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SAMPLING AND ANALYSIS PLAN FOR REMEDIAL INVESTIGATION AT SITE 43 NAS
PENSACOLA FL
1/1/2005
TETRA TECH

Sampling and Analysis Plan for Remedial Investigation at Site 43

**Naval Air Station Pensacola
Pensacola, Florida**



**Southern Division
Naval Facilities Engineering Command
Contract Number N62467-94-D-0888
Contract Task Order 0355**

January 2005

**SAMPLING and ANALYSIS PLAN
FOR
REMEDIAL INVESTIGATION AT SITE 43**

**NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA**

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ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirements
bls	Below Land Surface
°C	Degrees Celsius
CCI	CH2MHILL Constructors, Inc.
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CLEAN	Comprehensive Long-term Environmental Action Navy
CLP	Contract Laboratory Program
COC	Contaminant of Concern
CTO	Contract Task Order
DPT	Direct-push Technology
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
GCTL	Groundwater Cleanup Target Level
HASP	Health and Safety Plan
HCl	Hydrochloric Acid
HNO ₃	Nitric Acid
IDW	Investigation-derived Waste
IR	Installation Restoration
IRA	Interim Removal Action
mL	Milliliter
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NAS	Naval Air Station
NAVFAC EFD SOUTH	Southern Division, Naval Facilities Engineering Command
NELAP	National Environmental Laboratory Accreditation Program
oz	Ounce
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
RCRA	Resource Conservation and Recovery Act
RG	Remedial Goal
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SCTL	Soil Cleanup Target Level
SOP	Standard Operating Procedure
SVOC	Semivolatile Organic Compound

ACRONYMS (CONTINUED)

TAL	Target Analyte List
TCL	Target Compound List
TtNUS	Tetra Tech NUS, Inc.
UCL	Upper Confidence Limit
UST	Underground Storage Tank
µg/L	micrograms per Liter
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

1.0 INTRODUCTION

Tetra Tech NUS, Inc., (TtNUS) under contract to the Department of Navy, Southern Division, Naval Facilities Engineering Command (NAVFAC EFD SOUTH) is submitting this Sampling and Analysis Plan (SAP) for Remedial Investigation at Site 43 at Naval Air Station (NAS) Pensacola, Pensacola, Florida. This SAP was prepared under the Comprehensive Long-term Environmental Action Navy (CLEAN) III Contract Number N62467-94-D-0888, Contract Task Order (CTO) 0355 and was developed based on the results of the Site Characterization Report (TtNUS, 2004a).

1.1 FACILITY BACKGROUND

NAS Pensacola (Figure 1-1) is located in Escambia County, in Florida's northwest coastal area, approximately five miles west of the Pensacola City limits. The approximately 5,000-acre installation was constructed in the 1800's. Prior to construction, the facility was undeveloped and sparsely vegetated. Land use at NAS Pensacola consists of various military housing, training, and support facilities as well as large industrial complexes for major repairs and refurbishment of aircraft engines and frames. Additional details on the NAS Pensacola facility may be found in the facility administrative record. Site 43 is located at the southwest corner of Murray and Taylor Roads and consists of an area approximately 200 feet by 200 feet in size.

1.2 PURPOSE OF THE SAP

This SAP serves as a guide for the remedial investigation activities to be conducted at Site 43. This plan documents the procedures for field activities and sample analyses. The SAP specifies the sampling protocol and procedures for data collection and sample analysis, sample locations, frequency of samples to be collected, sample designations, sample handling, sampling equipment, and handling of investigation-derived waste (IDW). This plan was prepared in accordance with the TtNUS Corporate Quality Assurance Program Manual, dated January 1, 2001, and the TtNUS Florida Regional Quality Assurance Program Manual, dated October 9, 2002.

The field activities for the remedial investigation will include the collection of samples from surface soil, subsurface soil, and groundwater for submission to a National Environmental Laboratory Accreditation Program (NELAP)-certified laboratory for analysis. The data collected during the remedial investigation will be used in preparing a Remedial Investigation Report.

INSERT FIGURE 1-1 HERE Facility Location

1.3 SITE DESCRIPTION AND HISTORY

Site 43 (Figure 1-2) is located at the southwest corner of Murray and Taylor Roads and north of the access road to the NAS Pensacola Officer's Quarters. The area is grass covered with oak trees scattered throughout the site. Previously the site contained a tennis court and a building foundation/basketball court; however, in 2003 the tennis and basketball courts were removed by the facility. Overhead utilities are not present within the site area; however, an underground water line traverses the site in a general west to east direction.

In December 1992, a child using a metal detector discovered a partially exposed drum located east of the tennis court. A site reconnaissance indicated an additional partially buried drum was also present. One drum was in a vertical position; its end punctured revealing standing water in the interior. The second drum also appeared to be in a vertical position, but was not obviously punctured. A third iron object resembling a drum rim was observed east of the tennis court. Smaller, rusted metal debris was observed at the surface. No odors, visible soil stains, or other indications of contaminant release were observed. The area surrounding the buried drums was fenced to prevent general access until further investigations could be conducted. Prior to the current usage as a residential recreational area the site's use is unknown.

1.4 REGULATORY SETTING

The Navy Installation Restoration (IR) Program was designed to identify and abate or control contaminant migration resulting from past operations at naval installations, with the goal of expediting and improving environmental response actions while protecting human health and the environment. The IR program is conducted in accordance with Section 120 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 and Executive Order 12580. CERCLA requires that federal facilities comply with the act, both procedurally and substantively. Site 43 is being investigated as part of CERCLA requirements.

