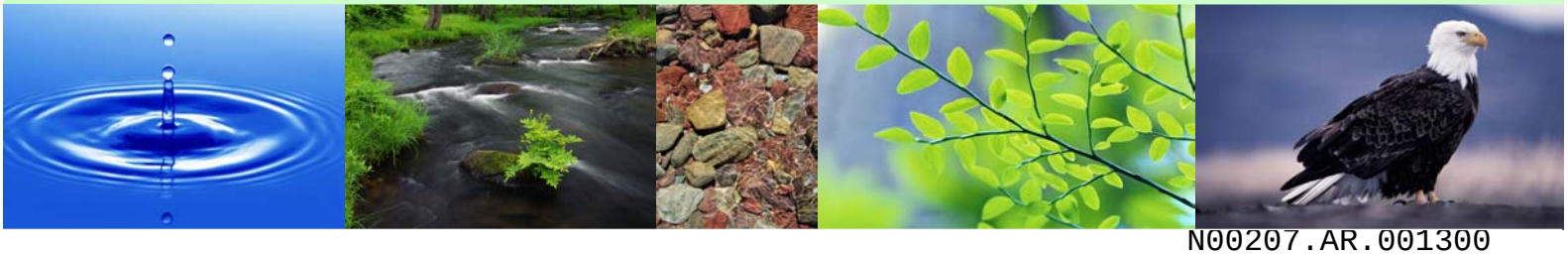
Comprehensive Long-term Environmental Action Navy

CONTRACT NUMBER N62467-04-D-0055



N00207.AR.001300
NAS JACKSONVILLE FL
5090.3a

Remedial Investigation/Feasibility Study Sampling and Analysis Plan Addendum
for
Potential Source of Contamination 47

Naval Air Station Jacksonville
Jacksonville, Florida

Contract Task Order 0047

November 2006

NAVFAC
Naval Facilities Engineering Command
Southeast
2155 Eagle Drive
North Charleston, South Carolina 29406

TETRA TECH NUS, Inc.

06JAX0099

REMEDIAL INVESTIGATION/FEASIBILITY STUDY SAMPLING AND ANALYSIS PLAN ADDENDUM FOR POTENTIAL SOURCE OF CONTAMINIATION 47

NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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

Submitted by:
Tetra Tech NUS, Inc.
661 Andersen Drive
Foster Plaza 7
Pittsburgh, Pennsylvania 15220

CONTRACT NUMBER N62467-04-D-0055
CONTRACT TASK ORDER 0047

NOVEMBER 2006

PREPARED UNDER THE SUPERVISION OF:

MARK A. PETERSON, P.G.
TASK ORDER MANAGER
TETRA TECH NUS, INC.
JACKSONVILLE, FLORIDA

APPROVED FOR SUBMITTAL BY:

DEBRA M. HUMBERT
PROGRAM MANAGER
TETRA TECH NUS, INC.
PITTSBURGH, PENNSYLVANIA

PROFESSIONAL CERTIFICATION

Remedial Investigation/Feasability Study
Sampling and Analysis Plan Addendum
Potential Source of Contamination 47
Naval Air Station Jacksonville, Florida

This Sampling and Analysis Plan Addendum was prepared in general accordance with the State of Florida Standard Operating Procedures under the direct supervision of the undersigned geologist using geologic and hydrogeologic principles standard to the profession at the time the report was prepared. If conditions are determined to exist that differ from those described, the undersigned geologist should be notified to evaluate the effects of additional information on the assessment described in this report. This report was developed specifically for the referenced site and should not be construed to apply to any other site.

Mark Peterson, P.G.
Florida License No. PG-0001852

11/28/06
Date

TABLE OF CONTENTS

PROFESSIONAL CERTIFICATION ..... **iii**

ACRONYMS ..... **vii**

1.0 INTRODUCTION **1-1**
- 1.1 OBJECTIVE AND SCOPE 1-1
- 1.2 DOCUMENT ORGANIZATION 1-3

2.0 SCOPE OF SUPPLEMENTAL INVESTIGATION **2-1**
- 2.1 PRIOR INVESTIGATION SUMMARY 2-1
- 2.2 INVESTIGATION RATIONALE 2-1

3.0 FIELD OPERATIONS AND ENVIRONMENTAL SAMPLING **3-1**
- 3.1 MOBILIZATION/DEMOBILIZATION 3-1
- 3.2 PHASE I SITE INVESTIGATION FIELD ACTIVITIES 3-1
- 3.2.1 Soil Sampling 3-1
- 3.2.2 Monitoring Well Installation and Development 3-6
- 3.2.3 Groundwater Sampling 3-6
- 3.2.4 Fixed-Based Laboratory Analyses 3-9
- 3.3 PHASE II SITE INVESTIGATION FIELD ACTIVITES 3-9
- 3.4 SAMPLE HANDLING 3-10
- 3.4.1 Sample Containers, Preservation, Holding Times, and Analyses 3-10
- 3.4.2 Sample Nomenclature 3-10
- 3.4.3 Sample Documentation, Packaging, and Shipping 3-11
- 3.4.4 Sample Chain-of-Custody 3-11
- 3.5 IDW MANAGEMENT 3-12
- 3.6 DECONTAMINATION 3-12
- 3.7 SURVEYING 3-12
- 3.8 SITE RESTORATION 3-13

REFERENCES **R-1**

APPENDIX

A FIELD FORMS

TABLES

NUMBER		PAGE
2-1	Site Specific Investigation Summary	2-3
3-1	Proposed Soil Samples	3-5
3-2	Phase I Groundwater Analytical Program	3-7

FIGURES

NUMBER		PAGE
1-1	Site Location Map	1-2
1-2	Site Map	1-4
3-1	Proposed Soil Sample Locations – Building 536	3-2
3-2	Proposed Soil Sample Locations – Building 937	3-3
3-3	Monitoring Well Sampling Locations	3-8

ACRONYMS

bls	Below land surface
CLEAN	Comprehensive Long-Term Environmental Action Navy
COPC	Chemical of Potential Concern
DPT	Direct-Push Technology
EGIS	Environmental Geographic Information System
DVECC	Disease Vector Ecology and Control Center
FDEP	Florida Department of Environmental Protection
FOL	Field Operations Leader
GCTL	Groundwater Cleanup Target Level
GPS	Global Positioning System
HSA	Hollow Stem Auger
IDW	Investigative-Derived Waste
IM	Interim Measure
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NAS	Naval Air Station
NAVFAC SE	Naval Facilities Engineering Command, Southeast
PSC	Potential Source of Contamination
PVC	Poly Vinyl Chloride
PWC	Public Works Center
QA	Quality Assurance
QC	Quality Control
RI/FS	Remedial Investigation/Feasibility Study
SAP	Sampling and Analysis Plan
SCTL	Soil Cleanup Target Level
SOP	Standard Operating Procedure
SPLP	Synthetic Precipitate Leaching Procedure
SVOC	Semi-volatile Organic Compound
TBC	To Be Considered
TBD	To Be Determined
TCL	Target Compound List
TOM	Task Order Manager
TtNUS	Tetra Tech NUS, Inc.
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

1.0 INTRODUCTION

This Remedial Investigation/Feasibility Study (RI/FS) Sampling and Analysis Plan (SAP) Addendum for Potential Source of Contamination (PSC) 47, Naval Air Station (NAS) Jacksonville, Jacksonville, Florida, has been prepared by Tetra Tech NUS, Inc. (TtNUS) for Naval Facilities Engineering Command, Southeast (NAVFAC SE) under the Navy Comprehensive Long-Term Environmental Action Navy (CLEAN) Program, Contract Number N62467-04-D-0055, Contract Task Order 0047. This SAP Addendum outlines the requirements and describes the procedures for performing the supplemental field investigation for the RI at PSC 47, which is comprised of the Pesticide Shop (Building 536) and the Disease Vector Ecology and Control Center (DVECC, Building 937) at NAS Jacksonville.

