analysis Time: _____

Equipment: DR-700 DR-8 __ Other: _____ Filtered: ☐

Program/Module: 60

Concentration: _____ mg/L Reagent Blank Correction: ☐

Standard Solution: ☐ Results: ☐

Notes:

Nitrate (NO_3^--N): Analysis Time: _____

Equipment: DR-700 DR-8 __ Other: _____ Filtered: ☐

Program/Module: 55

Concentration: _____ mg/L

Nitrite Interference Treatment: ☐

Standard Solution: ☐ Results: _____ Reagent Blank Correction: ☐

Standard Additions: ☐ Digits Required: 0.1ml:_____ 0.2ml:_____ 0.3ml:_____

Notes:

ATTACHMENT B-8 (Continued)

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Page __ of __

Project Site Name: _____ Sample ID No.: _____

Project No.: _____ Sample Location: _____

Sampled By: _____ Duplicate: ☐

Field Analyst: _____ Blank: ☐

Field Form Checked as per QA/QC Checklist (initials): ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Manganese (Mn^{2+}):

Equipment: DR-700 DR-8 _ _ HACH MN-5 Other: _____ Analysis Time: _____

Program/Module: 525nm 41

Concentration: _____ mg/L Filtered: ☐

Digestion: ☐

Standard Solution: ☐ Results: _____ Reagent Blank Correction: ☐

Standard Additions: ☐ Digits Required: 0.1ml:_____ 0.2ml:_____ 0.3ml:_____

Notes: _____

Ferrous Iron (Fe^{2+}):

Equipment: DR-700 DR-8 _ _ IR-18C Color Wheel Other: _____ Analysis Time: _____

Program/Module: 500nm 33

Concentration: _____ mg/L Filtered: ☐

Notes: _____

Hydrogen Sulfide (H_2S):

Equipment: HS-C Other: _____ Analysis Time: _____

Concentration: _____ mg/L Exceeded 5.0 mg/L range on color chart: ☐

Notes: _____

QA/QC Checklist:

All data fields have been completed as necessary: ☐

Correct measurement units are cited in the SAMPLING DATA block: ☐

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☐

Mulitplication is correct for each *Multiplier* table: ☐

Final calulated concentration is within the appropriate *Range Used* block: ☐

Alkalinity *Relationship* is determined appropriatly as per manufacturer (HACH) instructions: ☐

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐

Nitrite Interference treatment was used for Nitrate test if Nitrite was detected: ☐

Title block on each page of form is initialized by person who performed this QA/QC Checklist: ☐

ATTACHMENT C-1
EXAMPLE GROUNDWATER LEVEL MEASUREMENT SHEET

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name: _____ **Project No.:** _____
Location: _____ **Personnel:** _____
Weather Conditions: _____ **Measuring Device:** _____
Tidally Influenced: Yes ___ No ___ **Remarks:** _____

Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments

* All measurements to the nearest 0.01 foot

Page ___ of ___

ATTACHMENT C-2
EXAMPLE PUMPING TEST DATA SHEET

Tetra Tech NUS, Inc.

PUMPING TEST DATA SHEET

PROJECT NAME: _____ PUMPING WELL NUMBER: _____
PROJECT NUMBER: _____ MEASURED WELL NUMBER: _____

[ ] PUMPING TEST [ ] STEP DRAW DOWN TEST

DATE(s): MONITORING POINT:
MEASUREMENT METHOD: DEPTH CORRECTION (ft):
TEST NUMBER: PUMP SETTING (Ft. below monitoring point):
STATIC WATER LEVEL (ft): DISTANCE FROM PUMPING WELL (ft):
PERSONNEL:
REMARKS:

MILITARY TIME	ELAPSED TIME SINCE PUMP START OR STOP (Min.)	WATER LEVEL (Ft.)	CORRECTION (Ft.)	DRAW DOWN OR RECOVERY (Ft.)	PUMPING RATE (GPM)	FLOW METER READING (Gals.)	REMARKS

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted.