INSERT FIGURE 1-2 HERE Site Map

1.5 REPORT ORGANIZATION

The SAP is organized into eight sections. Below is a list of the sections and a brief description of their purpose:

- Section 1.0 – Presents the purpose, site description, and regulatory setting for the Remedial Investigation at NAS Pensacola.
- Section 2.0 – Summarizes previous investigations.
- Section 3.0 – Presents the site-specific investigation discussion.
- Section 4.0 – Presents the investigative methodology for conducting the assessment.
- Section 5.0 – Addresses the waste resulting from investigation activities.
- Section 6.0 – Discusses the investigative results of the assessment.
- Section 7.0 – Presents the sampling and analysis schedule of operations for the site assessment activities.
- References – Lists all references used in preparing this planning document.
- Supporting data are provided in the Appendices.

2.0 PREVIOUS INVESTIGATIONS

This chapter summarizes previous investigations performed at Site 43 at NAS Pensacola. Previous investigations include a geophysical survey, site characterization, drum characterization, and interim remedial action.

2.1 GEOPHYSICAL SURVEY

In March 1994, Ensafe/Allen & Hoshall conducted a geophysical investigation to assess the area surrounding the exposed drums using gradient and total magnetic surveys. Geophysical methods were used at the site because it is non-invasive and could provide a comprehensive overview of potential buried drums relatively quickly and easily. The objectives of the investigation were to determine the aerial extent of the disposal area and to determine if it was an extensive or limited drum disposal area. The geophysical survey was performed using a gradient magnetic geophysical survey, which responds exclusively to ferrous metals. The total magnetic field and vertical magnetic gradient were measured during the survey (Ensafe/Allen & Hoshall, 1994).

The suspected size of the disposal area was larger than the original fenced area installed based on the previous site reconnaissance. Although cultural clutter (buried utilities, metal fences, poles, buildings, etc.) precluded a definitive interpretation, magnetic anomalies typical of drums were limited to an area approximately 100 feet by 120 feet in size. The geophysical survey suggested that the disposal area was not systematic and widespread, but limited in aerial dimension and the number of disposed drums. A total of 25 individual geophysical anomalies were identified; however, the actual number of drums disposed in the area was not determined. The report concluded that the drum disposal area, as well as several anomalies discovered outside the disposal area should be further explored by test pitting or trenching to a depth of 5 feet. Figure 2-1 provides the survey results including the investigation area and areas of suspected drum locations. The summary report for the geophysical survey is included in Appendix A.

2.2 SITE CHARACTERIZATION

Following the geophysical survey, TtNUS conducted a site characterization sampling event in October 1999. The purpose of the site characterization was to investigate the anomalies detected during the geophysical survey, collect surface and subsurface soil samples from the anomaly locations, install temporary micro wells and collect samples from the micro wells. The results of the investigation are

Figure 2-1 Geophysical Anomaly Locations

summarized in the "Site Characterization Report (Site 43) NAS Pensacola, Pensacola Florida" submitted January 2004 (Appendix A).

As part of the site characterization, 17 surface soil samples collected at the site were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), metals, and cyanide. The sample locations are shown on Figure 2-2. The surface soil samples were reported to contain benzo(a)pyrene and eight metals (antimony, arsenic, barium, copper, iron, lead, nickel, and vanadium) at concentrations exceeding the Florida Department of Environmental Protection (FDEP) Soil Cleanup Target Levels (SCTLs) for Direct Exposure - Residential [Chapter 62-777, Florida Administrative Code (FAC)] and NAS Pensacola background concentrations. In addition, concentrations of antimony and nickel were reported to exceed FDEP's SCTLs for leachability to groundwater criteria (Chapter 62-777, FAC).

Following the surface soil sampling fieldwork, test pitting activities, anomaly removal and subsurface soil sampling was completed at Site 43. Test pitting was completed at 17 of the geophysical anomaly areas including anomaly area 4 and areas 10 through 25. As recommended, the pits were advanced to a depth of 5 feet using a track hoe and shovels. Drums were encountered and removed at 2 of the 17 anomaly areas (anomaly 15 – 1 drum; anomaly 20 – 13 drums). Following the excavation, seven subsurface soil samples were collected. Due to the shallow burial of the drums, subsurface, soil samples were collected immediately beneath the buried drums at depths ranging from 2 to 3.5 feet below land surface (bls). All soil samples were collected above the water table. The sample locations are shown on Figure 2-2. The samples were analyzed for the same parameters as the surface soil samples. The analytical data indicated benzo(a)pyrene, dibenzo(a,h)anthracene, and nine metals (antimony, arsenic, barium, copper, iron, lead, nickel, zinc, and vanadium) were present at concentrations exceeding the FDEP SCTL for Direct Exposure - Residential (Chapter 62-777, FAC) and NAS Pensacola background concentrations. Antimony, arsenic, barium, nickel and zinc concentrations were reported to exceed FDEP's SCTLs for leachability to groundwater criteria (Chapter 62-777, FAC).

During the Site Characterization Investigation, 14 drums were excavated and stored in over pack containers. The contents of the drums were later sampled during the drum characterization sampling event. The results from the drum characterization were included in the Site Characterization Report as an addendum. The analytical data from the drum characterization indicated that 12 of the 14 drums contained insufficient volume/mass to sample. The two remaining drums were sampled and contained metals and polynuclear aromatic hydrocarbons (PAHs) at concentrations exceeding FDEP SCTLs.

