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TECHNICAL MEMORANDUM ON GROUNDWATER SAMPLING FOR REMEDIATION ACTIVITIES AT STUDY AREA 36 NTC ORLANDO FL

3/5/2001

CH2M HILL

MEMORANDUM CH2MHILL

Project Instructions for Groundwater Sampling of Monitoring Wells for Remediation Activities at Study Area 36, Orlando NTC

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FROM: Jennifer Ottoson

DATE: March 5, 2001

Introduction

This memorandum presents the Project Instructions for the groundwater sampling of monitoring wells at Study Area (SA) 36 at Orlando Naval Training Center (NTC). These activities are part of the enhanced in-situ bioremediation actions planned for the site. This document will outline:

- Project Background
- Project Objectives
- Client Information and Communications
- Project Team
- Additional Documents
- Schedule and Project Number
- Summary of Groundwater Sampling Parameters and Procedures

These Project Instructions are not all-inclusive but are intended to provide guidance. When combined with other standing documents, these project instructions become the necessary instructions to execute specific elements of the essential project work. They will be amended and supplemented as required.

Project Background

SA 36 is located south of Langley Street and west of Grace Hopper Avenue on the Main Base (Figure 1). The SA includes Buildings 2121, 2122, and the western half of the Public Works Yard. The areas of the site east and west of Building 2121 were used to store a variety of items, including pipes, fire hydrants, and bricks. Building 2122 was the Paint Shop. Paints and paint