ATTACHMENT C-3

ATTACHMENT C-3

PACKER TEST REPORT FORM

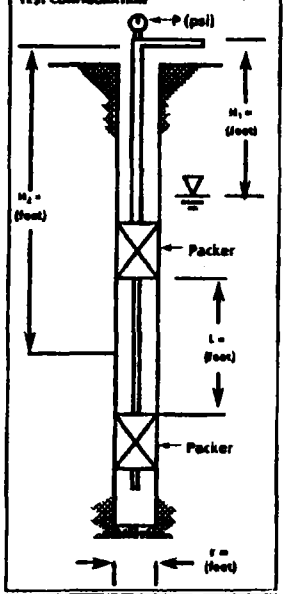
PROJECT: _____ PROJECT NO.: _____ TEST NO: _____ PAGE ____ OF ____

BORING NO.: _____ CASING DEPTH: _____ CONTRACTOR: _____ STATIC WATER LEVEL _____

TEST INTERVAL: _____ BY: _____ CHECKED: _____ PACKER PRESSURE _____

Flow Test					Calculated Results							
Pressure, p (psi)	Elapsed Time (min)	Flow Reading	Δ Flow, ΔQ (ft³)	Δ Flow, ΔQ (gal)	Flow Rate Q (gal/min)	H_1* (ft)	Hp(ft) = 2.31·(psi)	H_2* (ft)	H = Hp + (H1 or H2)	Cp	K (ft/yr) = Cp·Q/H	K (cm/sec) = 9.67 x 10⁻⁷ K (ft/yr)

TEST CONFIGURATION



Length of Test Section in feet, L	Cp (Casing Dia. Size)			
	2" (1.5")	3" (2.375")	4" (3.5")	6" (5")
1	31,000	30,100	29,000	28,700
2	19,400	18,100	16,800	15,900
5	9,800	9,300	8,800	8,300
8	6,800	6,500	6,100	5,800
10	5,700	5,400	5,400	4,900
15	4,100	3,900	3,700	3,600
20	3,200	3,100	3,000	2,800

CP = (1/(2 π L)) ln(L/r) (70,315 S)
7.48 Gallons = 1 Ft³
1 psi = 2.31 ft head

* H_1 is used when the test length is below the water table.
H_2 is used when the test length is above the water table.

Remarks: _____

ATTACHMENT C-4

Tetra Tech NUS, Inc.

BORING LOG

Page ___ of ___

PROJECT NAME: _____ BORING No.: _____
PROJECT NUMBER: _____ DATE: _____
DRILLING COMPANY: _____ GEOLOGIST: _____
DRILLING RIG: _____ DRILLER: _____

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	PID/FID Reading (ppm): Sampler BZ	PID/FID Reading (ppm): Borehole**	PID/FID Reading (ppm): Driller BZ**

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): ____

Remarks: _____

Converted to Well: Yes _____ No _____ Well I.D. #: _____

ATTACHMENT C4 (Continued)

LEGEND

SOIL TERMS

UNIFIED SOIL CLASSIFICATION (USCS)

COARSE-GRAINED SOILS More Than Half of Material is LARGER Than No. 200 Sieve Size					FINE-GRAINED SOILS More Than Half of Material is SMALLER Than No. 200 Sieve Size					
FIELD IDENTIFICATION PROCEDURES (Excluding Particles Larger Than 3 Inches and Basing Fractions on Estimated Weights)			GROUP SYMBOL	TYPICAL NAMES	FIELD IDENTIFICATION PROCEDURES (Excluding Particles Larger Than 3 Inches and Basing Fractions on Estimated Weights)				GROUP SYMBOL	TYPICAL NAMES
					Identification Procedures on Fraction Smaller than No. 40 Sieve Size					
						DAY STRENGTH (Crushing Characteristics)	DILATANCY (Reaction to Shaking)	TOUGHNESS (Consistency Near Plastic Limit)		
GRAVELS (50%(+)>1/4"⌀	CLEAN GRAVELS (Low % Fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes.	GW	Well graded gravels, gravel-sand mixtures, little or no fines.	SILTS AND CLAYS Liquid Limit <50	None to Slight	Quick to Slow	None	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity.
		Predominantly one size or a range of sizes with some intermediate sizes missing.	GP	Poorly graded gravels, gravel-sand mixtures, little or no fines.		Medium to High	None to Very Slow	Medium	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
	GRAVELS W/FINES (High % Fines)	Non-plastic fines (for identification procedures, see ML)	GM	Silty gravels, poorly graded gravel-sand-silt mixtures.		Slight to Medium	Slow	Slight	OL	Organic silts and organic silt-clays of low plasticity.
		Plastic fines (for identification procedures, see CL)	GC	Clayey gravels, poorly graded gravel-sand-clay mixtures.	SILTS AND CLAYS Liquid Limit >50	Slight to Medium	Slow to None	Slight to Medium	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
SANDS 50%(+)<1/4"⌀	CLEAN SANDS (Low % Fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes.	SW	Well graded sand, gravelly sands, little or no fines.		High to Very High	None	High	CH	Inorganic clays of high plasticity, fat clays.
		Predominantly one size or a range of sizes with some intermediate sizes missing.	SP	Poorly graded sands, gravelly sands, little or no fines.		Medium to High	None to Very Slow	Slight to Medium	OH	Organic clays of medium to high plasticity.
	SANDS W/FINES (High % Fines)	Non-plastic fines (for identification procedures, see MCL)	SM	Silty sands, poorly graded sand-silt mixtures.	HIGHLY ORGANIC SOILS	Readily identified by color, odor, spongy feel and frequently by fibrous texture.			Pt	Peat and other organic soils
		Plastic fines (for identification procedures, see CL)	SC	Clayey sands, poorly graded sand-clay mixtures.						