In addition to the test pitting subsurface soil sampling, a direct-push technology (DPT) rig was used to collect five additional soil samples from above the water table. The additional soil samples were collected

INSERT FIGURE 2-2 HERE

at locations corresponding to the soil boring and monitoring well locations shown on Figure 2-2. The samples were analyzed for the same parameters as the previous subsurface soil samples. However, the analytical results for the subsurface soil samples collected from additional locations did not indicate the presence of contaminants above regulatory standards or NAS Pensacola background concentrations.

Five temporary monitoring wells were installed at Site 43 during the Characterization Study and sampled for VOCs, SVOCs, pesticides and PCBs, Target Analyte List (TAL) metals and cyanide. The sample locations are shown on Figure 2-2. The groundwater samples were reported to contain methylene chloride, a common laboratory contaminant, and two metals (aluminum and iron) at concentrations exceeding the FDEP Groundwater Cleanup Target Levels (GCTLs) specified in Chapter 62-777, FAC. Although concentrations of both metals exceeded the FDEP GCTLs, only iron was reported to exceed the NAS Pensacola background levels.

2.3 INTERIM REMEDIAL ACTION

Following the completion of the site characterization investigation and addendum, an Interim Removal Action (IRA) was completed by CH2MHILL Constructors, Inc. (CCI) to remove the metal debris and contaminated surface and subsurface soils at the site. The interim removal action is summarized in the "Interim Removal Action Report Excavation of Contaminated Soil and Groundwater Monitoring at Site 43 Naval Air Station Pensacola, Pensacola, Florida" dated September 2003 (Appendix A).

Prior to initiating the IRA fieldwork, CCI developed remedial goals (RGs) for some contaminants of concern (COCs) at the site using 95% Upper Confidence Limit (UCL) procedure for surface soils. Once the 95% UCL-based RGs were calculated and approved by the regulators, samples were collected to delineate the extent of contamination prior to excavation activities. Forty-one (41) native surface soil samples and 21 subsurface soil samples were collected in the vicinity of the identified remedial areas for source delineation of the associate metals. Based on the laboratory results, the areas of excavation were defined (CCI, 2003).

Of the initial 15 anomalous areas characterized for contamination, 6 areas exceeded the initial cleanup criteria outlined in the Site 43 Work Plan. These areas included anomaly areas 4, 14, 15, 16, 20 and 22. From April through May 3, 2001, a total of 657 cubic yards of soil and debris were removed from these areas at Site 43. The excavated soil was either stockpiled or loaded directly onto transport vehicles. Soil that was analyzed and determined to be hazardous for lead was manifested accordingly. Approximately 20 to 25 rusted metal drums and drum parts and inert ornamental ordnance and munitions were uncovered in addition to the original 14 drums identified and previously removed (CCI, 2003). Following excavation activities, the excavated areas were backfilled with a clayey soil for the liner and topsoil for the

upper 1 foot surface completion. Following testing for appropriate density, the excavated areas were hydro-seeded with grass seed and fertilizer (CCI, 2003).

Baseline groundwater sampling was conducted prior to excavation activities and a subsequent round of semi-annual groundwater sampling was conducted after excavation activities were completed. Groundwater samples were analyzed for iron only. All detected iron concentrations were below the established NAS Pensacola background concentrations of 1,707 micrograms per liter ($\mu\text{g/L}$) for both consecutive sampling events (CCI, 2003).

Following excavation activities, the cleanup criteria were re-evaluated and revised. Many of the RGs established using the 95% UCL were not appropriate for the site. The University of Florida guidance (2004) indicates that 95% UCL cannot be used for barium, copper, nickel, or vanadium for current or potential residential land use due to acute toxic effects in children as a result of direct exposure. Additionally, the United States Environmental Protection Agency (USEPA) has indicated that 95% UCL should not be used for lead. Consequently, it was determined that nine other areas, anomaly areas 11, 12, 13, 17, 18, 19, 21, 23, and 24 contained contaminants that exceeded the revised cleanup criteria. Areas with exceedances that were not excavated included 11, 12, 13, 17, 23, and 24 (CCI, 2003). In addition, excavation activities were completed to a depth of 2 feet bls; however, subsurface soil samples collected within the excavation area at depths ranging from 2 feet bls to 3.5 feet bls during the Characterization Study contained exceedances of the revised RGs.

Because of the revised lower RGs established for the site after the soil removal activities were completed, CCI recommended a Remedial Investigation and Feasibility Study be completed at Site 43 to delineate contaminant of concern (COC) contamination and identify a final remedy for the site (CCI, 2003).

3.0 TECHNICAL APPROACH

3.1 OVERVIEW

The primary objective of this sampling plan is to determine if the previous soil remediation actions at Site 43 were effective at reducing the risks identified in the Site Characterization Report and to determine if soil and groundwater remains protective to human health at the site. Soil and groundwater samples will be collected for off-site laboratory analysis and the analytical results will be screened against appropriate federal and state screening values. Field activities, such as, sampling and monitoring well installation will be conducted in accordance with the Health and Safety Plan (HASP) and the FDEPs Standard Operating Procedures (SOPs) for Field Activities (FDEP, 2004). In the event the FDEP SOPs do not address a specific task, TtNUS will defer to the TtNUS Corporate SOPs (TtNUS, 2004b).