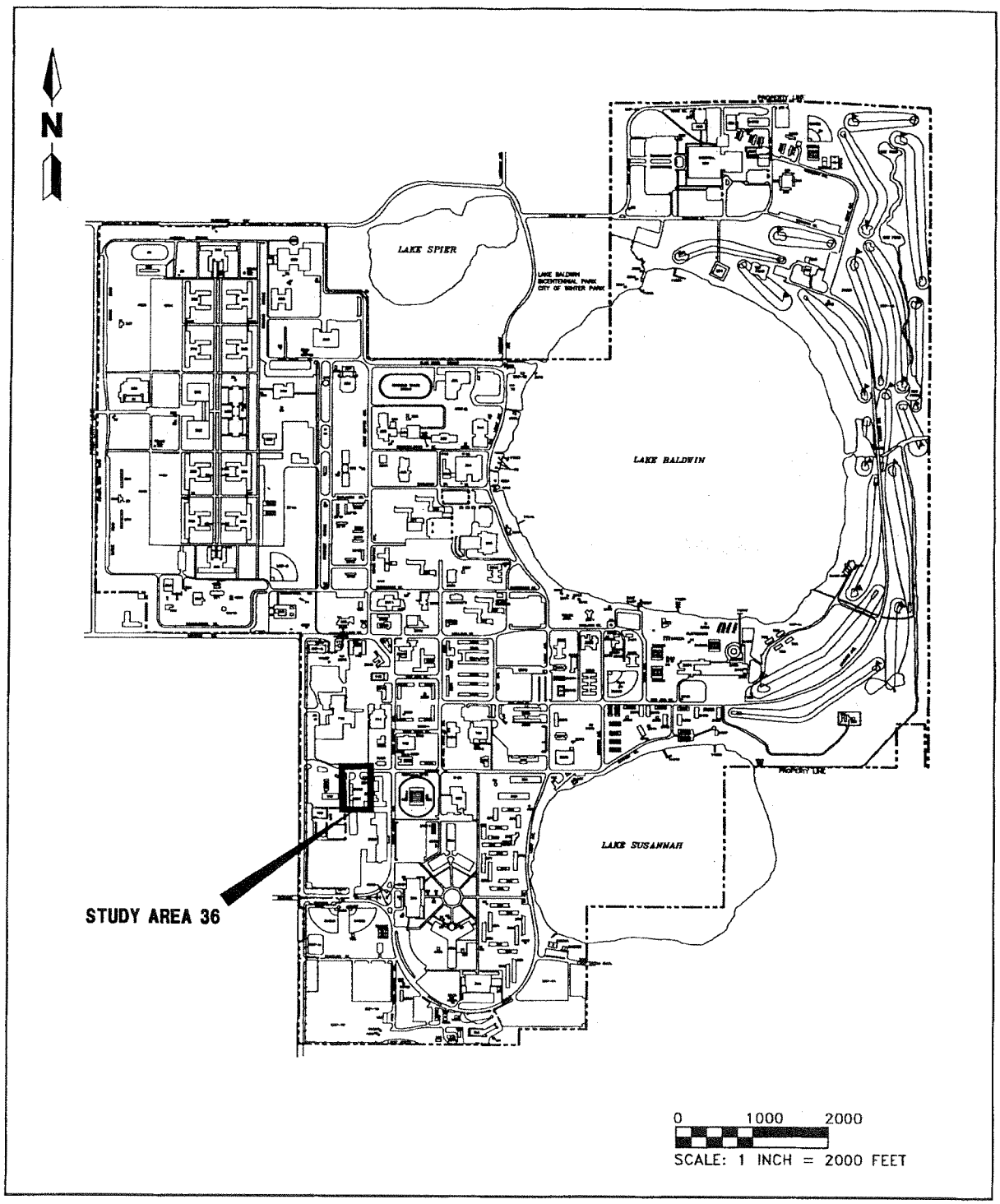

FIGURE 1
Location of Study Area 36
Naval Training Center,
Orlando, Florida

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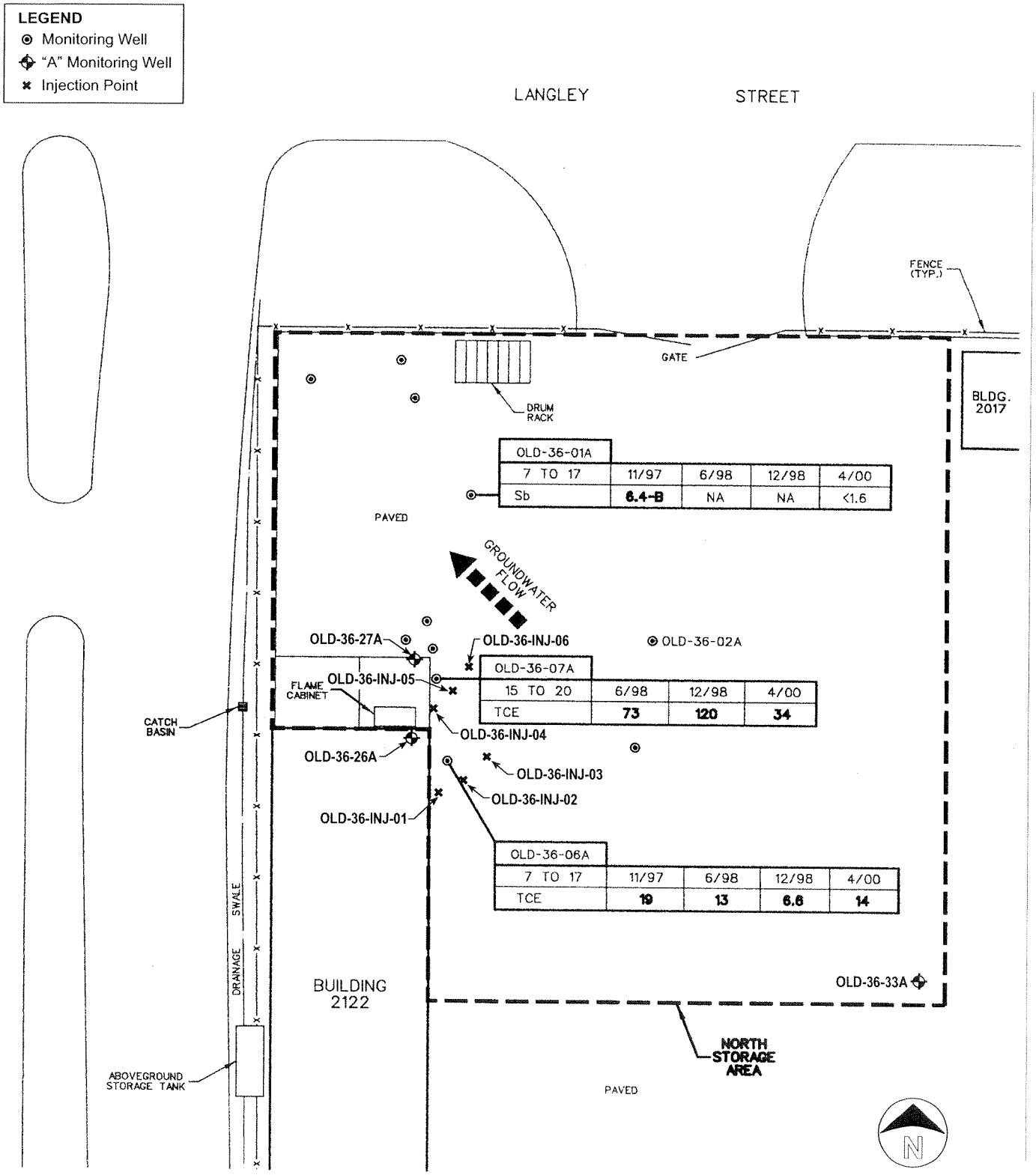


OLD-36-01A				
7 TO 17	11/97	6/98	12/98	4/00
Sb	**6.4-B**	NA	NA	<1.6

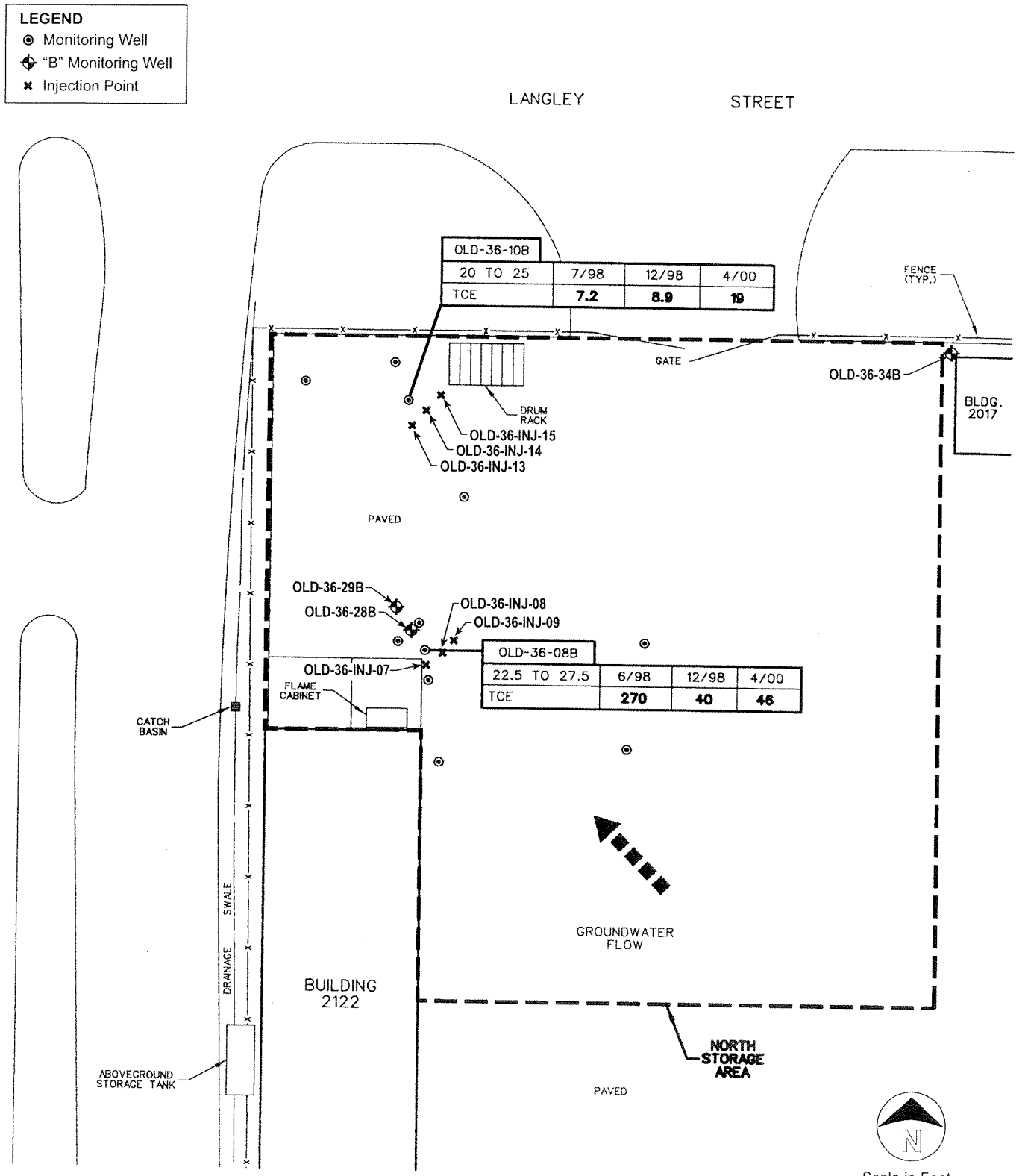
OLD-36-07A			
15 TO 20	6/98	12/98	4/00
TCE	**73**	**120**	**34**