Boundary classifications: Soils possessing characteristics of two groups are designated by combining group symbols. For example, GW-GC, well graded gravel-sand mixture with clay binder.
All sieve sizes on this chart are U.S. Standard.

DENSITY OF GRANULAR SOILS	
DESIGNATION	STANDARD PENETRATION RESISTANCE-BLOWS/FOOT
Very Loose	0-4
Loose	5-10
Medium Loose	11-30
Dense	31-50
Very Dense	Over 50

CONSISTENCY OF COHESIVE SOILS			
CONSISTENCY	UNC COMPRESSIVE STRENGTH (TONS/SQ. FT.)	STANDARD PENETRATION RESISTANCE-BLOWS/FOOT	FIELD IDENTIFICATION METHODS
Very Soft	Less than 0.25	0 to 2	Easily penetrated several inches by fist.
Soft	0.25 to 0.50	2 to 4	Easily penetrated several inches by thumb.
Medium Stiff	0.50 to 1.0	4 to 8	Can be penetrated several inches by thumb.
Stiff	1.0 to 2.0	8 to 15	Readily indented by thumb.
Very Stiff	2.0 to 4.0	15 to 30	Readily indented by thumbnail.
Hard	More than 4.0	Over 30	Indented with difficulty by thumbnail.

ROCK TERMS

ROCK HARDNESS (FROM CORE SAMPLES)			ROCK BROKENESS		
Descriptive Terms	Screwdriver or Knife Effects	Hammer Effects	Descriptive Terms	Abbreviation	Spacing
Soft	Easily Gouged	Crushes when pressed with hammer	Very Broken	(V. Br.)	0-2"
Medium Soft	Can be Gouged	Breaks (one blow); crumbly edges	Broken	(Br.)	2"-1'
Medium Hard	Can be scratched	Breaks (one blow); sharp edges	Blocky	(Bl.)	1'-3'
Hard	Cannot be scratched	Breaks conchoidally (several blows); sharp edges	Massive	(M.)	3'-10'

LEGEND:

SOIL SAMPLES - TYPES

5-2" Split-Barrel Sample

ST-3" O.D. Undisturbed Sample
O - Other Samples, Specify in Remarks

ROCK SAMPLES - TYPES

X-NX (Conventional) Core (~2-1/8" O.D.)

Q-NQ (Wireline) Core (~1-7/8" O.D.)
Z - Other Core Sizes, Specify in Remarks

12/18

WATER LEVELS

12/18
▽ 12.6' Initial Level w/Date & Depth

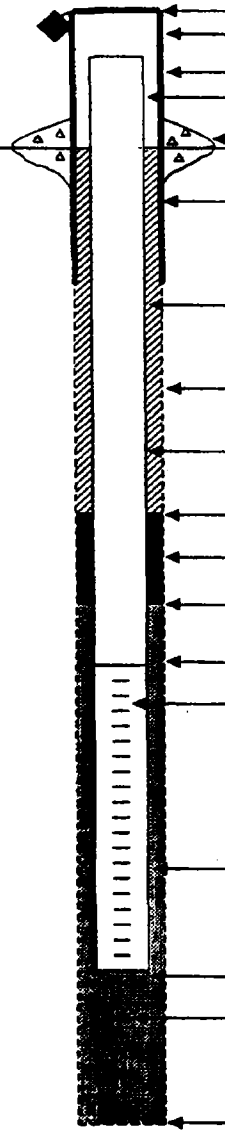
ATTACHMENT C-5
EXAMPLE OVERBURDEN MONITORING WELL SHEET

