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ABBREVIATED WORK PLAN FOR REMEDIAL ACTION PREDESIGN ACTIVITIES AT OPERABLE UNIT 2 (OU 2) NTC ORLANDO FL

4/9/2004

CH2M HILL

Abbreviated Work Plan for Remedial Action Pre-Design Activities, Operable Unit 2, Naval Training Center, Orlando, Florida

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TO: Task Order 2, Naval Training Center Orlando

DATE: April 9, 2004

1.0 Introduction

AGVIQ-CH2MHILL Joint Venture-II (JV-II) has been contracted by the Department of the Navy, Naval Facilities Engineering Command, Southern Division (NAVFAC EFD SOUTH), to prepare this Abbreviated Work Plan Memorandum for activities related to implementing a Remedial Action at Operable Unit (OU) 2 at McCoy Annex, Naval Training Center (NTC) Orlando, Florida. This work is being performed under Response Action Contract No. N62467-03-D-0260, Task Order (TO) 0002.

This work plan memorandum details the objectives, rationale and methodologies JV-II will use to gather pre-design data necessary to select and implement the necessary remedial actions at the site.

This Technical Memorandum is organized as follows:

- Section 1 – Introduction
- Section 2.0 – Project Activities
- Section 3.0 - Waste Management Plan
- Section 4.0 – Environmental Protection Plan
- Section 5.0 – Sampling and Analysis Plan
- Section 6.0 – Data Interpretation, Presentation, and Recommendations
- Section 7.0 – References Cited
- Attachment A – Health and Safety Plan
- Attachment B – Submittal Register
- Attachment C – Testing Plan and Log

1.1 Site History and Past Work

OU 2 is located in the southern portion of the McCoy Annex landfill at NTC Orlando (see Figure 1). OU 2 consists of approximately 114 acres and contains a former landfill that was operated by the U.S. Air Force and Navy from 1960 to 1978; a nine-hole golf course now occupies a portion of the site.

The OU 2 area was previously investigated by Tetra Tech NUS, Inc. between 1997 and 2001 during a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Remedial Investigation (RI). Several phases of groundwater direct push technology (DPT) sampling were conducted, with the objective of defining the nature and extent of contaminated groundwater.

Other previous studies include an Initial Assessment Study by C.C. Johnson in 1985, and Verification Study conducted by Geraghty & Miller in 1986.

The Navy has identified dissolved chlorinated volatile organic compounds (CVOCs) in two shallow groundwater plumes that are migrating toward drainage canals running along the eastern perimeter of the site. The drainage canals are partially located on property now owned by the Greater Orlando Airport Authority (GOAA). The overall remedial objective at OU 2 is to intercept the portion of the southern groundwater plume that is entering the GOAA property.

This work plan represents the first phase of a two-phase remedial approach. The investigation described in this work plan will provide data to be used in selecting a final remedy for OU 2. The second phase of the process will involved remedy selection, remedial design, pricing, and implementation of the selected final remedy.

1.2 Project Objectives

The purpose of this investigation is to evaluate the current distribution of trichloroethene (TCE) and associated CVOC contaminants in soil and groundwater, with the overall remedial objective of mitigating risks to human health and the environmental from the portion of the southern groundwater plume that may be entering GOAA property.

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SCALE IN FEET

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OPERABLE UNIT 2
McCOY ANNEX
LANDFILL

BOUNDARY

INSTALLATION

McCOY ANNEX

FIGURE 1

SITE LOCATION MAP
McCOY ANNEX LANDFILL
REMEDIAL INVESTIGATION

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Source: TETRATECH NUS, 2001

R4712981

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The field work currently proposed for investigating groundwater at OU 2 will provide the additional data necessary to select and implement a final remedy for groundwater at OU 2. The work will achieve the following specific objectives:

- Using groundwater DPT borings, determine where the highest concentrations of TCE are currently located in groundwater along the eastern landfill boundary, and where TCE may be leaving the property. Where the VOC/TCE plume is leaving the property, further evaluate the plume contaminant mass with an additional series of offsite DPT borings on GOAA property.
- Determine if TCE is present in offsite ditch sediments or groundwater on the GOAA property, located immediately to the east. Use data gathered to perform a hydrogeologic fate and transport assessment for TCE being transported from the GOAA property.

1.3 Project Schedule

JV-II anticipates mobilization for field activities on April 26, 2004. Field work should be completed by June 30, 2004. The report described in Section 6.0 of this work plan memorandum is scheduled to be complete by August 31, 2004.

1.4 Communications Plan

A communication matrix outlining the lines of communication for the Southern Division, NAVFAC, NTC and JV-II personnel for this work is presented in Table 1. Table 2 provides a project personnel directory.

TABLE 1
Communications Matrix

JVII Position	Navy Direct Report
Joe Colella, Program Manager Scott Smith, Deputy Program Manager	William Anonie, ACO Jimmy Jones, COTR
Steve Tsangaris, Task Order Manager	Barbara Nwokike, RPM Lt. Jorge R. Cuadros, PE, CEC, USN

ACO = Administrative Contracting Officer
COTR = Contracting Officer Technical Representative
RPM = Remedial Project Manager

TABLE 2
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	barbara.nwokike@navy.mil
Lt. Jorge R. Cuadros, PE, CEC, USN	ROICC Office	NAVFAC EFA SOUTHEAST P.O. Box 280073 Building 1966 Mayport, FL 32228-0073	(904) 270-6317 x101	(904) 270-7207	cuadrosjr@efdsouth.navfac.navy.mil
Barbara Czinder	ROICC Office	NAVFAC EFA SOUTHEAST P.O. Box 280073 Building 1966 Mayport, FL 32228-0073	(904) 270-6317	(904) 270-7207	czinderba@efdsouth.navfac.navy.mil
Robert Custance	Site Supervisor/ Health and Safety Supervisor	CH2M HILL 115 Perimeter Center Place, N.E., Suite 700 Atlanta, GA 30346-1278	(770) 604-9182	(770) 604-9183	robert.custance@ch2m.com
Joe Colella	Program Manager	AGVIQ 115 Perimeter Center Place, N.E., Suite 700 Atlanta, GA 30346-1278	(770) 604-9182 x 226	(770) 604-9183	jcolella@tikigaq.com
Richard Rathnow	Health & Safety Manager	CH2M HILL 151 LaFayette Dr., Suite 110 Oak Ridge, TN 37830	(865) 483-9005		rrathnow@ch2m.com
Steven Noe	Contracts Administrator	CH2M HILL 225 E. Robinson Street, Suite 505 Orlando, FL 32801	(407) 423-0030 x 289	(407) 839-5901	steve.noe@ch2m.com
Eric Burrell	Project QC Manager	CH2M HILL 115 Perimeter Center Place, N.E., Suite 700 Atlanta, GA 30346-1278	(770) 604-9182 x 259	(770) 604-9183	eburrell@ch2m.com
Lisa Schwan	Project Chemist	CH2M HILL 115 Perimeter Center Place, N.E., Suite 700 Atlanta, GA 30346-1278	(770) 604-9182 x 561	(770) 604-9183	lschwan@ch2m.com
Steve Tsangaris	Project Manager	CH2M HILL 4350 W. Cypress Street, Suite 600 Tampa, FL 33607	(813) 874-0777 x 4305	(813) 874-3056	stsangar@ch2m.com