NAS Jacksonville is located in northeastern Florida in Jacksonville, Duval County on the west bank of the St. Johns River. It occupies about 3,896 acres (history section NAS Jacksonville Internet site, 1999). PSC 47 is located within the physical confines of the base, west of Child Street (see Figure 1-1).

1.1 OBJECTIVE AND SCOPE

Multiple investigations have been conducted at PSC 47 to characterize and define soil and groundwater contamination. A draft RI for PSC 47 was completed in 2004 but has not been finalized. There are currently two data gaps that need addressed by this supplemental investigation. The first is the lack of arsenic in soil data near the southwest corner of Building 937 where groundwater impacted by arsenic above Florida Department of Protection (FDEP) groundwater cleanup target levels (GCTLs) has been documented. The second data gap occurs around Building 536 where pesticide and arsenic contaminated soil is not completely defined horizontally and vertically.

This SAP Addendum and the associated supplemental investigation comprises one element of the RI/FS to be performed at PSC 47. The objective of the comprehensive RI is to characterize the nature and extent of contaminant impacts to soil and groundwater resulting from past operations at the site so that threats to human health and the environment can be adequately assessed and strategies for remedial action elucidated, as required. The objective of this supplemental investigation is to complete the delineation of pesticide and arsenic contaminated soil and confirm existing groundwater contaminate concentrations. Soil data will be evaluated to define proposed excavation areas that will be removed through an interim measure (IM).

Field work will be performed in two phases in order to accomplish this objective. First, a soil assessment via hand augering or direct-push technology (DPT) will be conducted to identify areas where chemicals of potential concern (COPCs) (i.e., pesticides and arsenic) exceed applicable criteria. All samples collected

DRAWN BY J. LAMEY	DATE 8/18/03	SITE LOCATION MAP PSC 47 NAS JACKSONVILLE JACKSONVILLE, FLORIDA	CONTRACT NUMBER 3966
CHECKED BY C. METZ	DATE 11/15/06		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 1 - 1 / REV 0

P:\GIS\JACKSONVILLE_NAS\APR\PSC47.APR SITE LOCATION MAP 11/15/06 SP

during this phase will be analyzed by a certified fixed-base laboratory. Synthetic precipitate leaching procedure (SPLP) analysis will be run on select samples from the first phase to determine site-specific soil leachability criteria. If the results of the first phase indicate that the extent of contamination is not defined, a second phase of sampling will be conducted.

There are two areas of concern for the soil. One is the area around the Pesticide Shop (Building 536) (shown on Figure 1-2). The investigation at this area will address the horizontal and vertical extent of arsenic and pesticide compounds in soils to facilitate excavation and removal. The second area is the soil above the groundwater arsenic plume associated with DVECC Building 937 (shown on Figure 1-2). In this area, the investigation will attempt to verify the presence or absence of arsenic in soil and delineate if present. At both buildings, the focus is delineating soil contamination, which presents a potential source of groundwater contamination via leaching and a risk to human health.

The objective of the groundwater sampling is to verify that the concentrations of COPCs in the previously sampled wells has not changed significantly or migrated to the perimeter wells. Two new shallow wells will be installed and sampled near Building 937 to better define arsenic in groundwater. The groundwater data will then be incorporated into the RI report to update groundwater COPC concentrations. It is anticipated that the contaminated groundwater at PSC 47 will be the primary media of concern in the FS once an IM is conducted to remove soil with leachability exceedances.

1.2 DOCUMENT ORGANIZATION

In an effort to reduce redundancy and maintain brevity, information from the original 2001 SAP will not be reproduced in this SAP Addendum. This SAP Addendum includes only the site-specific information to be used for this supplemental RI sampling at PSC 47. The project scope and objectives are presented in Sections 1.0. Section 2.0 presents the scope of the supplemental sampling. Section 3.0 presents the site-specific field and sampling procedures.

2.0 SCOPE OF SUPPLEMENTAL INVESTIGATION

The scope of the supplemental investigation is as follows:

- At Building 536, collect and analyze soil samples for Target Compound List (TCL) pesticides and arsenic to complete horizontal and vertical contaminant delineation.
- At Building 937, collect and analyze soil samples for arsenic to complete the horizontal and vertical delineation as it pertains to leachability to groundwater and human health risk, as required.
- Install two new shallow monitoring wells near Building 937.
- Run SPLP analysis on select Phase I samples to determine site specific soil leachability criteria.
- Collect and analyze groundwater samples from 32 site monitoring wells (2 new and 30 existing) to verify the location and concentration of the previously defined groundwater contamination.

Data from previous site assessments will be combined with this assessment data to horizontally and vertically define soil contamination. The results will be used to define proposed excavation areas. Any soil exceeding industrial and/or leachability Soil Cleanup Target Levels (SCTLs) will be included in the proposed excavation areas to be removed via an IM. An IM is planned to remove contaminated soil exceeding industrial and/or leachability SCTLs and thus eliminate potential sources of groundwater contamination and risks to human health.

The soil and groundwater data will also be incorporated into the Draft RI/FS for PSC 47 to update the Baseline Human Health Risk Assessment (Section 7.0).

2.1 PRIOR INVESTIGATION SUMMARY

Please refer to the original SAP (June 2001) and the RI/FS (June 2004) for previous investigation history.

2.2 INVESTIGATION RATIONALE

Previous investigations have reported that soil and groundwater contamination exist at PSC 47. Data gaps from those investigations has led to this SAP Addendum. Since the contamination at PSC 47 is relatively wide spread and not localized, TtNUS will complete the supplemental investigation in two phases. Phase I will include soil sampling at planned locations and depths and analysis for TCL pesticides and/or arsenic, depending on sample locations. Select soil samples will be subjected to SPLP

extraction and analysis. Two shallow monitoring wells will be installed near Building 937 during Phase I. Additionally during Phase I, groundwater will be sampled from 32 wells (2 new and 30 existing) and analyzed for previously detected contaminant groups. If soil delineation is not adequately defined during Phase I, a second phase of sampling will be performed. Although not anticipated, additional well installations and groundwater sampling may also be required during the second phase of the investigation.