OLD-36-06A				
7 TO 17	11/97	6/98	12/98	4/00
TCE	**19**	**13**	**6.6**	**14**

Source: Tetra Tech NUS

STUDY AREA 36 – MAIN BASE

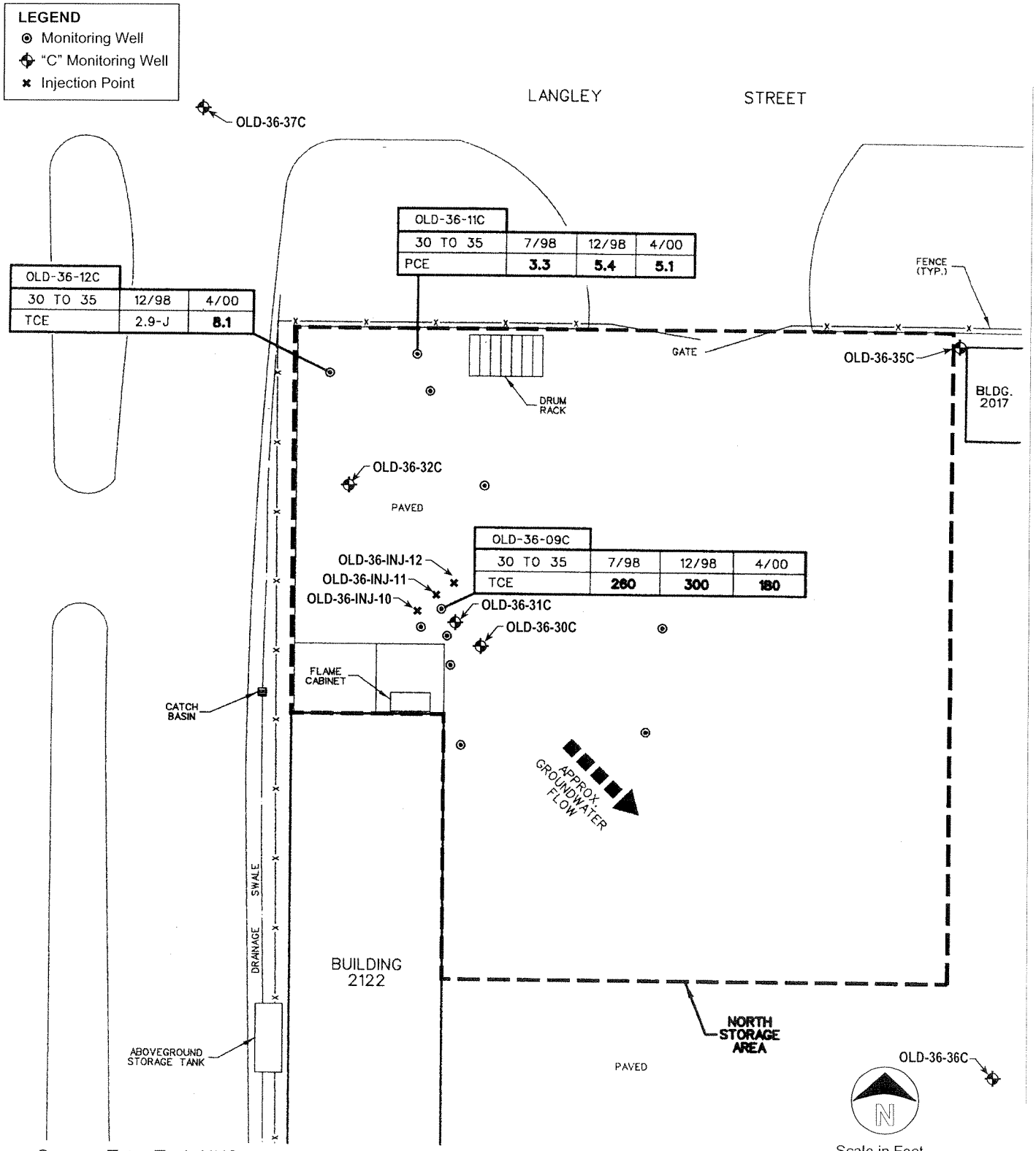
Injection Point and
Monitoring Well Locations for the "A" Zone
Naval Training Center,
Orlando, Florida **CH2MHILL**



Source: Tetra Tech NUS

STUDY AREA 36 – MAIN BASE

Injection Point and
Monitoring Well Locations for the "B" Zone
Naval Training Center,
Orlando, Florida **CH2MHILL**



Source: Tetra Tech NUS

STUDY AREA 36 – MAIN BASE

Injection Point and
Monitoring Well Locations for the "C" Zone
Naval Training Center,
Orlando, Florida

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thinner were stored inside the building. A flammable materials storage cabinet was located at the north end of the building.

An initial site screening investigation was conducted by HLA in 1997. The results of the initial screening investigation detected concentrations of metals, total recoverable petroleum hydrocarbons (TRPH), and polynuclear aromatic hydrocarbons (PAHs) in soil samples exceeding screening criteria. The investigation also detected VOC concentrations in groundwater samples above screening criteria.

Subsequently, the Orlando Partnering Team (OPT) requested that HLA perform supplemental screening investigations to evaluate and characterize the VOC contamination at the site. Concentrations of TCE and PCE were detected exceeding the State of Florida's groundwater cleanup target levels.

The investigation results indicate that surface soils contain arsenic, barium, mercury, TRPH, and benzo(a)pyrene at concentrations exceeding the regulatory screening criteria. In addition, groundwater has exceedances of aluminum, antimony, TCE and PCE. The maximum TCE concentration detected in a monitoring well at the site was 300 ug/l. The results of the groundwater investigation at the site indicate that TCE and/or PCE concentrations in groundwater exceed the GCTL in an area of approximately 5,000 sq. ft. in the North Storage Area. Chlorinated solvent detections exceeded screening criteria from 10 to 35 ft bls interval.

Project Objectives

The objective of the activities at SA 36 is to monitor the groundwater after the remedial alternative chosen for the site. Enhanced in-situ bioremediation via vegetable oil injection was used to improve groundwater quality so that the volatile organic compounds (VOCs) in groundwater meet regulatory maximum contaminant levels (MCLs). The objectives of the field activities for this action include the following:

- Round 1 groundwater sampling to be conducted at 2 months after vegetable oil injection
- Round 2 groundwater sampling to be conducted at 6 months after vegetable oil injection
- Round 3 groundwater sampling to be conducted at 9 months after vegetable oil injection
- Round 4 groundwater sampling to be conducted at 12 months after vegetable oil injection

Client Information and Communications

The U.S. Naval Facilities Engineering Command, Southern Division is the lead agency for this project.