2.0 Project Activities Summary

This section presents a brief summary of the project activities. Each of the field activities are described in Section 5.

2.1 Task 1 – Field Work

The field work to be performed at OU 2 is focused toward evaluating groundwater quality in the shallow aquifer system as it moves eastward from the landfill area toward GOAA property.

Field data collection will include using a drilling subcontractor to install two phases of DPT borings for groundwater sampling at multiple depths. The first phase borings will be installed at the eastern landfill/property boundary to determine the location of any dissolved VOC plume which may be migrating toward the offsite GOAA ditch to the east (see Figure 2). The second phase of DPT groundwater borings will be installed offsite between the east fence line and the GOAA ditch, to further evaluate the mass of contaminant migrating toward the ditch. Passive diffusion bag samplers (PDBSs) will be used to collect shallow groundwater and surface water samples will be collected from the GOAA ditch.

Additional field support tasks will include management of investigation-derived wastes (IDW), coordination with GOAA personnel for site access and security, location and marking of underground utilities, and land surveying of sampling locations.

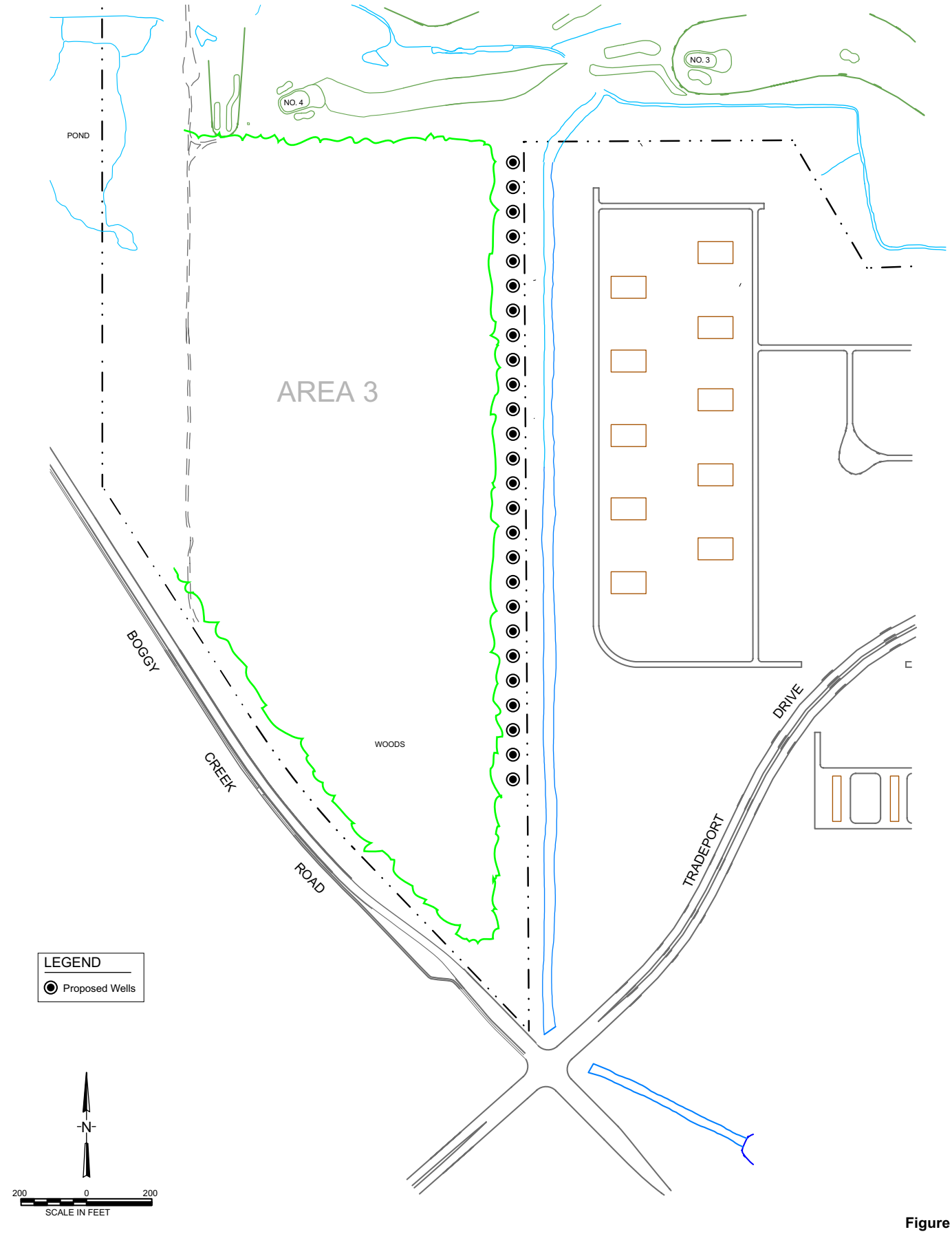
2.2 Task 2 – Data Management and Integration, Fate and Transport Assessment, and Report Preparation

The management of data collected in the field will the responsibility of the field Quality Control (QC) officer/project geologist. Field sampling data such as sampling dates, locations, depths, water quality parameters, and unusual sampling conditions will be entered in the Field Logbook, and on analytical chain of custody records as appropriate.

Analytical data developed by the offsite analytical laboratory subcontractor will be tracked using an automated laboratory information management system (LIMS). Laboratory data will be submitted in both hard copy and electronic format to the JV-II project chemists, who will perform the necessary data validation and formatting for presentation in the investigation report.