A fixed-based laboratory will be used to analyze surface and subsurface soil samples for TCL pesticides and arsenic in the area around Building 536 and arsenic only in the area around Building 937. SPLP pesticide and arsenic analysis will be run on select Phase I samples specified by the Task Order Manager (TOM) upon review the Phase I results. Groundwater samples will be analyzed for TCL volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), and TCL pesticides, and arsenic. A summary of site specific sampling is provided in Table 2-1.

Soil leachability is the main driving factor in defining the areas and volumes of contaminated soil. The objective in running SPLP analysis on select soil samples will be to obtain site-specific leachability criteria. These new site-specific leachability criteria will be used to more accurately define the areas and volumes of contaminated soil that will be excavated through an IM. To obtain site-specific leachability criteria, 12 samples for each constituent group (TCL pesticides and arsenic) will have SPLP performed on them. Each constituent group will have four low, four medium, and four high (total of 12 samples) concentration samples analyzed to represent the range of detected concentration. The SPLP results will then be used to calculate an average site-specific leachability number (criteria) for site soil COPCs.

TABLE 2-1
SITE SPECIFIC INVESTIGATION SUMMARY
PSC 47 RI/FS SAP ADDENDUM
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

Media	Data Gap/Need	Investigation Activity	Number of Locations	Samples per Location (1)	Analysis (2)
Soil (surface and subsurface)	Extent of soil contamination which may provide a source of contamination to groundwater.	Perform Phase I soil sampling at pre-determined locations.	50 Phase I soil boring locations (14 locations at Building 937 and 36 locations at Building 536.	2 (typically) one at the ground surface and one unsaturated sample above the water table. (3)	72 samples (36 locations) from the Building 536 area will be submitted to a fixed-based laboratory for TCL pesticides and arsenic analysis. 28 samples (14 locations) from the Building 937 area will be submitted to a fixed-based laboratory for arsenic analysis.
		Perform Phase II soil sampling at locations as needed to complete the delineation supporting the potential IM.	TBD	TBD	Samples to be submitted to a fixed-based laboratory for analysis of parameters determined during Phase I.
Groundwater	To determine that COPCs have not increased or migrated.	Collect groundwater samples.	32 Monitoring Wells (2 new and 30 existing)	1	All samples will be submitted to a fixed-based laboratory for analysis for TCL VOCs, TCL SVOCs, TCL pesticides and arsenic.
	Groundwater flow direction and gradient.	Measure monitoring well groundwater levels.	All Existing Wells	1	Measure and record synoptic water levels

(1) Does not include quality assurance/quality control (QA/QC) samples.

(2) Analysis for TCL pesticides via United States Environmental Protection Agency (USEPA) Method SW-846 8081A and arsenic via USEPA Method SW-846 6010B.

(3) Locations in the former excavation will have two soil samples collected. The first sample will be collected from below the former excavation depth and second just above the water table. The location of samples in the former excavation were selected from the “hottest” post excavation samples.

TCL Target Compound List

TBD To Be Determined.

3.0 FIELD OPERATIONS AND ENVIRONMENTAL SAMPLING

This section describes field operations and environmental sampling procedures for the investigation at PSC 47. Field activities will be conducted in general accordance with FDEP Standard Operating Procedure (SOPs) (FDEP, 2004).

3.1 MOBILIZATION/DEMOBILIZATION

Mobilization and demobilization activities will include the following:

- Mobilizing required subcontractors, equipment, and materials to the site.
- Incidental site clearing and site access.
- Obtaining a NAS Jacksonville excavation/digging permit.
- Conducting/attending a site-specific health and safety review meeting.
- General site clean-up and removal of trash.
- Management of investigative-derived waste (IDW).
- Demobilizing all equipment and materials from the site.

3.2 PHASE I SITE INVESTIGATION FIELD ACTIVITIES

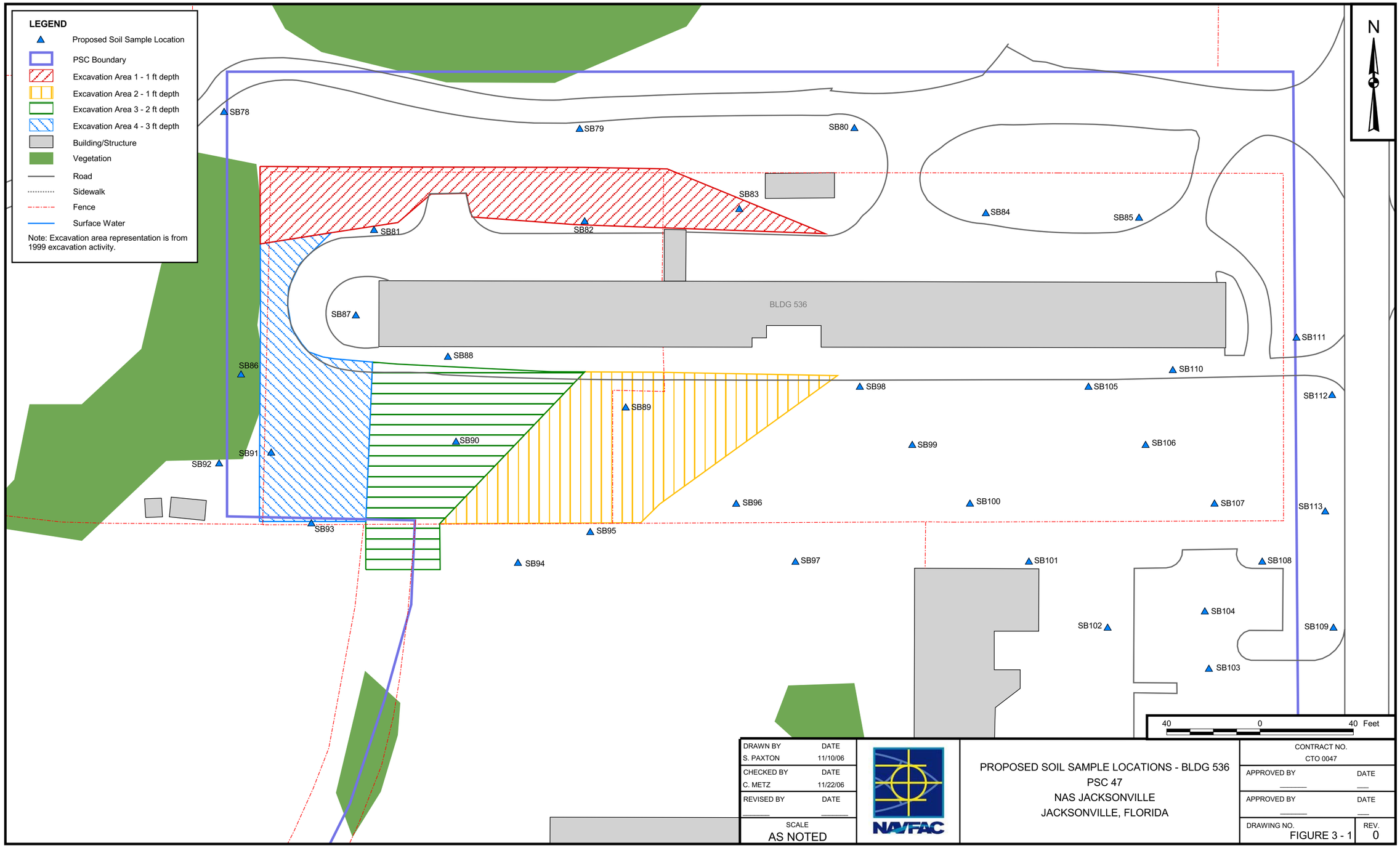
The Phase I site investigation field activities will include the following:

- Install 50 soil borings and collect soil samples for analysis.
- Establish coordinates for sample locations via global positioning system (GPS).
- Install two shallow groundwater monitoring wells near Building 937.
- Collect groundwater samples from 32 pre-selected site monitoring wells.
- Fixed-based laboratory analyses of the soil and groundwater samples.