3.2 SAMPLING AND ANALYSIS PLAN

Surface Soil Sampling Plan

Although extensive soil sampling was completed prior to the excavation activities at the site, all the areas of revised RG exceedances were not delineated or excavated previously. Surface soils samples collected in conjunction with anomaly areas 11, 12, 13, 17, 23 and 24 were not fully delineated. To delineate the exceedance area, TtNUS will collect surface soil samples from the test pit perimeter and analyze the samples for the same parameters as the indicated exceedance. In addition, three surface soil samples will be collected from the area west of the IRA excavation at the former location of the tennis court. These samples will be used to determine if excavation activities, which were limited previously by the presence of the tennis courts, were extensive enough. Approximately 20 surface soil samples (plus quality assurance and quality control samples) will be collected from on-site locations. The proposed soil sampling locations are shown on Figure 3-1. The surface soil samples will be collected from the ground surface to a depth of 1 foot bls using a hand-auger.

All surface soil samples collected at the site will be analyzed for Contract Laboratory Program (CLP) Target Compound List (TCL) SVOCs (USEPA Method SW-846 8270C), and inorganic analytes (USEPA Method SW-846 6010B) specific to the reported exceedances that are being investigated.

INSERT FIGURE 3-1

The specific parameters to be analyzed for each anomaly area are as follows:

- Anomaly Area 11 – SVOCs, arsenic, barium, copper, and lead
- Anomaly Area 12 – SVOCs, arsenic, barium, copper, lead, and vanadium
- Anomaly Area 17 – SVOCs and copper
- Anomaly Area 23 – SVOCs, arsenic, barium, lead, and vanadium
- Anomaly Area 24 – SVOCs, copper and lead

In addition, the soil samples for laboratory analysis will be collected in accordance with FS 3100, Surface Soil Sampling (FDEP, 2004). The laboratory analytical methods are specified in Table 3-1.

Subsurface Soil Sampling Plan

Because all areas of the revised RG exceedances were not delineated or excavated previously, additional subsurface soil sampling is required to fully characterize the contaminant levels at the site. Nine soil borings and associated subsurface soil sampling will be completed at geophysical anomaly/test pit locations 11, 12, 13, 17, 23 and 24 to further delineate the subsurface soils at locations not previously excavated. Six additional soil borings and associated subsurface soil sampling will be completed within the IRA excavation area to further delineate subsurface soil exceedances not removed during the IRA. And finally, five soil borings and associated subsurface soils samples will be completed at the former tennis court location to address potential subsurface soil contamination not previously evaluated due to the presence of the structure.

The soil borings will be completed using a DPT soil-sampling device (e.g., Geoprobe[®] system) to obtain subsurface soil samples at Site 43. The DPT sampler will be used to collect samples from discrete intervals below 2 feet bls to above the zone of groundwater saturation. It is anticipated that two soil samples will be collected from each soil boring, the first immediately below the soil excavation limit and the second at approximately 5 to 6 feet bls. The sampling methodology will be compliant with FDEP's Global RBCA Rule 62-780, including section 62-780.600(5) (c) 1, which describes how to conduct soil sampling when the remedial approach for the surface soil is proposed to be 95% UCL. In addition, quality assurance and quality control samples will be collected. The proposed subsurface soil investigation area is shown on Figure 3-2.

All subsurface soil samples collected at the site will be analyzed for CLP TCL SVOCs (USEPA Method SW-846 8270C), and specified inorganic analytes including arsenic, barium, copper, lead, and vanadium (USEPA Method SW-846 6010B). The soil samples for laboratory analysis will be collected in accordance with FS 3200, Subsurface Soil Sampling (FDEP, 2004). The laboratory analytical methods are specified in Table 3-1.

**TABLE 3-1
SUMMARY OF SOIL ANALYTICAL REQUIREMENTS
SAMPLING AND ANALYSIS PLAN FOR
REMEDIAL INVESTIGATION AT SITE 43
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA**

Analysis	Analytical Method	Sample Volume ⁽¹⁾	Bottleware	Preservation	Holding Time ⁽²⁾
<u>SOIL SAMPLING; FIXED-BASE LABORATORY</u>					
CLP TCL SVOCs	USEPA SW-846 8270C	1 x 8 oz	widemouth jar with Teflon [®] -lined lid	Cool to 4°C	14 days to extraction; 40 days from extraction to analysis
Specified Inorganic Compounds including: arsenic, barium, copper, lead & vanadium	USEPA SW-846 6010B	1 x 8 oz	widemouth jar (approx. 200 grams)	Cool to 4°C	Within 180 days

NOTES:

- 1 Sample volume may vary based on laboratory requirements.
- 2 Holding times are measured from the date/time of sample collection.

CLP = Contract Laboratory Program
 oz = ounce
 °C = Degrees Celsius
 SVOC = Semivolatile Organic Compound
 TCL = Target Compound List

INSERT FIGURE 3-2 HERE

Micro Well Abandonment and Monitoring Well Installation Plan

Because the temporary micro well network at the site has been compromised, TtNUS will abandon the temporary micro wells that are suspect or compromised and install new permanent monitoring wells for current and future groundwater monitoring activities. Existing micro wells that will be abandoned include Pen-43-1S (micro well is reportedly dry) and Pen-43-3S (micro well is reportedly dry). Micro well Pen-43-4S has not been located since the removal of the tennis court and is believed to have been destroyed; however, TtNUS will attempt to locate the micro well and properly abandon it. Micro wells Pen-43-2S and Pen-43-5S are believed to be secure and will be evaluated during the investigation; however, if the wells are determined to be compromised they will be abandoned. Otherwise the micro wells will be sampled and used in the evaluation of groundwater at the site.