The Southern Division Project Manager (PM), Mrs. Barbara Nwokike, is responsible for providing contract oversight for the Navy. Wayne Hansel, with the Navy Southern Division is the BRAC Environmental Coordinator responsible for the overall environmental activities at NTC. Bill Jacobs is the site caretaker for the Navy, and is responsible for contractor site access.

A summary of project personnel is presented in **Table 1**.

TABLE 1
Project Personnel Directory for NTC Orlando

Contact	Role	Address	Phone No.	Fax No.	E-Mail
Barbara Nwokike	Navy Remedial Project Manager	U.S. Naval Facilities Engineering Command Southern Division, Code 1873 2155 Eagle Drive N. Charleston, SC 29406	(843) 820-5566	(843) 820-5563	nwokikebr@efdsouth.navfac.navy.mil
Wayne Hansel	BRAC Environmental Coordinator	U.S. Naval Facilities Engineering Command Southern Division, Code 18B7 2155 Eagle Drive N. Charleston, SC 29406	Charleston (843) 820-5572 Orlando (407) 895-6714	Charleston (843) 820-5563 Orlando (407) 894-4992	Hanselwj@efdsouth.navfac.navy.mil
Craig Haas/TPA	Site Supervisor	CCI 115 Perimeter Center Place, N.E., Suite 700 Atlanta, GA 30346-1278	(770) 604-9182	(770) 604-9183	chaas@ch2m.com
Scott Newman/ATL	Program Manager	CCI 115 Perimeter Center Place, N.E., Suite 700 Atlanta, GA 30346-1278	(770) 604-9182 x 519	(770) 604-9183	mailto:snewman@ch2m.com
Bob Nash/ATL	Health & Safety Manager	CH2M HILL 115 Perimeter Center Place, N.E., Suite 700 Atlanta, GA 30346-1278	(770) 604-9182 x 341	(770) 604-9183	rnash@ch2m.com
Eric Brothers/ATL	Contracts Administrator/ Project Controls	CCI 115 Perimeter Center Place, N.E., Suite 700 Atlanta, GA 30346-1278	(770) 604-9182 x 543	(770) 604-9183	mailto:ebrother@ch2m.com
Theresa Rojas/ATL	Program Quality Control & Project Chemist	CCI 115 Perimeter Center Place, N.E., Suite 700 Atlanta, GA 30346-1278	(770) 604-9182 x 568	(770) 604-9183	trojas@ch2m.com
Lisa Schwan/ATL	Project Chemist	CCI 115 Perimeter Center Place, N.E., Suite 700 Atlanta, GA 30346-1278	(770) 604-9182	(770) 604-9183	lschwan@ch2m.com
Steve Tsangaris/TPA	Project Manager	CH2M Hill 4350 W. Cypress Street, Suite 600 Tampa, FL 33607	(813) 874-0777 x 4305	(813) 874-3056	Stsangar@ch2m.com
Gareth Bonds/ATL	QC Manager	CCI 115 Perimeter Center Place, N.E., Suite 700 Atlanta, GA 30346-1278	(770) 604-9182	(770) 604-9183	mailto:gbonds@ch2m.com
Jennifer Ottoson/Cocoa	Field Hydrogeologist	205 Indian River Drive Cocoa, FL 32922	(321) 636-7575	(321) 636-7522	jottoson@ch2m.com

Subcontractor Information

All groundwater samples, except for sulfide, dissolved iron, methane, ethane, and ethene (MEE) and metabolic fatty acid analyses, collected during the sampling activities will be sent to Accura Lab in Norcross, GA. Groundwater samples collected for MEE and fatty acids analyses will be sent to Microseeps Laboratories of Pittsburgh, Pennsylvania. Groundwater samples collected for sulfide and dissolved iron will be sent to STL Pensacola. The relevant laboratory addresses and telephone numbers are listed below:

Accura Labs
Bonnie Hogue
6017 Financial Drive
Norcross, GA 30071
770.449.8800 x233 (voice)

Microseeps Laboratories
220 William Pitt Way
Pittsburgh, PA 15238
800.659.2887 (voice)

STL Pensacola
Rick Hayes, Client Services
3355 McLemore Dr
Pensacola, FL 32514
850-474-1001 (voice)

CH2M HILL Project Team

CCI Project Manager – Steve Tsangaris/ TPA

Field Team Members - Tammy Plumlee
Gareth Bonds
Craig Haas

Mr. Haas will serve as the site safety coordinator.

All of your communications with the client or subcontractors should be through Steve Tsangaris. Please contact Jennifer Ottoson at (321) 626-7555 if problems should occur during implementation of field activities.

Additional Documents

In addition to these project instructions, there are four additional documents that have been established for the project. The additional documents include:

Work Plan Addendum 1-C, Study Areas 17, 36, and 39, **prepared by CH2M HILL Constructors, Inc. (CCI), August 2000**: This document also includes the project Sampling and Analysis Plan, Quality Control Plan, Health and Safety Plan, and Wastestream Management Plan. A copy of this document will accompany team members into the field. Field team members should refer to these documents for specifics related to the field sampling program.

Work Plan for Enhanced In-Situ Bioremediation of Chlorinated Solvents Via Vegetable Oil Injection at SA-39 **prepared by CH2M HILL Constructors, Inc. (CCI), July 2000**: This document describes the scope of work for the enhanced in-situ bioremediation at SA-39. It provides site background and specifications for the application of field activities related to the remedial action.

Basewide Work Plan **prepared by CCI, June 1999:** This document describes the generic efforts necessary to perform environmental remediation services at NTC, Orlando, Florida, and outlines the fundamental plans and requirements for completion of these activities at NTC Orlando. Necessary site-specific information for each Contract Task Order (CTO) or project will be provided in work plan addenda (for example, Work Plan Addendum 1-B) to supplement this Basewide Work Plan. A copy of this document will accompany team members into the field. Field team members should refer to this document for specific procedures related to the field sampling activities.

Project Operations Plan for Site Investigations and Remedial Investigations **prepared by ABB Environmental Services (ABB), August 1997:** This document includes a description of field procedures for use during activities at NTC Orlando. A copy of this document will accompany team members into the field. Field team members should refer to this document for specific procedures related to the field sampling activities that may not be included in the Basewide Workplan.

Activities and Project Numbers

Labor and expenses for the site activities at SA 36 should be charged to project number 152044.32.12.01.08.

Schedule

The Round 1 groundwater sampling event will commence the week of March 12 and last for approximately 5 days.