After the field data are compiled and evaluated, a groundwater contaminant fate and transport assessment will be conducted. Available literature regarding site hydrogeologic conditions will be reviewed, as well as results of current and previous investigations at OU 2 and NTC Orlando. The information on aquifer characteristics and the data gathered in this field effort on OU 2 CVOC distribution will be used in assessing the environmental fate and transport of TCE and its breakdown products. Qualitative predictive models may be used, as appropriate, to simulate site groundwater flow conditions.

A Technical Memorandum will be prepared to present the study results and making recommendations for further action to address the CVOC plume.



Source: TETRATECH NUS, 2001

Figure 2
Phase 1a Groundwater DPT Locations,OU2
McCoy Annex Landfill Naval Training Center, Orlando

E042004005GNV

3.0 Waste Management Plan

The scope of this work plan memorandum includes the management and disposal or recycling of materials and wastes generated during the field activities at OU 2, NTC Orlando. Wastes will be characterized according to the Section 5.0 Sampling and Analysis Plan, and consistent with the Basewide Waste Management Plan included in the Basewide Work Plan (CH2MHILL, June 1999). Waste characterization information typically will be included on a waste profile form provided by the offsite facility. JV-II will provide analytical data from the most recent characterization sampling and analysis event. In some cases, however, facilities permitted to accept a specific waste material may require specific or additional analyses to evaluate the wastestream before acceptance.

As part of the field activities, a certain amount of waste (including potentially contaminated media) will be generated in association with personal protection, sample handling, media sampling, well purging, and equipment decontamination. IDW expected to be generated as part of this investigation includes purged groundwater, soil cuttings, used acetate sleeves, equipment decontamination wastes (liquids and solids), and used personal protective equipment (PPE). Proper management of all IDW is required to comply with applicable Navy, State and Federal regulations regarding hazardous waste generation, storage and disposal.

Every effort will be made to minimize the waste generated and to dispose of this waste in the most appropriate, cost-effective manner. The majority of waste material generated by these remediation activities will be uncontaminated or below applicable land disposal limits. Some waste, however, will come in contact with (or be composed of) contaminated media, which may require offsite disposal. The primary contaminants of concern are PCE, TCE, DCE, and vinyl chloride in groundwater.

Waste will be segregated by medium (i.e., soil, groundwater, debris), and by location into storage containers (generally, Department of Transportation [DOT]-approved 55-gallon drums). Labels will be attached to the storage containers that describe the following:

- Content of the specific container
- Location/Study Area
- Date of generation
- U.S. Environmental Protection Agency (EPA) ID number and waste codes (for hazardous waste)

3.1 Liquid Waste

Liquid waste will be generated from two sources: 1) groundwater generated from sampling and purging of vertical profiler borings, and 2) water generated during equipment and personnel decontamination procedures.

Laboratory analysis of groundwater samples from the representative monitoring wells will be used: 1) to determine if the liquid waste is acceptable to the City of Orlando for discharge into the onsite sewer system, or 2) to characterize the liquid for offsite disposal.

Analytical results will be submitted to the City of Orlando for approval, on a drum-by-drum basis, to discharge the liquid waste into the onsite sewer system. Once approval for discharge via the sewers is received, the City and Public Works Center (PWC) Orlando will be notified of the date, location, and approximate amount of liquid that will be discharged.

The liquid waste will then be discharged to a drain designated by an NTC Orlando representative. If the City of Orlando rejects a specific container or liquid wastestream, the liquid will be disposed offsite, or as directed by an NTC Orlando representative.

3.2 Solid Waste

Solid (i.e., non-liquid) waste may be generated from personal protective equipment (PPE) and equipment decontamination-related debris (e.g., plastic sheeting, paper towels). Solid wastes generated will also include soils from soil sampling. The soils will be accumulated in separate drums for waste characterization sampling and analysis. Uncontaminated PPE and other uncontaminated disposable materials may be double-bagged in plastic trash bags and disposed in onsite dumpsters.

3.3 Waste Storage Areas

3.3.1 Containers

An NTC Orlando representative will designate the waste storage areas. The storage containers will be segregated by Study Area and placed on pallets. The pallets will be arranged so as to allow access between them for inspection and emergency response. Labeling information will be recorded in the Field Logbook, as well as a sketch map of the storage areas.

Containers will remain closed unless adding or removing material. Covers will be secured properly at the end of each workday. Secondary containment will be provided for drums of liquid hazardous waste or hazardous wastes that are incompatible with other wastes or materials stored nearby. Containers may be disposed of with the contents. If the contents are removed from the containers for offsite transportation and disposal or treatment, the containers will be decontaminated prior to re-use or before leaving the site.

3.3.2 Tanks

In the event that liquids are stored in portable tanks (e.g., frac tanks), the following management standards will apply. Tanks will be provided with covers and old labels will be removed. Any tank arriving onsite with contents will be rejected. Tanks will be decontaminated prior to leaving the site. Typically, decontamination procedures will occur immediately following removal of the tank contents. The fluids used in the decontamination activities will be disposed of with the tank contents. Vehicles transporting bulk waste liquids will be decontaminated following each vehicle's final load at the end of each workday. Decontamination procedures will be completed by the transporter at the point of disposal or by returning the tank to the site for decontamination.

3.4 Inspections

Containers and tanks will be inspected for signs of contamination and/or deterioration, and will be inventoried upon arrival onsite using the Transportation and Disposal Log. Waste

storage areas (including areas with containers and tanks) will be inspected visually on a daily basis for releases or signs of corrosion, deterioration or other conditions that could result in a release. In the event of a release, prompt response will be made in the event of any evidence of failure to contain the wastes. These inspections will be recorded in the Field Logbook.

3.5 Waste Transportation and Disposal

Each vehicle transporting waste will be inspected before leaving the site. The quantities of waste leaving the site will be recorded in the Field Logbook. A licensed commercial transporter will transport non-hazardous wastes. Hazardous waste transporters will be licensed in accordance with 49 Code of Federal Regulation (CFR) 171-179. A copy of the documentation indicating that the selected transporter has appropriate licenses will be received prior to transport of any waste.

Small containers such as 55-gallon drums that are transported onsite or offsite will be placed on pallets and loaded onto a transport vehicle, or loaded directly using a drum handler designed to lift 55-gallon drums. Containers will be secured prior to loading a pallet onto a vehicle. Similarly, once containers are loaded on a vehicle, they will be secured (e.g., with tie-down straps) to prevent shifting or any other condition that would cause damage to a container.