In conjunction with the abandonment of the on-site micro wells, TtNUS will install a new permanent monitoring well network including both shallow and deep monitoring wells. Eight shallow monitoring wells will be installed to an approximate depth of 25 feet bls at the locations shown on Figure 3-3. In addition, two deep permanent monitoring wells will be installed to an approximate depth of 50 feet bls. All monitoring wells will be installed using Hollow Stem Auger drilling methods. The monitoring wells will be installed and constructed in accordance with NAVFAC EFD SOUTH and FDEP guidance documents.

Groundwater Sampling Plan

Groundwater samples will be collected from all accessible and secure on-site micro wells and monitoring wells to assess the current groundwater conditions. It is anticipated that eight shallow monitoring wells, two shallow micro wells, and two deep monitoring wells will be sampled. The well locations are shown on Figure 3-3.

Prior to obtaining groundwater sampling, water levels and total well depths will be measured at all wells. The wells will then be purged, using a peristaltic pump (shallow wells) or submersible pump (deep wells) and a low-flow quiescent purging technique. Purging completion will be determined in accordance with FS 2212, Well Purging Techniques (FDEP, 2004).

The groundwater samples collected from on-site wells will be analyzed for CLP TCL VOCs (USEPA Method SW-846 8260B) and TAL metals (USEPA Method SW 846 6010B, 9010, and 7471). The list of the analyses for each groundwater sample is provided in Table 3-2. Groundwater samples will be collected in accordance with FS 2220, Groundwater Sampling Techniques (FDEP, 2004) and the groundwater piezometric head will be measured in each monitoring well.

INSERT FIGURE 3-3

TABLE 3-2
SUMMARY OF GROUNDWATER ANALYTICAL REQUIREMENTS
SAMPLING AND ANALYSIS PLAN FOR
REMEDIAL INVESTIGATION AT SITE 43
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Analysis	Analytical Method	Sample Volume⁽¹⁾	Bottleware	Preservation	Holding Time⁽²⁾
CLP TCL VOCs	SW-846 8260B	3 x 40 mL	Glass, plastic screw cap, Teflon™-lined	Cool to 4°C, HCl to pH<2	14 days from sampling to analysis
CLP TAL Inorganics	SW-846 6010B, 9010, and 7471	1 Liter	Polyethene, plastic cap, plastic liner	Cool to 4°C; dark HNO ₃ to pH<2	Within 180 days

NOTES:

- 1 Sample volume may vary based on laboratory requirements.
- 2 Holding times are measured from the date/time of sample collection.

mL = milliliter
 °C = Degrees Celsius
 CLP = Contract Laboratory Program
 TCL = Target Compound List
 VOC = Volatile Organic Compound
 TAL = Target Analyte List
 HCl = Hydrochloric Acid
 HNO₃ = Nitric acid

Aquifer Testing

Based on the extensive aquifer testing previously completed that the NAS Pensacola facility, TtNUS will not perform additional aquifer tests as part of the Site 43 RI investigation. In place of site-specific aquifer slug tests, existing aquifer test data and results from pumping tests and slug tests completed at many of the IR and Underground Storage Tank (UST) sites throughout the facility will be included in the IR report.

The facility geology has consistently been described as light brown to tan fine grained quartz sand with associated stringers and lens of clay and gravel. The Site 43 site-specific geology is defined as light to dark brown fine to medium sand with interspersed white fine sand (TtNUS, 2004a). Because of the similarity of the site-specific and facility-specific geologic conditions and the abundance of existing aquifer data for the facility, the time and expense to collect additional site-specific aquifer slug test data is not warranted.

4.0 FIELD OPERATIONS

This section describes the procedures for conducting the project-specific field investigation activities to be performed during the Site 43 Sampling Event. Field operation activities to be performed include mobilization of equipment, waste handling, soil sampling, groundwater sampling, and water level measurements. The individual activities are described below.

4.1 DECONTAMINATION

Decontamination of major equipment and sampling equipment will be in general accordance with FC 1000, Cleaning / Decontamination Procedures (FDEP, 2004).

4.2 WASTE HANDLING

Limited solid wastes in the form of soil or sediment are expected to be generated during this field program. All solid and liquid wastes generated will be collected in 55-gallon drums and will be handled in accordance with applicable state and federal regulations.

4.3 SOIL SAMPLING

Surface soil samples will be collected using a stainless steel hand auger, and subsurface soil samples will be collected using a DPT core barrel. The sample aliquots will be collected at the prescribed intervals as detailed in section 3.2 of this SAP. Each sample aliquot will be screened immediately with a flame ionization detector, then homogenized in a stainless steel bowl and transferred to sample bottles. The samples will be labeled, preserved on ice, and transported to the laboratory. All portions of the sampling equipment used in sample collection will be decontaminated before each use using standard decontamination procedures. Equipment rinsate blanks will be collected from the decontaminated sampler at the prescribed frequency. All soil will be collected using the procedures as specified in FS 3100, Surface Soil Sampling and FS 3200, Subsurface Soil Sampling (FDEP, 2004).