Summary of Groundwater Sampling Parameters and Procedures

Groundwater samples will be collected from the following thirteen monitoring wells as part of the Round 1 sampling event:

- OLD-36-06A, OLD-36-07A, OLD-36-26A, OLD-36-27A, OLD-36-08B, OLD-36-28B, OLD-36-29B, OLD-36-10B, OLD-36-11C, OLD-36-30C, OLD-36-31C, OLD-36-32C and OLD-36-09C.

The locations of these monitoring wells are illustrated on the attached figures.

Groundwater samples from the monitoring wells will be laboratory analyzed for the following analyte suite (summary provided in **Table 2**):

- **VOCs by EPA Method 8260B.**
- **Nitrate, Nitrite, and Chloride by EPA Method 300.1.**
- **Alkalinity by EPA Method 310.1**
- **TOC by EPA Method 9060 Modified.**
- **FL-PRO by DEP FLPRO**

TABLE 2
Sampling and Laboratory Analytical Summary

Sample Task	Sample Point	Matrix	Sampling Frequency	Approx Sample No	Sampling Method (Note 1)	Sampling Equipment (Note 1)	TAT[1]	DQO Level/ Data Package Reqmnt	Required Analysis	Analytical Method	Holding Time	Sample Preservtn[3]	Containers	
SA-36 Groundwater Sampling														
Groundwater Sampling	13 Groundwater Monitoring Wells at SA-36 OLD-36-06A,OLD-36-07A, OLD-36-26A OLD-36-27A OLD-36-08B OLD-36-10B OLD-36-28B OLD-36-29B OLD-36-09C OLD-36-11C OLD-36-30C THRU OLD-36-32C	Water	Quarterly	13 + 10% Dup + 5% MS/MSD total = 17	Grab	Peristaltic pump and teflon tubing	14 days	DQO Level III, CCI Level C	Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(3) 40 ml vial	Accura
									Nitrate	300.1	48 hours	Cool to 4°C	(1) 250 mL HDPE	
									Nitrite	300.1	48 hours	Cool to 4°C	(1) 250 mL HDPE	
									Chloride	300.1	28 days	Cool to 4°C	(1) 250 mL HDPE	
									TOC	9060	28 days	HCl or H2SO4 pH< 2; Cool to 4oC	(1) 500 mL HDPE	
									Alkalinity	310.1	14 days	Cool to 4°C	(1) 250 mL HDPE	
									FI PRO	DEP FLPRO	7 days to extraction, 40 days to analysis	H2SO4 pH<2, Cool to 4°C	(2) 1L amber	
									Total Dissolved Solids	160.1	7 days	Cool to 4°C	(1) 250 mL HDPE	
									Dissolved iron	SW846 6010B		Cool to 4°C, HNO3	(1) 250 mL HDPE	STL Pensacola
									Sulfide	376		Cool to 4°C	(1) 250 mL HDPE	
									MEE	AM19GA	14 days	Cool to 4°C	(3) 40mL vial	Microseeps
									Volatile Fatty Acids	AM21G	14 days	Cool to 4°C	(2) 40mL vial	
	Pre-cleaned Equipment Rinsate Blank	Water	1 per quarter	1	Prepared in the Field	N/A	14 days	DQO Level III, CCI Level C	Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(3) 40 ml vial	Accura
									Nitrate	300.1	48 hours	Cool to 4°C	(1) 250 mL HDPE	
									Nitrite	300.1	48 hours	Cool to 4°C	(1) 250 mL HDPE	
									Chloride	300.1	28 days	Cool to 4°C	(1) 250 mL HDPE	
									TOC	9060	28 days	HCl or H2SO4 pH< 2; Cool to 4oC	(1) 500 mL HDPE	
									Alkalinity	310.1	14 days	Cool to 4°C	(1) 500 mL HDPE	
									FL-PRO	DEP FLPRO	7 days to extraction, 40 days to analysis	H2SO4 pH<2, Cool to 4°C	(2) 1L amber	
									Dissolved iron	SW846 6010B		Cool to 4°C, HNO3	(1) 250 mL HDPE	STL Pensacola
									Sulfide	376		Cool to 4°C	(1) 250 mL HDPE	
									MEE	AM19GA	14 days	Cool to 4°C	(3) 40mL vial	Microseeps
									Volatile Fatty Acids	AM21G	14 days	Cool to 4°C	(2) 40mL vial	
	Ambient Blank	Water	1 per quarter	1	Prepared in the Field	N/A	14 days	DQO Level III, CCI Level C	Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 ml vial	
	Trip Blank	Water	1 per VOC cooler	2	Prepared by Lab	N/A	14 days	DQO Level III, CCI Level C	Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 ml vial	

Notes.
1) In accordance with NTC Orlando POP

TABLE 2
Sampling and Laboratory Analytical Summary

Sample Task	Sample Point	Matrix	Sampling Frequency	Approx Sample No	Sampling Method (Note 1)	Sampling Equipment (Note 1)	TAT[1]	DQO Level/ Data Package Reqmnt	Required Analysis	Analytical Method	Holding Time	Sample Preservtn[3]	Containers
SA-36 Disposal Sampling													
Disposal of Aqueous Waste Sampling, and Decon Activities	Drums	Water	Once	1	Grab	Drum thief or dip jar	7 days	DQO Level III, CCI Level A	TCL Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 ml vial
									TCL Semi-volatiles	8270C	14 days ext; 40 days analysis	Cool to 4°C	(3) 1L amber glass
									TCL Pesticides	8081A	14 days ext; 40 days analysis		
									Herbicides	8151A	7 day extr; 40 day analysis		
									TCL PCBs	8082	14 days ext; 40 days analysis		
									TAL Metals	6010B/7470A	180 days; Hg = 28 days	HNO3 pH< 2; Cool to 4°C	(1) 500ml HDPE
									Cyanide	335.3	14 days	Cool to 4°C NaOH pH>12	(1) 200ml glass
									pH			Cool to 4°C	(1) 500ml HDPE
									Reactivity	9045B	ASAP		
									Ignitability	1010/1020A	ASAP		
									Corrosivity	Chapter 7.3	ASAP		
Disposal of Solid waste, soil drill cuttings	Drums	Soil	Once	1	Composite	Hand auger or spoon and bowl	7 days	DQO Level III, CCI Level A	TCL Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 ml vial
									TCL Semi-volatiles	8270C	14 days ext; 40 days analysis	Cool to 4°C	(3) 1L amber glass
									TCL Pesticides	8081A	14 days ext; 40 days analysis		
									Herbicides	8151A	7 day extr; 40 day analysis		
									TCL PCBs	8082	14 days ext; 40 days analysis		
									TAL Metals	6010B/7470A	180 days; Hg = 28 days	HNO3 pH< 2; Cool to 4°C	(1) 500ml HDPE
									Cyanide	335.3	14 days	Cool to 4°C NaOH pH>12	(1) 200ml glass
									Reactivity	9045B	ASAP	Cool to 4°C	(1) 500ml HDPE
									Ignitability	1010/1020A	ASAP		
									Corrosivity	Chapter 7.3	ASAP		