BORING NO.: _____

OVERBURDEN
MONITORING WELL SHEET

PROJECT _____ LOCATION _____
PROJECT NO. _____ BORING _____
ELEVATION _____ DATE _____
FIELD GEOLOGIST _____

DRILLER _____
DRILLING METHOD _____
DEVELOPMENT METHOD _____



ELEVATION OF TOP OF SURFACE CASING : _____
ELEVATION OF TOP OF RISER PIPE: _____

STICK - UP TOP OF SURFACE CASING: _____
STICK - UP RISER PIPE : _____

TYPE OF SURFACE SEAL: _____

I.D. OF SURFACE CASING: _____
TYPE OF SURFACE CASING: _____

RISER PIPE I.D. _____
TYPE OF RISER PIPE: _____

BOREHOLE DIAMETER: _____

TYPE OF BACKFILL: _____

ELEVATION / DEPTH TOP OF SEAL: _____ / _____

TYPE OF SEAL: _____

DEPTH TOP OF SAND PACK: _____

ELEVATION / DEPTH TOP OF SCREEN: _____ / _____

TYPE OF SCREEN: _____

SLOT SIZE x LENGTH: _____

I.D. OF SCREEN: _____

TYPE OF SAND PACK: _____

ELEVATION / DEPTH BOTTOM OF SCREEN: _____ / _____

ELEVATION / DEPTH BOTTOM OF SAND PACK: _____ / _____
TYPE OF BACKFILL BELOW OBSERVATION WELL: _____

ELEVATION / DEPTH OF HOLE: _____ / _____

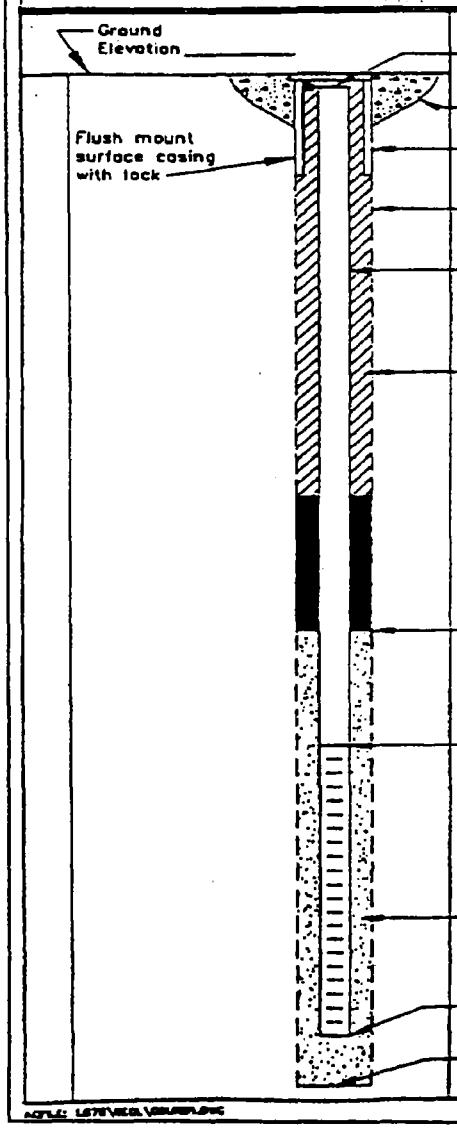
ATTACHMENT C-5A
EXAMPLE OVERBURDEN MONITORING WELL SHEET (FLUSHMOUNT)