4.4 GROUNDWATER SAMPLING

Groundwater samples will be collected using low-flow purging (typically a rate of less than 1 liter per minute) and sampling with a peristaltic pump (shallow wells) or submersible pump (deep wells) and Teflon™ tubing dedicated to each well. All groundwater samples will be collected using the procedures specified in FS 2200, Groundwater Sampling (FDEP, 2004). If light non-aqueous phase liquid is detected in any monitoring well prior to sampling, a groundwater sample will not be collected at that location.

Prior to groundwater sample collection, the monitoring wells will be purged to remove stagnant water in the well casing. Both purging and sampling operations will be conducted at a flow rate that results in a groundwater turbidity measurement of 20 nephelometric turbidity units or less if possible.

Groundwater samples collected using a peristaltic pump for analysis other than VOCs will be collected using a vacuum trap apparatus to prevent sample contact with the peristaltic pump and placed in precleaned containers supplied by the contract laboratory. The sample aliquot for VOC analysis will be collected last by slowly pulling the Teflon™ tubing out of the well to minimize agitation of the water in the monitoring well and then transferring the contents of the tubing to a VOC vial. Groundwater samples collected using a submersible pump will be collected directly from the delivery tubing. After collection, all samples will be placed in a cooler, chilled with ice, and shipped under chain-of-custody protocol to the off-site laboratory for analysis.

4.5 WATER LEVEL MEASUREMENTS

One round of water-level measurements will be conducted at the site during each sampling event to provide information regarding groundwater flow patterns and gradients. Water levels will be measured from all existing and available monitoring wells at the site. Water-level measurements will be completed within the shortest time possible on the same day, and no sooner than 24 hours after a significant precipitation event to minimize the precipitation effects on the data sets.

In each monitoring well, water-level measurements will be made by obtaining a direct reading from a measuring tape with an attached water interface probe. Measurement will be recorded to the nearest 0.01 foot and referenced to the top of casing notch or north side of the well casing. The measurement tape will be properly decontaminated prior to conducting the measurement event and between each monitoring well.

4.6 SAMPLE HANDLING

4.6.1 Sample Containers, Preservation, Holding Times, and Analyses

The sample containers, preservatives, holding times, and specific analysis are provided in Tables 3-1 and 3-2. Pre-preserved, certified-clean bottleware will be supplied by the subcontracted laboratory.

4.6.2 Sample Documentation, Packaging, and Shipping

Matrix-specific sample logsheets will be maintained for each sample collected. In addition, sample collection information will be recorded in bound field notebooks or specific field forms. Samples will be packaged and shipped according to FS 1000, General Sampling Procedures (FDEP, 2004).

4.7 DATA QUALITY REQUIREMENTS

4.7.1 Laboratory Analyses and Quality Assurance/Quality Control Samples

The analytical methods to be used are presented in Tables 3-1 and 3-2. The analytical data packages should be Naval Energy and Environmental Support Activity Level E (USEPA Level III). The analytical data will receive a full validation.

Rinsate blanks are collected to determine whether the source water or the decontamination process have introduced contaminants to the environmental samples collected. Trip blanks are used to determine if contaminants are introduced in the samples during the sample shipping process. Field duplicates are a single sample split into two portions for a determination of the precision of the sampling and analysis method employed.

The field sampling team will provide the appropriate additional sample volume as prescribed by the laboratory requirements for laboratory duplicate and matrix spike samples. The additional sample aliquots required for analysis of matrix spike/matrix spike duplicates (MS/MSD) will be collected with a frequency of 1 per 20 samples per matrix. See Table 4-1 for frequency of field quality control samples.

4.7.2 Data Reduction, Validation, and Reporting

Formal off-site data validation has been included in this work. The data will be evaluated for, but not limited to precision, accuracy, representativeness, completeness, and comparability parameters using the USEPA Contract Laboratory Program National Validation Functional Guidelines for Organic Data Review (USEPA, 1999), the USEPA Contract Laboratory Program National Validation Functional Guidelines of Inorganic Data Review (USEPA, 1994), and the TtNUS SOPs.

TABLE 4-1

**FREQUENCY OF FIELD QUALITY CONTROL SAMPLES
SAMPLING AND ANALYSIS PLAN FOR
REMEDIAL INVESTIGATION AT SITE 43
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA**

Type Of Samples	Frequency
Rinsate Blank	1 per media per sample event
Trip Blank (VOCs only)	1 per sample shipment
Field Duplicate	1 per 20 samples/matrix
Matrix spike/Matrix spike duplicate (MS/MSD)	1 per 20 samples/matrix

5.0 INVESTIGATION-DERIVED WASTE MANAGEMENT

IDW generated during the RI activities will be managed in accordance with the procedures described in the NAS Pensacola IDW Plan. This document emphasizes management of all IDW in an environmentally responsible manner consistent with the CERCLA program, Resource Conservation and Recovery Act (RCRA) requirements, and the base's standard procedures. The objectives of the IDW management plan are

- Management of IDW in a manner that prevents contamination of uncontaminated areas (by IDW) and that is protective of human health and the environment.
- Minimization of IDW, thereby reducing costs and the potential for human or ecological exposure to contaminated materials.
- Compliance with federal and state requirements that are Applicable or Relevant and Appropriate Requirements (ARARs).