For large containers, the transporter will be responsible for weighing loads at a certified scale. For each load of material, weight measurements will be obtained for each full and empty container or tanker truck. Disposal quantities will be based on the difference of weight measurements between the full and empty container or tanker truck. Weights will be recorded on the waste manifest. The transporter will provide copies of weight tickets with the final manifest.

Except for uncontaminated O&M debris, each load of waste will be manifested prior to leaving the site. **All required transportation manifests will be prepared by JV-II and signed by an NTC Orlando representative**. If required, a bill of lading and weight ticket will be prepared for the transportation of uncontaminated operations and maintenance debris.

The manifest form, with multiple carbon copies, typically will be provided by the waste transporter or selected treatment or disposal facility. The manifest will accompany the waste material to its final destination. If the waste is hazardous, the manifest will be completed in accordance with 40 CFR 262. The treatment, disposal, or recycling facility will be responsible for providing a copy of the final waste manifest and for providing a certificate of treatment or disposal for each load of waste received.

At a minimum, the non-hazardous or hazardous manifest form will include the following information:

- Transporter information including name, address, contact and phone number
- Generator information including name, address, contact, and phone number
- Site name including street/mailing address
- Description of waste including reference to characterization form if available
- Type of container
- Quantity of waste (volumetric estimate)

Additionally, each waste stream transported offsite will also have a waste profile, Land Disposal Restriction (LDR) Notifications/Certifications (for hazardous wastes), and a haul ticket.

Transportation of wastes will be inventoried the day of transportation from the site using the Transportation and Disposal Log. A carbon copy of the initial manifest form for each load will be retained onsite and attached to the Daily Production Report.

The following procedures are observed when hauling and transporting wastes:

- Minimize impacts to general public traffic,
- Repair road damage caused by construction and/or hauling traffic, and
- Clean up material spilled in transit

All personnel involved in offsite disposal activities will follow safety and spill response procedures outlined in the Health and Safety Plan (Attachment A).

No materials from other projects will be combined with materials from NTC Orlando.

Because these remediation activities are conducted under the authority of CERCLA, hazardous wastes will be transported to and treated or disposed at an offsite facility determined acceptable by the EPA Regional Offsite Contact, consistent with the CERCLA Offsite Policy (58 FR 49200, September 22, 1993). JV-II will obtain a record of a hazardous waste facility's CERCLA Offsite approval under this policy.

3.6 Record-Keeping and Reporting

The following records and documents will be maintained onsite:

- Transportation and offsite disposal records
- Waste profiles and associated analytical data
- Manifests, bills of lading, and other shipping records
- Offsite facility waste receipts
- Training record
- Inspection records
- Material Data Safety Sheets (MSDS) for chemicals brought onsite

Monthly summaries of the analytical results, comparisons to background, toxicity characteristic leaching procedure (TCLP), and wastewater treatment plant (i.e., PWC Orlando) limit values, waste classification and proposed disposal methods, location maps, will be provided to the Navy for distribution to interested parties (e.g., City of Orlando) as necessary.

4.0 Environmental Protection Plan

The Environmental Protection Plan (EPP) of the Basewide Work Plan for NTC Orlando addresses general procedures that will be implemented to prevent pollution and protect the environment during site monitoring and remediation activities at OU 2. The purpose of the EPP is to describe the environmental requirements associated with the remedial actions at OU 2, NTC Orlando.

The EPP also describes the procedures necessary for compliance with these requirements and to provide general environmental protection. The procedures include provisions for managing wastes generated during remediation activities are discussed in Section 3.0 Waste Management Plan.

4.1 Scope of Work

The current scope of work for this phase of work at OU 2 includes groundwater sampling using Geoprobe™ DPT, installation of temporary wellpoints, groundwater sampling using PDBSs, fate and transport assessment for groundwater contaminants, soil and surface water sampling, and offsite analysis of soil and groundwater samples by a fixed-base analytical laboratory.

4.2 Regulatory Drivers

All solid/hazardous waste and media will be characterized according to the requirements of Chapter 62-730, Florida Administrative Code (FAC), Part I, "Hazardous Waste Rule - Definition and Identification."

All hazardous waste and media will be managed according to the requirements of Chapter 62-730.160, FAC, "Standards for Generators and Transporters of Hazardous Waste and Owners and Operators of Hazardous Waste Facilities."

4.3 Spill Prevention and Control

The provisions for spill prevention and control establish minimum site requirements. Subcontractors are responsible for spill prevention and control related to their operations. Subcontractors' written spill prevention and control procedures must be consistent with this plan. All spills must be reported to the supervisor, the JV-II onsite representative, and the Navy onsite representative. The Health and Safety Plan provided in Attachment A includes emergency response procedures.

All fuel, chemical, and waste storage areas will be properly protected from onsite and offsite vehicle traffic. All tanks (including fuel storage and waste storage) must be equipped with secondary containment. These tanks must be inspected daily for signs of leaks. Accumulated water must be inspected for signs of contamination (e.g., product sheen, discoloration, and odor) before being discarded. Fire protection provisions outlined in the HSP and in subcontractor plans must be adhered to.

Onsite aboveground fuel storage tanks (ASTs) must meet applicable requirements of Chapter 62-761, FAC, as applicable. All subcontractors will be required to maintain tank loading procedures and fueling procedures that include spill prevention measures.

Incidental chemical products must be stored, transferred, and used properly. If chemical product use occurs outside areas equipped with spill control materials, adequate spill control materials must be maintained at the local work area.

4.3.1 Spill Containment

Spill control materials will be maintained in the support zone, at fuel storage and dispensing locations, and at waste storage areas. Incidental spills will be contained with sorbent and

disposed of properly. Spilled materials must be contained and controlled immediately. The following spill response procedures will be followed:

- Immediately warn any nearby workers and notify supervisor.
- Assess the spill area to ensure that it is safe to respond.
- Evacuate the area if the spill presents an emergency.
- Ensure that any nearby ignition sources are eliminated immediately.
- Stop the source of the spill.
- Establish site control for the spill area.
- Contain and control spilled material through the use of sorbent booms, pads, or other material.
- Use proper PPE in responding to spills.

4.3.2 Spill Cleanup and Removal

All spilled material, contaminated sorbents, and contaminated media will be cleaned up and removed as soon as possible. Contaminated spill material will be drummed, labeled, and stored properly until the material is disposed of. Contaminated spill material will be disposed of according to applicable federal, state, and local requirements.