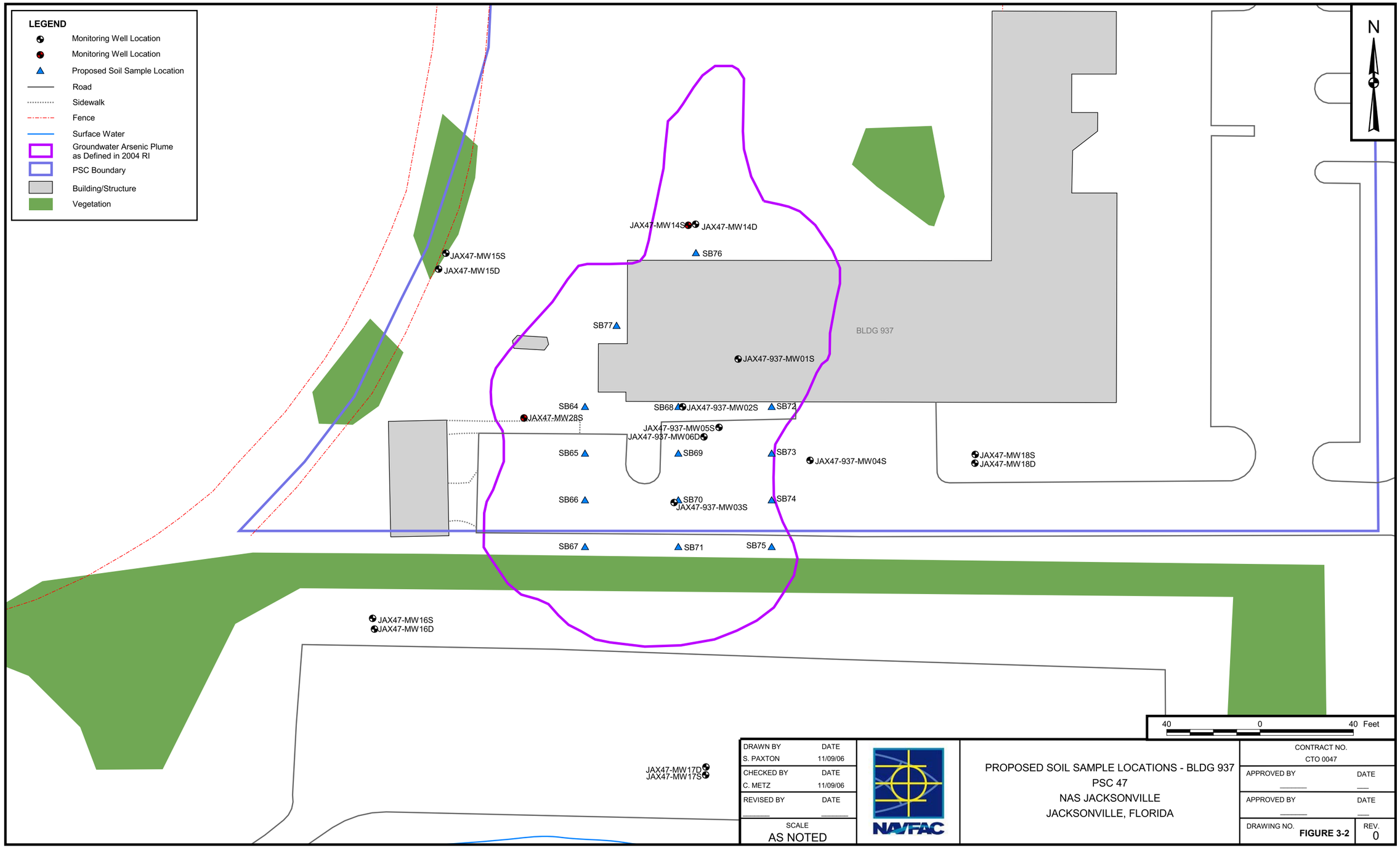
3.2.1 Soil Sampling

To delineate the vertical and horizontal extent of soil contamination, samples will be collected from 50 (36 borings at Building 536 and 14 borings at Building 937) proposed sample locations at PSC 47. Proposed soil sample locations for Building 536 and 937 are shown on Figures 3-1 and 3-2, respectively. Two samples, a surface and subsurface, will be collected from each proposed boring location. Soil borings will be advanced to the water table at locations in and around Buildings 536 and 937 during field activities. Soil borings will be advanced using a stainless steel hand auger unless site conditions limit advancement

P:\GIS\JACKSONVILLE_NAS\APR\PSC47.APR BUILDING 536 PROPOSED SOIL SAMPLE LOCATION LAYOUT 11/22/06 SP



P:\GIS\JACKSONVILLE_NAS\APR\PSC47.APR BUILDING 937 PROPOSED SOIL SAMPLE LOCATION LAYOUT 11/09/06 SP



DRAWN BY	DATE
S. PAXTON	11/09/06
CHECKED BY	DATE
C. METZ	11/09/06
REVISED BY	DATE
SCALE	
AS NOTED	

NAVFAC

PROPOSED SOIL SAMPLE LOCATIONS - BLDG 937
PSC 47
NAS JACKSONVILLE
JACKSONVILLE, FLORIDA

CONTRACT NO.	
CTO 0047	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 3-2	REV. 0

using this method. If technical difficulty (e.g., refusal) prevents hand augering, a DPT rig will be used to collect split spoon soil samples. The location and number of soil samples collected may be altered by the Field Operations Leader (FOL) based on site conditions encountered.

If soil samples are obtained using DPT, the sample will be collected directly from the soil core. The core is contained in a plastic sleeve, which is split longitudinally to allow one-half of the sleeve to be removed exposing the soil core. The soil can then be transferred directly into the appropriate sample container as specified by the laboratory.

Soil sampling and decontamination of soil sampling equipment will be conducted in accordance with FDEP SOPs (FDEP, 2004).

