N60200.AR.003433
NAS CECIL FIELD, FL
5090.3a

REMEDIAL INVESTIGATION REPORT FOR OPERABLE UNIT 9 (OU 9) SITE 57 AND SITE 58 VOLUME 1 OF 2 TEXT AND APPENDICES A AND B NAS CECIL FIELD FL

8/30/2002

TETRA TECH NUS INC

Remedial Investigation Report
for
Operable Unit 9, Sites 57 and 58

Volume I of II
Text and Appendices A & B

Naval Air Station Cecil Field
Jacksonville, Florida

Southern Division
Naval Facilities Engineering Command

Contract Number N62467-94-D-0888

Contract Task Order 0078

August 2002

REMEDIAL INVESTIGATION REPORT
FOR
OPERABLE UNIT 9, SITES 57 AND 58

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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

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

CONTRACT NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0078

AUGUST 2002

PREPARED UNDER THE SUPERVISION OF:

MARK SPERANZA, P.E.
TASK ORDER MANAGER
TETRA TECH NUS, INC.
PITTSBURGH, PENNSYLVANIA

APPROVED FOR SUBMITTAL BY:

DEBBIE WROBLEWSKI
PROGRAM MANAGER
TETRA TECH NUS, INC.
PITTSBURGH, PENNSYLVANIA

This document that describes the Remedial Investigation for Operable Unit 9, Sites 57 and 58, Naval Air Station Cecil Field, Jacksonville, Florida, has been prepared under the direction of a Florida-registered professional engineer. The work and professional opinions rendered in this report were conducted or developed in accordance with commonly accepted procedures consistent with applicable standards of practice.

Mark P. Speranza

Mark P. Speranza, P.E.
Professional Engineer No. PE0050304

Date: 8/30/02

Mark P Speranza

CERTIFICATION OF TECHNICAL
DATA CONFORMITY

The Contractor, Tetra Tech NUS, Inc., hereby certifies that, to the best of its knowledge and belief, the technical data delivered herewith under Contract No. N62467-94-D-0888 are complete and accurate and comply with all requirements of this contract.

DATE: August 30, 2002

COMPANY CERTIFICATION AUTHORIZATION NUMBER: 7988
Tetra Tech NUS, Inc.
661 Anderson Drive
Pittsburgh, PA 15220

NAME AND TITLE OF CERTIFYING OFFICIAL: Mark Speranza, P.E.
Task Order Manager

TABLE OF CONTENTS

SECTION **PAGE NO.**

ACRONYMS ..... **viii**

EXECUTIVE SUMMARY **ES-1**

1.0 INTRODUCTION **1-1**
1.1 PURPOSE OF REPORT 1-1
1.2 SITE DESCRIPTION AND BACKGROUND 1-1
1.3 DOCUMENT ORGANIZATION 1-6

2.0 STUDY AREA INVESTIGATION **2-1**
2.1 GROUNDWATER INVESTIGATIONS 2-1
2.1.1 Site 57 2-1
2.1.2 Site 58 2-2
2.1.3 Monitoring Well Construction and Installation 2-2
2.1.4 Monitoring Well Development 2-4
2.1.5 Water-Level Measurements 2-4
2.1.6 Groundwater Sampling 2-4
2.2 SITE 57 FREE-PRODUCT INVESTIGATION 2-7
2.3 SITE 57 SURFACE WATER SAMPLING 2-7
2.4 SITE 58 SEDIMENT SAMPLING 2-7
2.5 GEOLOGIC AND HYDROGEOLOGIC INVESTIGATION 2-8
2.5.1 Geotechnical Analysis 2-8
2.5.2 Specific Capacity Testing 2-9

3.0 GENERAL DATA EVALUATION PROCEDURES **3-1**
3.1 DATA QUALITY 3-1
3.1.1 Data Quality Objectives 3-1
3.1.2 Field Quality Control Samples 3-3
3.1.3 Data Validation 3-4
3.2 HUMAN HEALTH RISK ASSESSMENT PROCEDURES 3-7
3.2.1 Data Evaluation 3-7
3.2.2 Toxicity Screening 3-8
3.3 ECOLOGICAL RISK ASSESSMENT PROCEDURES 3-9
3.4 FLORIDA STANDARDS 3-9

4.0 PHYSICAL CHARACTERISTICS OF THE STUDY AREA **4-1**
4.1 SURFACE FEATURES 4-1
4.2 SURFACE HYDROLOGY/STORM SEWERS 4-1
4.3 SOILS 4-1
4.4 GEOLOGY 4-2
4.4.1 Physiography 4-2
4.4.2 Regional Geology 4-3
4.4.3 Site Geology 4-3
4.5 HYDROGEOLOGY 4-4
4.5.1 Regional Hydrogeology 4-4
4.5.2 Site Hydrogeology 4-5
4.6 FDEP GROUNDWATER CLASSIFICATION 4-7
4.7 FUTURE LAND USE 4-7

TABLE OF CONTENTS (Continued)

SECTION **PAGE NO.**

5.0 NATURE AND EXTENT OF CONTAMINATION 5-1
5.1 SITE 57 5-1
5.1.1 Groundwater 5-1
5.1.2 Surface Water 5-3
5.1.3 Temporary Wells 5-3
5.2 SITE 58 5-3
5.2.1 Groundwater 5-3
5.2.2 Sediment 5-5
5.3 COMPARISON TO STATE CRITERIA AND U.S. EPA PRGs 5-5
5.4 SUMMARY 5-7

6.0 CONTAMINANT FATE AND TRANSPORT 6-1
6.1 CHEMICAL AND PHYSICAL PROPERTIES 6-1
6.1.1 Volatile Organic Compounds 6-3
6.1.2 Polynuclear Aromatic Hydrocarbons 6-3
6.2 CONTAMINANT PERSISTENCE 6-4
6.2.1 Monocyclic Aromatics 6-4
6.2.2 Halogenated Aliphatics 6-4
6.2.3 Polynuclear Aromatic Hydrocarbons 6-5
6.3 NATURAL ATTENUATION 6-5
6.3.1 Natural Attenuation Overview 6-6
6.3.2 Natural Attenuation Evaluation 6-9

7.0 HUMAN HEALTH PRELIMINARY RISK EVALUATION 7-1
7.1 SITE 57 GROUNDWATER EVALUATION 7-1
7.2 SITE 58 GROUNDWATER EVALUATION 7-1
7.3 SITE 58 SOIL EVALUATION 7-2
7.4 HUMAN HEALTH PRE CONCLUSIONS 7-2
7.4.1 Site 57 7-2
7.4.2 Site 58 7-2

8.0 ECOLOGICAL RISK ASSESSMENT 8-1
8.1 SITE 57 8-1
8.2 SITE 58 8-2

9.0 SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS 9-1
9.1 SUMMARY 9-1
9.1.1 Site 57 9-1
9.1.2 Site 58 9-2
9.2 CONCLUSIONS 9-3
9.2.1 Site 57 9-3
9.2.2 Site 58 9-4

REFERENCES R-1

TABLE OF CONTENTS (CONTINUED)

APPENDICES

A SAMPLE LOG SHEETS, CHAIN-OF-CUSTODY RECORDS, AND SURVEY DATA
- **A.1 GROUNDWATER SAMPLE LOG SHEETS AND LOW-FLOW PURGE DATA SHEETS**
- **A.2 SITE 57 SURFACE WATER SAMPLE LOG SHEET**
- **A.3 SITE 58 SEDIMENT SAMPLE LOG SHEETS**
- **A.4 CHAIN-OF-CUSTODY RECORDS**
- **A.5 SURVEY DATA**

B BORING AND WELL RECORDS
- **B.1 BORING LOGS**
- **B.2 MONITORING WELL CONSTRUCTION SHEETS**
- **B.3 WELL CONFORMANCE REPORTS**

C AQUIFER CHARACTERISTICS, CALCULATIONS, AND RECORDS
- **C.1 MONITORING WELL DEVELOPMENT LOGS**
- **C.2 SYNOPTIC GROUNDWATER LEVEL MEASUREMENTS**
- **C.3 AQUIFER TEST DATA AND CALCULATIONS**

D TEMPORARY WELL FREE-PRODUCT MEASUREMENTS

E DATA VALIDATION SUMMARIES

F GEOTECHNICAL SAMPLE ANALYSES

TABLES

NUMBER		PAGE NO.
1-1	Summary of Analytical Results - Positive Detections, OU 9, Site 57	1-9
1-2	Summary of Analytical Results - Positive Detections, OU 9, Site 58	1-19
2-1	Monitoring Well Construction Information- OU9, Site 57	2-12
2-2	Monitoring Well Construction Information - OU9, Site 58	2-13
2-3	Summary of Groundwater Sampling and Analysis - OU9, Site 57	2-14
2-4	Summary of Groundwater Sampling and Analysis - OU9, Site 58	2-16
2-5	Summary of Temporary Well Locations - OU9, Site 57	2-17
3-1	Sample Rejections	3-11
4-1	Local Hydrostratigraphy	4-9
4-2	Synoptic Water Levels - OU 9, Site 57	4-10
4-3	Synoptic Water Levels - OU 9, Site 58	4-12
5-1	Summary of Analytical Results - Positive Detections, OU9, Site 57	5-11
5-2	Summary of Analytical Results - Positive Detections, OU 9, Site 58	5-12
5-3	Sediment Sample Analytical Results	5-18
5-4	Frequency of Detection for Chemicals of Concern in Groundwater	5-19
5-5	Summary of Groundwater Analytical Results	5-20
5-6	Sediment Sample Analytical Results	5-21
6-1	Environmental Fate and Transport Parameters for Organic Chemicals	6-13
6-2	Summary of Natural Attenuation Indicator Parameters in Groundwater, OU 9, Site 57 - Building 824A/Day Tank 1 Area	6-14
6-3	Summary of Natural Attenuation Indicator Parameters in Groundwater, OU 9 Site 58 - Building 312	6-15
7-1	Groundwater Analytes Detected above Screening Criteria - Site 57	7-3
7-2	Groundwater Analyte Detected above Screening Criteria - Site 58	7-4
7-3	Soil Analytes Detected above Screening Criteria - Site 58	7-5

FIGURES

NUMBER		PAGE NO.
1-1	Site Location Map, Site 57	1-21
1-2	Site Layout and Existing Monitoring Wells - OU 9, Site 57	1-23
1-3	Groundwater Results Exceeding Criteria, Existing Data - OU9, Site 57	1-25
1-4	General Location Map - OU 9, Site 58	1-27
1-5	Site Layout and Monitoring Well Locations - OU 9, Site 58	1-28
1-6	Groundwater Results Exceeding Criteria, Existing Data - OU 9, Site 58	1-29
2-1	Monitoring Well Locations - OU9, Site 57	2-19
2-2	Monitoring Well Locations- OU9, Site 58	2-21
2-3	Temporary Well Locations	2-22
2-4	Surface Water Sampling Location	2-23
2-5	Sediment Sampling Locations	2-24
4-1	Potentiometric Surface Elevation Map, Shallow Groundwater - OU 9, Site 57	4-13
4-2	Potentiometric Surface Elevation Map, Shallow Groundwater - OU 9, Site 58	4-15

FIGURES (CONTINUED)

NUMBER		PAGE NO.
5-1	VOCs in Groundwater, RI Data - OU 9, Site 57	5-25
5-2	PAHs in Groundwater, RI Data - OU 9, Site 57	5-27
5-3	TRPH in Groundwater, RI Data - OU 9, Site 57	5-29
5-4	VOCs in Groundwater, RI Data - OU 9, Site 58	5-31
5-5	PAHs in Groundwater, RI Data - OU 9, Site 58	5-32
5-6	TRPH in Groundwater, RI Data - OU 9, Site 58	5-33
5-7	Sediment Sample Results - RI Data, OU 9, Site 58	5-34
6-1	Dissolved Oxygen in Groundwater - OU 9, Site 57	6-17
6-2	Ferrous Iron in Groundwater - OU 9, Site 57	6-19
6-3	Sulfate, Sulfide, and Hydrogen Sulfide in Groundwater - OU 9, Site 57	6-21
6-4	Methane, Ethane, and Ethene in Groundwater - OU 9, Site 57	6-23
6-5	Oxidation-Reduction Potential in Groundwater - OU 9, Site 57	6-25
6-6	Carbon Dioxide and Alkalinity in Groundwater OU 9, Site 57	6-27
6-7	Dissolved Oxygen in Groundwater - OU 9, Site 58	6-29
6-8	Ferrous Iron in Groundwater - OU 9, Site 57	6-30
6-9	Sulfate, Sulfide, and Hydrogen Sulfide in Groundwater - OU 9, Site 57	6-31
6-10	Methane, Ethane, and Ethene in Groundwater - OU 9, Site 57	6-32
6-11	Oxidation-Reduction Potential in Groundwater - OU 9, Site 57	6-33
6-12	Carbon Dioxide and Alkalinity in Groundwater - OU 9, Site 57	6-34

ACRONYMS

ABB-ES	ABB Environmental Services, Inc.
AMSL	Above mean sea level
AST	Above-ground storage tank
ATSDR	Agency for Toxic Substances and Disease Registry
BaPEq	Benzo(a)pyrene equivalent
BCT	BRAC Cleanup Team
bgs	Below ground surface
BRAC	Base Realignment and Closure
BTEX	Benzene, toluene, ethylbenzene, and xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy
COC	Contaminant of concern
COPC	Contaminant of potential concern
cPAH	Carcinogenic PAH
CTO	Contract Task Order
DCA	Dichloroethane
DCE	Dichloroethene
DO	Dissolved oxygen
DPT	Direct-push technology
DQO	Data Quality Objective
EISOPQAM	Environmental Investigations Standard Operating Procedures and Quality Assurance Manual
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FS	Feasibility Study
FSP	Field Sampling Plan
GCTL	Groundwater Cleanup target level
HASP	Health and Safety Plan
HLA	Harding Lawson Associates
HQ	Hazard Quotient
HSA	Hollow-stem auger
IAS	Initial Assessment Study
IBDS	Inorganic background data set
ID	Inside diameter
IR	Installation Restoration

KAG	Kerosene Analytical Group
MB-18	Main Base Area 18
MCL	Maximum Contaminant Level
MTBE	Methyl tert-butyl ether
NAS	Naval Air Station
NAVFACENGCOM	Naval Facilities Engineering Command
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NGVD	National Geodetic Vertical Datum
NSF	National Sanitation Foundation
NTU	Nephelometric turbidity unit
ORP	Oxidation-reduction potential
OU	Operable Unit
PAH	Polynuclear aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PCE	Tetrachloroethene
PID	Photoionization detector
PQL	Practical quantitation limit
PRE	Preliminary Risk Evaluation
PRG	Preliminary Remediation Goal
PVC	Polyvinyl chloride
QA	Quality assurance
QC	Quality control
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RPD	Relative percent difference
RQL	Required quantitation limit
SAR	Sampling and Analysis Report
SAOR	Sampling and Analysis Outline and Report
SCS	Soil Conservation Service
SCTL	Soil Cleanup Target Level
SDG	Sample Delivery Group
SMCL	Secondary Maximum Contaminant Level
SOP	Standard operating procedure
SOUTHDIV	Southern Division
SPECAP	Specific capacity
SVOC	Semivolitile organic compound

TAL	Target Analyte List
TCA	Trichloroethane
TCE	Trichloroethene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TOC	Total organic carbon
TRPH	Total recoverable petroleum hydrocarbons
TtNUS	Tetra Tech NUS, Inc.
USCS	United Soil Classification System
USDA	United States Department of Agriculture
U.S. EPA	United States Environmental Protection Agency
UST	Underground storage tank
VOC	Volatile organic compound

EXECUTIVE SUMMARY

This Remedial Investigation (RI) Report for Operable Unit (OU) 9, Sites 57 and 58, Naval Air Station (NAS) Cecil Field, Jacksonville, Florida, has been prepared by Tetra Tech NUS, Inc., (TtNUS) for the Southern Division (SOUTHDIV) Naval Facilities Engineering Command (NAVFACENGCOM) under the Navy Comprehensive Long-Term Environmental Action Navy (CLEAN) Program, Contract Number N62467-94-D-0888, Contract Task Order (CTO) 0078. This report describes the field investigation and subsequent findings of the RIs at Site 57 – the Day Tank 1/Building 824A Area and Site 58 – Building 312.

SITE 57

Site 57 includes contaminated groundwater in the area of Day Tank 1 and nearby buildings including 824/824A, 293, 846, and 1848. The Day Tank 1 site is the former location of a 200,000-gallon above-ground storage tank (AST) that was removed in November 1999 along with approximately 24,000 tons of petroleum-contaminated soil. A biosparge/vapor collection system began operation in this area on February 29, 2000. Free-product has been detected in two vapor extraction wells just west of Building 846. Chlorinated solvent groundwater contamination was detected in the area south of Building 824A as part of the Main Base 18 (MB-18) investigation. Day Tank 1 soils are being investigated under the Petroleum Program. The petroleum and chlorinated groundwater contamination in the Day Tank 1 and 824A areas are being evaluated as Site 57 under the Installation Restoration (IR) Program.

RI field activities at Site 57 included permanent groundwater monitoring well installation and sampling, temporary well installation for free-product evaluation, and surface water sampling. Utilizing data gathered during the RI, a human health Preliminary Risk Evaluation (PRE) and an ecological risk evaluation were conducted to evaluate potential risks to human health and the environment posed by the site.

Ten monitoring wells (five shallow, three intermediate, and two deep) were installed during the RI, and these and 31 previously installed monitoring wells were sampled to delineate the horizontal and vertical extent of groundwater contamination. Based on historic analytical data from Day Tank 1 and Building 824A wells, groundwater samples were analyzed for volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs), and total recoverable petroleum hydrocarbons (TRPH). To evaluate the potential for natural attenuation at the site, nine of these wells were also analyzed for geochemical indicator parameters. Nineteen temporary wells were installed surrounding the vapor extraction wells at which free-product was previously detected to delineate the extent of free-product. To evaluate potential impacts to surface water from groundwater infiltrating the storm sewer system in the

site area, a surface water sample was collected from the associated storm sewer outfall at its discharge point on the east side of the north-south runways. This sample was analyzed for VOCs, PAHs, and TRPH.

A petroleum plume, a trichloroethene (TCE) plume, and an isolated area of chlorinated groundwater contamination were identified during the RI. The petroleum plume, defined by benzene concentrations greater than 1 µg/L, extends from the eastern side of Building 846 toward the southeast to the area east of Building 824A and generally encompasses exceedances of Florida Department of Environmental Protection (FDEP) Groundwater Target Cleanup Levels (GCTLs) for toluene, ethylbenzene, xylenes, PAHs (1- and 2- methylnaphthalene), and TRPH. Immediately east of Building 846, the plume is limited to the shallow zone of the surficial aquifer, but extends into the intermediate zone in one well in the western portion of the plume. This plume extends approximately 750 feet to the southeast from Building 846 and has an average width of approximately 225 feet. The TCE plume, defined by concentrations of TCE greater than 3 µg/L, is centered to the east of, and partially overlaps, the petroleum plume and extends to the southeast. This plume is approximately 250 feet by 180 feet in size and, with the exception of one exceedance in an isolated area southeast of the plume, encompasses chlorinated exceedances at the site. Chlorinated compounds in wells located in this area southeast of the TCE plume do not appear to be associated with the plume based on the lack of detections of chlorinated compounds in intervening wells. Contamination in both areas is limited to the shallow zone of the surficial aquifer.