5.0 Sampling and Analysis Plan

The Sampling and Analysis Plan (SAP) presents the first phase of investigations necessary to design and implement the final remedy for CVOCs in groundwater at OU 2, NTC Orlando.

5.1 Purpose and Scope

This SAP describes the rationale and methods that will be employed to investigate surface water, sediments and groundwater at OU 2. The objective of this work is to determine the location of the southern TCE plume component, and to evaluate whether TCE is present in the offsite surface water, ditch sediments and shallow groundwater on the GOAA property.

The results of this field work will provide the necessary data to design and implement the appropriate groundwater remedial action at the site.

The Basewide Work Plan and the Project Operations Plan (POP) (HLA, August 1997), provides sample collection frequency and sampling methodology for waste characterization and incidental samples collected during the remedial phase of the project completed under this contract; sample quality assurance/quality control (QA/QC) procedures to be maintained during all sample collection activities; and sample equipment decontamination procedures.

Samples will be collected in accordance with the POP, FDEP Standard Operating Procedures DEP-SOP-001/01 (FDEP, January 2002), and the EPA Region IV Environmental Investigative Standard Operating Procedures and Quality Assurance Manual (EISOPQAM)

(EPA, November 2001). Where these documents conflict, the more stringent will apply. The sampling team will maintain a Quality Assurance Project Plan (QAPP) per Florida QA Rules and be qualified under the Navy Installation Restoration Chemical Data Quality Manual (IRCDQM) sampling requirements.

The selected groundwater cleanup target levels (GCTLs) for OU 2 are listed in Table I of Chapters 62-777 and 62-550, FAC, and are summarized in Table 3. Several cleanup levels are below standard reporting limits required at the laboratories. The selected laboratory must show that it can report to the levels shown in Table 3.

TABLE 3
Groundwater Cleanup Target Levels for OU 2, NTC Orlando

Chemicals of Concern	GCTLs (µg/L)
Acetone	700
Benzene	1
Bromodichloromethane	0.6
Bromoform	4.4
Chlorobenzene	100
Chloroethane	NS
Chloroform	5.7
Carbon disulfide	700
Carbon tetrachloride	3
1,2-Dibromo-3-chloropropane (DBCP)	0.2
1,2-Dibromomethane (EDB)	0.02
1,2-Dichlorobenzene	600
1,3-Dichlorobenzene	10
1,4-Dichlorobenzene	75
1,1-Dichloroethane	70
1,1-Dichloroethylene	7
1,2-Dichloroethane	3
1,2-Dichloropropane	5
Dibromochloromethane	0.4
Dichlorodifluoromethane	1400
Cis-1,2-Dichloroethylene	70
Cis-1,3-Dichloropropene	0.2
Trans-1,2-Dichloroethylene	100
Trans-1,2-Dichloropropene	NS
Ethylbenzene	700
2-Hexanone	280
Methyl bromide	9.8
Methyl chloride	2.7
Methylene chloride	5
Methyl ethyl ketone	4200
Methyl-T-Butyl-Ether (MTBE)	50
Styrene	100
1,2,4-Trichlorobenzene	70
1,1,1-Trichloroethane	200
1,1,2,2-Tetrachloroethane	0.2
1,1,2-Trichloroethane	5
Tetrachloroethene	3

TABLE 3
Groundwater Cleanup Target Levels for OU 2, NTC Orlando

Chemicals of Concern	GCTLs (μg/L)
Trichlorofluoromethane	2100
Toluene	1000
Trichloroethene	3
Vinyl chloride	1
Xylene (total)	10000
Aluminum	200
Antimony	6
Arsenic	50
Barium	2000
Beryllium	4
Cadmium	5
Calcium	NS
Chromium	100
Cobalt	420
Copper	1000
Iron	300
Lead	15
Magnesium	NS
Manganese	50
Mercury	2
Nickel	100
Potassium	NS
Selenium	50
Sliver	100
Sodium	160000
Thallium	2
Vanadium	49
Zinc	5000

5.2 Data Quality Levels and Measurement Data

Table 4 lists the data quality levels for each sampling task. Table 5 lists the sampling and analytical requirements, along with the required level of quality and data packages. The quantitation, project action, accuracy, precision, and completeness limits by which the data will be evaluated will be provided by the selected laboratory and approved by JV-II's Quality Assurance Chemist. These limits will, at a minimum, meet the project-specific QC objectives found in the POP.

Navy Level C QC and JV-II Level C packages will be required along with appropriate QC samples for all samples with exception of the groundwater DPT samples, which will require Level A Quality Assurance. All analytical data will be submitted as both hard copy and electronic files. A Navy, United States Army Corps of Engineers (USACE), or Air Force Center for Environmental Excellence (AFCEE)-approved laboratory will be used for all sample analyses.

TABLE 4
Data Quality Levels

Sampling Activity	Data Quality Objective Category
Sampling of groundwater for off-site laboratory analysis	Definitive
Sampling and analysis of groundwater using Passive Diffusion Bag Samplers	Definitive
Sampling soil/sediment and surface water for offsite laboratory analysis	Definitive
Waste characterization of any waste products generated by operation of systems	Definitive

Data validation will be performed by an independent third-party on all groundwater samples. Data validation results will be provided in the final report.

5.2.1 Groundwater DPT Sampling

For groundwater DPT samples collected for laboratory analysis, the required EPA Data Quality Objective (DQO) is Level III, for contaminant identification and quantification. Required field and laboratory QA/QC samples for this level will be collected and analyzed at the frequencies specified by the project QA Plan (typically 10 percent).

5.2.2 Passive Groundwater Diffusion Bag Samplers (PDBS)

For groundwater PDBS samples collected for laboratory analysis, the required EPA Data Quality Objective (DQO) is Level III, for contaminant identification and quantification. Required field and lab QA/QC samples for this level will be collected and analyzed at the frequencies specified by the project QA Plan.

5.2.3 Surface Water and Soil Samples

For surface water and soil samples collected for laboratory analysis, the required EPA Data Quality Objective (DQO) is Level III, for contaminant identification and quantification. Required field and lab QA/QC samples for this level will be collected and analyzed at the frequencies specified by the project QA Plan.

All laboratory subcontractor data deliverables will undergo data validation by JV-II chemists prior to final interpretation, submittal or use in remedial design work.