In general, surface soil samples will be collected from the 0- to 12-inch interval. For the 0- to 12-inch interval, the soil will be collected from the upper 6 inches where possible. No surface soil sample will be collected in the areas that were previously excavated and backfilled with “clean” soil. These areas will have two subsurface soil samples collected. Subsurface soil samples will be collected immediately above the water table in unsaturated soil. The water table is relatively shallow and ranges in depth from approximately 2 to 7 feet below land surface (bls) across the site. Water levels in the vicinity of the soil sampling will be measured prior to commencement of the soil boring efforts to confirm the water table.

All samples will be sent to a certified fixed-based laboratory. Soil samples will be analyzed for TCL pesticides via USEPA Method SW-846 8081A and/or arsenic via USEPA Method SW-846 6010B. Soil borings SB64 through SB77, near Building 937, will be analyzed for arsenic only (Figure 3-2). Soil borings SB78 though SB113, near Building 536, will be analyzed for TCL pesticides and arsenic (Figure 3-1). Soil sample log sheets (Appendix A) will be completed for each soil boring location. A listing of proposed soil boring locations and analytical parameters for each location is provided in Table 3-1.

3.2.1.1 Bldg 536 – Soil Sampling

Soil borings SB78 through SB113 will have samples collected for pesticide and arsenic analysis at Building 536 (see Figure 3-1). Except in the former excavation areas, a surface soil (0 to 12 inches bls) and subsurface soil (immediately above water table) sample will be collected from each boring. Four excavation areas, depicted on Figure 3-1, were previously excavated to between 1 and 3 feet bls and backfilled with “clean” soil. No surface soil samples will be collected from the seven soil borings (SB81, SB82, SB83, SB88, SB89, SB90, and SB91) that are proposed in the former excavation areas. Instead of a surface soil sample, subsurface soil samples will be collected from immediately below the former

excavation boundary. A second subsurface soil sample will also be collected from immediately above the water table at each of the seven soil borings. See Table 3-1 for sample collection information.

TABLE 3-1
PROPOSED SOIL SAMPLES
PSC 47 RI/FS SAP ADDENDUM
NAS JACKSONVILLE, FLORIDA

Sample Location [1]		Sample Depth	Required Analysis	
			TCL Pesticides [3][4]	Arsenic [3][4]
SB64 through SB77		0 -12 inches		X
		Immediately above water table		
SB81, SB82, SB83, SB88, SB89, SB90, SB91		Immediately above water table	X	X
	SB81 [2]	1 – 2 feet		
	SB82 [2]	1 – 2 feet		
	SB83 [2]	1 – 2 feet		
	SB88 [2]	3 – 4 feet		
	SB89 [2]	1– 2 feet		
	SB90[2]	2 – 3 feet		
	SB91 [2]	3 – 4 feet		
Any Soil Boring between SB78 and SB113 that is not in former excavation limits listed above		0 -12 inches	X	X
		Immediately above water table	X	X

Notes:

(1) Soil sample locations SB64 through SB77 are shown on Figure 3-2 and samples SB78 through SB113 are shown on Figure 3-1.

(2) Seven samples are proposed for the former excavation areas. All 7 proposed borings will have a sample collected directly above the water table. A second sample from directly below the previous excavation depth will be collected. See Figure 3-1 for previous excavation boundaries and depths.

(3) Select SPLP samples will be run by the fixed-base laboratory. The laboratory will provide preliminary analytical data for all samples to the Task Order Manager (TOM). Based on the preliminary data, the TOM will select 12 samples (4 each of low, medium, and high concentration) for SPLP analysis of pesticides and 12 samples for arsenic.

(4) Analysis for TCL pesticides via USEPA Method SW-846 8081A and arsenic via USEPA Method SW-846 6010B.

3.2.1.2 Bldg 937 – Soil Sampling

Soil borings SB64 through SB77 will have samples collected for arsenic analysis at Building 937. The sample locations are shown on Figure 3-2. A surface soil (0 to 12 inches bls) and a subsurface soil (immediately above water table) sample will be collected from each of the 14 proposed soil borings.

3.2.1.3 SPLP Analysis

Preliminary analytical results from the Phase I sampling will be provided by the fixed-base laboratory to the TOM for the purpose of selecting SPLP analysis samples. The TOM will evaluate the analytical results and select four low, four medium, and four high concentration samples for both pesticide and arsenic SPLP analysis. Selected samples will represent the range of detected concentrations.

3.2.2 Monitoring Well Installation and Development

Two new shallow monitoring wells are planned to be installed near Building 937. The wells will be identified as JAX47-MW14S and JAX47-MW28S and their locations are shown on Figure 3-2. To assist in utility clearance efforts, soil will be removed from each well location via posthole digger to a depth approximately 4 feet bls prior to commencement of drill activities. The wells will be advanced via hollow stem auger (HSA) to 13 feet bls. Each shallow well will consists of a 10 feet section of threaded, 2-inch diameter, schedule 40 polyvinyl chloride (PVC), 0.10-slot screen with a 4-inch PVC end cap. The remaining well riser will consist of threaded 2-inch diameter, schedule 40 PVC to land surface. At a minimum, 2 feet of fine choke sand will be placed above the screen. The remaining annular space will be filled with neat Type I Portland Cement (i.e., no additives) to the surface. Each of the wells will be completed as flush mount (8 inch bolt down steel manhole centered in a 2-foot by 2-foot concrete pad). Development of each well will occur no sooner than 24 hours after installation. Well development will be performed with a submersible pump. Temperature, pH, specific conductance, and turbidity will be recorded on a Monitoring Well Development Record (Appendix A) for each well. Well development will be considered complete when the well water is clear to the unaided eye and parameters listed above are stable.