Notes:
1) *In accordance with NTC Orlando POP*

TABLE 3
Field Sampling and Analytical Summary

Task	Location	Activitiy	Parameter	Method	QC Level	QC Requirements
Groundwater Sampling Field Analyses	Groundwater Monitoring Wells at SA-36	Measurement	Ferrous Iron	Hach Method 8146 (or similar)	None	Filter sample before taking measurement. Collect sample when conditions meet conditions required in NTC Orlando POP
		Measurement	Manganese	Hach Method 8034 (or similar)	None	Filter sample before taking measurement. Collect sample when conditions meet conditions required in NTC Orlando POP
		Measurement	Hydrogen Sulfide	Hach Method 8131 (or similar)	None	Filter sample before taking measurement. Collect sample when conditions meet conditions required in NTC Orlando POP
		Measurement	Alkalinity	Hach Method	None	Filter sample before taking measurement. Collect sample when conditions meet conditions required in NTC Orlando POP
		Measurement	Sulfate	Hach Method 8051 (or similar)	None	Filter sample before taking measurement. Collect sample when conditions meet conditions required in NTC Orlando POP
		Measurement	Temperature	Direct reading thermometer	None	Calibrate as per NTC Orlando POP Collect sample when conditions meet conditions required in NTC Orlando POP
		Measurement	pH	Direct reading meter	None	Calibrate as per NTC Orlando POP Collect sample when conditions meet conditions required in NTC Orlando POP
		Measurement	Specific Conductance	Direct reading meter	Screening	Calibrate as per NTC Orlando POP Collect sample when conditions meet conditions required in NTC Orlando POP
		Measurement	Dissolved Oxygen	Direct reading meter	Screening	Calibrate as per manufacturer's instructions
		Measurement	Oxidation Reduction Potential	Direct reading meter	Screening	Calibrate as per manufacturer's instructions
		Measurement	Turbidity	Direct reading meter	None	Calibrate as per NTC Orlando POP Collect sample when conditions meet conditions required in NTC Orlando POP
		Measurement	Water Level	Water Level Indicator	None	As specified in NTC Orlando POP

- **Volatile Fatty Acids by AM21G**
- **MEE by AM19GA**
- **Sulfide Method 376**
- **Dissolved Iron SW846 6010B**

Further, the field team will measure natural attenuation parameters **ferrous iron, manganese, hydrogen sulfide**, and **sulfate** using Colorimetric Hach test kits. Oxidation-reduction potential (ORP), dissolved oxygen (DO), pH, specific conductivity, temperature, and turbidity will also be measured. This information is summarized in **Table 3**.

Pre-purging Activities

The following activities will be performed immediately prior to purging each well:

1. Check the well for proper identification and location.
2. Measure and record the height of protective casing.
3. Measure and record the distance between the top of the well casing and the top of the protective casing.
4. Using the electronic water-level meter, measure and record the static water level from the reference point to an accuracy of 0.01 foot. Upon removing the water-level wire, rinse it with water from an approved water source.
5. Inspect the well head for any signs of forced entry, which could invalidate the sampling data.

Monitoring Well Low-Flow Purging and Sampling

Collection of groundwater samples from monitoring wells is required to characterize the nature and extent of contamination. Because of concerns about turbidity in the wells and the effects on metals sampling results, the low-flow purge and sample method will be used.

Purging

The low-flow purge and sample method consists of using a submersible or peristaltic pump to purge the well at a very low flow rate (less than 1 liter per minute [l/min]). The pump intake (dedicated Teflon ® tubing) is set approximately in the middle of the well screen, with a stagnant water column over the top of the pump. The well is purged at the low-flow rate until the field parameters (temperature, pH, specific conductance, turbidity, DO, and redox potential) have stabilized. The sample is then collected using the peristaltic pump. The following steps outline the purging and sampling activities.

1. The intake for the peristaltic pump should be set at approximately the middle of the screen. Be careful not to place the pump intake less than 2 feet above the bottom of the well because this may cause mobilization of any sediment present in the bottom of the well. Start pumping the well at less than 1 l/min.
2. The water level in the well should be monitored during pumping and, ideally, the pump rate should equal the well recharge rate with little or no water-level drawdown in the well (the water level should stabilize for the pumping rate). There should be at least 1 foot of water over the pump intake so there is no risk of the pump suction being broken or

entrainment of air in the sample. Record the pumping rate adjustments and depth(s) to water in the logbook. If the recharge rate of the well is very low and the well is purged dry, then wait until the well has recharged to a sufficient level and collect the appropriate volume of sample with the pump, or use standard purge-and-sample techniques.

3. The well should be purged at a low-flow rate (ideally, less than 1 l/min). During purging, monitor the field parameters (temperature, pH, turbidity, specific conductance, DO, and redox potential) using the flow through cell approximately every 3 to 5 minutes (or as often as practical) until the parameters have stabilized to within 10 percent (plus or minus 5 percent) over a minimum of three readings. Turbidity and DO are typically the last of the field parameters to stabilize. If turbidity readings are below 7 nephelometric turbidity units (NTUs), then the stabilization range can be amended to 20 percent (plus or minus 10 percent) over a minimum of three readings. Wells should be purged a minimum of three well volumes and no more than five well volumes prior to sampling.

4. Record the *in situ* parameters (pH, temperature, specific conductance, turbidity, DO, and redox potential), along with the corresponding volume purged, on a Groundwater Sample Field Data Record or in a bound field logbook.

Field Measurements

Once the field parameters have stabilized, perform Colorimetric Hach tests for natural attenuation parameters. Since these measurements are based on variations of color, sample water should be filtered. Perform tests according to instructions provided by the manufacturer, included with the test kits.

Sampling Procedures

Once the field parameters have stabilized, collect the samples using the peristaltic pump. All sample bottles should be filled by allowing the water to flow gently down the inside of the bottle with minimal turbulence. Cap each bottle as it is filled. Volatiles and analytes that degrade by aeration must be collected first. Volatile samples will be collected by shutting off the pump, disconnecting the tubing, holding a thumb over the end of the tubing, and withdrawing the tubing from the well. The sample containers will be filled by removing the thumb and allowing groundwater to flow, by gravity, into the containers containing preservatives.