5.3 Sampling Methods

To determine the location of the highest CVOC concentrations in the lower groundwater plume that may be migrating toward the ditch on the GOAA property, a combination of groundwater sampling techniques will be utilized, along the east fence onsite, and in and along the adjacent ditch on GOAA property.

TABLE 5
Sampling and Analytical Summary

Sample Task	Sample Point	Matrix	Sampling Frequency	Approx Sample No	Sampling Method	Sampling Equipment	TAT[1]	Data Package Reqmnt	Required Analysis	Analytical Method	Holding Time	Sample Preservtn	Containers
Groundwater Sampling													
Groundwater DPT Sampling	Monitor wells selected based on MIP results	Water	Once	75+ 54+ 13 dup + 7 MS + 7 MSD Total = 156	Grab	Peristaltic pump; Teflon tubing	14 days	CCI Level C	TCL Volatiles	8260B	14 day	HCl pH< 2; Cool to 4°C	(2) 40 mL vials
	Pre-Equipment Rinsate Blank	Water	1 per set of pre-cleaned equipment (5%)	6	Prepared in Field	Analyte-free water, SS funnel	14 days	CCI Level C	TCL Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 ml vial
	Post-Equipment Rinsate Blank	Water	1 per set of field-cleaned equipment (5%)	6	Prepared in Field	Analyte-free water, SS funnel	14 days	CCI Level C	TCL Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 ml vial
	(if equipment are decontaminated in the field)												
	Trip Blank	Water	1 Per cooler containing volatile samples	7	Prepared by Lab	(2) 40 mL vials	14 days	CCI Level C	TCL Volatiles	8260B	14 day	HCl pH< 2; Cool to 4°C	(2) 40 mL vials
Groundwater Diffusion Bag Samplers	Temporary well points	Water	Once	36 + 4 dup + 2 MS + 2 MSD Total = 44	Grab	EON PDBS or equiv.	14 days	CCI Level C	TCL Volatiles, metals, nutrients	8260B, other SW846	14 day	VOC = HCl pH< 2; All = Cool to 4°C	VOC = (2) 40 mL vials, other as per lab
	Pre-Equipment Rinsate Blank	Water	1 per set of pre-cleaned equipment (5%)	2	Prepared in Field	Analyte-free water, SS funnel	14 days	CCI Level C	TCL Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 ml vial
	Post-Equipment Rinsate Blank	Water	1 per set of field-cleaned equipment (5%)	2	Prepared in Field	Analyte-free water, SS funnel	14 days	CCI Level C	TCL Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 ml vial
	(if equipment are decontaminated in the field)												
	Trip Blank	Water	1 Per cooler containing volatile samples	3	Prepared by Lab	(2) 40 mL vials	14 days	CCI Level C	TCL Volatiles	8260B	14 day	HCl pH< 2; Cool to 4°C	(2) 40 mL vials

Notes:
1. Calendar days

TABLE 5
Sampling and Analytical Summary

Sample Task	Sample Point	Matrix	Sampling Frequency	Approx Sample No	Sampling Method	Sampling Equipment	TAT[1]	Data Package Reqmnt	Required Analysis	Analytical Method	Holding Time	Sample Preservtn	Containers
Soil Sampling													
Waste Characterization Sampling Solids													
Drill Cuttings/Boring Material	Drums	Soil/ Solids	1 per 6 Drums	1	Composite 5 random grabs into 1 sample (do not composite VOCs)	SS spoon, SS bowl	14 days	CCI Level B	TCLP Volatiles	1311/8260B	14 day TCLP extr; 14 day analysis	Cool to 4°C	(1) 4 oz amber glass
									TCLP Semi-Volatiles	1311/8270C	14 day TCLP extr; 7 day extr; 40 day analysis	Cool to 4°C	(2) 8 oz amber glass
									TCLP Metals	1311/6010B/ 7470	6 month TCLP extr; 6 month analysis Hg: 28 day TCLP extr; 28 day analysis		
									TCLP Pesticides	1311/8081A	14 day TCLP extr; 7 day extr; 40 day analysis		
									TCLP Herbicides	1311/8151A	14 day TCLP extr; 7 day extr; 40 day analysis		
									PCBs	8082	14 day extr; 40 day analysis		
									Corrosivity	9045a	ASAP		
									Ignitability	1010/1020	ASAP		

Notes:
1. Calendar days

TABLE 5
Sampling and Analytical Summary

Sample Task	Sample Point	Matrix	Sampling Frequency	Approx Sample No	Sampling Method	Sampling Equipment	TAT[1]	Data Package Reqmnt	Required Analysis	Analytical Method	Holding Time	Sample Preservtn	Containers
Waste Characterization Sampling Liquids													
Characterization of Decontamination Water and/or Well Development Water	Decon or Purge water	Water	As Required	1 (or as needed for disposal)	Grab	Drum thief or dip jar	14 days	CCI Level B	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		
									TCL Herbicides	8151A	7 day extr; 40 day analysis		
									TAL Metals	6010B/7470A	0 days; Hg = 28 da	HNO3 pH< 2; Cool to 4°C	(1) 500ml HDPE
									Ignitability	9040B	ASAP	Cool to 4°C	(1) 250 mL amber glass
									Corrosivity	Chapter 7.3	ASAP	Cool to 4°C	(1) L amber glass

Notes:
1. Calendar days

A Geoprobe™ DPT drill rig will be used to advance a series of borings along the eastern landfill boundary for collection of groundwater samples. The DPT borings will be advanced in two phases, with the first phase borings installed at the eastern landfill/property boundary to determine the location of any dissolved VOC plume which may be migrating toward the offsite GOAA ditch to the east. The second phase of DPT groundwater borings will be installed offsite between the east fence line and the GOAA ditch, to further evaluate the mass of contaminant migrating toward the ditch.

In and along the GOAA ditch, a series of six sampling transects will be utilized to evaluate the capacity of the site soils to naturally attenuate the contaminants of concern in groundwater. Surface water samples will also be collected directly from the ditch at the time the PDBSs are removed from the wells to evaluate any potential VOC flux from groundwater to surface water.

All soil and groundwater sampling locations will be marked or staked in the field prior to initiation of field work, and the necessary agencies and departments will be notified regarding activities planned at these locations. Clearance and marking of existing underground water, natural gas, telephone, electrical and other utility lines which are potential hazards at the site will be obtained prior to mobilization. Once utilities are marked and identified, sample locations will be adjusted as needed.