The temporary well investigation delineated an area of free-product with an extent of approximately 350 square feet and thickness of less than 1 foot just west of Building 846 and extending beneath the building. Surface water sampling indicated that groundwater potentially infiltrating the storm sewer system in the site area does not have an impact on surface water quality at the storm sewer discharge point.

The human health PRE indicated that residential exposure to groundwater from Site 57 could result in adverse impacts. Concentrations of benzene, 1,1-dichloroethene (DCE), and TCE in groundwater resulted in risks exceeding United States Environmental Protection Agency's (U.S. EPA's) target risk range and FDEP target risk. Concentrations of cis-1,2-DCE and naphthalene in groundwater resulted in hazard quotients (HQs) greater than one. The ecological risk evaluation indicated negligible ecological risks based on the limited extent and poor quality of habitat in the site area and the lack of significant and/or complete exposure pathways for soil and surface water.

Based on the results of the RI, unacceptable risks are posed by potential future groundwater use at the site, and the recommended Remedial Action Objective (RAO) is to prevent ingestion of groundwater with concentrations of VOCs, PAHs, and TRPH in excess of FDEP GCTLs.
Recommendations to meet this objective include:

- Free-product removal
- Remediation of contaminated groundwater to conform to FDEP criteria, or
- Implementation of institutional controls to prevent the use of groundwater as a potable water source
- Continued monitoring of the plume

An evaluation of remedial actions to meet the RAO for Site 57 will be conducted as part of a Feasibility Study (FS).

SITE 58

Site 58 consists of the area around Building 312, including the former aircraft wash rack southeast of the building and the drainage ditch south of the building that received discharges from the wash rack. Investigations of Building 312 and the associated wash rack were initially conducted under the Petroleum Program; however, when chlorinated contaminants were detected in groundwater, the site was transferred to the IR Program.

RI field activities at Site 58 included permanent groundwater monitoring well installation and sampling and sediment sampling. Utilizing data gathered during the RI, a human health PRE and an ecological risk evaluation were conducted to evaluate potential risks to human health and the environment posed by the site.

Seven monitoring wells (six shallow and one intermediate) were installed during the RI, and these and 11 previously installed monitoring wells were sampled to delineate the horizontal and vertical extent of groundwater contamination. Based on historic analytical data, groundwater samples were analyzed for VOCs, PAHs, and TRPH. To evaluate the potential for natural attenuation at the site, five of these wells were also analyzed for geochemical indicator parameters. To evaluate potential impacts to sediment from storm sewer discharges from the wash rack catch basin to the drainage ditch south of Building 312, three sediment samples were collected from this ditch, downstream of the discharge point, and analyzed for VOCs, PAHs, and TRPH. The first sample was collected in the ditch approximately 15 feet downstream of the culvert at the head of the ditch and the other samples were collected approximately 80 and 175 feet downstream of the culvert.

The naphthalene plume, delineated during the RI and located southeast of Building 312, is approximately 100 feet by 60 feet in size and is limited to the shallow zone of the surficial aquifer. The plume outline, defined by naphthalene concentrations greater than 20 µg/L, encompasses shallow groundwater exceedances of FDEP GCTLs for naphthalene and TRPH detected at the site during the RI. One of the three sediment samples collected during the RI from the normally dry drainage ditch had concentrations of PAHs in excess of FDEP residential direct exposure Soil Target Cleanup Levels (SCTLs). The sample located approximately 70 feet downstream of the contaminated sample had concentrations of PAHs less than SCTLs, and the sample collected approximately 90 feet farther downstream did not have detectable concentrations of PAHs.

The human health PRE indicated that residential exposure to groundwater from Site 58 could result in adverse impacts because concentrations of naphthalene in groundwater resulted in a HQ greater than one. Because the drainage ditch from which sediment samples were collected is normally dry, the sediment samples from the ditch were evaluated as soil in the PRE. Potential risks associated with the maximum detected benzo(a)pyrene equivalent (BaPEq) concentration at the site, in the sediment sample closest to the storm sewer discharge point, are within U.S. EPA's risk range, but exceed FDEP's target risk for both industrial and residential exposure scenarios. The ecological risk evaluation indicated negligible ecological risks based on the limited extent and poor quality of habitat in the site area and the lack of significant and/or complete exposure pathways for soil and surface water.

Based on the results of the RI, unacceptable risks are posed by potential future residential groundwater use and by residential exposure to sediment/soil at the site. The recommended RAOs are:

- To prevent ingestion of groundwater with concentrations of naphthalene in excess of FDEP GCTLs
- To prevent residential exposure to soil with concentrations of PAHs in excess of FDEP SCTLs.

Recommendations to meet these objectives include:

- Removal of soil with BaPEq concentrations in excess of FDEP SCTLs
- Remediation of contaminated groundwater to conform to FDEP criteria, or
- Implementation of institutional controls to prevent the use of groundwater as a potable water source
- Continued monitoring of the plume.

An evaluation of remedial actions to meet the RAOs for Site 58 will be conducted as part of an FS.

1.0 INTRODUCTION

This Remedial Investigation (RI) Report for Operable Unit (OU) 9, Sites 57 and 58 at Naval Air Station (NAS) Cecil Field, Jacksonville, Florida, has been prepared by Tetra Tech NUS, Inc. (TtNUS) for the Southern Division (SOUTHDIV) Naval Facilities Engineering Command (NAVFACENGCOM) under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Program, Contract Number N62467-94-D-0888, Contract Task Order (CTO) 0078. This report describes the field investigations and subsequent findings for Site 57, Building 824A/Day Tank 1 Area and Site 58, Building 312.

The RI was conducted to determine the nature and extent of contamination, to assess the human health and environmental risks posed by contamination, and to provide a basis for selecting alternatives for remediation of the site. Because the risks posed by the sites are not expected to be significant and the sites are located within industrial areas in accordance with current reuse plans, the Base Realignment and Closure (BRAC) Cleanup Team (BCT) agreed that a Preliminary Risk Evaluation (PRE) would be acceptable, rather than a Baseline Risk Assessment.

The RI fieldwork was conducted from September 2001 through December 2001, in accordance with the Final RI Work Plans for Sites 57 and 58 (TtNUS, 2001a) and the RI Work Plan Addendum (TtNUS, 2001b).

1.1 PURPOSE OF REPORT

This report presents the results of the RIs conducted at Sites 57 and 58. It includes a description of the field investigations, presentation of the data, the human health PREs, and the ecological risk assessments.

The results and conclusions of this report will be used to develop a Feasibility Study (FS) for each site to develop, screen, and evaluate remedial alternatives based on risk assessments and remediation criteria.

1.2 SITE DESCRIPTION AND BACKGROUND

Site 57

Figure 1-1 provides a site location map for Site 57, and Figure 1-2 provides the site layout and existing monitoring well locations. Previous investigations in the Site 57 area were conducted under the petroleum and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) programs; however, the BCT decided that the Site 57 area would be investigated in its entirety under the

Installation Restoration (IR) Program, as governed by the CERCLA. The area to be included under this RI consists of contaminated groundwater in the area around Buildings 824/824A, 293, 846, and 1848.

Buildings associated with Site 57 include 824/824A, 293, 817, 824A LS, 825, 825A LS, 841, 846, 852, 870, and 1848. Building 824, built in 1957, and Building 824A, annexed in 1988, were used as an electronics maintenance and support facility for jet aircraft. The buildings were used to test and repair electrical equipment including such activities as welding, painting, sandblasting, hydraulics repair, corrosion control, and parts cleaning. Floor drains in various areas of the building reportedly discharged to the sanitary sewer system. Wastewater from parts cleaning activities outside the building reportedly drained into the storm sewer system. Building 293, the Day Tank 1 administrative office building, was constructed in 1955.

Building 817, constructed in 1971, housed diesel-powered generators for use at Building 825, an aircraft hangar, if main base power was unavailable. Buildings 824A LS and 825A LS are sanitary sewer lift stations that received discharges for more than 20 years from Building 824/824A and outside aircraft wash racks, respectively. Building 825 was built in 1966 and was used as an aircraft storage and maintenance area; it was also used a hazardous waste satellite accumulation point. Building 841, constructed in 1993, was a flammable materials locker used for the storage of hazardous materials and petroleum products. The locker was located on a raised grassy area next to a paved aircraft wash rack located east of Building 846. Wash water from this rack discharged to storm drains in the pavement and eventually to storm sewers.

Building 846, the ground support equipment storage facility, was constructed in 1974 and was used to temporarily store equipment and materials until they were transferred to Building 1846. Hazardous materials reportedly stored at this facility included hydraulic fluid, jet fuel, compressed gas, epoxy resin, and petroleum naphtha. Buildings 852 and 870, constructed in 1988 and 1980, respectively, were used as hazardous materials storage lockers. Materials stored in these lockers may have included paint, floor adhesive, epoxy resin, polyamide epoxy, aliphatic naphtha, paint thinner, polyurethane coating, hydraulic fluid, and insulating oil. Building 1848 was built in 1985 and was used to store ground support equipment before it was issued for use on the runway (ABB-ES, 1994).

The Day Tank 1 site is the former location of a 200,000-gallon above-ground storage tank (AST) that received jet fuel from the North Fuel Farm and supplied it to high-speed refuelers along the flightline. A retention pond north of the tank received wastewater and drained to the storm sewer system. Numerous spills have been reported over the course of site operations. A Contamination Assessment conducted in 1996 documented soil and groundwater contamination at the site, and a Remedial Action Plan (RAP) was developed for the excavation of 20,000 tons of soil and installation of a biosparging/vapor collection

groundwater remediation system (ABB-ES, 1997). In November 1999, the AST and approximately 24,000 tons of petroleum-contaminated soil were removed. Start-up of the biosparge/vapor collection system occurred on February 29, 2000.

Operation of this system will continue under the Petroleum Program. Also under the Petroleum Program, further delineation of potential petroleum-related soil contamination and removal of free product associated with Day Tank 1 will be conducted.

As part of the Sampling and Analysis Outline and Report (SAOR) investigation at Main Base Open Area 18 (MB-18), trichloroethene (TCE) and 1,1-dichloroethane (DCA) were detected in a direct-push technology (DPT) groundwater sample (85Q01301) collected from 13 feet below ground surface (bgs) in a temporary well located southeast of Building 824A (HLA, 1999). The concentration of TCE detected was greater than the Florida Department of Environmental Protection (FDEP) groundwater cleanup target level (GCTL). A permanent monitoring well, CEF-824A-01Sa, was installed at this location, and analytical results showed naphthalene and 2-methylnaphthalene at concentrations in excess of GCTLs and 1,1-DCA at a concentration less than the GCTL. TCE was not detected in the permanent well. This sample was identified in the MB-18 report as 85G01801. This well was resampled by TtNUS in May 2000, and analytical data indicated TCE and 2-methylnaphthalene at concentrations in excess of GCTLs and naphthalene at a concentration less than its GCTL (TtNUS, 2000).

Four additional shallow monitoring wells were installed to delineate groundwater contamination detected during previous sampling. These wells, designated CEF-824A-02S through CEF-824A-05S, were sampled along with CEF-824A-01Sa in July 2000. In September 2000, an intermediate well (CEF-824A-06I) was installed at the CEF-824A-01Sa location, and a shallow well (CEF-824A-07S) was installed downgradient (southeast) of CEF-824A-01Sa, north of the storm sewer running east-west through the area (TtNUS, 2000). The intermediate well was installed to investigate potential vertical migration of contamination, and CEF-824A-07S was installed to investigate potential impacts of the storm sewer on contaminant migration. Based on analytical data from sampling through September 2000, further well installation and sampling were required in this area to delineate the extent of groundwater contamination.

Because of the proximity of existing wells installed and sampled as part of the Day Tank 1 investigation to the 824A wells and because of the presence of common groundwater contaminants (petroleum-related and chlorinated), it was decided that a more comprehensive evaluation of groundwater in the area was necessary. Four additional shallow wells and one additional intermediate well were installed to further delineate the Building 824A area plume (TtNUS, 2000). These wells, along with six wells from the Day Tank 1 monitoring program (CEF-293-10, -11, -19, -20, -21, and -22, and CEF-825LS-1S), were sampled

in January 2001. In addition, a round of synoptic water level measurements was obtained from the sampled wells and from eight additional existing wells in the area to investigate groundwater flow conditions. These wells included CEF-824A-01Sa, -02S, -03S, -04S, -05S, -06I, -07S, and CEF-293-13.

Currently, the quarterly groundwater monitoring program for the biosparging and soil vapor extraction system at Day Tank 1 includes sampling of wells CEF-293-4, -9, -13, -20, and -21 and eight vapor extraction wells (VEW-1 through VEW-8) for volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs). Due to the presence of free product, vapor extraction well VEW-1 was not sampled during any of the quarterly events and VEW-2 was not sampled during the third quarterly event. VEW-1 has been bailed periodically since October 2000, and, by September 2001, approximately 14.5 gallons of product had recovered. The thickness of free product has not significantly decreased in VEW-1 during this time period. Free product was minimal in VEW-2 after June 2000, and no recovery has been conducted at this well (CH2MHill, 2001).

An additional semi-annual groundwater monitoring program for Day Tank 1 conducted under the petroleum program includes collection of samples from wells CEF-293-4, -11, -13, -14, -19, -20, and -21 and analysis for benzene, ethylbenzene, toluene, xylenes (BTEX), methyl tert-butyl ether (MTBE), and polynuclear aromatic hydrocarbons (PAHs).

Historic groundwater data for Site 57 are presented in Table 1-1 and on Figure 1-3.

Site 58

Figure 1-4 provides a site location map for Site 58, and Figure 1-5 provides the site layout and existing monitoring well locations. Previous investigations in this area, conducted under the Petroleum Program to investigate an aircraft wash rack, identified that groundwater was contaminated with chlorinated compounds; therefore, the BCT decided that this area would be investigated under the IR Program.

Building 312, a corrosion control hangar, was built in 1957 and previously housed administrative offices and two paint booths. Activities included sanding, priming, and corrosion control for jet aircraft and equipment. Associated structures included an abandoned hydraulic lift, an aircraft wash rack, an oil/water separator, and a waste oil underground storage tank (UST). Wastewater from the wash rack appears to have discharged to the storm sewer and sanitary sewer systems. 312LS, a sanitary sewer lift station built in 1957, served Building 312 and the wash rack. A small unnumbered building northeast of Building 312 was used as a hazardous waste satellite accumulation point (ABB-ES, 1994).

As part of field activities associated with the Sampling and Analysis Report (SAR), two groundwater samples, two sediment samples, and one subsurface soil sample were collected (ABB-ES, 1996).

Sediment and subsurface soil samples were analyzed for SVOCs, pesticides, and inorganics, and groundwater samples were analyzed for VOCs, SVOCs, and inorganics. Groundwater samples were collected from wells CEF-312-01, located southeast of the wash rack catch basin, and CEF-312-02, located at the northeastern corner of Building 312. Sediment samples were collected from a drainage swale south of Building 312 that received discharge from the wash rack. The subsurface soil sample was collected from 2 to 3 feet bgs at a location adjacent to the subsurface hydraulic lift cylinder housing.

Naphthalene, aluminum, arsenic, iron, and manganese were detected in unfiltered groundwater samples at concentrations greater than screening criteria. Arsenic was detected in sediment in excess of screening criteria. No analytes were detected in subsurface soil in excess of screening criteria. Based on human health and ecological PREs performed as part of the SAR investigation, it was concluded that the concentrations of analytes detected in groundwater, sediment, and subsurface soil did not pose risks to human health or the environment.

To investigate previous exceedances of groundwater criteria, monitoring well CEF-312-01 was resampled in 1999 for total and dissolved iron and manganese and naphthalene. Total and dissolved manganese concentrations were less than the FDEP GCTL and the NAS Cecil Field Inorganic Background Data Set (IBDS) value (HLA, 1998). Total and dissolved iron concentrations were greater than the GCTL and the IBDS value, and the naphthalene concentration was greater than the GCTL. Based on the SAR Addendum issued with these results, it was decided that the groundwater at the site would be evaluated under the Petroleum Program (TtNUS, 1999).

The Phase I Groundwater Assessment included the installation and sampling of three additional shallow monitoring wells at the site. CEF-B312-1S was installed west of existing well CEF-312-01, and CEF-B312-02S and CEF-B312-03S were installed northeast and southeast, respectively, of CEF-312-01. Groundwater samples from these wells were analyzed for constituents of the Kerosene Analytical Group (KAG), including VOCs, PAHs, and lead. Naphthalene and total recoverable petroleum hydrocarbon (TRPH) concentrations exceeded FDEP GCTLs in the three wells, and the vinyl chloride concentration in CEF-B312-03S exceeded the GCTL.

The Phase II Groundwater Assessment included installation of five additional shallow wells (CEF-B312-04S, -05S, -06S, -07S, and -08S) and one intermediate well (CEF-B312-01I). Groundwater samples were collected from CEF-312-01 and the nine new and existing Phase I and Phase II wells and analyzed for KAG parameters. Exceedances of GCTLs in Phase II sampling included the following:

- CEF-312-01 – naphthalene
- CEF-B312-01S – 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, and TRPH

- CEF-B312-02S – naphthalene
- CEF-B312-03S – naphthalene, vinyl chloride, and 1,1-dichloroethene (DCE)
- CEF-B312-06S – naphthalene
- CEF-B312-08S – 1,1-DCE, 1,1-DCA, and naphthalene

Based on the results of the Phase I and Phase II Groundwater Assessments, it was decided that groundwater in the Building 312 area would be addressed under the IR Program.

Existing groundwater data for Site 58 are presented in Table 1-2, and existing groundwater analytical results are presented on Figure 1-6.

1.3 DOCUMENT ORGANIZATION

This RI Report has been organized with the intent of meeting the general format requirements specified in the October 1988 RI/FS guidance document (U.S. EPA, 1988) and the requirements of the RI work plans for Sites 57 and 58 (TtNUS, 2001a, TtNUS, 2001b).

Section 1.0, Introduction, summarizes the purpose of the report, provides site background information, summarizes previous investigations, and provides the report outline.

Section 2.0, Study Area Investigation, provides a summary of investigative procedures (e.g., groundwater sampling and analysis, water level measurement, hydraulic testing, etc.) used at the site.

Although Sections 1.0 and 2.0 are generally consistent with the format required by the RI/FS guidance document, Section 3.0, General Data Evaluation Procedures, is an additional section that describes data analysis and interpretation methods. Section 3.0 includes a discussion of data validation procedures and the human health and environmental risk assessment components such as data evaluation, toxicity assessment, and exposure assessment. The results of the data validation and quality control samples are also discussed in this section.

Section 4.0, Physical Characteristics of the Study Area, conforms to the typical Section 3.0 of an RI Report.

Section 5.0, Nature and Extent of Contamination, describes the nature and extent of contamination at the site.

Section 6.0, Contaminant Fate and Transport, describes general contaminant fate and transport characteristics and provides an evaluation of site-specific contaminant fate and transport information including a discussion of natural attenuation.

Section 7.0, Human Health Preliminary Risk Evaluation, describes the data evaluation, exposure assessment, and risk characterization.

Section 8.0, Ecological Risk Assessment, describes the ecological risk assessment.

Section 9.0, Summary, Conclusions, and Recommendations, provides an overall summary, conclusions, and recommendations.

Supplemental information for this report is included in the Appendices.

This page intentionally left blank.