6.0 REMEDIAL INVESTIGATION REPORT

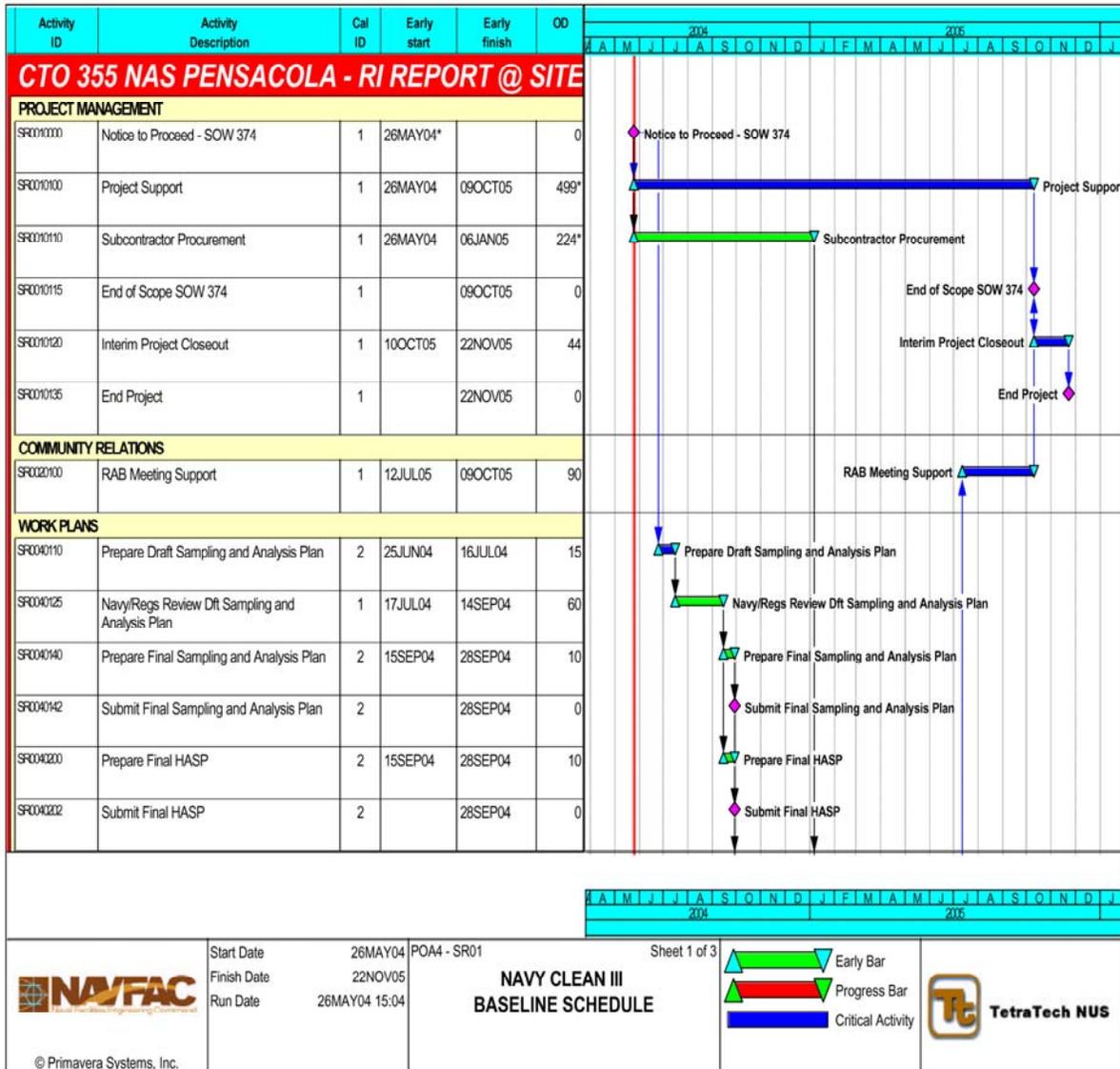
The Draft Remedial Investigation Report will include appropriate sections concerning site background, investigation activities, physical characteristics, nature and extent of contamination, aquifer characteristics, and human health risk assessment and screening level ecological risk assessment.