Upon completion of sampling, all borings will be promptly backfilled to the land surface with a Portland cement or bentonite grout, in accordance with applicable regulations. All boring locations will be marked with the station I.D. for the survey team to establish horizontal location coordinates.

5.3.1 Groundwater DPT Investigation

To identify groundwater contamination at the eastern landfill/property boundary, a series of initial groundwater samples will be collected at multiple depths along the eastern fence line. The Geoprobe™ DPT drill rig will be used with stainless steel groundwater sampling screens to collect groundwater samples from up to 25 Phase I borings. Three groundwater samples will be collected from each Phase I boring, using a separate pre-cleaned sampling screen and drive point for each interval within each boring. Samples will be collected from depths of 10 (or depth to water table, whichever is greater), 20, and 30 feet below land surface (bls) in each boring.

The Phase I DPT borings will be located in a north-south line paralleling the east fence, along the east edge of the former landfill. Borings will be spaced at distances of approximately 75 to 100 feet apart, extending approximately 1,500 to 2,000 feet, depending on site access and conditions. This will result in installation of approximately 20 to 25 Phase I borings, and collection of approximately 60 to 75 groundwater samples.

To further evaluate the area where the greatest mass of CVOC contaminants is migrating past the fence toward the GOAA ditch, nine Phase II borings will also be installed during a separate mobilization. The borings will be placed in a line along the west side of the ditch where the Phase I DPT groundwater results show the highest CVOC concentrations. Groundwater samples will be collected from the Phase II DPT borings at depths of 5, 10, 15, 20, 25, and 30 feet, provided that sufficient groundwater for sampling is present in all

intervals. A total of up to approximately 54 Phase II groundwater DPT samples will be collected for chemical analysis for VOCs by EPA SW 846 Method 8260b.

The DPT groundwater sampling equipment will be standard Geoprobe™ DPT devices, equipped with a stainless steel sampling screen 4 feet in length, for groundwater sample collection. The actual sampling screen length used during the investigation will be selected on the basis of the yield obtained during purging activities, and will be noted in the Field Logbook and on the Chain of Custody forms.

A clean sampler will be pushed to the 10-foot depth, the stainless drive point on the lead rod will be removed, and the screen cover retracted to allow water to enter the screen. A clean piece of Teflon tubing will be inserted into the DPT rod and lowered to the screen depth. A peristaltic pump will be attached, and the screen will be purged until the water is as clear as practicable. Water quality parameters will be measured in the field with a portable meter, and then the sample containers will be filled by extracting the tubing and reversing the pump to prevent pressurization of the sample water. The rod and screen will then be removed and decontaminated, and a clean sampling screen will be advanced to the next sampling interval.

Groundwater samples will be collected from depths of approximately 10, 20 and 30 feet bls in each Phase I DPT boring. After sampling, the Teflon tube will be discarded, the screen and rod will be extracted, the boring grouted, and an adjacent boring advanced to the subsequent sampling depth. A separate boring, clean tools, and new Teflon tubing will be used to collect samples from the three depths at each boring location.

Phase II DPT borings will be located in a line on the east side of the fence, between the fence and the west edge of the GOAA ditch. The horizontal spacing of the Phase II borings will be based on the width of the observed plume, as determined by the Phase I groundwater analytical results. Groundwater samples will be collected from depths of 5, 10, 15, 20, 25 and 30 feet in Phase II borings, if sufficient groundwater is available for sampling at all intervals.

All borings will be grouted upon completion, and all purge water will be containerized and retained for waste characterization analysis. The groundwater samples will be delivered or sent via overnight carrier to an offsite laboratory where they will be analyzed for VOCs using EPA SW846 method 8260b.

5.3.2 Temporary Wellpoint Installation

The main objective of installing wellpoints will be to ease sample recovery from two independent saturated zones beneath the floor of the drainage ditch at OU 2. The purpose of these samples is to characterize the extent of the TCE contamination present in the subsurface soils and to evaluate whether contaminated groundwater is discharging to the ditch bottom.

Soil and groundwater samples will be collected and utilized in this ditch bottom investigation to evaluate TCE occurrence in soil and groundwater beneath the GOAA ditch. Temporary wellpoints will be installed at two depths (2 feet and 5 feet) with soil, groundwater, and surface water samples coming from each location. The temporary wells will be installed along six transects across the ditch bottom (perpendicular to ditch centerline), with one sampling location positioned at each side of the ditch located near the

edge of water, and one point located in the center of the ditch at each transect. This will result in collection of approximately 36 groundwater samples. One soil sample will be collected from the 0- to 2-foot depth interval at each location, for a total of 18 soil samples.

Temporary wellpoints will be constructed of 1.4-inch or 2-inch diameter polyvinyl chloride (PVC) pipe with a 0.010-inch slotted screen 2 feet in length. Wellpoints will be installed by driving them to the desired depth with a fence post driver, leaving sufficient casing riser above the ditch water surface to prevent water intrusion. Prior to installing each well, a soil sample will also be recovered from each wellpoint location at an approximate depth of 0 to 2 feet bls for chemical analysis for VOCs, nutrients, metals, and other inorganic compounds.

The shallow wellpoint at each of the 18 locations will have a screened interval of 0 to 2 feet bls, and the deeper wellpoint will be screened at the 3- to 5-foot bls depth. Each well at each transect location will be installed in a separate driven boring, resulting in three temporary wells installed at each transect station location. Cement grout suitable for underwater conditions will be placed around the riser of each wellpoint after installation.

PDBSs will then be installed in each temporary well to measure dissolved VOC groundwater concentrations at various depths below the ditch bottom.

5.3.3 Groundwater Samples from Passive Diffusion Bag Samplers

Once the temporary wellpoints are installed, each well will be developed following standard well installation practices. Development water will be containerized for characterization analysis. It is anticipated that PDBSs, such as the EON Products, Inc. Equilibrator™ Diffusion Sampler, will be installed in each of the 36 temporary wellpoints along the GOAA ditch. Customized-length samplers will be requested to maximize the sample volume. Analyte-free water will be provided by the subcontractor laboratory to fill the samplers at the site immediately prior to installation.

Samplers will be labeled and suspended below the water table in each well. The samplers will be left in the wells for a minimum of 2 weeks before retrieval for chemical analyses.