TABLE 1-1

SUMMARY OF ANALYTICAL RESULTS - POSITIVE DETECTIONS
OU 9, SITE 57 - BUILDING 824A/DAY TANK 1 AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 1 OF 10

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-293-4						CEF-293-7	CEF-293-8	CEF-293-9				CEF-293-10		REGION IX PRGs(2)	FEDERAL MCLs(3)
		Sep-96	Jul-99	Jan-00	Jun-00	Sep-00	Jan-01	Sep-96	Sep-96	Sep-96	Jun-00	Sep-00	Jan-01	Sep-96	Jan-01		
VOLATILE ORGANIC COMPOUNDS (ug/L)																	
Acetone	700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	50 U	610	NA
Benzene	1	1 U	1 U	1 U	1 U	1 U	1 U	6.7	1 U	240	1 U	1 U	1 U	1 U	1 U	0.35	5
Chloroethane	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	4.6	NA
Chloroform	5.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2 U	0.16	NA
cis-1,2-Dichloroethene	70	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2 U	61	70
1,2-Dichlorobenzene	600	NA	1 U	1 U	1 U	1 U	NA	NA	NA	NA	NA	1 U	1 U	NA	NA	370	600
1,3-Dichlorobenzene	10	NA	1 U	1 U	1 U	1 U	NA	NA	NA	NA	NA	1 U	1 U	NA	NA	5.5	75
1,1-Dichloroethane	70	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2 U	810	NC
1,2-Dichloroethane	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2 U	0.12	5
1,1-Dichloroethene	7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2 U	0.046	7
1,2-Dichloroethene, total	63	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC	NC
Ethylbenzene	30	1 U	1 U	1 U	1 U	1 U	1 U	57	1 U	1000	**1.4**	1 U	1 U	1 U	2 U	1300	700
4-Methyl-2-pentanone	560	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	10 U	160	NC
Methylene chloride	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	4.3	NC
Tetrachloroethene	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2 U	1.1	5
Toluene	40	1 U	1 U	1 U	1 U	1 U	1 U	**7.7**	1 U	370	1 U	1 U	1 U	1 U	2 U	720	1000
trans-1,2-Dichloroethene	31	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2 U	120	100
Trichloroethene	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2 U	1.6	5
Vinyl chloride	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.014	2
Xylenes, total	20	1 U	1 U*	3 U	3 U	3 U	3 U	140	**1.5**	2100	**2.7 J**	3 U	3 U	1 U	**2 J**	1400	10000
MTBE	35	NA	10 U	1 U	1 U	1 UJ	NA	NA	NA	NA	1 U	1 UJ	1 U	NA	NA	20	NC
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)																	
Acenaphthylene	210	1.1 U	5 U	5 U	5.5 U	5 U	4 U	5.4 U	1.1 U	11 U	5 U	5 U	5.5 U	1.1 U	NA	NC	NC
BEHP	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.8	NC
1-Methylnaphthalene	20	1.1 U	5 U	5 U	5.5 U	5 U	2 U	80	**6.4**	160	5 U	5 U	5.5 U	1.1 U	2.2 U	NA	NC
2-Methylnaphthalene	20	1.1 U	5 U	5 U	5.5 U	5 U	2 U	57	**5.2**	110	5 U	5 U	5.5 U	1.1 U	2.2 U	NA	NC
Naphthalene	20	1.1 U	5 U	5 U	5.5 U	5 U	2 U	100	**5**	290	5 U	5 U	5.5 U	**11**	22	6.2	NC
Phenol	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	22000	NC
1,2,4-Trichlorobenzene	70	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	190	70
1,2,4-Trimethylbenzene	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	12	NC

TABLE 1-1

SUMMARY OF ANALYTICAL RESULTS - POSITIVE DETECTIONS
OU 9, SITE 57 - BUILDING 824A/DAY TANK 1 AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 2 OF 10

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-293-11							REGION IX PRGs(2)	FEDERAL MCLs(3)
		Sep-96	Aug-97	Feb-98	Jul-98	Jul-99	Jul-00	Jan-01		
VOLATILE ORGANIC COMPOUNDS (ug/L)										
Acetone	700	NA	NA	NA	NA	NA	NA	50 U	610	NA
Benzene	1	27	1 U	1 U	16	35	48	63.2	0.35	5
Chloroethane	12	NA	NA	NA	2 U	NA	NA	5 U	4.6	NA
Chloroform	5.7	NA	NA	NA	1 U	NA	NA	2 U	0.16	NA
cis-1,2-Dichloroethene	70	NA	NA	NA	1 U	NA	NA	2 U	61	70
1,2-Dichlorobenzene	600	NA	NA	NA	NA	**62**	NA	NA	370	600
1,3-Dichlorobenzene	10	NA	NA	NA	NA	**9.1**	NA	NA	5.5	75
1,1-Dichloroethane	70	NA	NA	NA	1 U	NA	NA	2 U	810	NC
1,2-Dichloroethane	3	NA	NA	NA	1 U	NA	NA	2 U	0.12	5
1,1-Dichloroethene	7	NA	NA	NA	1 U	NA	NA	**1 J**	0.046	7
1,2-Dichloroethene, total	63	NA	NA	NA	NA	NA	NA	NA	NC	NC
Ethylbenzene	30	63	1 U	1 U	**4.2**	61	140	237	1300	700
4-Methyl-2-pentanone	560	NA	NA	NA	NA	NA	NA	10 U	160	NC
Methylene chloride	5	NA	NA	NA	NA	NA	NA	5 U	4.3	NC
Tetrachloroethene	3	NA	NA	NA	2 U	NA	NA	2 U	1.1	5
Toluene	40	10 U	1 U	1 U	1 U	**18**	54	72.9	720	1000
trans-1,2-Dichloroethene	31	NA	NA	NA	1 U	NA	NA	2 U	120	100
Trichloroethene	3	NA	NA	NA	1 U	NA	NA	2 U	1.6	5
Vinyl chloride	1	NA	NA	NA	1 U	NA	NA	1 U	0.014	2
Xylenes, total	20	100	1 U	1 U*	**6.4***	580*	360*	826	1400	10000
MTBE	35	NA	NA	2 U	2 U	40	50 U	2 U	20	NC
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)										
Acenaphthylene	210	5 U	20 U	10 U	10 U	5 U	5 U	22 U	NC	NC
BEHP	6	NA	NA	NA	NA	NA	NA	NA	4.8	NC
1-Methylnaphthalene	20	110	59	10 U	**16**	60	79	100	NA	NC
2-Methylnaphthalene	20	87	78	22	**18**	100	120	92.9	NA	NC
Naphthalene	20	170	130	37	25	190	180	167	6.2	NC
Phenol	10	NA	NA	NA	NA	NA	NA	NA	22000	NC
1,2,4-Trichlorobenzene	70	NA	NA	NA	NA	NA	NA	NA	190	70
1,2,4-Trimethylbenzene	10	NA	NA	NA	NA	NA	NA	NA	12	NC

TABLE 1-1

SUMMARY OF ANALYTICAL RESULTS - POSITIVE DETECTIONS
OU 9, SITE 57 - BUILDING 824A/DAY TANK 1 AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 3 OF 10

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-293-13											REGION IX PRGs(2)	FEDERAL MCLs(3)
		Sep-96	Jul-97	Feb-98	Aug-98	Jul-99	Jun-00	Jul-00	Sep-00	Dec-00	Jan-01			
											Sample	Dup		
VOLATILE ORGANIC COMPOUNDS (ug/L)														
Acetone	700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	610	NA
Benzene	1	330	71	790	470	200	128	67	112	1.6	**0.95 J**	**0.75 J**	0.35	5
Chloroethane	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	NA	4.6	NA
Chloroform	5.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	2 U	NA	0.16	NA
cis-1,2-Dichloroethene	70	NA	NA	NA	NA	NA	NA	NA	NA	NA	2 U	NA	61	70
1,2-Dichlorobenzene	600	NA	NA	NA	NA	NA	1 U	NA	2 U	1 U	NA	NA	370	600
1,3-Dichlorobenzene	10	NA	NA	NA	NA	17	1 U	NA	2 U	1 U	NA	NA	5.5	75
1,1-Dichloroethane	70	NA	NA	NA	NA	NA	NA	NA	NA	NA	2 U	NA	810	NC
1,2-Dichloroethane	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	2 U	NA	0.12	5
1,1-Dichloroethene	7	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1 J**	NA	0.046	7
1,2-Dichloroethene, total	63	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC	NC
Ethylbenzene	30	89	32	430	170	340	124	95	106	1 U	**0.64 J**	1 U	1300	700
4-Methyl-2-pentanone	560	NA	NA	NA	NA	NA	NA	NA	NA	NA	10 U	NA	160	NC
Methylene chloride	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	NA	4.3	NC
Tetrachloroethene	3	NA	NA	NA	NA	NA	NA	NA	NA	NA	2 U	NA	1.1	5
Toluene	40	**38**	**14**	310	110	81	**3.1**	**1**	**2.2**	1 U	1 U	1 U	720	1000
trans-1,2-Dichloroethene	31	NA	NA	NA	1 U	NA	NA	NA	NA	NA	2 U	NA	120	100
Trichloroethene	3	NA	NA	NA	1 U	NA	NA	NA	NA	NA	2 U	NA	1.6	5
Vinyl chloride	1	NA	NA	NA	1 U	NA	NA	NA	NA	NA	1 U	NA	0.014	2
Xylenes, total	20	340	130	1220*	500*	1810*	193	27*	161	3 U	3 U	3 U	1400	10000
MTBE	35	NA	NA	2 U	2 U	390	**2.2**	10 U	2 UJ	1 U	1 U	1 U	20	NC
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)														
Acenaphthylene	210	11 U	20 U	10 U	**11**	5 U	10 U	5 U	20 U	5 U	4.4 U	4.4 U	NC	NC
BEHP	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.8	NC
1-Methylnaphthalene	20	200	75	74	43	58	64.2	43	61.1	29.6	27.6	25.4	NA	NC
2-Methylnaphthalene	20	130	100	98	43	96	82.2	62	75	39.2	30.8	28.4	NA	NC
Naphthalene	20	310	160	150	60	180	157	88	163	40.7	**13.1**	**12.3**	6.2	NC
Phenol	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	22000	NC
1,2,4-Trichlorobenzene	70	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	190	70
1,2,4-Trimethylbenzene	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	12	NC

TABLE 1-1

SUMMARY OF ANALYTICAL RESULTS - POSITIVE DETECTIONS
OU 9, SITE 57 - BUILDING 824A/DAY TANK 1 AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 4 OF 10

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-293-14							REGION IX PRGs(2)	FEDERAL MCLs(3)
		Sep-96	Aug-97	Feb-98	Aug-98	Jul-99	Jul-00	Jan-01		
VOLATILE ORGANIC COMPOUNDS (ug/L)										
Acetone	700	NA	NA	NA	NA	NA	NA	NA	610	NA
Benzene	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.35	5
Chloroethane	12	NA	NA	NA	NA	NA	NA	NA	4.6	NA
Chloroform	5.7	NA	NA	NA	NA	NA	NA	NA	0.16	NA
cis-1,2-Dichloroethene	70	NA	NA	NA	NA	NA	NA	NA	61	70
1,2-Dichlorobenzene	600	NA	NA	NA	NA	**0.84 J**	NA	NA	370	600
1,3-Dichlorobenzene	10	NA	NA	NA	NA	1 U	NA	NA	5.5	75
1,1-Dichloroethane	70	NA	NA	NA	NA	NA	NA	NA	810	NC
1,2-Dichloroethane	3	NA	NA	NA	NA	NA	NA	NA	0.12	5
1,1-Dichloroethene	7	NA	NA	NA	NA	NA	NA	NA	0.046	7
1,2-Dichloroethene, total	63	NA	NA	NA	NA	NA	NA	NA	NC	NC
Ethylbenzene	30	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1300	700
4-Methyl-2-pentanone	560	NA	NA	NA	NA	NA	NA	NA	160	NC
Methylene chloride	5	NA	NA	NA	NA	NA	NA	NA	4.3	NC
Tetrachloroethene	3	NA	NA	NA	NA	NA	NA	NA	1.1	5
Toluene	40	1 U	1 U	1 U	1 U	1 U	1 U	1 U	720	1000
trans-1,2-Dichloroethene	31	NA	NA	NA	NA	NA	NA	NA	120	100
Trichloroethene	3	NA	NA	NA	NA	NA	NA	NA	1.6	5
Vinyl chloride	1	NA	NA	NA	NA	NA	NA	NA	0.014	2
Xylenes, total	20	1 U	1 U	1 U*	1 U*	1 U*	1 U*	3 U	1400	10000
MTBE	35	NA	NA	2 U	2 U	10 U	10 U	1 U	20	NC
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)										
Acenaphthylene	210	1.1 U	10 U	10 U	10 U	5 U	5 U	4 U	NC	NC
BEHP	6	NA	10 U	NA	NA	NA	NA	NA	4.8	NC
1-Methylnaphthalene	20	**2.9**	10 U	10 U	10 U	5 U	5 U	2 U	NA	NC
2-Methylnaphthalene	20	**1.2**	10 U	10 U	10 U	5 U	5 U	2 U	NA	NC
Naphthalene	20	1.1 U	10 U	10 U	10 U	5 U	5 U	2 U	6.2	NC
Phenol	10	NA	10 U	NA	NA	NA	NA	NA	22000	NC
1,2,4-Trichlorobenzene	70	NA	10 U	NA	NA	NA	NA	NA	190	70
1,2,4-Trimethylbenzene	10	NA	NA	NA	NA	NA	NA	NA	12	NC

TABLE 1-1

SUMMARY OF ANALYTICAL RESULTS - POSITIVE DETECTIONS
OU 9, SITE 57 - BUILDING 824A/DAY TANK 1 AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 5 OF 10

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-293-19									REGION IX PRGs(2)	FEDERAL MCLs(3)
		Aug-95	Sep-96	Feb-98	Aug-98	Jul-99	Jul-00		Nov-00	Jan-01		
							Sample	Dup				
VOLATILE ORGANIC COMPOUNDS (ug/L)												
Acetone	700	NA	NA	NA	NA	NA	NA	NA	500 U	**57.8**	610	NA
Benzene	1	1 U	**1.4**	**1**	**1.9**	**1.7**	**1.9**	**100**	10 U	**1.9**	0.35	5
Chloroethane	12	1 U	NA	NA	2 U	NA	NA	NA	50 U	5 U	4.6	NA
Chloroform	5.7	1 U	NA	NA	1 U	NA	NA	NA	20 U	2 U	0.16	NA
cis-1,2-Dichloroethene	70	NA	NA	NA	**170**	NA	NA	NA	**1000**	**815**	61	70
1,2-Dichlorobenzene	600	NA	NA	NA	NA	1 U	NA	NA	NA	NA	370	600
1,3-Dichlorobenzene	10	NA	NA	NA	NA	1 U	NA	NA	NA	NA	5.5	75
1,1-Dichloroethane	70	**10**	NA	NA	**61**	NA	NA	NA	**58.5**	**55**	810	NC
1,2-Dichloroethane	3	1 U	NA	NA	1 U	NA	NA	NA	20 U	**2 U**	0.12	5
1,1-Dichloroethene	7	1 U	NA	NA	1 U	NA	NA	NA	20 U	**1.1 J**	0.046	7
1,2-Dichloroethene, total	63	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC	NC
Ethylbenzene	30	**2**	**2.1**	**3.6**	**4.1**	**2.7**	**4.3**	**14 J**	20 U	**4.9**	1300	700
4-Methyl-2-pentanone	560	NA	NA	NA	NA	NA	NA	NA	100 U	**40.4**	160	NC
Methylene chloride	5	1 U	NA	NA	2 U	NA	NA	NA	50 U	5 U	4.3	NC
Tetrachloroethene	3	1 U	NA	NA	1 U	NA	NA	NA	20 U	2 U	1.1	5
Toluene	40	**36**	**3**	**25**	**32**	**34**	**30**	NA	**41.4**	**41.4**	720	1000
trans-1,2-Dichloroethene	31	1 U	NA	NA	1 U	NA	NA	NA	20 U	**3.2**	120	100
Trichloroethene	3	**1.5**	NA	NA	**12**	NA	NA	NA	**45.6**	**48.9**	1.6	5
Vinyl chloride	1	1 U	NA	NA	1 U	NA	NA	NA	10 U	1 U	0.014	2
Xylenes, total	20	**4.2**	**3.5**	**9.4***	**16.3***	**16.3***	**12***	**27 J***	60 U	**31.2**	1400	10000
MTBE	35	1 U	NA	2 U	2 U	10 U	**13**	2 U	20 U	2 U	20	NC
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)												
Acenaphthylene	210	2 U	1.1 U	10 U	10 U	5 U	**5.3**	5 U	NA	4 U	NC	NC
BEHP	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.8	NC
1-Methylnaphthalene	20	2 U	1.1 U	10 U	10 U	5 U	5 U	**9.2**	NA	4 U	NA	NC
2-Methylnaphthalene	20	2 U	1.1 U	10 U	10 U	5 U	5 U	**12**	NA	2 U	NA	NC
Naphthalene	20	**14**	1.1 U	**37**	**18**	**13**	**16**	**8.9**	NA	**20.8**	6.2	NC
Phenol	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	22000	NC
1,2,4-Trichlorobenzene	70	NA	NA	NA	NA	NA	NA	NA	NA	NA	190	70
1,2,4-Trimethylbenzene	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	12	NC

TABLE 1-1

SUMMARY OF ANALYTICAL RESULTS - POSITIVE DETECTIONS
OU 9, SITE 57 - BUILDING 824A/DAY TANK 1 AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 6 OF 10

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-293-20											REGION IX PRGs(2)	FEDERAL MCLs(3)
		Aug-95	Sep-96	Feb-98	Aug-98	Jul-99		Jul-00	Sep-00	Nov-00	Dec-00	Jan-01		
						Sample	Dup							
VOLATILE ORGANIC COMPOUNDS (ug/L)														
Acetone	700	NA	NA	NA	NA	NA	NA	NA	NA	50 U	NA	50 U	610	NA
Benzene	1	**1.6**	**1.6**	**1.4**	1 U	**0.89 J**	**0.73 J**	1 U	1 U	**0.81 J**	1 U	**0.58 J**	0.35	5
Chloroethane	12	1 U	NA	NA	2 U	NA	NA	NA	NA	5 U	NA	5 U	4.6	NA
Chloroform	5.7	1 U	NA	NA	1 U	NA	NA	NA	NA	2 U	NA	2 U	0.16	NA
cis-1,2-Dichloroethene	70	NA	NA	NA	**73**	NA	NA	NA	NA	**73.9**	NA	**210**	61	70
1,2-Dichlorobenzene	600	NA	NA	NA	NA	1 U	**0.9 J**	NA	1 U	NA	1 U	NA	370	600
1,3-Dichlorobenzene	10	NA	NA	NA	NA	1 U	1 U	NA	1 U	NA	1 U	NA	5.5	75
1,1-Dichloroethane	70	1 U	NA	NA	**1.3 J**	NA	NA	NA	NA	**1 J**	NA	2 U	810	NC
1,2-Dichloroethane	3	1 U	NA	NA	1 U	NA	NA	NA	NA	2 U	NA	2 U	0.12	5
1,1-Dichloroethene	7	**1.7**	NA	NA	1 U	NA	NA	NA	NA	2 U	NA	2 U	0.046	7
1,2-Dichloroethene, total	63	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC	NC
Ethylbenzene	30	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U	2 U	1300	700
4-Methyl-2-pentanone	560	NA	NA	NA	NA	NA	NA	NA	NA	10 U	NA	10 U	160	NC
Methylene chloride	5	1 U	NA	NA	**4**	NA	NA	NA	NA	5 U	NA	5 U	4.3	NC
Tetrachloroethene	3	1 U	NA	NA	1 U	NA	NA	NA	NA	2 U	NA	2 U	1.1	5
Toluene	40	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U	2 U	720	1000
trans-1,2-Dichloroethene	31	1 U	NA	NA	1 U	NA	NA	NA	NA	2 U	NA	2 U	120	100
Trichloroethene	3	1 U	NA	NA	**15**	NA	NA	NA	NA	**3.3**	NA	**2.7**	1.6	5
Vinyl chloride	1	1 U	NA	NA	1 U	NA	NA	NA	NA	1 U	NA	1 U	0.014	2
Xylenes, total	20	**5.3**	**1.3**	**2.3***	1 U*	**0.52 J***	1 U	1 U*	3 U	6 U	3 U	6 U	1400	10000
MTBE	35	1 U	NA	2 U	2 U	10 U	10 U	10 U	1 U	2 U	1 U	2 U	20	NC
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)														
Acenaphthylene	210	2 U	1.1 U	10 U	10 U	5 U	5 U	5 U	5 U	NA	5 U	4 U	NC	NC
BEHP	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.8	NC
1-Methylnaphthalene	20	2 U	1.1 U	10 U	10 U	5 U	5 U	5 U	5 U	NA	5 U	2 U	NA	NC
2-Methylnaphthalene	20	2 U	1.1 U	10 U	10 U	5 U	5 U	5 U	5 U	NA	5 U	2 U	NA	NC
Naphthalene	20	2 U	1.1 U	10 U	10 U	5 U	5 U	5 U	5 U	NA	5 U	2 U	6.2	NC
Phenol	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	22000	NC
1,2,4-Trichlorobenzene	70	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	190	70
1,2,4-Trimethylbenzene	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	12	NC