BORING NO.: _____

MONITORING WELL SHEET

PROJECT _____ LOCATION _____
PROJECT NO. _____ BORING _____
ELEVATION _____ DATE _____
FIELD GEOLOGIST _____

DRILLER _____
DRILLING METHOD _____
DEVELOPMENT METHOD _____



ELEVATION TOP OF RISER: _____

TYPE OF SURFACE SEAL: _____

TYPE OF PROTECTIVE CASING: _____

I.D. OF PROTECTIVE CASING: _____

DIAMETER OF HOLE: _____

TYPE OF RISER PIPE: _____

RISER PIPE I.D.: _____

TYPE OF BACKFILL/SEAL: _____

_____

DEPTH/ELEVATION TOP OF SAND: _____ / _____

DEPTH/ELEVATION TOP OF SCREEN: _____ / _____

TYPE OF SCREEN: _____

SLOT SIZE x LENGTH: _____

TYPE OF SAND PACK: _____

DIAMETER OF HOLE IN BEDROCK: _____

DEPTH/ELEVATION BOTTOM OF SCREEN: _____ / _____

DEPTH/ELEVATION BOTTOM OF SAND: _____ / _____

DEPTH/ELEVATION BOTTOM OF HOLE: _____ / _____

BACKFILL MATERIAL BELOW SAND: _____

NOTE: LETTERED VARIABLES

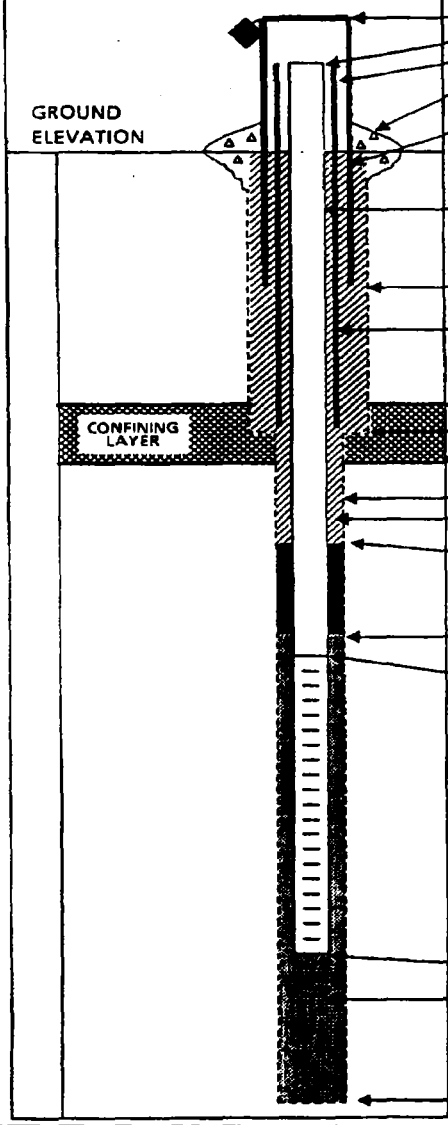
ATTACHMENT C-6
EXAMPLE CONFINING LAYER MONITORING WELL SHEET

BORING NO.: _____

CONFINING LAYER
MONITORING WELL SHEET

PROJECT _____ LOCATION _____
PROJECT NO. _____ BORING _____
ELEVATION _____ DATE _____
FIELD GEOLOGIST _____

DRILLER _____
DRILLING METHOD _____
DEVELOPMENT METHOD _____



ELEVATION OF TOP OF SURFACE CASING : _____
ELEVATION OF TOP OF RISER PIPE: _____
ELEVATION TOP OF PERM. CASING: _____
TYPE OF SURFACE SEAL: _____

I.D. OF SURFACE CASING: _____
TYPE OF SURFACE CASING: _____

RISER PIPE I.D. _____
TYPE OF RISER PIPE: _____

BOREHOLE DIAMETER: _____

PERM. CASING I.D. _____
TYPE OF CASING & BACKFILL: _____

ELEVATION / DEPTH TOP CONFINING LAYER: _____
ELEVATION / DEPTH BOTTOM OF CASING: _____
ELEVATION / DEPTH BOT. CONFINING LAYER: _____