Clean unused tubing should be used for each monitoring well. Used tubing will be disposed of as solid waste.

Shipping

Samples will be preserved, labeled, and placed immediately into a cooler and maintained at 4 degrees Celsius (°C) throughout the sampling and transportation period. Samples should be labeled, recorded on the COC, and shipped/delivered to the appropriate laboratory.

Field Documentation

A single responsible party will be designated for field documentation whenever feasible. For multi-person sampling teams, the party responsible for documentation will be focused on the field documentation effort such as the daily log and other related forms and will not be directly involved in the sample collection activities. The field documentation will include sufficient detailed information so that the history of each sample can be retained when necessary without

the assistance of the sample collection personnel. Data will typically include a detailed description of equipment decontamination procedures, equipment calibration procedures, preparatory purging at each sample location, inventory of all generated wastes, and disposition of all generated wastes. Information can be recorded in the field log book, or on the attached Waste Inventory Tracking Form, Water Level Form, Monitoring Well Purging Form, Field Sampling Report

Sample Identification

All samples and field quality control will be designated a unique sample identification. The sample identification procedure to be implemented for the monitoring well samples is described as follows:

CTO Number-Monitoring Well Location-Q #-Year-Number of Months of Treatment System Operation (if applicable)

- Q #: Represents the quarter number in the calendar year (e.g., fourth quarter is Q4)
- Number of Months of Treatment System Operation (if applicable): Represents the number of months the groundwater treatment system, soil treatment system, and/or product recovery system has been in operation since start-up.
- An example of the monitoring well sample identification protocol is a quarterly sampling event conducted at a site with an air sparge system that has been in operation since November 1997. The sample event, conducted under CTO No. 0002, included a sample collected from groundwater monitoring well MW-1 in May 1998. This example has the following identification number: 002-MW1-Q2-98-06.

Sample Labels

Any samples placed into a sample container will be identified by a sample label. The following information is included on the label:

- Project Number and Project Name
- Date – month, day, year
- Time – Military time
- Sample Identification
- Sample Description
- Sampler – Sampler's name(s)
- Preservatives
- Analyses Requested

This information should be printed neatly using an indelible marker. After the sample is taken and the label is securely attached, the sample is logged into the sample log book.

Custody Seals

Custody seals are narrow strips of adhesive tape of glass fiber used to demonstrate that no tampering has occurred. They may be used on sampling equipment, sample transport containers, and individual sample jars. They should be signed and dated by the sampler and placed from one side, across the top, and to the other side of the sample bottle or across the openings of the sample transport containers.

Chain-of-Custody Form

A COC form will be completed for each sampling event and will accompany the samples during shipment. The COC record documents the sample information and the transfer of custody from the sampler to the laboratory. The record will, at a minimum, contain the following:

- Project Name
- Project Location – City and State in which the project is located
- Project Number
- Project Contact – employee responsible for overseeing the sampling operation. This person should be the individual to whom questions are to be directed or verbal results given (Project Manager, Site Supervisor, Project QC Officer, or Project Chemist)
- Site Telephone Number – Telephone number of on-site office trailer or number where person responsible for samples can be contacted.
- Sample Date – month, day, year
- Sample Time – military time
- Sample Identification – unique sample number/identifier
- Sample Type – designation of sample as grab or composite
- Sample Description – sample matrix and a brief description of the sampling location
- Sample Preservation – preservatives used
- Analytical Parameters Requested – analytical parameter, method numbers, and specific compounds of interest, if applicable.
- Airbill or courier tracking number
- Laboratory – laboratory where samples are to be sent
- Laboratory Phone – telephone number of laboratory
- Laboratory Contact – contact for laboratory
- Relinquished by – signature of sender
- Date Relinquished – date samples were relinquished
- Accepted by – signature of acceptor
- Date Received – date samples were accepted
- Turnaround Time – turnaround times requested or date the results are required from the lab
- Sampler's Signature – signature of sampler
- Signature of person(s) involved in chain of possession

- Transfer date(s) and time(s) in chain of possession

Personnel preparing the COC form (i.e., sampler) will retain a copy of the form and attach it to the project's daily field logs.

If the samples are shipped by common carrier, the COC form will be placed in a sealed plastic bag inside the shipping container. Prior to shipment, the shipping container will be secured with strapping tape and a custody seal. Thus, in the case of using a common carrier for shipment, two signatures will be required on the final chain-of-custody: one signature by the sample technician who prepared the form and one signature of the sample custodian assigned by the laboratory. The sample technician will relinquish the samples to the carrier. The carrier's company name and tracking number will be placed in the box of "receiver" and in the box of "relinquisher" upon being received at the laboratory by the sample custodian. The sample custodian must ensure that the tracking number on the sample container matches that on the COC. The sample custodian assigned by the laboratory will open the shipping container and will document on the chain-of-custody form any shipping container custody seal breaks and/or shipping container or sample container(s) damage.

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CHAIN-OF-CUSTODY RECORD

[1] COC NUMBER:

[2] PROJECT NAME:

[3] PROJECT PHASE/SITE/TASK:

[4] PROJECT CONTACT:

[5] PROJECT NUMBER:

[6] CTO OR DO NUMBER:

[7] PROJECT TEL NO AND FAX NO:

[8] LAB NAME AND CONTACT:

[9] LAB PO NUMBER:

[10] LAB TEL NO AND FAX NO:

[11] FAX AND MAIL REPORTS/EDD TO:: RECIPIENT 1 (Name and Company):

[12] FAX AND MAIL REPORTS/EDD TO:: RECIPIENT 2 (Name and Company):

[13] FAX AND MAIL REPORTS/EDD TO:: RECIPIENT 3 (Name and Company):

[14] RECIPIENT 1 (Address, Tel No. , and Fax No.):

[15] RECIPIENT 2 (Address, Tel No. , and Fax No.):

[16] RECIPIENT 3 (Address, Tel No. , and Fax No.):

[25] ANALYSES REQUIRED (Include Method Numbers)

[17] ITEM	[18] SAMPLE IDENTIFIER	[19] SAMPLE DESCRIPTION/LOCATION	[20] MATRIX (see codes on SOP)	[21] DATE COLLECTED	[22] TIME COLLECTED	[23] DATA PKG LEVEL (see codes on SOP)	[24] TAT (calendar days)										[26] SAMPLE TYPE (see codes on SOP)	[27] COMMENTS/ SCREENING READINGS	[28] LAB ID (for lab's use)
1																			
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

[29] SAMPLER(S) AND COMPANY: (please print)

[30] COURIER AND SHIPPING NUMBER:

[31] SAMPLES TEMPERATURE AND CONDITION UPON RECEIPT (for lab's use):

[32] RELINQUISHED BY	DATE	TIME	[33] RECEIVED BY	DATE	TIME
Printed Name and Signature:			Printed Name and Signature:		
Printed Name and Signature:			Printed Name and Signature:		
Printed Name and Signature:			Printed Name and Signature:		

Distribution: [ ] **Original** - Laboratory (To be returned with Analytical Report); [ ] **Copy 1** - Project File; [ ] **Copy 2** - PMO

Form CC1001, Rev 06/00

Equipment Decontamination

Field equipment decontamination should follow the procedures described below. For equipment not listed below, refer to the *Performance Operations Plan* for proper decontamination procedures

Well Sounders and Groundwater Measurement Tapes: Decontamination procedures for Teflon™, PVC, stainless-steel, and glass tubing used for groundwater sampling are listed below.