TABLE 1-1

SUMMARY OF ANALYTICAL RESULTS - POSITIVE DETECTIONS
OU 9, SITE 57 - BUILDING 824A/DAY TANK 1 AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 7 OF 10

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-293-21							REGION IX PRGs(2)	FEDERAL MCLs(3)
		Aug-95	Sep-96	Feb-98	Aug-98	Jul-99	Jul-00	Jan-01		
VOLATILE ORGANIC COMPOUNDS (ug/L)										
Acetone	700	NA	NA	NA	NA	NA	NA	50 U	610	NA
Benzene	1	1 U	1 U	**28**	**2.1**	**160**	**66**	**141**	0.35	5
Chloroethane	12	1 U	NA	NA	2 U	NA	NA	5 U	4.6	NA
Chloroform	5.7	1 U	NA	NA	1 U	NA	NA	2 U	0.16	NA
cis-1,2-Dichloroethene	70	NA	NA	NA	1 U	NA	NA	2 U	61	70
1,2-Dichlorobenzene	600	NA	NA	NA	NA	**23**	NA	NA	370	600
1,3-Dichlorobenzene	10	NA	NA	NA	NA	**1.7**	NA	NA	5.5	75
1,1-Dichloroethane	70	1 U	NA	NA	1 U	NA	NA	2 U	810	NC
1,2-Dichloroethane	3	1 U	NA	NA	1 U	NA	NA	2 U	0.12	5
1,1-Dichloroethene	7	1 U	NA	NA	1 U	NA	NA	2 U	0.046	7
1,2-Dichloroethene, total	63	NA	NA	NA	NA	NA	NA	NA	NC	NC
Ethylbenzene	30	1 U	1 U	**5.9**	1 U	**19**	**4 J**	**11**	1300	700
4-Methyl-2-pentanone	560	NA	NA	NA	NA	NA	NA	10 U	160	NC
Methylene chloride	5	1 U	NA	NA	2 U	NA	NA	5 U	4.3	NC
Tetrachloroethene	3	1 U	NA	NA	1 U	NA	NA	2 U	1.1	5
Toluene	40	1 U	1 U	**3.4**	1 U	**1.7**	1 U	2 U	720	1000
trans-1,2-Dichloroethene	31	1 U	NA	NA	1 U	NA	NA	2 U	120	100
Trichloroethene	3	1 U	NA	NA	1 U	NA	NA	2 U	1.6	5
Vinyl chloride	1	1 U	NA	NA	1 U	NA	NA	1 U	0.014	2
Xylenes, total	20	1 U	1 U	**8.4***	1 U*	**61***	**7.4***	**14.1**	1400	10000
MTBE	35	1 U	NA	2 U	2 U	**28**	10 U	2 U	20	NC
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)										
Acenaphthylene	210	2 U	1.1 U	10 U	10 U	5 U	5 U	**4.4 U**	NC	NC
BEHP	6	NA	NA	NA	NA	NA	NA	NA	4.8	NC
1-Methylnaphthalene	20	2 U	1.1 U	10 U	10 U	**7.7**	**10**	**13.2**	NA	NC
2-Methylnaphthalene	20	2 U	1.1 U	10 U	10 U	**7.8**	**14**	**13.2**	NA	NC
Naphthalene	20	2 U	1.1 U	10 U	10 U	**9.7**	**8.8**	**16.6**	6.2	NC
Phenol	10	NA	NA	NA	NA	NA	NA	NA	22000	NC
1,2,4-Trichlorobenzene	70	NA	NA	NA	NA	NA	NA	NA	190	70
1,2,4-Trimethylbenzene	10	NA	NA	NA	NA	NA	NA	NA	12	NC

TABLE 1-1

SUMMARY OF ANALYTICAL RESULTS - POSITIVE DETECTIONS
OU 9, SITE 57 - BUILDING 824A/DAY TANK 1 AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 8 OF 10

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-293-22						CEF-824A-01Sa						REGION IX PRGs(2)	FEDERAL MCLs(3)
		Aug-95	Sep-96	Jun-00	Sep-00	Dec-00	Jan-01	85Q01301 DPT/Mar-96	85G01801 Apr-98	May-00 Sample	May-00 Dup	Jul-00	Sep-00		
VOLATILE ORGANIC COMPOUNDS (ug/L)															
Acetone	700	NA	NA	NA	NA	NA	50 U	NA	NA	50 U	50 U	5 U	50 U	610	NA
Benzene	1	34	20	43.2	6.4	19.7	20	5 U	1 U	1 U	1 U	1 U	1 U	0.35	5
Chloroethane	12	5 U	NA	NA	NA	NA	5 U	5 U	2 U	5 U	5 U	1 U	5 U	4.6	NA
Chloroform	5.7	5 U	NA	NA	NA	NA	2 U	5 U	1 U	2 U	2 U	1 U	2 U	0.16	NA
cis-1,2-Dichloroethene	70	NA	NA	NA	NA	NA	2 U	5 U	NA	**0.81 J**	**0.87 J**	1 U	**0.7 J**	61	70
1,2-Dichlorobenzene	600	NA	NA	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	370	600
1,3-Dichlorobenzene	10	NA	NA	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	5.5	75
1,1-Dichloroethane	70	5 U	NA	NA	NA	NA	2 U	**11**	**37**	2 U	2 U	1 U	2 U	810	NC
1,2-Dichloroethane	3	NA	NA	NA	NA	NA	2 U	5 U	1 U	2 U	2 U	2 U	2 U	0.12	5
1,1-Dichloroethene	7	5 U	NA	NA	NA	NA	2 U	5 U	1 U	2 U	2 U	1 U	2 U	0.046	7
1,2-Dichloroethene, total	63	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC	NC
Ethylbenzene	30	60	**12**	60.6	**8.4**	**9.7**	**12.7**	5 U	**5.7**	2 U	2 U	1 U	2 U	1300	700
4-Methyl-2-pentanone	560	NA	NA	NA	NA	NA	10 U	NA	NA	10 U	10 U	5 U	10 U	160	NC
Methylene chloride	5	5 U	NA	NA	NA	NA	5 U	5 U	3 U	5 U	5 U	5 U	5 U	4.3	NC
Tetrachloroethene	3	5 U	NA	NA	NA	NA	2 U	5 U	2 U	2 U	2 U	1 U	2 U	1.1	5
Toluene	40	5 U	**1.4**	**5.5**	1 U	1 U	2 U	5 U	1 U	2 U	2 U	1 U	2 U	720	1000
trans-1,2-Dichloroethene	31	5 U	NA	NA	NA	NA	2 U	5 U	1 U	2 U	2 U	1 U	2 U	120	100
Trichloroethene	3	5 U	NA	NA	NA	NA	2 U	35	1 U	43.6	48.8	47	51	1.6	5
Vinyl chloride	1	5 U	NA	NA	NA	NA	1 U	5 U	1 U	1 U	1 U	1 U	1 U	0.014	2
Xylenes, total	20	150	41	218	**20.7**	**11.9**	**16.5**	5 U	2 U*	6 U	6 U	3 U	6 U	1400	10000
MTBE	35	5 U	NA	**0.85 J**	1 UJ	1 U	NA	NA	6 U	2 U	2 U	NA	2 U	20	NC
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)															
Acenaphthylene	210	10 U	5.5 U	20 U	5 U	5 U	8.8 U	NA	5 U	2.2 U	2.2 U	2.2 U	4 U	NC	NC
BEHP	6	NA	NA	NA	NA	NA	NA	NA	5 U	NA	NA	NA	NA	4.8	NC
1-Methylnaphthalene	20	68	56	80.3	22	31.6	24.8	NA	31	**19.8**	**16**	**16.5**	**12.8**	NC	NC
2-Methylnaphthalene	20	74	34	95.4	25.1	42.4	25.6	NA	42	25.2	20.3	25.5	**18**	NC	NC
Naphthalene	20	150	59	188	38.7	95	46.2	41	58	**1.8 J**	**1.5 J**	**1.1 J**	**1 J**	6.2	NC
Phenol	10	NA	NA	NA	NA	NA	NA	NA	5 U	NA	NA	NA	NA	22000	NC
1,2,4-Trichlorobenzene	70	NA	NA	NA	NA	NA	NA	5 U	5 U	NA	NA	NA	NA	190	70
1,2,4-Trimethylbenzene	10	NA	NA	NA	NA	NA	NA	28	NA	NA	NA	NA	NA	12	NC

TABLE 1-1

SUMMARY OF ANALYTICAL RESULTS - POSITIVE DETECTIONS
OU 9, SITE 57 - BUILDING 824A/DAY TANK 1 AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 9 OF 10

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-824A-2S		CEF-824A-3S		CEF-824A-4S			CEF-824A-5S			CEF-824A-6I	REGION IX PRGs(2)	FEDERAL MCLs(3)
		Jul-00	Sep-00	Jul-00	Sep-00	Jul-00	Sep-00		Jul-00		Sep-00	Sep-00		
							Sample	Dup	Sample	Dup				
VOLATILE ORGANIC COMPOUNDS (ug/L)														
Acetone	700	5 U	50 U	5 U	50 U	5 U	250 U	50 U	5 U	5 U	50 U	50 U	610	NA
Benzene	1	1 U	1 U	1.9	1 U	251 J	230	259	1 U	1 U	1 U	1 U	0.35	5
Chloroethane	12	1 U	5 U	1 U	5 U	1 U	25 U	5 U	1 U	1 U	5 U	5 U	4.6	NA
Chloroform	5.7	1 U	2 U	1 U	2 U	1 U	10 U	2 U	1 U	1 U	2 U	**2.5**	0.16	NA
cis-1,2-Dichloroethene	70	1 U	2 U	1 U	2 U	1 U	10 U	2 U	1 U	1 U	2 U	2 U	61	70
1,2-Dichlorobenzene	600	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	370	600
1,3-Dichlorobenzene	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.5	75
1,1-Dichloroethane	70	1 U	**0.6 J**	1 U	2 U	1 U	10 U	2 U	1 U	1 U	2 U	2 U	810	NC
1,2-Dichloroethane	3	1 U	2 U	1 U	2 U	1 U	10 U	2 U	1 U	1 U	2 U	2 U	0.12	5
1,1-Dichloroethene	7	1 U	2 U	1 U	2 U	1 U	10 U	2 U	1 U	1 U	2 U	2 U	0.046	7
1,2-Dichloroethene, total	63	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC	NC
Ethylbenzene	30	3 U	2 U	**1.4**	2 U	**27**	38.8	56.1	1 U	1 U	2 U	2 U	1300	700
4-Methyl-2-pentanone	560	5 U	10 U	5 U	10 U	5 U	50 U	10 U	5 U	5 U	10 U	10 U	160	NC
Methylene chloride	5	5 U	5 U	5 U	5 U	5 U	25 U	5 U	5 U	5 U	5 U	5 U	4.3	NC
Tetrachloroethene	3	1 U	2 U	1 U	2 U	1 U	10 U	2 U	1 U	1 U	2 U	2 U	1.1	5
Toluene	40	1 U	2 U	1 U	2 U	**2**	**3.5 J**	**4.7**	1 U	1 U	2 U	2 U	720	1000
trans-1,2-Dichloroethene	31	1 U	2 U	1 U	2 U	1 U	10 U	2 U	1 U	1 U	2 U	2 U	120	100
Trichloroethene	3	1 U	2 U	1 U	2 U	1 U	10 U	2 U	1 U	1 U	2 U	**0.71 J**	1.6	5
Vinyl chloride	1	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	0.014	2
Xylenes, total	20	**6.1**	6 U	**16.4**	6 U	97.9	112	166	**7.9**	**7.9**	6 U	6 U	1400	10000
MTBE	35	NA	2 U	NA	2 U	NA	10 U	2 U	NA	NA	2 U	2 U	20	NC
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)														
Acenaphthylene	210	2.2 U	4.4 U	2.2 U	4 U	2.2 U	4.4 U	4.4 U	2.2 U	2.4 U	4 U	4 U	NC	NC
BEHP	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.8	NC
1-Methylnaphthalene	20	**2 J**	**2.4**	2.2 U	2 U	**5.8**	**10.4**	**9.4**	2.2 U	2.4 U	2 U	2 U	NA	NC
2-Methylnaphthalene	20	**3.3**	**4.1**	2.2 U	2 U	**7.1**	**12.2**	**11**	2.2 U	2.4 U	2 U	2 U	NA	NC
Naphthalene	20	2.2 U	2.2 U	2.2 U	2 U	**13.6**	25.3	21.6	2.2 U	2.4 U	2 U	**1.1 J**	6.2	NC
Phenol	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	22000	NC
1,2,4-Trichlorobenzene	70	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	190	70
1,2,4-Trimethylbenzene	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	12	NC

TABLE 1-1

SUMMARY OF ANALYTICAL RESULTS - POSITIVE DETECTIONS
OU 9, SITE 57 - BUILDING 824A/DAY TANK 1 AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 10 OF 10

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-824A-7S	CEF-824A-8S	CEF-824A-9S	CEF-824A-10S		CEF-824A-11S	CEF-824A-12I	CEF-825LS-1S			REGION IX PRGs(2)	FEDERAL MCLs(3)
					Jan-01				25G00101 02/01/1996	Mar-97	Jan-01		
		Sep-00	Jul-00	Jan-01	Sample	Dup	Jan-01	Jan-01					
VOLATILE ORGANIC COMPOUNDS (ug/L)													
Acetone	700	50 U	50 U	50 U	50 U	50 U	100 U	**23.1 J**	**11**	NA	50 U	610	NA
Benzene	1	**5.1**	**0.93 J**	1 U	**1.4**	**1.2**	**12.2**	**8.1**	1 U	1 U	1 U	0.35	5
Chloroethane	12	5 U	5 U	5 U	5 U	5 U	10 U	5 U	2 U	1 U	5 U	4.6	NA
Chloroform	5.7	2 U	2 U	2 U	2 U	2 U	4 U	2 U	1 U	1 U	2 U	0.16	NA
cis-1,2-Dichloroethene	70	**0.73 J**	**1.2 J**	2 U	**10.9**	**12.9**	4 U	2 U	NA	NA	2 U	61	70
1,2-Dichlorobenzene	600	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	370	600
1,3-Dichlorobenzene	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.5	75
1,1-Dichloroethane	70	**1.3 J**	**8.2**	**2.8**	**2.4**	**3**	4 U	2 U	1 U	1 U	2 U	810	NC
1,2-Dichloroethane	3	2 U	2 U	2 U	2 U	2 U	4 U	2 U	1 U	1 U	2 U	0.12	5
1,1-Dichloroethene	7	2 U	**26.7**	**0.67 J**	2 U	2 U	4 U	2 U	1 U	1 U	2 U	0.046	7
1,2-Dichloroethene, total	63	NA	NA	NA	NA	NA	NA	NA	1 U	NA	NA	NC	NC
Ethylbenzene	30	**2.4**	2 U	2 U	**10**	**9.4**	**100**	**26.8**	1 U	1 U	2 U	1300	700
4-Methyl-2-pentanone	560	10 U	10 U	10 U	**2.8 J**	10 U	20 U	10 U	2 U	NA	10 U	160	NC
Methylene chloride	5	5 U	5 U	5 U	5 U	5 U	**10 U**	**5 U**	1 U	1 U	5 U	4.3	NC
Tetrachloroethene	3	2 U	2 U	2 U	2 U	2 U	4 U	**2.3**	1 U	1 U	2 U	1.1	5
Toluene	40	2 U	2 U	2 U	**2.2**	**2.9**	**29.2**	2 U	1 U	1 U	2 U	720	1000
trans-1,2-Dichloroethene	31	2 U	2 U	2 U	2 U	2 U	4 U	2 U	NA	1 U	2 U	120	100
Trichloroethene	3	**14.9**	2 U	**1.2 J**	2 U	**0.6 J**	4 U	2 U	1 U	1 U	2 U	1.6	5
Vinyl chloride	1	1 U	1 U	1 U	1 U	**1 U**	1 U	1 U	1 U	1 U	1 U	0.014	2
Xylenes, total	20	6 U	**1.8 J**	6 U	**10.6**	**10.1**	**321**	**66.8**	1 U	6 U	6 U	1400	10000
MTBE	35	2 U	NA	NA	NA	NA	NA	NA	NA	1 U	NA	20	NC
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)													
Acenaphthylene	210	4.4 U	4 U	4 U	8 U	8 U	45 U	16 U	10 U	4 U	2 U	NC	NC
BEHP	6	NA	NA	NA	NA	NA	NA	NA	10 U	NA	NA	4.8	NC
1-Methylnaphthalene	20	**22.1**	2 U	2 U	**8.7**	**8.6**	**124**	**22.4**	NA	2 U	2 U	NA	NC
2-Methylnaphthalene	20	**24.7**	2 U	2 U	**10.6**	**9.8**	**137**	**21.5**	10 U	2 U	2 U	NA	NC
Naphthalene	20	**82.5**	2 U	2 U	**70.6**	**59.7**	**287**	**120**	**2.2 J**	2 U	2 U	6.2	NC
Phenol	10	NA	NA	NA	NA	NA	NA	NA	10 U	NA	NA	22000	NC
1,2,4-Trichlorobenzene	70	NA	NA	NA	NA	NA	NA	NA	10 U	NA	NA	190	70
1,2,4-Trimethylbenzene	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	12	NC

NA = Not analyzed.
NC = No criterion.
Bolded values exceed detection limits.
Shaded values exceed target cleanup goals.
* Total of o-, m-, and p-xylenes.

U = Not detected at or above method detection limit as listed.
J = Estimated value.
(1) FDEP GCTL, F.A.C. 62-777, 1999.
(2) U.S. EPA Region IX PRGs.
(3) U.S. EPA Federal MCLs.