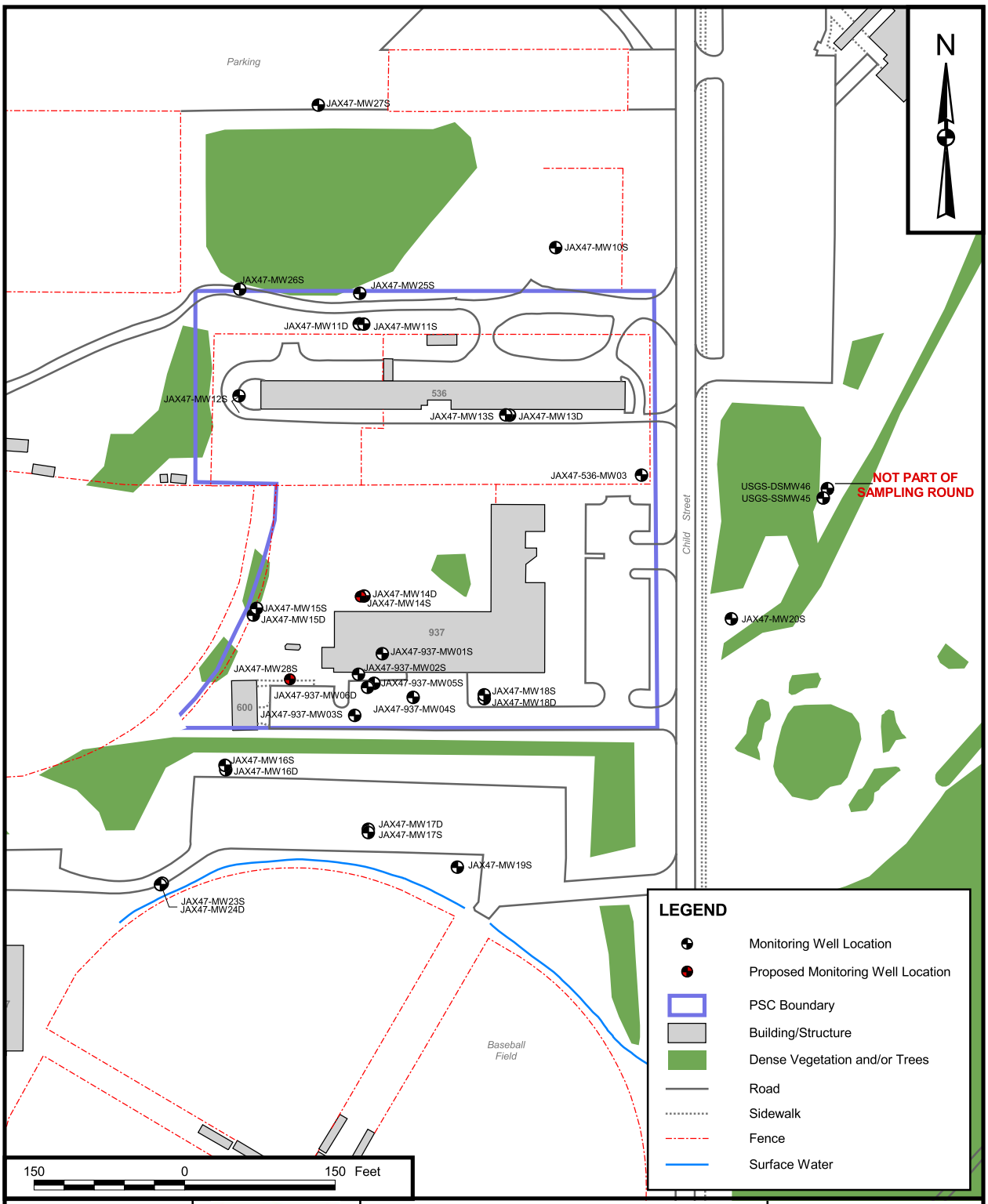
3.2.3 Groundwater Sampling

Groundwater sampling shall be conducted in general accordance with FDEP SOPs using low flow quiescent sampling techniques. Groundwater samples will be obtained from 32 (2 new and 30 existing) existing wells listed in Table 3-2 and shown on Figure 3-3. Table 3-2 also lists the analytical requirements for each well.

TABLE 3-2
PHASE I GROUNDWATER ANALYTICAL PROGRAM
PSC 47 RI/FS SAP ADDENDUM
NAS JACKSONVILLE, FLORIDA

Well Identification Number-	Analysis/Method				
	TCL VOCs	TCL Pesticides	TCL SVOCs	Arsenic	
	EPA 8260B	EPA 8081A	EPA 8270C	EPA 6010	
	Unfiltered				Filtered
JAX47-MW-10S	√	√	√	√	
JAX47-MW-11S	√	√	√	√	
JAX47-MW-11D	√	√	√	√	
JAX47-MW-12S	√	√	√	√	
JAX47-MW-13S	√	√	√	√	
JAX47-MW-13D	√	√	√	√	
JAX47-MW-14S*	√	√	√	√	√
JAX47-MW-14D	√	√	√	√	
JAX47-MW-15S	√	√	√	√	
JAX47-MW-15D	√	√	√	√	
JAX47-MW-16S	√	√	√	√	
JAX47-MW-16D	√	√	√	√	
JAX47-MW-17S	√	√	√	√	
JAX47-MW-17D	√	√	√	√	
JAX47-MW-18S	√	√	√	√	
JAX47-MW-18D	√	√	√	√	
JAX47-MW-19S	√	√	√	√	
JAX47-MW-20S	√	√	√	√	
JAX47-MW-23S	√	√	√	√	
JAX47-MW-24D	√	√	√	√	
JAX47-MW-25S	√	√	√	√	
JAX47-MW-26S	√	√	√	√	
JAX47-MW-27S	√	√	√	√	
JAX47-MW-28S*	√	√	√	√	√
JAX937-MW-01S	√	√	√	√	√
JAX937-MW-02S	√	√	√	√	√
JAX937-MW-03S	√	√	√	√	√
JAX937-MW-04S	√	√	√	√	√
JAX937-MW-05S	√	√	√	√	√
JAX937-MW-06D	√	√	√	√	√
JAX536-MW-03S	√	√	√	√	
JAX-USGS-SSMW45	√	√	√	√	

Notes:
EPA - United States Environmental Protection Agency
TCL - Target Compound List
* = New well to be installed during Phase I sampling event



DRAWN BY S. PAXTON	DATE 11/09/06	MONITORING WELL SAMPLING LOCATIONS PSC 47 NAS JACKSONVILLE JACKSONVILLE, FLORIDA	CONTRACT NUMBER 0497
CHECKED BY C. METZ	DATE 11/09/06		APPROVED BY ___ DATE ___
COST/SCHEDULE-AREA			APPROVED BY ___ DATE ___
SCALE AS NOTED			DRAWING NO. FIGURE 3-3 REV 0

P:\GIS\JACKSONVILLE_NAS\APR\PSC47.APR UPDATED EXISTING MONITORING WELL LAYOUT - A SIZE 11/09/06 SP

Relevant purge data will be recorded using the FDEP Groundwater Log Sheet (provided in Appendix A) and pertinent sample information will be noted in the field notebook.

3.2.3.1 Water-Level Measurements

Depth-to-water measurements will be recorded at all existing monitoring wells using an electronic water level probe. One round of measurements will be obtained prior to collection of groundwater samples. Top of well casings will be permanently marked or notched (if not previously done) by the FOL at the point where measurements are taken to assure consistency from one field event to the next. The water level probe will be checked for damage, legibility, etc. before use and will be decontaminated before and after use. Measurements will be recorded to the nearest 0.01 foot and the time of day at which each measurement is taken will be recorded. In addition to the water-level measurements, the total well depth will be measured from the reference point and recorded on a groundwater level measurement sheet (provided in Appendix A).

3.2.4 Fixed-Based Laboratory Analyses

All soil and groundwater samples will be sent to a fixed-based laboratory for analyses. Samples collected during the Phase I effort will be analyzed as follows:

- Soil: TCL Pesticides and arsenic in the area around Building 536 (soil borings SB78 through SB134) Arsenic only in the borings around Building 937 (SB64 through SB77).
- Groundwater: TCL VOCs, TCL SVOCs, TCL pesticides, and arsenic.

3.3 PHASE II SITE INVESTIGATION FIELD ACTIVITES

The Phase II site investigation field activities will include the following:

- Installing step-out soil borings as required.
- Collect soil samples for laboratory analyses.
- Install and sample additional monitoring wells, if needed.