BOREHOLE DIA. BELOW CASING: _____
TYPE OF BACKFILL: _____

ELEVATION / DEPTH TOP OF SEAL: _____
TYPE OF SEAL: _____

DEPTH TOP OF SAND PACK: _____

ELEVATION/DEPTH TOP OF SCREEN: _____
TYPE OF SCREEN: _____

TYPE OF SAND PACK: _____

ELEVATION / DEPTH BOTTOM OF SCREEN: _____

ELEVATION / DEPTH BOTTOM OF SAND PACK: _____
TYPE OF BACKFILL BELOW OBSERVATION WELL: _____

ELEVATION / DEPTH OF HOLE: _____

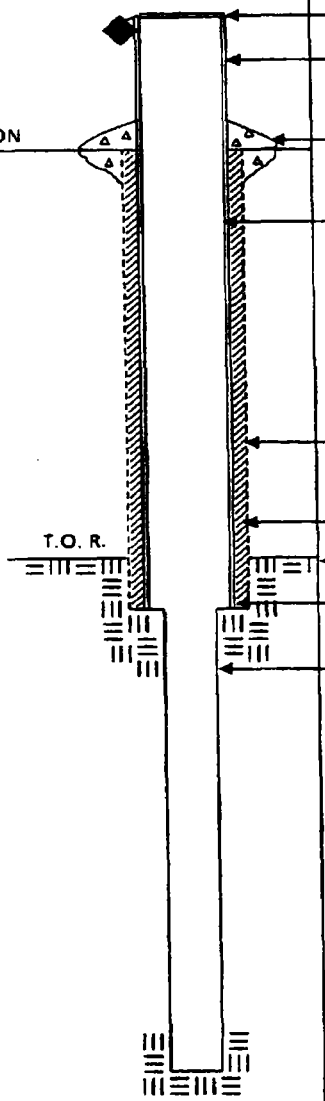
ATTACHMENT C-7
EXAMPLE BEDROCK MONITORING WELL SHEET - OPEN HOLE WELL

BORING NO.: _____

BEDROCK MONITORING WELL SHEET
OPEN HOLE WELL

PROJECT _____ LOCATION _____
PROJECT NO. _____ BORING _____
ELEVATION _____ DATE _____
FIELD GEOLOGIST _____

DRILLER _____
DRILLING METHOD _____
DEVELOPMENT METHOD _____



ELEVATION OF TOP OF CASING: _____

STICK UP OF CASING ABOVE GROUND SURFACE: _____

TYPE OF SURFACE SEAL: _____

I.D. OF CASING: _____
TYPE OF CASING: _____

TEMP. / PERM.: _____

DIAMETER OF HOLE: _____

TYPE OF CASING SEAL: _____

DEPTH TO TOP OF ROCK: _____

DEPTH TO BOTTOM CASING: _____

DIAMETER OF HOLE IN BEDROCK: _____

DESCRIBE IF CORE / REAMED WITH BIT:

_____

DESCRIBE JOINTS IN BEDROCK AND DEPTH:

_____

ELEVATION / DEPTH OF HOLE: _____ / _____

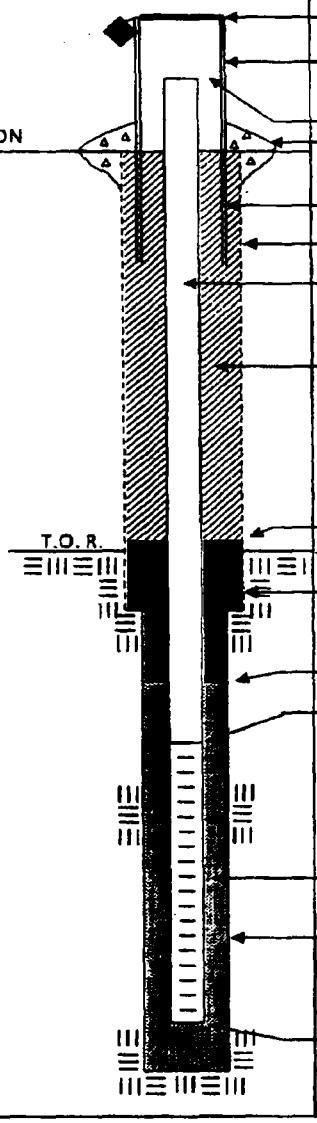
ATTACHMENT C-8
EXAMPLE BEDROCK MONITORING WELL SHEET - WELL INSTALLED IN BEDROCK