TABLE 1-2

SUMMARY OF ANALYTICAL RESULTS - POSITIVE DETECTIONS
OU 9, SITE 58 - BUILDING 312 GROUNDWATER
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 1 OF 2

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-312-01	CEF-312-02	CEF-312LS-01Sa		CEF-B312-01I	CEF-B312-01S		CEF-B312-02S		CEF-B312-03S			REGION IX PRGs(2)	FEDERAL MCLs(3)
		Dec-00	May-95	Mar-97	Dec-97	Dec-00	Jul-00	Dec-00	Jul-00	Dec-00	Jul-00 Sample	Jul-00 Dup	Dec-00		
VOLATILE ORGANIC COMPOUNDS (ug/L)															
Acetone	700	NA	10 U	NA	2 U	NA	NA	NA	NA	NA	NA	NA	NA	610	NA
Benzene	1	1 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.35	5
1,1-Dichloroethane	70	**1.9**	10 U	1 U	1 U	1 U	**3.2**	**9.9**	**29**	**16**	**38**	**39**	**25**	810	NC
1,1-Dichloroethene	7	1 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	**5.4**	**4.7**	**9.9**	0.046	7
Ethylbenzene	30	1 U	10 U	1 U	1 U	1 U	**1.1**	**1.1**	**0.71 J**	1 U	**0.9 J**	**1**	**0.65 J**	1300	700
Toluene	40	1 U	10 U	1 U	1 U	1 U	**1.1**	**2.1**	1 U	1 U	**1.5**	**1.5**	**1**	720	1000
Trichloroethene	3	1 U	10 U	1 U	1 U	1 U	1 U	1 U	**0.58 J**	**0.52 J**	1 U	1 U	1 U	1.6	5
1,1,1-Trichloroethane	200	1 U	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	540	200
Vinyl chloride	1	NA	10 U	1 U	1 U	NA	1 U	1 U	1 U	1 U	**7.2**	**6.5**	**11**	0.014	2
Xylenes, total	20	2 U	**1.5**	1 U	2 U*	1 U	**12**	**9.8**	**6.9**	**1 J**	**3.4**	**4.2**	**2.9**	1400	10000
MTBE	35	10 U	NA	1 U	1 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	20	NC
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)															
Acenaphthene	210	1 U	10 U	2 U	5 U	1 U	**0.45 J**	1.1 U	1.1 U	1 U	1.1 U	1.1 U	1 U	370	NC
1-Methylnaphthalene	20	**2.8**	NA	2 U	NA	1 U	**41**	**19.4**	**19.4**	**1.1**	**12.8**	**13.9**	**11**	NC	NC
2-Methylnaphthalene	20	**3.8**	10 U	2 U	5 U	1 U	**65**	**3.7**	**3.7**	**1.5**	**8.4**	**9.2**	**10**	NC	NC
Naphthalene	20	**95**	10 U	2 U	5 U	**0.79 J**	**680**	**72.1**	**72.1**	**35**	**93.6**	**101**	**99**	6.2	NC
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH) (mg/L)															
TRPH	5	**2.5 J**	NA	0.5 U	NA	**0.31 J**	**13**	**15 J**	**15**	**4.7 J**	**5.2**	**5.6**	**2.8 J**	NC	NC

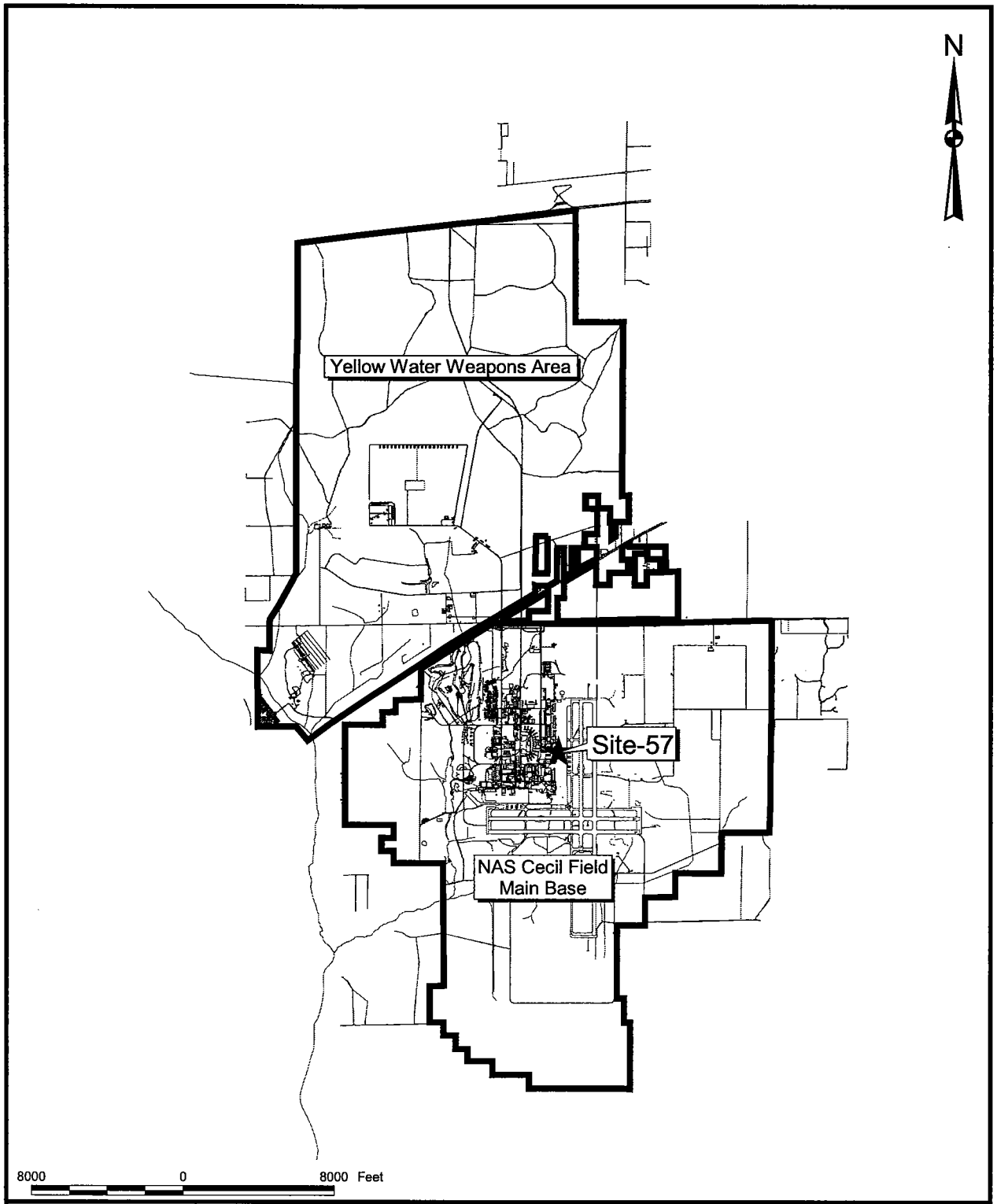
TABLE 1-2

SUMMARY OF ANALYTICAL RESULTS - POSITIVE DETECTIONS
OU 9, SITE 58 - BUILDING 312 GROUNDWATER
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 2 OF 2

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-B312-04S	CEF-B312-05S	CEF-B312-06S	CEF-B312-07S						CEF-B312-08S	REGION IX PRGs(2)	FEDERAL MCLs(3)
					May-95		May-95		Dec-00				
		Dec-00	Dec-00	Dec-00	Sample	Dup	Sample	Dup	Sample	Dup	Dec-00		
VOLATILE ORGANIC COMPOUNDS (ug/L)													
Acetone	700	NA	NA	NA	**69 J**	**58 J**	NA	NA	NA	NA	NA	610	NA
Benzene	1	1 U	1 U	1 U	10 U	10 U	NA	NA	1 U	1 U	5 U	0.35	5
1,1-Dichloroethane	70	**5.4**	**2.5**	**1.6 J**	**15**	**15**	NA	NA	1 U	1 U	**730**	810	NC
1,1-Dichloroethene	7	1 U	1 U	1 U	10 U	10 U	NA	NA	1 U	1 U	**94**	0.046	7
Ethylbenzene	30	1 U	1 U	1 U	10 U	10 U	NA	NA	1 U	1 U	**4.7 J**	1300	700
Toluene	40	**1**	1 U	1 U	10 U	10 U	NA	NA	1 U	1 U	**9.9**	720	1000
Trichloroethene	3	1 U	**0.74 J**	1 U	10 U	10 U	NA	NA	1 U	1 U	**2.7 J**	1.6	5
1,1,1-Trichloroethane	200	1 U	1 U	1 U	10 U	10 U	NA	NA	1 U	1 U	**9.9**	540	200
Vinyl chloride	1	1 U	1 U	1 U	10 U	10 U	NA	NA	1 U	1 U	5 U	0.014	2
Xylenes, total	20	**2.9**	2 U	2 U	10 U	10 U	NA	NA	2 U	2 U	**14**	1400	10000
MTBE	35	10 U	10 U	10 U	NA	NA	NA	NA	10 U	10 U	50 U	20	NC
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)													
Acenaphthylene	210	1 U	1 U	1 U	20 U	20 U	NA	NA	1 U	1 U	1 U	370	NC
1-Methylnaphthalene	20	**0.59 J**	1 U	**5.1**	NA	NA	NA	NA	1 U	1 U	**1.4**	NC	NC
2-Methylnaphthalene	20	**0.62 J**	1 U	**3.6**	20 U	20 U	NA	NA	1 U	1 U	**0.92 J**	NC	NC
Naphthalene	20	**5.8**	**1.3**	**58**	**27**	**27**	**33.9**	**34.2**	**0.49 J**	**0.47 J**	**33**	6.2	NC
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH) (mg/L)													
TRPH	5	**1.2 J**	**0.28 J**	**3 J**	NA	NA	NA	NA	1 UJ	1 UJ	**0.28 J**	NC	NC

NA = Not analyzed.
Bolded values exceed detection limits.
Shaded values exceed GCTLs.
* Total of o-, m-, and p-xylenes.
U = Not detected at or above method detection limit as listed.

J = Estimated value.
(1) FDEP GCTL, F.A.C. 62-777, 1999.
(2) U.S. EPA Region IX PRGs.
(3) U.S. EPA Federal MCLs.



DRAWN BY MJJ	DATE 24Jan02	GENERAL LOCATION MAP OU 9, SITE-57 - BUILDING 824A / DAY TANK 1 AREA NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 0039
CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1-1 / REV 0

P:\GIS\NAS_CecilField\site-57.apr 24Jan02 MJJ Layout 1-1

This page intentionally left blank.

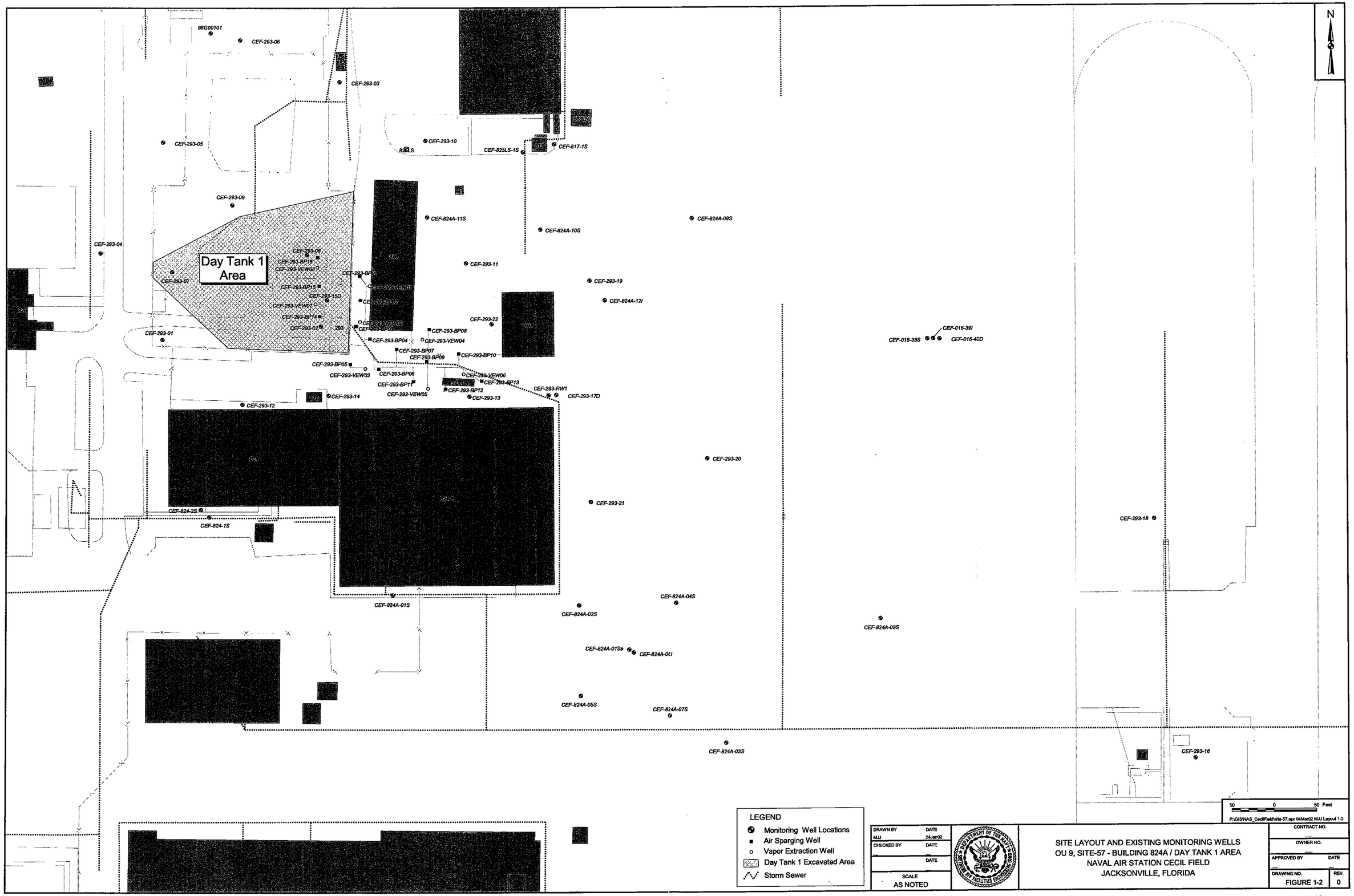

N
Day Tank 1 Area
88G00101
CEF-293-06
CEF-293-03
CEF-293-05
CEF-293-10
825LS
CEF-825LS-1S
CEF-817-1S
CEF-293-08
CEF-824A-11S
CEF-824A-09S
CEF-824A-10S
CEF-293-04
CEF-293-09
CEF-293-BP16
CEF-293-VEW08
CEF-293-11
CEF-293-07
CEF-293-19
CEF-293-BP15
CEF-293-15D
CEF-824A-12I
CEF-293-VEW07
CEF-293-BP14
CEF-293-22
CEF-293-02
CEF-293-01
CEF-293-BP08
CEF-293-BP04
CEF-293-VEW04
CEF-293-BP07
CEF-293-BP09
CEF-293-BP10
CEF-293-BP05
CEF-293-VEW03
CEF-293-BP06
CEF-293-VEW06
CEF-293-BP13
CEF-293-BP11
CEF-293-BP12
CEF-293-VEW05
CEF-293-13
CEF-293-14
CEF-293-RW1
CEF-293-17D
CEF-293-12
CEF-016-39I
CEF-016-38S
CEF-016-40D
CEF-293-20
CEF-293-21
CEF-293-18
CEF-824-2S
CEF-824-1S
CEF-824A-04S
CEF-824A-01S
CEF-824A-02S
CEF-824A-08S
CEF-824A-01Sa
CEF-824A-06I
CEF-824A-05S
CEF-824A-07S
CEF-824A-03S
CEF-293-16
50 0 50 Feet
P:\GIS\NAS_CecilField\site-57.apr 04Mar02 MJJ Layout 1-2
LEGEND
Monitoring Well Locations
Air Sparging Well
Vapor Extraction Well
Day Tank 1 Excavated Area
Storm Sewer
DRAWN BY MJJ
DATE 24Jan02
CHECKED BY
DATE
DATE
SCALE AS NOTED
SITE LAYOUT AND EXISTING MONITORING WELLS
OU 9, SITE-57 - BUILDING 824A / DAY TANK 1 AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
CONTRACT NO.
OWNER NO.
APPROVED BY
DATE
DRAWING NO. FIGURE 1-2
REV. 0