5.3.4 Soil Sampling

Soil and sediment sampling will be conducted to an approximate depth of 3 to 5 feet below the ditch or swale bottom at each of the 18 temporary wellpoint locations. Soil samples will be retrieved with a hand auger and will be delivered or shipped via overnight courier to an offsite laboratory for VOC and other analyses as stated in Table 5.

5.3.5 Surface Water Sampling

On the date of retrieval of the PDBSs from the temporary wells, surface water samples will also be collected from each of the 18 wellpoint sample locations beginning, with the downstream transects sampled first to prevent contamination by the disturbed water.

Sample descriptions, site conditions, and any observations regarding potentially contaminated zones encountered will be recorded in the Field Logbook. The station number and depth interval will be recorded on the sample, on the Chain of Custody form, and in the Field Logbook. Samples will be analyzed for the parameters listed in Table 5.

5.4 Field Quality Control

Field duplicate samples, pre-equipment, and post-equipment blank samples will be collected at a minimum frequency of 10 percent times the total number of samples collected for an analysis and rounded to the nearest whole number. One trip blank sample will be provided at a frequency of one per sample cooler containing volatile samples. Matrix spike/matrix spike duplicates (MS/MSDs) will be required at a maximum frequency of one per sample event or a minimum frequency of one per 20 samples (5 percent).

Post-equipment samples will be collected only when sampling equipment is decontaminated in the field.

Field water blanks will be collected at a rate of two per source for all parameters measured. One will be collected at the beginning of the project and one at the end.

Quantity and frequency of field QC samples are detailed in Table 5.

5.5 Sample Handling and Chain of Custody

Sample collection procedures and site conditions at the time of sampling will be documented in a Field Logbook by the field team leader. Samples will be collected in prepared containers supplied by the subcontractor laboratory, using preprinted Chain of Custody logsheets and coolers for transport of the samples. Samples will be iced, preserved as appropriate, and transported by the sampling team or by bonded overnight courier to the laboratory for analysis. The Chain of Custody will be maintained at all times after sampling occurs until analysis is completed.

5.6 Waste Characterization Sampling

Wastestreams from various sampling activities such as DPT groundwater sampling and soil sampling will be collected in labeled drums for analysis to determine whether the wastes must be disposed of as hazardous waste under Resource Conservation and Recovery Act (RCRA) regulations.

5.6.1 Water

The aqueous waste from groundwater sampling and equipment decontamination activities will be collected in drums. A sample will be collected from the drums using either a dip jar or bailer. The sample containers for VOC analyses will be filled first. The 40-ml vials will be filled so that there is no headspace in each vial. The sample containers for the remaining analyses will then be filled.

Navy Level B QC and JV-II Level B packages will be required along with appropriate QC samples for the required waste characterization and incidental wastestream samples. All analytical data will be submitted in both hard copy and electronic format.

5.6.2 Soils

The solid waste (soils) from soil boring and sampling and equipment decontamination activities will be collected in drums. A composite sample will be collected from the drums using stainless steel hand samplers. The sample containers for VOC analyses will be filled

first. The vials will be filled so that there is no headspace in each vial. The sample containers for the remaining analyses will then be filled.

Navy Level B QC and JV-II Level B packages will be required along with appropriate QC samples for the required waste characterization and incidental wastestream samples. All analytical data will be submitted in both hard copy and electronic format.

5.7 Equipment Decontamination

Decontamination of the drill rig, drill rods, samplers, tools, and all downhole equipment will consist of high pressure, low volume steam cleaning at the temporary drilling equipment decontamination pad. All tools and drilling equipment to be placed in the drill hole and the rear of the drill rig will be steam cleaned:

- Before drilling begins
- Between each boring, and
- After work is completed.

JV-II field personnel will designate a central staging and decontamination area. All wash and decontamination water will be collected, containerized and sampled for waste characteristics. All personnel protection clothing and articles will be contained in drums and disposed of separately.

5.8 Analytical Methods

Soil and groundwater samples will be collected and analyzed for the analytical methods summarized in Table 5.

Preliminary analytical results will be faxed to Bonnie Hogue at the following fax number per the turnaround times listed in Table 5 from day of sample receipt. The final hard copy data and electronic file will be delivered to Melissa Osborne within 14 days of sample receipt.

Bonnie Hogue/Melissa Osborne
CH2M HILL
115 Perimeter Center Place, Suite 700
Atlanta, GA 30346
(770) 604-9182 x263/x562
(678) 579-8106 (fax)

QC and minimum reporting or practical quantitation limit requirements are specified in the approved laboratory's QAPP. These limits will be reviewed and approved by the JV-II QA Chemist and, at a minimum, will meet the requirements specified in the POP (HLA, August 1997).

6.0 Data Interpretation, Presentation, and Recommendations

After completion of sampling and analysis and data validation QC checks, the groundwater, soil, and surface water data will be reviewed and integrated into a graphical presentation figure and a tabular summary. The location of the highest VOC concentrations in the lower

south groundwater plume will be identified, and any indications of contamination of the GOAA ditch soils or surface water will be discussed with respect to contaminant fate and transport.

After the field data are compiled and evaluated, a groundwater contaminant fate and transport assessment will be conducted. Available literature regarding site hydrogeologic conditions will be reviewed, as well as results of current and previous investigations at OU 2 and NTC Orlando. This information on aquifer characteristics and the data gathered in this field effort on OU 2 VOC distribution will be used in assessing the environmental fate and transport of TCE and its breakdown products. Qualitative predictive models may be used, as appropriate, to simulate site groundwater flow conditions.

A Technical Memorandum will be prepared which will present the study results and making recommendations for further action to address the VOC plume.

7.0 References Cited

CH2M HILL Constructors, Inc. 1999. Basewide Work Plan, NTC Orlando; Orlando, Florida.

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Florida Administrative Code. 1999. Chapters 62-777, 62-730 and 62-550, FDEP, Tallahassee, Florida.

Harding Lawson Associates. 1997. Project Operations Plan for Orlando Naval Training Center, Orlando, Florida.

Terraine, Inc. November 2003. Second Quarter Groundwater Sampling Report for OU 2, NTC Orlando; Orlando, Florida.

Tetra Tech NUS, Inc. March 2001. Remedial Investigation Report for Operable Unit 2, McCoy Annex Landfill, NTC Orlando; Orlando, Florida.

U.S. Environmental Protection Agency. November 2001. Region IV Environmental Investigative Standard Operating Procedures and Quality Assurance Manual.

Attachment A
Site Health and Safety Plan