BORING NO.: _____

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT _____ LOCATION _____
PROJECT NO. _____ BORING _____
ELEVATION _____ DATE _____
FIELD GEOLOGIST _____

DRILLER _____
DRILLING METHOD _____
DEVELOPMENT METHOD _____



ELEVATION OF TOP OF SURFACE CASING: _____

STICK UP OF CASING ABOVE GROUND SURFACE: _____

ELEVATION TOP OF RISER: _____

TYPE OF SURFACE SEAL: _____

I.D. OF SURFACE CASING: _____

DIAMETER OF HOLE: _____

RISER PIPE I.D.: _____

TYPE OF RISER PIPE: _____

TYPE OF BACKFILL: _____

ELEVATION / DEPTH TOP OF SEAL: ____/____

ELEVATION / DEPTH TOP OF BEDROCK: ____/____

TYPE OF SEAL: _____

ELEVATION / DEPTH TOP OF SAND: ____/____

ELEVATION / DEPTH TOP OF SCREEN: ____/____

TYPE OF SCREEN: _____

SLOT SIZE x LENGTH: _____

I.D. SCREEN: _____

TYPE OF SAND PACK: _____

DIAMETER OF HOLE IN BEDROCK:

CORE / REAM: _____

ELEVATION / DEPTH BOTTOM SCREEN: ____/____

ELEVATION / DEPTH BOTTOM OF HOLE: ____/____

ATTACHMENT C-9
EXAMPLE BEDROCK MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK (FLUSHMOUNT)

BORING NO.: _____

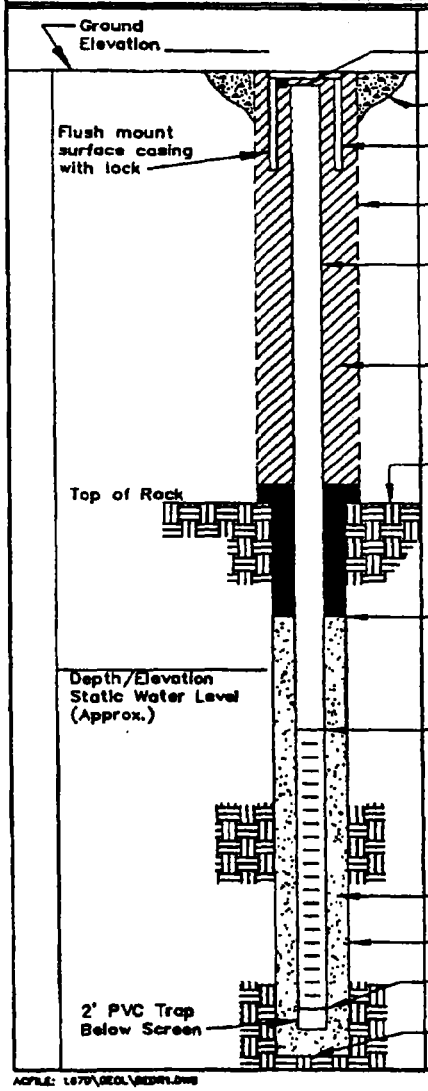
BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT: _____ LOCATION: _____ DRILLER: _____

PROJECT NO.: _____ BORING: _____ DRILLING METHOD: _____

ELEVATION: _____ DATE: _____ DEVELOPMENT METHOD: _____

FIELD GEOLOGIST: _____



ELEVATION TOP OF RISER: _____

TYPE OF SURFACE SEAL: _____

TYPE OF PROTECTIVE CASING: _____

I.D. OF PROTECTIVE CASING: _____

DIAMETER OF HOLE: _____

TYPE OF RISER PIPE: _____

RISER PIPE I.D.: _____

TYPE OF BACKFILL/SEAL: _____

_____

DEPTH/ELEVATION TOP OF BEDROCK: _____ / _____

DEPTH/ELEVATION TOP OF SAND: _____ / _____

DEPTH/ELEVATION TOP OF SCREEN: _____ / _____

TYPE OF SCREEN: _____

SLOT SIZE x LENGTH: _____

TYPE OF SAND PACK: _____

DIAMETER OF HOLE IN BEDROCK: _____

DEPTH/ELEVATION BOTTOM OF SCREEN: _____ / _____

DEPTH/ELEVATION BOTTOM OF SAND: _____ / _____

DEPTH/ELEVATION BOTTOM OF HOLE: _____ / _____

BACKFILL MATERIAL BELOW SAND: _____

ACFILE: L070\GEOL\BEDRR.DWG

ATTACHMENT C-10
EXAMPLE TEST PIT LOG

TEST PIT LOG

Tetra Tech NUS, Inc.