Figure 1-2, Backside

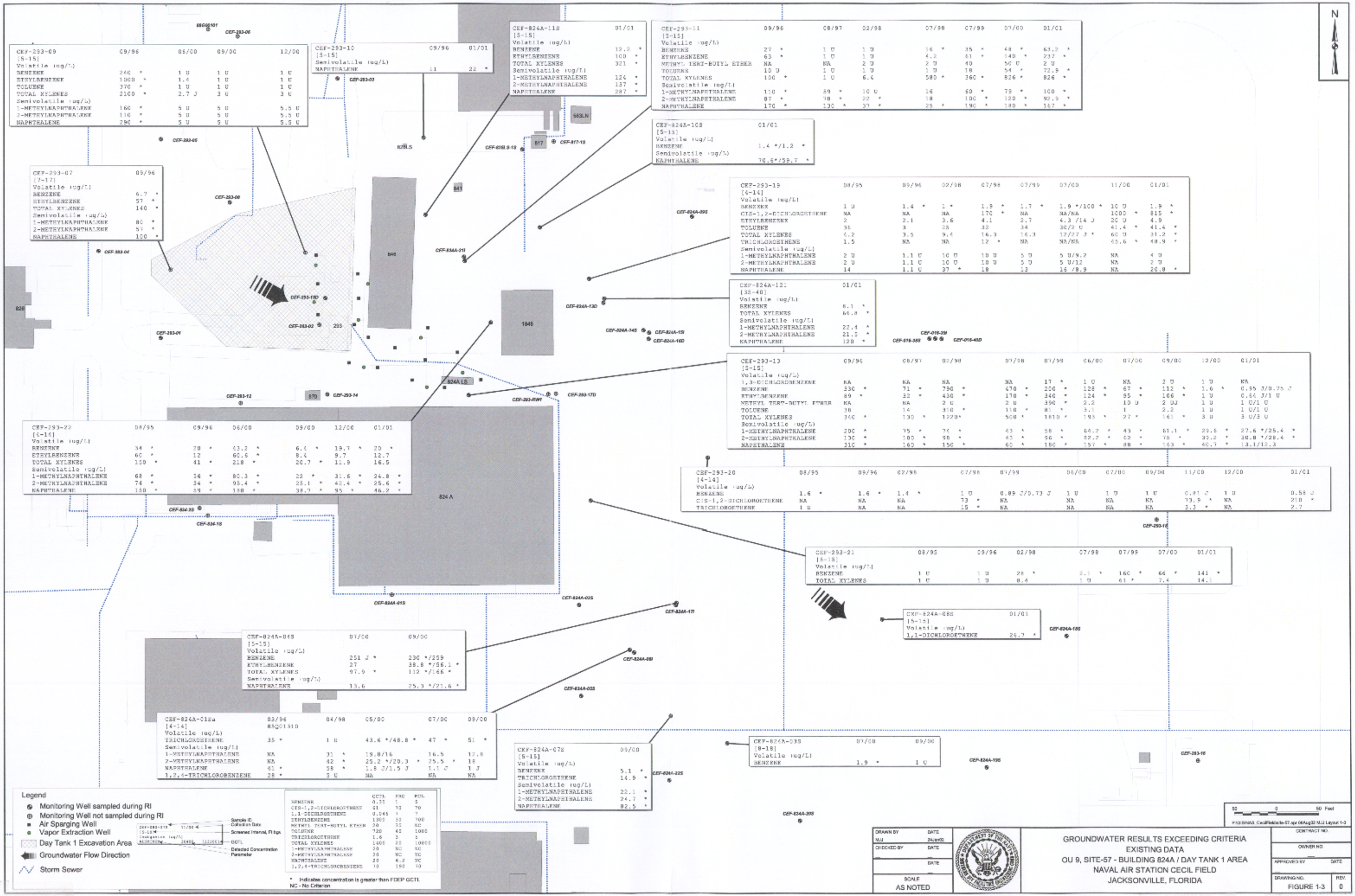
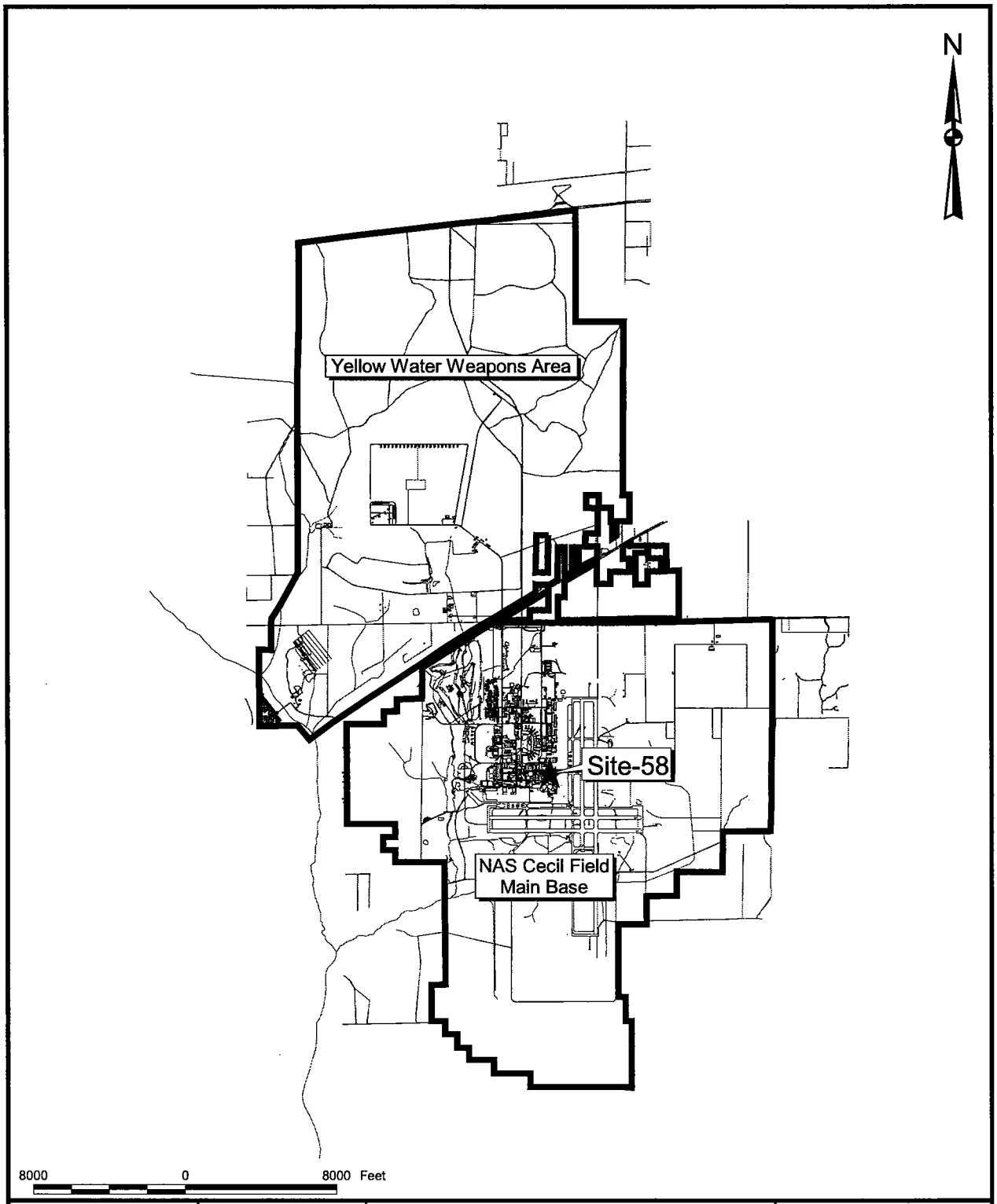
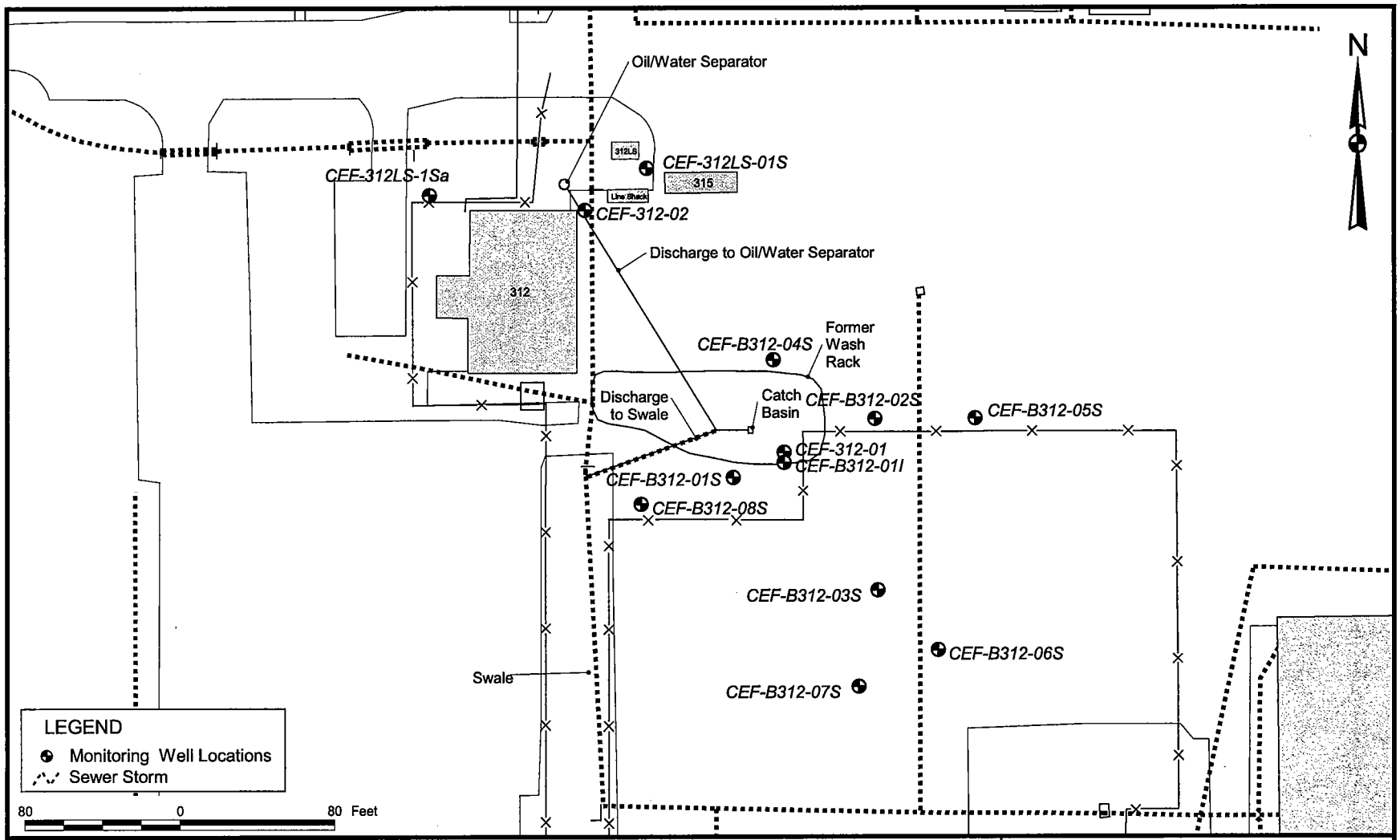

N
CEF-293-09 09/96 05/00 09/00 12/00
[5-15]
Volatile (ug/L)
BENZENE 240 * 1 U 1 U 1 U
ETHYLBENZENE 1000 * 1.4 1 U 1 U
TOLUENE 370 * 1 U 1 U 1 U
TOTAL XYLENES 2100 * 2.7 J 3 U 3 U
Semivolatile (ug/L)
1-METHYLNAPHTHALENE 160 * 5 U 5 U 5.5 U
2-METHYLNAPHTHALENE 110 * 5 U 5 U 5.5 U
NAPHTHALENE 290 * 5 U 5 U 5.5 U
CEF-293-10 09/96 01/01
[5-15]
Semivolatile (ug/L)
NAPHTHALENE 11 22 *
CEF-824A-118 01/01
[5-15]
Volatile (ug/L)
BENZENE 12.2 *
ETHYLBENZENE 100 *
TOTAL XYLENES 321 *
Semivolatile (ug/L)
1-METHYLNAPHTHALENE 124 *
2-METHYLNAPHTHALENE 137 *
NAPHTHALENE 287 *
CEF-293-11 09/96 08/97 02/98 07/98 07/99 07/00 01/01
[5-15]
Volatile (ug/L)
BENZENE 27 * 1 U 1 U 16 * 35 * 48 * 63.2 *
ETHYLBENZENE 63 * 1 U 1 U 4.2 61 * 140 * 237 *
METHYL TERT-BUTYL ETHER NA NA 2 U 2 U 40 50 U 2 U
TOLUENE 10 U 1 U 1 U 1 U 18 54 * 72.9 *
TOTAL XYLENES 100 * 1 U 6.4 580 * 360 * 826 * 826 *
Semivolatile (ug/L)
1-METHYLNAPHTHALENE 110 * 59 * 10 U 16 60 * 79 * 100 *
2-METHYLNAPHTHALENE 87 * 78 * 22 * 18 100 * 120 * 92.9 *
NAPHTHALENE 170 * 130 * 37 * 25 * 190 * 140 * 167 *
CEF-824A-108 01/01
[5-15]
Volatile (ug/L)
BENZENE 1.4 */1.2 *
Semivolatile (ug/L)
NAPHTHALENE 70.6*/59.7 *
CEF-293-07 09/96
[7-17]
Volatile (ug/L)
BENZENE 6.7 *
ETHYLBENZENE 57 *
TOTAL XYLENES 140 *
Semivolatile (ug/L)
1-METHYLNAPHTHALENE 80 *
2-METHYLNAPHTHALENE 59 *
NAPHTHALENE 100 *
CEF-293-19 08/95 09/96 02/98 07/98 07/99 07/00 11/00 01/01
[4-14]
Volatile (ug/L)
BENZENE 1 U 1.4 * 1 * 1.5 * 1.7 * 1.9 */100 * 10 U 1.9 *
CIS-1,2-DICHLOROETHENE NA NA NA 170 * NA NA/NA 1000 * 815 *
ETHYLBENZENE 2 2.1 3.6 4.1 2.7 4.3 /14 J 20 U 4.9
TOLUENE 36 3 25 32 34 30/2 U 41.4 * 41.4 *
TOTAL XYLENES 4.2 3.5 9.4 16.3 16.3 17/27 J * 60 U 31.2 *
TRICHLOROETHENE 1.5 NA NA 12 * NA NA/NA 45.6 * 48.9 *
Semivolatile (ug/L)
1-METHYLNAPHTHALENE 2 U 1.1 U 10 U 10 U 5 U 5 U/9.2 NA 4 U
2-METHYLNAPHTHALENE 2 U 1.1 U 10 U 10 U 5 U 5 U/12 NA 2 U
NAPHTHALENE 14 1.1 U 37 * 18 13 16 /8.9 NA 20.8 *
CEF-824A-121 01/01
[35-40]
Volatile (ug/L)
BENZENE 8.1 *
TOTAL XYLENES 66.8 *
Semivolatile (ug/L)
1-METHYLNAPHTHALENE 22.4 *
2-METHYLNAPHTHALENE 21.2 *
NAPHTHALENE 120 *
CEF-293-13 09/96 08/97 02/98 07/98 07/99 06/00 07/00 09/00 12/00 01/01
[5-15]
Volatile (ug/L)
1,3-DICHLOROBENZENE NA NA NA NA 17 * 1 U NA 2 U 1 U NA
BENZENE 330 * 71 * 790 * 470 * 200 * 128 * 67 * 112 * 1.6 * 0.95 J/0.75 J
ETHYLBENZENE 89 * 32 * 430 * 170 * 340 * 124 * 95 * 106 * 1 U 0.66 J/1 U
METHYL TERT-BUTYL ETHER NA NA 2 U 2 U 390 * 2.2 10 U 2 UJ 1 U 1 U/1 U
TOLUENE 38 14 310 * 110 * 81 * 3.1 1 2.2 1 U 1 U/1 U
TOTAL XYLENES 340 * 130 * 1220* 500 * 1810 * 195 * 27 * 161 * 3 U 3 U/3 U
Semivolatile (ug/L)
1-METHYLNAPHTHALENE 200 * 75 * 76 * 43 * 58 * 64.2 * 43 * 61.1 * 25.6 * 27.6 */25.4 *
2-METHYLNAPHTHALENE 130 * 100 * 98 * 43 * 96 * 82.2 * 62 * 75 * 35.2 * 38.8 */28.4 *
NAPHTHALENE 310 * 160 * 150 * 60 * 180 * 157 * 88 * 163 * 40.7 * 13.1/12.3
CEF-293-22 08/95 09/96 06/00 09/00 12/00 01/01
[4-14]
Volatile (ug/L)
BENZENE 34 * 20 * 43.2 * 6.6 * 19.7 * 20 *
ETHYLBENZENE 60 * 12 60.6 * 8.4 9.7 12.7
TOTAL XYLENES 150 * 41 * 218 * 20.7 * 11.9 16.5
Semivolatile (ug/L)
1-METHYLNAPHTHALENE 68 * 36 * 80.3 * 22 * 31.6 * 24.8 *
2-METHYLNAPHTHALENE 74 * 34 * 95.4 * 25.1 * 42.4 * 25.6 *
NAPHTHALENE 150 * 59 * 188 * 38.7 * 95 * 46.2 *
CEF-293-20 08/95 09/96 02/98 07/98 07/99 06/00 07/00 09/00 11/00 12/00 01/01
[4-14]
Volatile (ug/L)
BENZENE 1.6 * 1.6 * 1.4 * 1 U 0.89 J/0.73 J 1 U 1 U 1 U 0.81 J 1 U 0.58 J
CIS-1,2-DICHLOROETHENE NA NA NA 73 * NA NA NA NA 73.5 * NA 210 *
TRICHLOROETHENE 1 U NA NA 15 * NA NA NA NA 3.3 * NA 2.7
CEF-293-21 08/95 09/96 02/98 07/98 07/99 07/00 01/01
[5-15]
Volatile (ug/L)
BENZENE 1 U 1 U 28 * 2.1 * 160 * 66 * 141 *
TOTAL XYLENES 1 U 1 U 8.4 1 U 61 * 7.4 14.1
CEF-824A-088 01/01
[5-15]
Volatile (ug/L)
1,1-DICHLOROETHENE 26.7 *
CEF-824A-048 07/00 09/00
[5-15]
Volatile (ug/L)
BENZENE 251 J * 230 */259
ETHYLBENZENE 27 38.8 */56.1 *
TOTAL XYLENES 97.9 * 112 */166 *
Semivolatile (ug/L)
NAPHTHALENE 13.6 25.3 */21.6 *
CEF-824A-018a 03/96 04/98 05/00 07/00 09/00
[4-14] BSQ01310
Volatile (ug/L)
TRICHLOROETHENE 35 * 1 U 43.6 */48.8 * 47 * 51 *
Semivolatile (ug/L)
1-METHYLNAPHTHALENE NA 31 * 19.8/16 16.5 12.8
2-METHYLNAPHTHALENE NA 42 * 25.2 */20.3 * 25.5 * 18
NAPHTHALENE 41 * 58 * 1.8 J/1.5 J 1.1 J 1 J
1,2,4-TRICHLOROBENZENE 28 * 5 U NA NA NA
CEF-824A-078 09/00
[5-15]
Volatile (ug/L)
BENZENE 5.1 *
TRICHLOROETHENE 14.9 *
Semivolatile (ug/L)
1-METHYLNAPHTHALENE 22.1 *
2-METHYLNAPHTHALENE 24.7 *
NAPHTHALENE 82.5 *
CEF-824A-038 09/00 09/00
[8-18]
Volatile (ug/L)
BENZENE 1.9 * 1 U
Legend
Monitoring Well sampled during RI
Monitoring Well not sampled during RI
Air Sparging Well
Vapor Extraction Well
Day Tank 1 Excavation Area
Groundwater Flow Direction
Storm Sewer
Sample ID
Collection Date
Screened Interval, Ft bgs
Detected Concentration
Parameter
GCTL
BENZENE 0.35 1 5
CIS-1,2-DICHLOROETHENE 61 70 70
1,1-DICHLOROETHENE 0.045 7 7
ETHYLBENZENE 1,900 30 700
METHYL TERT-BUTYL ETHER 20 35 NC
TOLUENE 720 40 1000
TRICHLOROETHENE 1.6 3 3
TOTAL XYLENES 1,600 20 10000
1-METHYLNAPHTHALENE 20 NC NC
2-METHYLNAPHTHALENE 20 NC NC
NAPHTHALENE 20 6.2 NC
1,2,4-TRICHLOROBENZENE 70 190 70
* Indicates concentration is greater than FDEP GCTL
NC - No Criterion
0 50 Feet
DRAWN BY MJJ DATE 24jan02
CHECKED BY DATE
SCALE AS NOTED
GROUNDWATER RESULTS EXCEEDING CRITERIA
EXISTING DATA
OU 9, SITE-57 - BUILDING 824A / DAY TANK 1 AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
CONTRACT NO.
OWNER NO.
APPROVED BY DATE
DRAWING NO. FIGURE 1-3
REV. 0