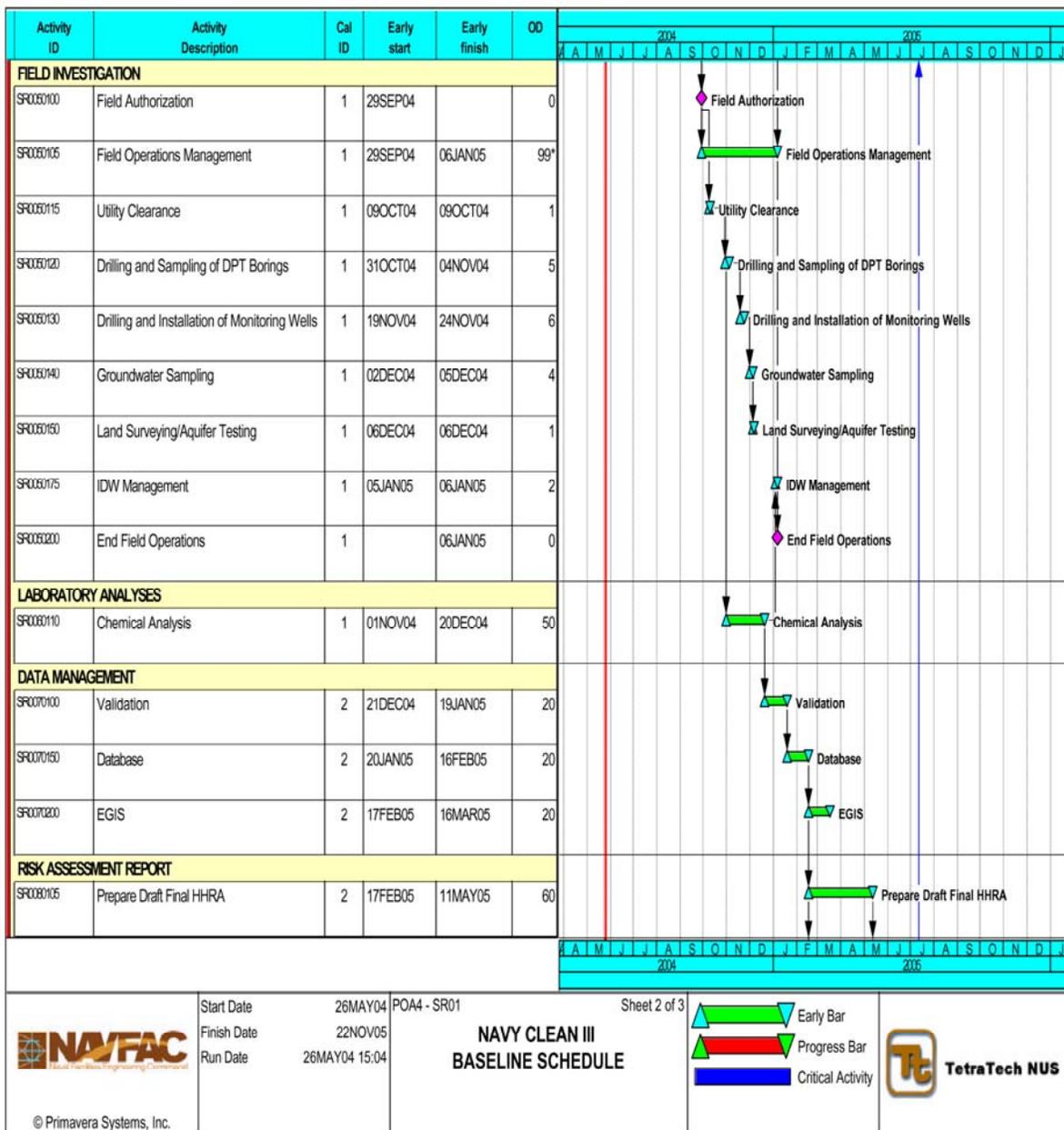
After internal review, the Draft Remedial Investigation Report will be issued to NAVFAC EFD SOUTH for review. The Final Remedial Investigation Report will be issued upon incorporation of review comments.

7.0 PROJECT SCHEDULE

The field investigation activities were originally proposed to begin in October 2004. A delay in the review of the Draft Sampling and Analysis Plan has postponed the project. Attempts will be made to make up or return to the original schedule, however due to the long delay, the scheduled submittal dates for the Final Remedial Investigation Report to the Navy and regulatory personnel in July 2005 is unlikely. The original estimated start and finish dates as well as the duration of each task, in working days, are shown on the project schedule shown on Figure 7-1. This schedule is based on assumed site conditions and will be updated to the Navy monthly to reflect actual progress during the project.

Figure 7-1
Project Schedule





REFERENCES

CCI (CH2MHILL Constructors, Inc.), 2003. Interim Removal Action Report, Excavation of Contaminated Soil and Groundwater Monitoring at Site 43, Naval Air Station Pensacola, Pensacola, Florida September.

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FDEP (Florida Department of Environmental Protection), 1998. Petroleum Contamination Site Cleanup Criteria, Chapter 62-770 Florida Administrative Code, September 23, 1998.

FDEP, 2004. Standard Operating Procedures for Field Activities DEP-SOP-001/01, February 1, 2004.

TtNUS (Tetra Tech NUS, Inc.), 2001. Corporate Quality Assurance Program Manual, January 1, 2001.

TtNUS, 2002. Florida Regional Quality Assurance Manual, October 9, 2002.

TtNUS, 2004a. Site Characterization Report (Site 43) Naval Air Station Pensacola, Pensacola, Florida January 2004

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USEPA (U.S. Environmental Protection Agency), 1994. USEPA Contract Laboratory Program National Functional Guidelines For Inorganic Data Review, Office of Solid Waste and Remedial Response, Washington, District of Columbia.

USEPA, 1999. USEPA Contract Laboratory Program National Functional Guidelines For Organic Data Review, Office of Emergency and Remedial Response, Washington, District of Columbia.

University of Florida, 2004. Technical Report: Development of Cleanup Target Levels (CTLs) for Chapter 62-777, F.A.C. Center for Environmental & Human Toxicology, Gainesville, Florida, February 26, 2004

APPENDIX A

HISTORIC DOCUMENT CD

- Geophysical Investigation of Buried Drum Area Site 10 (West), Naval Air Station Pensacola (Ensafe/Allen & Hoshall, 1994).
- Site Characterization Report (Site 43) Naval Air Station Pensacola, Pensacola, Florida (TtNUS, 2004).
- Interim Removal Action Report Excavation of Contaminated Soil and Groundwater Monitoring at Site 43, Naval Air Station Pensacola, Pensacola (CCI, 2003).

APPENDIX B
HEALTH AND SAFETY PLAN
SITE 43

APPENDIX C

RESPONSE TO COMMENTS FROM REGULATORY AGENCIES