PROJECT: _____ TEST PIT NO.:

PROJECT NO _____ DATE: _____

LOCATION: _____

FIELD GEOLOGIST: _____

DEPTH (ft.)	LITHOLOGY CHANGE (Depth ft.)	MATERIAL DESCRIPTION (Soil Density / Consistency, Color)	USCS	REMARKS

Test Pit Cross Section and / or Plan View

REMARKS _____

PHOTO LOG _____ TEST PIT _____

PAGE ____ OF ____

ATTACHMENT C-11
EXAMPLE CERTIFICATE OF CONFORMANCE

MONITORING WELL MATERIALS CERTIFICATE OF CONFORMANCE

Well Designation: _____ Site Geologist: _____

Site Name: _____ Drilling Company: _____

Date Installed: _____ Driller: _____

Project Name: _____ Project Number: _____

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing			
Well Screen			
End Cap			
Drilling Fluid			
Drilling Fluid Additives			
Backfill Material			
Annular Filter Pack			
Bentonite Seal			
Annular Grout			
Surface Cement			
Protective Casing			
Paint			
Rod Lubricant			
Compressor Oil			

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: _____

ATTACHMENT C-12
EXAMPLE MONITORING WELL DEVELOPMENT RECORD

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Page ___ of ___

Site: _____ Depth to Bottom (ft.): _____ Project Name: _____
Well: _____ Static Water Level Before (ft.): _____ Project Number: _____
Date Installed: _____ Static Water Level After (ft.): _____ Site Geologist: _____
Date Developed: _____ Screen Length (ft.): _____ Drilling Co.: _____
Dev. Method: _____ Specific Capacity: _____
Pump Type: _____ Casing ID (in.): _____

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units _____)	Turbidity (NTU)	Remarks (odor, color, etc.)

ATTACHMENT D
EXAMPLE EQUIPMENT CALIBRATION LOG

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : _____ INSTRUMENT NAME/MODEL: _____

SITE NAME: _____ MANUFACTURER: _____

PROJECT No.: _____ SERIAL NUMBER: _____

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		

ATTACHMENT E

Tetra Tech NUS, Inc.

DAILY ACTIVITIES RECORD

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

CLIENT: _____ **LOCATION:** _____

DATE: _____ **ARRIVAL TIME:** _____

Tt NUS PERSONNEL: _____ **DEPARTURE TIME:** _____

CONTRACTOR: _____ **DRILLER:** _____

ITEM	QUANTITY ESTIMATE	QUANTITY TODAY	PREVIOUS TOTAL QUANTITY	CUMULATIVE QUANTITY TO DATE

COMMENTS: _____

APPROVED BY:

_____ _____

Tt NUS REPRESENTATIVE DRILLER

DATE: _____

ATTACHMENT F
FIELD TRIP SUMMARY REPORT
PAGE 1 OF 2

SUNDAY

Date: _____ Personnel: _____
Weather: _____ Onsite: _____

Site Activities: _____

MONDAY

Date: _____ Personnel: _____
Weather: _____ Onsite: _____

Site Activities: _____

TUESDAY

Date: _____ Personnel: _____
Weather: _____ Onsite: _____

Site Activities: _____

WEDNESDAY

Date: _____ Personnel: _____
Weather: _____ Onsite: _____

Site Activities: _____

ATTACHMENT F
PAGE 2 OF 2
FIELD TRIP SUMMARY REPORT

THURSDAY

Date: _____ Personnel: _____

Weather: _____ Onsite: _____

Site Activities: _____

_____

_____

_____

FRIDAY

Date: _____ Personnel: _____

Weather: _____ Onsite: _____

Site Activities: _____

_____

_____

_____

SATURDAY

Date: _____ Personnel: _____

Weather: _____ Onsite: _____

Site Activities: _____

_____

_____

_____