Figure 1-3 Backside



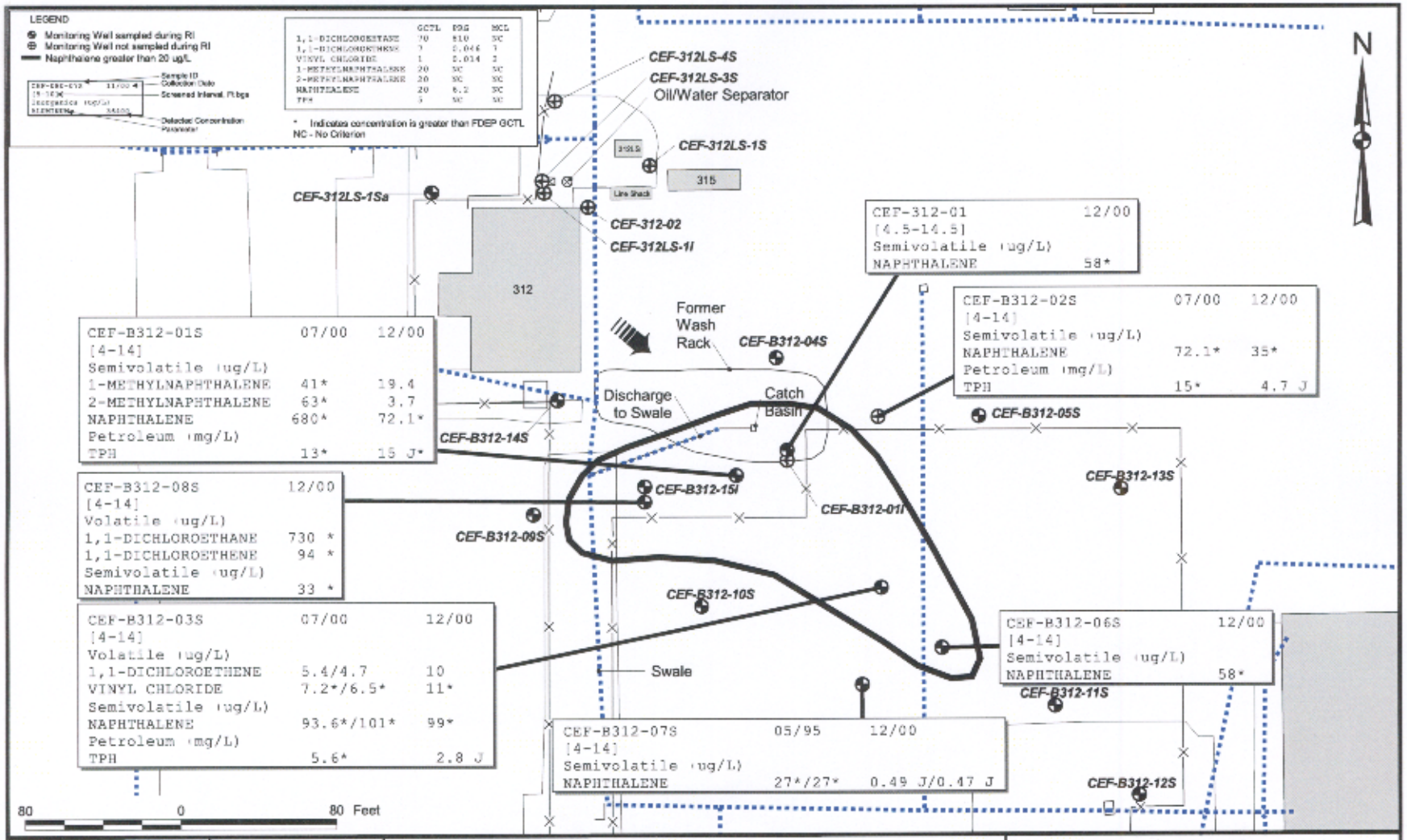
DRAWN BY MJJ	DATE 24Jan02	GENERAL LOCATION MAP OU 9, SITE-58 - BUILDING 312 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 0039
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1-4 / REV 0

P:\GIS\NAS_CecilField\site-58.apr 24Jan02 MJJ Layout 1-4



DRAWN BY MJJ	DATE 08Jun01	SITE LAYOUT AND MONITORING WELL LOCATIONS OU 9, SITE 58 - BUILDING 312 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 0039
CHECKED BY	DATE		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 1-5 / REV 0

P:\GIS\NAS_CecilField\site-58.apr 04Mar02 MJJ Layout 1-5



DRAWN BY	DATE
MJJ	08Jun01
CHECKED BY	DATE
COST/SCHEDULE AREA	
SCALE	AS NOTED

GROUNDWATER RESULTS EXCEEDING CRITERIA

(EXISTING DATA)

OU 9, SITE 58 - BUILDING 312

NAVAL AIR STATION CECIL FIELD

JACKSONVILLE, FLORIDA

CONTRACT NUMBER	
0039	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 1-6	REV 0

P:\GIS\NAS_CecilField\site-58.apr 08Aug02 MJJ Layout 1-6

2.0 STUDY AREA INVESTIGATION

The RI field investigations at Sites 57 and 58 were conducted from September 10 to October 3 and December 6 to 17, 2001. During the field investigation, permanent and temporary monitoring wells were installed, groundwater samples were collected from these and existing wells, surface water and sediment samples were collected, geotechnical soil samples were collected, and aquifer tests were conducted. Information collected during the investigation was used to determine risks in the PRE and to evaluate remedial alternatives for the FS. The following sections discuss the field investigation activities conducted at Sites 57 and 58. Sample log sheets, chain-of-custody forms, and survey data from RI field activities are included in Appendix A. Boring logs and monitoring well construction data are included in Appendix B.

2.1 GROUNDWATER INVESTIGATIONS

2.1.1 Site 57

Figure 1-3 presents historical exceedances of FDEP GCTLs at Site 57. The objective of the groundwater investigation was to evaluate the nature and extent of groundwater contaminated with chlorinated compounds and BTEX constituents in the Building 824A/Day Tank 1 area. A soil investigation was conducted as part of the Day Tank 1 contamination assessment, and approximately 24,000 tons of soil were removed in 1999. No additional soil sampling was required as part of the RI.

A total of 10 new permanent wells, five shallow, three intermediate, and two deep, were installed in the shallow surficial aquifer to delineate the horizontal and vertical extent of groundwater contamination (see Figure 2-1). Shallow wells were installed to a depth of 15 feet bgs, intermediate wells were installed to 40 feet bgs, and deep wells were set at the bottom of the surficial sand unit (approximately 85 feet bgs).

Eight new wells, CEF-824A-13D through CEF-824A-20S, were installed and sampled in September and October 2001. CEF-824A-13D was installed at the CEF-824A-12I location to vertically delineate BTEX and chlorinated contamination at this location. CEF-824A-14S, -15I, and -16D were installed southeast of CEF-824A-12I to horizontally and vertically delineate groundwater contamination downgradient of CEF-824A-12I. CEF-824A-17I was installed at the CEF-824A-04S location to vertically delineate BTEX contamination at this location. CEF-824A-18S and CEF-824A-19S were installed east and southeast, respectively, of CEF-824A-08S to provide horizontal delineation of chlorinated contamination. CEF-824A-20S was installed southeast of CEF-824A-03S to provide horizontal delineation of chlorinated contamination in this area.

Based on a preliminary evaluation of RI groundwater data and as described in the RI work plan addendum, two additional new wells were installed and sampled in December 2001 (TtNUS, 2001b). Intermediate well CEF-824A-21I was installed in the area around CEF-293-11 and CEF-824A-11S to provide vertical delineation data for this area. Shallow well CEF-824A-22S was installed south of CEF-824A-7S to provide further information on the groundwater flow direction and the horizontal extent of contamination.

2.1.2 Site 58

Figure 1-6 presents historical exceedances of FDEP GCTLs at Site 58. The objective of the groundwater investigation was to evaluate the nature and extent of groundwater contaminated with chlorinated compounds, naphthalene, and BTEX in the Building 312 area.

A total of seven new permanent wells, including six shallow and one intermediate, were installed to delineate the horizontal and vertical extent of groundwater contamination (see Figure 2-2). Shallow wells were installed to approximately 15 feet bgs, and the intermediate well was installed to a depth of 40 feet bgs. New wells CEF-B312-09S and CEF-B312-10S were installed west and southeast, respectively, of existing well CEF-B312-08S to provide horizontal delineation information in this area. CEF-B312-11S and CEF-B312-12S were installed southeast of CEF-B312-6S to provide downgradient data. CEF-B312-13S was installed southeast of CEF-B312-5S for horizontal delineation in this area. CEF-B312-14S was installed northeast of CEF-B312-09S to provide data upgradient of the wash rack area. CEF-B312-15I was installed at the CEF-B312-08S location (highest detected concentrations of 1,1-DCA and 1,1-DCE) to determine if contamination had migrated vertically.

2.1.3 Monitoring Well Construction and Installation

Before the permanent wells were installed, the proposed well locations for Sites 57 and 58 were reviewed and approved by the BCT. In accordance with the RI work plan, eight new wells, including four shallow, two intermediate, and two deep wells, were installed at Site 57 in September 2001 as part of RI field activities. Based on analytical data from these and existing wells, one additional shallow well and one additional intermediate well were installed in December 2001 (TtNUS, 2001b).

Tables 2-1 and 2-2 list the construction and installation details for the newly installed and existing monitoring wells sampled as part of the RI. Monitoring well construction logs are included in Appendix B. New and existing wells at Site 57 are shown on Figure 1-3 and at Site 58 are shown on Figure 1-6.

Groundwater monitoring wells installed as part of this investigation were installed in general accordance with applicable Department of the Navy, Southern Division Naval Facilities Engineering Command,

Monitoring Well Design, Installation, Construction, and Development Guidelines, State of Florida Well Standards and Regulations, and United States Environmental Protection Agency (U.S. EPA) Region IV Environmental Investigations Standard Operating Procedure and Quality Assurance Manual (EISOPQAM) (U.S. EPA, 1996a). In some cases, slight modifications in well installation and/or construction methods were required due to site conditions, geologic settings, or other factors.

Shallow and intermediate monitoring wells were installed using the hollow-stem auger (HSA) drilling method. Deep monitoring wells were installed using mud rotary drilling techniques. Monitoring wells were constructed of 2-inch inside diameter (ID), Schedule 40, flush-threaded, National Sanitation Foundation (NSF)-approved polyvinyl chloride (PVC) well screen and compatibly threaded PVC riser.

The shallow wells were installed to monitor the uppermost portion of the surficial aquifer. The top of the screened interval for the shallow wells was placed above the water table to allow measurement of the thickness of free-phase petroleum product, if present. Intermediate wells monitor the middle portion, and deep wells monitor the lower portion of the surficial aquifer to determine if contaminated groundwater has migrated vertically.

Well screens for shallow monitoring wells were 10 feet long with 0.010-inch slots. Intermediate and deep well screens were 5 feet long with 0.010-inch slots.

A primary filter pack of clean silica sand was installed around the well screen. This filter pack consisted of a sand mixture retained by U.S. Standard Sieve Nos. 20-30 (20/30 sand). The sand pack was installed flush with the bottom of the well to a minimum of 2 feet above the top of the well screen. A bentonite slurry was installed above the sand pack. The thickness of the bentonite seal was 0.5 foot in shallow wells, 3 feet in intermediate wells, and 5 feet in deep wells. The annular space above the bentonite seal was backfilled with a 10 percent bentonite/cement grout mixture to within approximately 2 feet of land surface. The cement material used was Portland Cement Type I. In the shallow wells, the bentonite/cement grout was poured into the borehole from the land surface. In the intermediate well, the bentonite/cement grout was pressure grouted into the borehole from the top of the bentonite seal to within 2 feet of ground surface. Concrete was used to fill the remaining annular space.

All the monitoring wells were completed with 8-inch ID, flush-mounted, protective steel covers with bolt-on lids. A sloping 2-foot- by 2-foot-wide by 6-inch-thick concrete surface pad was installed flush with the ground surface.

At the conclusion of the well installation activities, all new well locations were surveyed. At each well location, the vertical elevation of the ground surface, the protective cover, and the measuring point on the

PVC well casing were surveyed. In addition, the horizontal position of each well was surveyed. The vertical elevations are based upon the National American Vertical Datum (NAVD) 1988, and the horizontal locations are based upon the State Plane Coordinates for Florida East Zone, North American Datum, 1983/90. The survey data for each new and existing well are listed in Appendix A. Well elevation data are included in Table 2-1.

2.1.4 Monitoring Well Development

Following installation, each monitoring well was developed to remove drill cuttings and formation fines from the area around the well screen. The monitoring wells were developed 6 to 7 calendar days after well installation. Prior to development, an oil/water interface probe was used to determine the potential presence of both light and dense non-aqueous phase liquids in each well. Wells were developed by surging and pumping. During development, pH, temperature, turbidity, and specific conductivity measurements were collected after each borehole volume was removed. Wells were considered developed after these readings stabilized, as determined using the following criteria: pH ±0.1 unit, temperature ±1.0°C, turbidity $\leq$ 10 nephelometric turbidity units (NTU), and specific conductivity ±10 percent. A minimum of five times the standing water volume in the well casing plus five times the water volume in the saturated gravel pack (assuming 30 percent porosity) was removed. Water-quality measurements and the volumes removed were recorded for each well on the well development forms, included in Appendix C.

2.1.5 Water-Level Measurements

One round of synoptic water level measurements was collected from Sites 57 and 58 wells on September 24, 2000. An additional round of synoptic water-level measurements was collected at Site 57 in December 2001 following installation of wells CEF-824A-21I and CEF-824A-22S. December 2001 data were used to generate a potentiometric surface map for Site 57, and September 2001 groundwater elevations were used to generate a potentiometric surface map for Site 58.

The referenced measuring point for each well was clearly marked on each permanent well and is located on the north side of the PVC well casing. Water-level measurements were noted with the time and recorded to the nearest 0.01 foot. The logbook notations for the water level measurements are included in Appendix C.

2.1.6 Groundwater Sampling

Groundwater sampling for the RIs at Site 57 and Site 58 was conducted in accordance with procedures described in Section 7.2.3 of the Field Sampling Plan (FSP) for the Sites 36 and 37 RI (TtNUS, 1998).

Groundwater samples were collected using low-flow sampling techniques. At Site 57, groundwater samples were collected from September 25 to October 3 and from December 14 to 17, 2001. Groundwater samples were collected at Site 58 from September 19 to October 2 and on December 12, 2001.

Before a groundwater sample was obtained from each monitoring well, the static water level in the well was measured to within 0.01-foot accuracy from a marked location on the top of the well riser pipe. A headspace reading was obtained in the well's riser pipe using a photoionization detector (PID).

Groundwater samples were collected from monitoring wells using dedicated medical-grade flexible silicon and rigid Teflon™ tubing and a peristaltic pump. The tubing was lowered in the wells to approximately the midpoint of the well screens. The wells were then purged in accordance with the low-flow sampling techniques specified in Section 7.2.3 of the FSP for the Sites 36 and 37 RI (TtNUS, 1998). During purging, water-quality parameters (pH, temperature, specific conductance, turbidity, and dissolved oxygen) were measured using a Horiba U-10 meter and recorded about every 10 minutes until the parameters stabilized and the minimum purge volume was removed. The minimum purge volume with negligible drawdown (0.3 feet or less) was two saturated screen length volumes. Stabilization of the above parameters was defined as follows: temperature ±1.0ºC, pH ±0.1 units, turbidity < 10 NTU, and specific conductance ±3 percent. Water level data, flow rates, and water-quality data collected during purging were recorded on Low Flow Purge Data Sheets and included in Appendix A.

Immediately before sampling, the temperature, pH, specific conductance, turbidity, and dissolved oxygen of the water were measured and recorded on the Groundwater Sample Log Sheet (see Appendix A). Sample containers were filled by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence. Samples for dissolved metals analysis were collected using an in-line, 1-micron, disposable particulate filter. The 1-micron filter was an FDEP requirement (FDEP, 1994). Sample containers were immediately labeled and placed in a cooler with ice.

Sample preservation, packaging, and shipping requirements were followed in accordance with Section 7.3.1 of the FSP for the RI for Sites 36 and 37 (TtNUS, 1998).

Groundwater sampling and analysis conducted as part of the Site 57 RI are presented in Table 2-3. At Site 57, the 10 new wells (eigth originally proposed and two additional) and 31 existing wells were sampled and analyzed for contaminants of concern (COCs) including VOCs, PAHs, and TRPH, to determine the horizontal and vertical boundaries of groundwater contamination and to provide contaminant trend data within the site area. Thirty-nine groundwater samples were collected as part of the original RI field activities, and the two additional new wells were sampled and four existing wells were

resampled in December 2001. Three of the existing wells resampled (CEF-824A-11S, CEF-824A-07S, and CEF-293-11) were located near newly installed wells and were resampled to provide data for comparison with data from the new wells. CEF-824A-01Sa was resampled because data collected during RI sampling were significantly different than previous data.

Nine selected wells were analyzed for field and laboratory geochemical parameters to evaluate the potential for natural attenuation at the site. Natural attenuation parameters measured in the field included

- Temperature
- Dissolved oxygen (DO)
- pH
- Specific conductivity
- Alkalinity
- Ferrous iron
- Hydrogen sulfide
- Sulfide
- Oxidation-reduction potential (ORP)
- Carbon dioxide

Natural attenuation parameters measure by fixed-base laboratory methods include

- Alkalinity
- Dissolved iron
- Nitrate
- Nitrite
- Sulfate
- Dissolved sulfide
- Chloride
- Orthophosphate
- Methane, ethane, and ethene
- Total organic carbon

Groundwater sampling and analysis conducted as part of the Site 58 RI are presented in Table 2-4. The seven new wells and 11 existing wells were sampled and analyzed for COCs including VOCs, PAHs, and TRPH to determine the horizontal and vertical boundaries of groundwater contamination and to provide contaminant trend data within the site area. In addition, five selected wells were analyzed for field and laboratory geochemical parameters to evaluate the potential for natural attenuation at the site. To verify

the results of VOC data from RI sampling (September 2001) at CEF-B312-08S, this well was resampled in December 2001. Field and fixed-base natural attenuation parameters for Site 58 are the same as those listed for Site 57.

2.2 SITE 57 FREE-PRODUCT INVESTIGATION

Nineteen temporary wells were installed using DPT methods to delineate the extent of free product in the area of CEF-293-VEW01. Temporary wells CEF-824A-TW-01 through CEF-824A-TW15 were installed from September 11 to 14, 2001, and CEF-824A-TW17 through -TW19 were installed on October 3, 2001. CEF-824A-TW16 could not be installed due to auger refusal. The locations of these temporary wells are shown in Figure 2-3 and described in Table 2-5.

Temporary wells were installed to an approximate depth of 15 feet and were constructed of 1-inch ID, flush-threaded PVC well screen and riser. Well screens were 0.010-inch slot for all wells, with a screen length of 10 feet. Wells screens were installed to intersect and straddle the water table. A 20/30-grade sand pack was installed from the bottom of the well screen to ground surface. Temporary wells were equipped with locking caps; however, no protective casings or concrete pads were installed. Temporary wells were bailed to verify hydraulic connections with the aquifer and then allowed to stabilize. Depth to groundwater and depth to free product were then measured.

2.3 SITE 57 SURFACE WATER SAMPLING

A preliminary evaluation of groundwater elevation data from Site 57 suggested that groundwater may be infiltrating into the nearby storm sewer in the area of CEF-824A-03S and CEF-824A-07S. To investigate potential impacts of this situation, a surface water sample was collected at the discharge point of this storm sewer, an outfall on the eastern side of the north-south runway designated Outfall No. 4 (see Figure 2-4). The sample was collected on December 17, 2001 and analyzed for VOCs, PAHs (naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene only), and TRPH. Surface water sample bottles were filled directly from the outfall.

2.4 SITE 58 SEDIMENT SAMPLING

Three sediment samples were collected on September 19, 2001 from the drainage ditch south of Building 312 to investigate potential migration of contaminants. The locations of the sediment samples, CEF-B312-SD-001, CEF-B312-SD-002, and CEF-B312-SD-003, are shown in Figure 2-5. The sediment samples were collected as grab samples using plastic, disposable trowels and were analyzed for VOCs, PAHs, and TRPH.