- Wash with laboratory detergent and tap water.
- Rinse with tap water.
- Rinse with analyte-free (deionized) water.
- Wrap equipment in aluminum foil.

Field Parameter Measurement Probes: Field parameter measurement probes, (e.g., pH or specific ion electrodes, geophysical probes, or thermometers) that come in direct contact with the sample will be decontaminated using the procedures listed below, unless manufacturer's instructions indicate otherwise. Probes that make no direct contact (e.g., OVA equipment) will be wiped with clean paper towels.

- Rinse with tap water.
- Rinse with analyte-free (deionized) water.
- Solvent rinse if obvious contamination remains after rinsing and if solvent will not damage probe.
- Rinse with analyte-free (deionized) water.

Sampling Equipment for Organic and Metal Analysis: Teflon™, stainless-steel, glass, or metal sampling equipment used to collect samples for organic and metal analysis will be cleaned between sample locations as listed below.

- Wash and scrub equipment thoroughly with laboratory detergent and tap water.
- Rinse thoroughly with tap water.
- Rinse thoroughly with deionized, analyte-free water.
- Rinse with solvent (pesticide-grade isopropanol). Note: Do not rinse PVC or plastic materials with solvent.
- Rinse with organic-free water and allow to air dry as long as possible.
- If organic-free water is not available, allow equipment to air dry as long as possible. Do not rinse again with deionized or distilled water.
- Wrap with aluminum foil to prevent contamination.

Field Quality Control

The following Field Quality Control Samples will be collected during the sampling activities

Duplicate Sample -- two or more samples collected from a common source. The purpose of a duplicate sample is to estimate the variability of a given characteristic or contaminant associated with a population. Matrix spike and matrix spike duplicate (MS/MSD) samples are provided for laboratory QC activities. **For this sampling event, collect 2 dups, 1 MS, and 1 MSD.**

Trip Blanks -- a sample which is prepared prior to the sampling event in the actual container and is stored with the investigative samples throughout the sampling event. They are then packaged for shipment with the other samples and submitted for analysis. At no time after their preparation are trip blanks to be opened before they reach the laboratory. Trip blanks are used to determine if samples were contaminated during storage and/or transportation back to the laboratory (a measure of sample handling variability resulting in positive bias in contaminant concentration). **If volatile organic samples are to be shipped, trip blanks are to be provided with each cooler. In addition, collect 1 ambient/field blank while on-site.**

Pre-Cleaned Equipment Blanks - a sample collected using analyte-free water, which has been run over/through sample collection equipment. These samples are used to determine if contaminants have been introduced by contact of the sample medium with sampling equipment. Pre-cleaned equipment blanks will be collected on equipment that is brought to the site pre-cleaned and ready for use. Pre-cleaned equipment will include disposable sampling equipment (i.e., disposable Teflon bailers, etc.). These blanks will be collected from the sampling equipment immediately prior to sampling by rinsing the sampling equipment with analyte-free water and collecting rinsate in the appropriate sample containers. **For this sampling event, collect 1 EB.**

Field-Cleaned Equipment Blanks - a sample collected using organic-free water, which has been run over/through sample collection equipment. These samples are used to determine if contaminants have been introduced by contact of the sample medium with sampling equipment. Field-cleaned equipment blanks are often associated with collecting rinse blanks of equipment that has been field-cleaned. These blanks will be collected after the equipment is decontaminated by rinsing the sampling equipment with analyte-free water and collecting rinsate in the appropriate sample containers.

Investigation Derived Waste Management

As part of the field activities, a certain amount of IDW material will be generated in association with personal protection, sample handling, well purging and sampling, and decontamination. Every effort should be made to minimize the IDW generated and to dispose of the material in the most appropriate, cost-effective manner. The majority of material generated by investigation activities will be uncontaminated or below applicable disposal limits; however, some material will come in contact with, or be composed of contaminated media, which may require pretreatment or off-site disposal.

The IDW will be segregated by medium (i.e., solids or liquids) and by location (i.e., boring, well, study area) into storage containers (generally, Department of Transportation [DOT]-approved 55-gallon drums). Labels will be attached to the storage containers that describe the content of the specific container, the POI or Study Area of origin, the specific exploration location, and the date of generation. The storage containers will be segregated by POI or Study Area of origin. The storage container pallets will be arranged so as to allow access between them for inspection. A logbook will be maintained with the preceding information recorded in it, as well as a sketch map of the storage areas. The IDW storage area will be designated by the Navy. To avoid

transporting IDW on public roads, each discrete NTC, Orlando facility will have one or more designated storage areas. Quarterly inspections of the IDW storage areas will be conducted to confirm that all requirements are being met and that the integrity of all storage containers remains uncompromised. **All IDW drums must be placed in the locked/fenced staging area at Area C.**

Laboratory analysis of groundwater samples from the representative monitoring wells will be used to determine if the liquid IDW is acceptable to the City of Orlando for disposal to the onsite sewer systems. If representative groundwater samples have been collected and submitted for laboratory analysis of site-specific compounds, those results will be submitted to determine disposal options. If no representative groundwater samples are available, or if the IDW source is decontamination fluid, a sample from each drum will be analyzed for VOCs.

Analytical results, either from the contract laboratory (Level III or IV data) will be submitted to the City of Orlando for approval, on a drum-by-drum basis, to dispose of the IDW in the onsite sewer system. Once approval for disposal via the sewers is received, the City and Public Works Center (PWC) Orlando are notified of the date, location, and approximate amount of liquid to be disposed of. A designated drain at each separate facility at NTC, Orlando has been designated for IDW disposal to minimize the handling and transportation of the containers. If the City of Orlando rejects a specific container or group of containers, a determination will be made whether some pretreatment (e.g., carbon stripping) will render the material suitable for on-site disposal or whether off-site disposal will be necessary.