If Phase II is required, the number, location, and analysis of samples will be determined by the TOM based upon evaluation of the Phase I data.

3.4 SAMPLE HANDLING

3.4.1 Sample Containers, Preservation, Holding Times, and Analyses

Sample handling includes the proper selection of sample containers, preservative, and allowable holding times for the required analyses. These requirements will follow FDEP SOPs.

3.4.2 Sample Nomenclature

Each soil sample will be assigned a unique codified sample identification number. The unique nomenclature established for this sampling event is as follows:

1		2		3		4
JAX47	-	SBXXX	-	NN	-	MMDDYY
Site Location and Site Number		Sample Location		Sample Depth (bottom of sample depth)		Sample Collection Date

1 JAX- Naval Air Station Jacksonville
47 – represents the PSC name (e.g., 47 for PSC 47)

2 SBXXX represents the soil boring locations shown on Figures 3-1 and 3-2 that run sequential from SB64 through SB113.

3 NN is used as the depth of sample collection. For example, if a soil sample was collected from the 5 to 6 feet bls interval this number would be 06.

4 The sample collection date, MMDDYY, shall be listed as two digits each for the month, day and then year (e.g., for August 8, 2006 use 080806).

A soil boring example of the above is:

A soil sample from soil boring SB53 collected from approximately 3 to 4 feet bls on August 20, 2006 would be represented by JAX47-SB053-04-082006.

Monitoring well samples will simply be the site name, monitoring well ID and sample date. An example of a monitoring well sample is:

- A groundwater sample from MW-3 collected on August 21, 2006 would have the identifier JAX47-MW3-082106.

Duplicate samples collected for QA/QC during the sampling program will be identified as JAX47-DUPNN-MMDDYY, where NN is an ascending sequential number starting with 01 and MMDDYY is the month, day, and year . An example of the first duplicate collected on November 28, 2006 during the PSC 47 RI/FS sampling program is JAX47-DUP01-112806.

Other QA/QC samples collected during the RI field activities will be labeled as follows:

Trip Blanks – JAX47-TBNN, where NN is an ascending sequential number starting with 01. An example of the second trip blank collected during the PSC 47 RI/FS sampling program is JAX47-TB02.

Rinsates – JAX47-RNN, where NN is an ascending sequential number starting with 01. An example of the first rinsate sample collected during the PSC 47 RI/FS sampling program is JAX47-R01.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) – JAX47-MSNN, where NN is an ascending sequential number starting with 01. An example of the first rinsate sample collected during the PSC 47 RI/FS sampling program is JAX47-MS01.

3.4.3 Sample Documentation, Packaging, and Shipping

Matrix-specific sample log sheets will be maintained for each sample collected. In addition, sample collection information will be recorded in field notebooks and the site logbook. Samples will be packaged and shipped according to FDEP SOPs.

3.4.4 Sample Chain-of-Custody

Sample custody procedures are designed to provide proper documentation of sample acquisition and integrity. Sample custody will be maintained and documented at all times. Proper sample custody is maintained if

- The sample is in the actual possession of the investigator.
- Is in view after being in his or her possession.
- The sample was secured by the investigator to prevent tampering.
- Is in a designated secure area.

Custody begins at the time of collection and ends at the time of disposal by the laboratory.

The chain-of-custody report is a multi-part, standardized form used to summarize and document pertinent sample information, such as sample identification and type, matrix, date and time of collection, preservation, and requested analyses. Furthermore, through the sequential signatures of various sample custodians (e.g., sampler, courier [waybill number], laboratory sample custodian), custody and tracking is documented in the chain-of-custody report.

Custody procedures apply to all environmental and associated field QC samples obtained as part of the data collection system. Chain-of-custody protocol will follow FDEP SOPs

3.5 IDW MANAGEMENT

Purge water and excess soil will be collected and containerized in Department of Transportation-approved (Specification 17C) 55-gallon drums provided by NAS Jacksonville Public Works Center (PWC). An IDW classification will be provided for this site by NAS Jacksonville's Environmental Department. Hazardous waste labels stating the generation date, waste profile number, and waste codes are required to be on all drums that contain wastes. At no time should an unlabeled drum be used or present on site. A waste staging area will be established at the site to store IDW generated during the sampling activities. All decontamination materials generated during the site investigation will be containerized for proper disposal. TtNUS will also conduct weekly drum inspections until the drums are removed from the site. Appropriate IDW documentation will be maintained in the project field log book. For IDW drum disposal, contact the NAS Jacksonville PWC office at (904) 542-5979 to schedule a drum pick up.

3.6 DECONTAMINATION

The equipment involved in field sampling activities will be decontaminated prior to and during sampling activities in accordance with FDEP SOPs. Non-disposable equipment used for collecting samples will be decontaminated prior to beginning field sampling and between sample locations.

3.7 SURVEYING

The coordinates of soil boring locations will be obtained by TtNUS using a Trimble ProXRS GPS unit (or equivalent). Horizontal positions will be surveyed in feet relative to the Florida State Plane Coordinate System, Florida State Plane North [North American Datum 1983 (NAD83)]. The soil boring coordinates will then be transferred into the NAS Jacksonville Environmental Geographic Information System (EGIS)

database. The coordinates of the two newly installed monitoring wells will be obtained through a professionally licensed surveyor.

3.8 SITE RESTORATION

If investigation activities (e.g., DPT borings) disturb or alter the landscape, vegetation, or other features of PSC 47, the site may require restoration to conditions present prior to the investigation. If vegetation is significantly stressed or damaged as a result of investigation activities, the affected area will be re-seeded, as agreed upon by the NAS Jacksonville Partnering Team.

REFERENCES

FDEP (Florida Department of Environmental Protection), 2004. Standard Operation Procedures 001/01: FS1000 – General Sampling; FS2200 – Groundwater Sampling; and FS3000 – Soil Sampling. February.

TtNUS (Tetra Tech NUS, Inc.), 2001. Remedial Investigation/Feasibility Study Sampling and Analysis Plan for Potential Source of Contamination (PSC) 47. Prepared for Southern Division, Naval Facilities Engineering Command, North Charleston, SC. June.

TtNUS, 2004. Remedial Investigation/Feasibility Study for Potential Source of Contamination 47. Prepared for Southern Division, Naval Facilities Engineering Command, North Charleston, SC. June.

APPENDIX A

FIELD FORMS

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name: _____ **Project No.:** _____

Location: _____ **Personnel:** _____

Weather Conditions: _____ **Measuring Device:** _____

Tidally Influenced: Yes ____ No ____ **Remarks:** _____

Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments

* All measurements to the nearest 0.01 foot

Tetra Tech NUS / FDEP Groundwater Sampling Sheet

SITE NAME:	SITE LOCATION:

WELL NO:	SAMPLE ID:	DATE:

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL DEPTH: feet to feet	STATIC DEPTH TO WATER (feet):	PURGE PUMP TYPE OR BAILER:

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
only fill out if applicable)

_____Liters

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

_____Liters

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (Liters):

TIME	VOLUME PURGED (Liters)	CUMUL. VOLUME PURGED (Liters)	PURGE RATE (lpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (^{O}C)	COND. (μmhos/cm or μS/cm)	DISSOLVED OXYGEN (circle mg/L or % saturation)	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURES:	SAMPLING INITIATED AT:	SAMPLING ENDED AT:
PUMP OR TUBING DEPTH IN WELL (feet):	SAMPLE PUMP FLOW RATE (mL per minute):	TUBING MATERIAL CODE: Teflon	
FIELD DECONTAMINATION: Y N	FIELD-FILTERED: Y N FILTER SIZE: ____ μm Filtration Equipment Type: _____	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH		

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING/PURGING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **VT** = Vacuum Trap; **O** = Other (Specify)

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: _____
Project No.: _____

[] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other: _____
[] QA Sample Type: _____

Sample ID No.: _____
Sample Location: _____
Sampled By: _____
C.O.C. No.: _____

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date:	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

QA SAMPLE LOG SHEET

Project Site Name: _____ Sample ID Number: _____
Project Number: _____ Sampled By: _____
Sample Location: _____ C.O.C. Number: _____
QA Sample Type:

[] Trip Blank [] Rinsate Blank
[] Source Water Blank [] Other Blank _____

SAMPLING DATA:

Date: _____
Time: _____
Method: _____

WATER SOURCE:

[] Laboratory Prepared [] Tap
[] Purchased [] Fire Hydrant
[] Other _____

PURCHASED WATER INFORMATION (If Applicable as Source or Rinsate Water):

Product Name: _____
Supplier: _____
Manufacturer: _____
Order Number: _____
Lot Number: _____
Expiration Date: _____

RINSATE INFORMATION (If Applicable):

Media Type: _____
Equipment Used: _____
Equipment Type:
[] Dedicated
[] Reusable

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Volatiles	Cool 4°C & HCl		YES / NO
Semivolatiles	Cool 4°C		YES / NO
Pesticide / PCB	Cool 4°C		YES / NO
Metals	Cool 4°C & HNO_3		YES / NO
Cyanide	Cool 4°C & NaOH		YES / NO

OBSERVATIONS / NOTES:

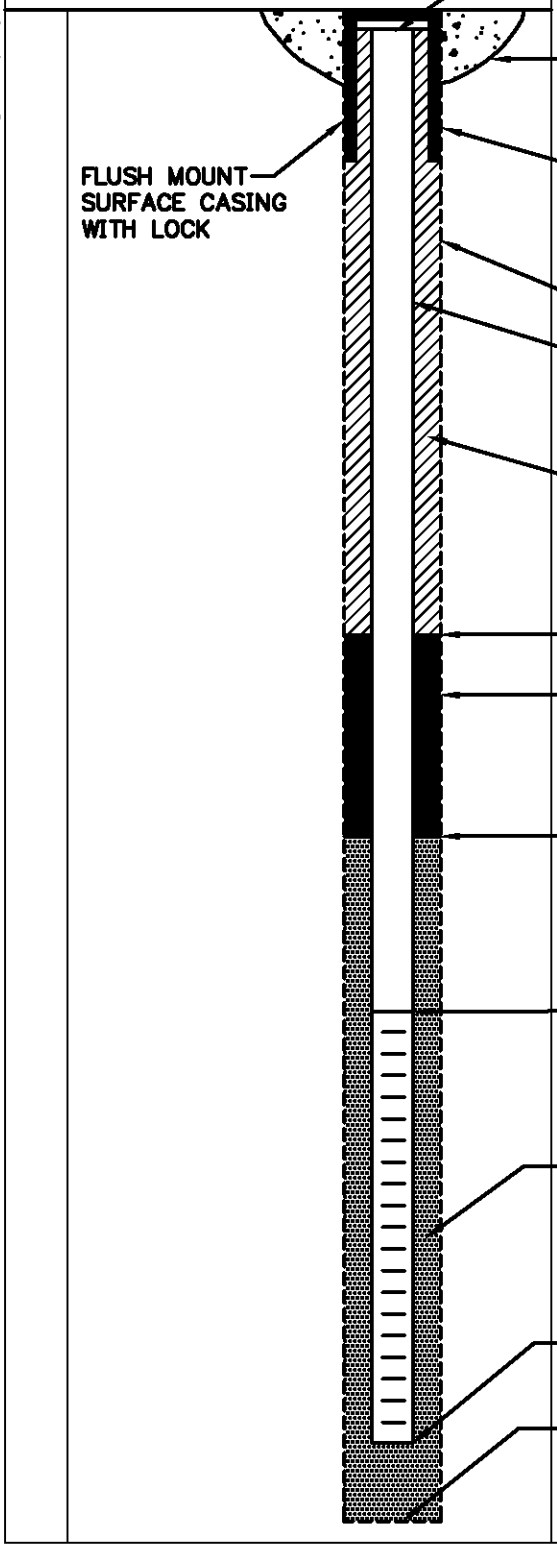
Signature(s):

WELL NO.: _____

Tetra Tech NUS, Inc.

OVERBURDEN
MONITORING WELL SHEET
FLUSH - MOUNT

PROJECT _____	LOCATION _____	DRILLER _____
PROJECT NO. _____	BORING _____	DRILLING METHOD _____
DATE BEGUN _____	DATE COMPLETED _____	
FIELD GEOLOGIST _____		DEVELOPMENT METHOD _____
GROUND ELEVATION _____	DATUM _____	



ELEVATION TOP OF RISER: _____

TYPE OF SURFACE SEAL: _____

TYPE OF PROTECTIVE CASING: _____

I.D. OF PROTECTIVE CASING: _____

DIAMETER OF HOLE: _____

TYPE OF RISER PIPE: _____

RISER PIPE I.D.: _____

TYPE OF BACKFILL/SEAL: _____

ELEVATION/DEPTH TOP OF SEAL: ____/____

TYPE OF SEAL: _____

ELEVATION/DEPTH TOP OF SAND: ____/____

ELEVATION/DEPTH TOP OF SCREEN: ____/____

TYPE OF SCREEN: _____

SLOT SIZE x LENGTH: _____

TYPE OF SAND PACK: _____

DIAMETER OF HOLE IN BEDROCK: _____

ELEVATION / DEPTH BOTTOM OF SCREEN: ____/____

ELEVATION / DEPTH BOTTOM OF SAND: ____/____

ELEVATION/DEPTH BOTTOM OF HOLE: ____/____

BACKFILL MATERIAL BELOW SAND: _____

ACAD: FORM_MWFM.dwg 07/20/99 INL

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Site: _____ Depth to Bottom (ft.): _____ Project Name: _____
Well: _____ Static Water Level Before (ft.): _____ Project Number: _____
Date Installed: _____ Static Water Level After (ft.): _____ Site Geologist: _____
Date Developed: _____ Screen Length (ft.): _____ Drilling Co.: _____
Dev. Method: _____ Specific Capacity: _____
Pump Type: _____ Casing ID (in.): _____

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units _____)	Turbidity (NTU)	Remarks (odor, color, etc.)