2.5 GEOLOGIC AND HYDROGEOLOGIC INVESTIGATION

Geologic and hydrogeologic information was obtained as part of the RI at each site to investigate the existing and potential fate and transport mechanisms for groundwater and COCs at the sites. Furthermore, site-specific geologic and hydrogeologic information is required to evaluate remediation alternatives. The following sections describe the procedures used during this investigation to collect site-specific geologic and hydrogeologic information.

2.5.1 Geotechnical Analysis

Geotechnical samples were collected during this investigation for the analysis of engineering parameters and for use in contaminant fate and transport evaluations. Undisturbed soil samples (Shelby tube samples) were collected in general accordance with procedures outlined in Section 2.3.2 of the RI Report for Sites 36 and 37 (TtNUS, 1999) and were analyzed for the following geotechnical parameters:

- Grain-size analysis
- Porosity
- pH
- Specific gravity
- Bulk density

Numerous previous studies at NAS Cecil Field have confirmed that shallow subsurface materials consist of a fairly uniform sand with varying relatively amounts of silt and clay. Because of the relative homogeneity of the shallow aquifer materials, one Shelby tube sample was collected from each site to confirm that site-specific data were within the range of previously-detected data.

One Shelby tube sample was collected at Site 57 from within the screened interval of well CEF-824A-15I at approximately 36 to 38 feet bgs, and one was collected at Site 58 from the screened interval of CEF-B312-10S at a depth of approximately 6 to 8 feet bgs. The Shelby tubes consisted of a 3-inch-ID by 24-inch-long, thin-walled, seamless aluminum sleeve that was connected to a drilling rod for advancement. The Shelby tube was pushed in a rapid continuous motion without using any rotation or hammering so that an undisturbed soil sample was collected. When the Shelby tube was advanced to the desired depth, the tube was allowed to remain in the ground for approximately 5 minutes. After 5 minutes, the tube was rotated approximately 180 degrees to break the undisturbed soil sample from the formation, and then slowly withdrawn to land surface. Upon retrieval of the sample tube, the tube was inspected for damage that may have affected the sample and to confirm that the tube was full. Following the inspection, each end was capped by filling the ends with paraffin wax and reinforcing them with duct tape. The tube was then labeled with the proper sample identification number and orientation (top and bottom).

The samples were stored in an upright position in a secure location until shipment to the off-site soil laboratory.

2.5.2 Specific Capacity Testing

Specific capacity (SPECAP) tests were performed at one shallow well and one intermediate monitoring well at Site 57 (CEF-824A-05SS and CEF-824A-12I) and one shallow well at Site 58 (CEF-B312-02S). The objective of the SPECAP tests was to determine the productivity or yield per unit of drawdown of the aquifer in which the well is screened in order to estimate hydraulic conductivity and transmissivity. Although there is published information concerning formation hydraulic conductivities at NAS Cecil Field, SPECAP tests were conducted to verify and confirm the hydraulic conductivity values previously determined.

Specific capacity is defined as yield divided by drawdown and is normally expressed as gallons per minute per foot of drawdown. Both the pumping rate and the stabilized drawdown are measured simultaneously after a sufficient amount of time has elapsed for the well to reach equilibrium. Dividing the yield rate by the stabilized drawdown, when both are measured simultaneously, gives the specific capacity. SPECAP tests are advantageous because they are conducted immediately following development, and automatic data-logging equipment is not necessary. Specific capacity can vary with pumping duration, and specific capacity decreases as pumping time increases. Additionally, specific capacity generally decreases as the discharge rate increases. Both of these responses are due to dewatering of the aquifer within the cone of depression. For a given amount of drawdown, the yield progressively decreases as the saturated thickness of the aquifer is reduced. Specific capacity may also vary with yield as a function of the well efficiency.

The procedure for conducting a SPECAP test consisted of the following general steps:

1. After the well was properly developed, pumping was continued at a constant rate.

2. The pumping rate and drawdown were measured simultaneously at regular and frequent intervals, and the data were recorded on the Monitoring Well Development Record, included in Appendix C. Drawdown was measured using an electronic water level indicator (M-scope).

3. Pumping continued until drawdown stabilized (generally, measurements within 0.03 foot over a 10-minute interval were considered stable).

4. Pumping was terminated and water level recovery was measured.

5. Water levels were measured at frequent intervals during recovery to make sure that the original static water level was reached; if not, the water level measured when residual drawdown stabilized was used as the static water level.

To perform the SPECAP tests, a submersible pump was used to pump the well. Aquifer parameters were calculated from the SPECAP test data using a computer program developed by Bradbury and Rothschild (1985) based on equations presented in Lohman (1972). The results are included in Appendix C.

This page intentionally left blank.

TABLE 2-1

MONITORING WELL CONSTRUCTION DATA
OPERABLE UNIT 9, SITE 57 - BUILDING 824A/DAY TANK 1 AREA
REMEDIAL INVESTIGATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Monitoring Well	Date Installed	Total Depth (in feet bgs)	Screened Interval (in feet bgs)	Ground Surface Elevation (in feet amsl)	Top of casing Elevation (in feet amsl)
CEF-824A-01Sa	NA	14	4 to 14	NA	74.88
CEF-824A-02S	Jun-00	17	7 to 17	74.88	74.36
CEF-824A-03S	Jun-00	18	8 to 18	73.75	73.75
CEF-824A-04S	Jun-00	15	5 to 15	74.60	74.60
CEF-824A-05S	Jun-00	17	7 to 17	74.15	74.15
CEF-824A-06I	Sep-00	38	33 to 38	75.00	75.00
CEF-824A-07S	Sep-00	15	5 to 15	74.48	74.48
CEF-824A-08S	Jan-01	15	5 to 15	74.39	74.39
CEF-824A-09S	Jan-01	15	5 to 15	74.93	74.93
CEF-824A-10S	Jan-01	15	5 to 15	74.12	74.12
CEF-824A-11S	Jan-01	15	5 to 15	74.95	74.95
CEF-824A-12I	Jan-01	40	35 to 40	75.11	75.11
CEF-824A-13D	Sep-01	87	81 to 86	75.40	75.20
CEF-824A-14S	Sep-01	15	4 to 14	75.50	76.12
CEF-824A-15I	Sep-01	41	36 to 41	75.50	75.14
CEF-824A-16D	Sep-01	85	80 to 85	75.50	75.28
CEF-824A-17I	Sep-01	41	36 to 41	74.70	74.38
CEF-824A-18S	Sep-01	15	4 to 14	72.60	72.56
CEF-824A-19S	Sep-01	15	4 to 14	74.30	74.00
CEF-824A-20S	Sep-01	15	4 to 14	73.30	73.00
CEF-824A-21I	Dec-01	40.5	35 to 40	75.20	75.03
CEF-824A-22S	Dec-01	14	3.5 to 13.5	74.36	74.36
CEF-293-1	NA	15	5 to 15	76.30	76.29
CEF-293-3	NA	15	5 to 15	77.10	76.91
CEF-293-4	NA	12	2 to 12	75.90	75.72
CEF-293-5	NA	14	4 to 14	77.10	76.82
CEF-293-8	NA	17	7 to 17	78.20	78.12
CEF-293-10	NA	15	5 to 15	75.40	75.25
CEF-293-11	NA	15	5 to 15	75.48	75.27
CEF-293-13	NA	15	5 to 15	74.61	74.48
CEF-293-14	NA	15	5 to 15	75.50	75.08
CEF-293-15D	NA	NA	NA	77.90	77.60
CEF-293-19	NA	17	4 to 14	NA	75.08
CEF-293-20	NA	17	4 to 14	NA	74.37
CEF-293-21	NA	17	5 to 15	NA	74.45
CEF-293-22	NA	17	4 to 14	NA	74.42
CEF-824LS-01S	NA	19	8 to 18	75.70	75.56
CEF-16-38S	NA	17	7 to 17	17.00	76.70
CEF-16-39I	NA	55	45 to 55	55.00	76.69
CEF-16-40D	NA	89	79 to 89	89.00	76.65

Elevation is referenced to 1988 National American Vertical Datum (NAVD).
bgs = Below ground surface.
amsl = Above mean sea level.
NA = Not available.

TABLE 2-2

MONITORING WELL CONSTRUCTION DATA
OPERABLE UNIT 9, SITE 58 - BUILDING 312
REMEDIAL INVESTIGATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Monitoring Well	Date Installed	Total Depth (in feet bgs)	Screened Interval (in feet bgs)	Ground Surface Elevation (in feet amsl)	Top of casing Elevation (in feet amsl)
CEF-312-01	NA	15	4.5 to 14.5	72.12	71.88
CEF-B312-01I	Nov-00	35	30 to 35	72.26	72.08
CEF-B312-01S	Jun-00	14	4 to 14	73.40	73.22
CEF-B312-02S	Jun-00	14	4 to 14	72.05	71.79
CEF-B312-03S	Jun-00	14	4 to 14	73.49	73.24
CEF-B312-04S	Nov-00	14	4 to 14	72.66	72.45
CEF-B312-05S	Nov-00	14	4 to 14	71.78	71.51
CEF-B312-06S	Nov-00	14	4 to 14	72.75	72.44
CEF-B312-07S	Nov-00	14	4 to 14	73.07	72.75
CEF-B312-08S	Nov-00	14	4 to 14	74.39	74.10
CEF-B312-09S	Sep-01	15	4.5 to 14.5	76.97	76.77
CEF-B312-10S	Sep-01	15	4 to 14	74.15	73.93
CEF-B312-11S	Sep-01	15	4.5 to 14.5	73.80	73.61
CEF-B312-12S	Sep-01	15	4.5 to 14.5	73.27	72.92
CEF-B312-13S	Sep-01	15	4.5 to 14.5	73.52	73.34
CEF-B312-14S	Sep-01	15	4 to 14	74.80	74.64
CEF-B312-15I	Sep-01	41	35 to 40	74.50	74.15
CEF-312LS-01Sa	NA	16	6 to 16	75.50	74.23

Elevation is referenced to 1988 National American Vertical Datum (NAVD).
NA = Not available.
bgs = Below ground surface.
amsl = Above mean sea level.

TABLE 2-3

SUMMARY OF GROUNDWATER SAMPLING AND ANALYSIS
OPERABLE UNIT 9, SITE 57 - BUILDING 824A/DAY TANK 1 AREA
REMEDIAL INVESTIGATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 1 OF 2

SAMPLE ID	ANALYSIS			
	VOCS	PAHS	TRPH	Natural Attenuation Parameters
CEF-824A-01	X	X	X	-
CEF-824A-01Sa	X	X	X	-
CEF-824A-02S	X	X	X	-
CEF-824A-03S	X	X	X	-
CEF-824A-04S	X	X	X	X
CEF-824A-05S	X	X	X	-
CEF-824A-06I	X	X	X	-
CEF-824A-07S	X	X	X	X
CEF-824A-08S	X	X	X	-
CEF-824A-09S	X	X	X	X
CEF-824A-10S	X	X	X	-
CEF-824A-11S	X	X	X	-
CEF-824A-12I	X	X	X	-
CEF-824A-13D	X	X	X	-
CEF-824A-14S	X	X	X	-
CEF-824A-15I	X	X	X	-
CEF-824A-16D	X	X	X	-
CEF-824A-17I	X	X	X	-
CEF-824A-18S	X	X	X	-
CEF-824A-19S	X	X	X	-
CEF-824A-20S	X	X	X	-
CEF-824A-21I	X	X	X	-
CEF-824A-22S	X	X	X	-
CEF-293-1	X	X	X	-
CEF-293-3	X	X	X	-
CEF-293-4	X	X	X	X
CEF-293-5	X	X	X	-
CEF-293-8	X	X	X	-
CEF-293-10	X	X	X	-
CEF-293-11	X	X	X	X
CEF-293-12	X	X	X	-
CEF-293-13	X	X	X	X

TABLE 2-3

SUMMARY OF GROUNDWATER SAMPLING AND ANALYSIS
OPERABLE UNIT 9, SITE 57 - BUILDING 824A/DAY TANK 1 AREA
REMEDIAL INVESTIGATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 2 OF 2

SAMPLE ID	ANALYSIS			
	VOCS	PAHS	TRPH	Natural Attenuation Parameters
CEF-293-14	X	X	X	-
CEF-293-15D	X	X	X	-
CEF-293-19	X	X	X	X
CEF-293-20	X	X	X	X
CEF-293-21	X	X	X	-
CEF-293-22	X	X	X	X
CEF-825LS-01S	X	X	X	-
CEF-16-38S	X	X	X	-
CEF-16-39I	X	X	X	-
CEF-16-40D	X	X	X	-

NA = Natural attenuation.

TABLE 2-4

SUMMARY OF GROUNDWATER SAMPLING AND ANALYSIS
OPERABLE UNIT 9, SITE 58 - BUILDING 312
REMEDIAL INVESTIGATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

SAMPLE ID	ANALYSIS			
	VOCS	PAHS	TRPH	Natural Attenuation Parameters
CEF-B312-GW-09S-01	X	X	X	-
CEF-B312-GW-10S-01	X	X	X	-
CEF-B312-GW-11S-01	X	X	X	-
CEF-B312-GW-12S-01	X	X	X	-
CEF-B312-GW-13S-01	X	X	X	-
CEF-B312-GW-14S-01	X	X	X	-
CEF-B312-GW-15I-01	X	X	X	-
CEF-312-GW-01-02	X	X	X	-
CEF-B312-GW-01I-02	X	X	X	-
CEF-B312-GW-01S-03	X	X	X	X
CEF-B312-GW-02S-02	X	X	X	X
CEF-B312-GW-03S-02	X	X	X	X
CEF-B312-GW-04S-02	X	X	X	-
CEF-B312-GW-05S-02	X	X	X	X
CEF-B312-GW-06S-02	X	X	X	-
CEF-B312-GW-07S-03	X	X	X	-
CEF-B312-GW-08S-03	X	X	X	-
CEF-312LS-GW-01Sa-03	X	X	X	X

NA = Natural attenuation

TABLE 2-5

SUMMARY OF TEMPORARY WELL LOCATIONS
OPERABLE UNIT 9, SITE 57 - BUILDING 824A/DAY TANK 1 AREA
REMEDIAL INVESTIGATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

TEMPORARY WELL ID CEF-824A-	LOCATION
TW-01	20 feet north of CEF-293-VEW01, 10 feet north of TW-02
TW-02	10 feet north of CEF-293-VEW01
TW-03	10 feet east of CEF-293-VEW01, beneath Building 846 floor
TW-04	10 feet east of TW-03, beneath Building 846 floor
TW-05	10 feet south of CEF-293-VEW01
TW-06	10 feet south of TW-05
TW-07	10 feet south of TW-06
TW-08	10 feet south of TW-07
TW-09	10 feet south of TW-08 (southeast of CEF-293-VEW02)
TW-10	15 feet west and 15 feet south of CEF-293-VEW01
TW-11	10 feet west of CEF-293-VEW01
TW-12	20 feet west of CEF-293-VEW01
TW-13	15 feet west and 15 feet north of CEF-293-VEW01
TW-14*	Approximately 50 feet south and 25 feet west of TW-04, beneath Building 846 floor
TW-15*	Approximately 40 feet east of TW-04, beneath Building 846 floor
TW-16**	Approximately 70 feet south and 15 feet east of TW-07, beneath Building 846 floor (auger refusal – no well installed)
TW-17*	Approximately 40 feet south and 50 feet east of TW-04, beneath Building 846 floor
TW-18*	Approximately 40 feet east of TW-04, beneath Building 846 floor
TW-19*	Approximately 40 feet east of TW-19, beneath Building 846 floor

* Locations of temporary wells CEF-824A-TW-14 through TW-19 were determined in the field following installation of the 13 temporary wells proposed in the RI work plan to further delineate the extent of free product.

** An obstruction was hit during installation activities at the CEF-824A-16 location. No temporary well was installed.

This page intentionally left blank.

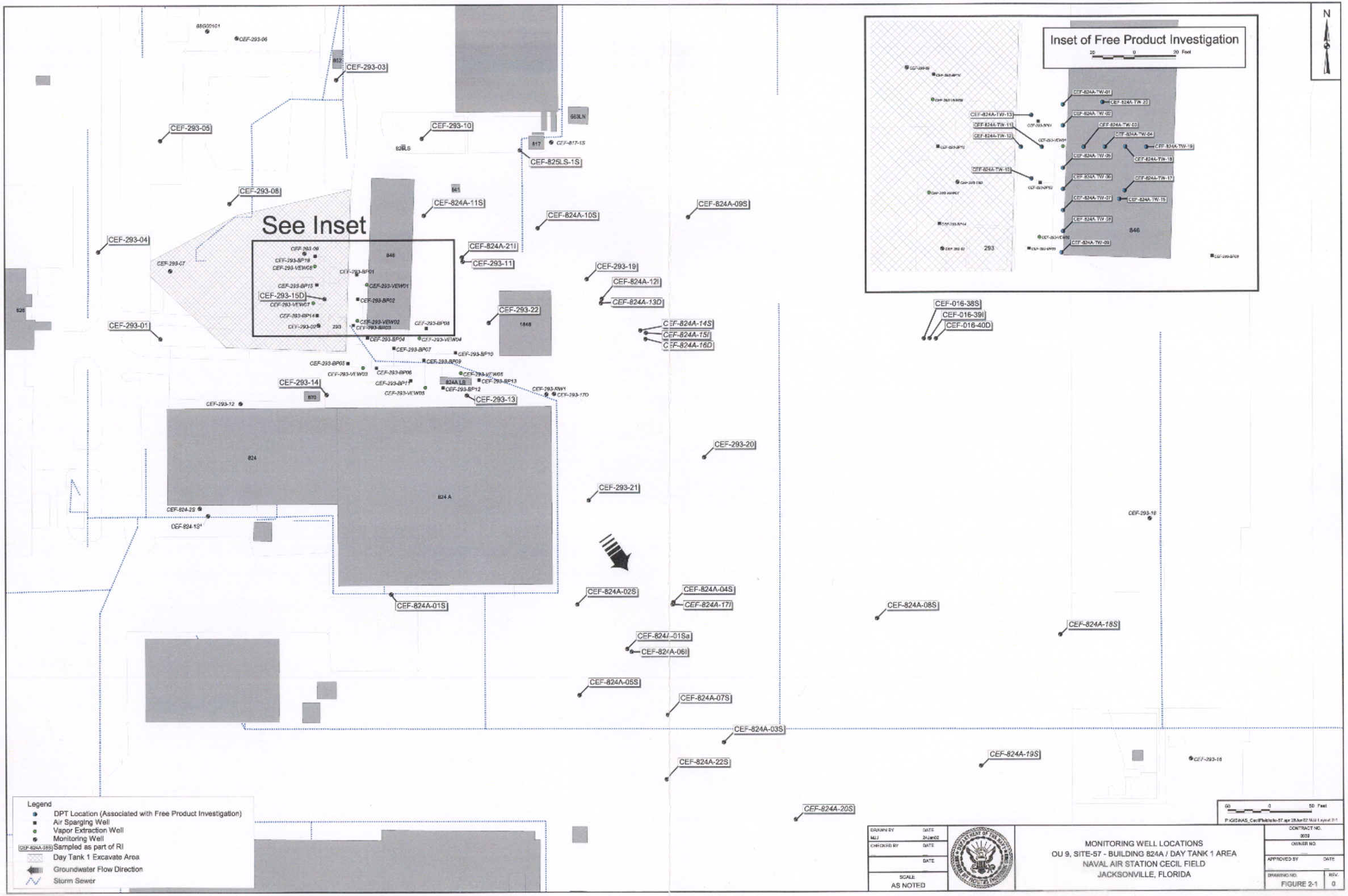
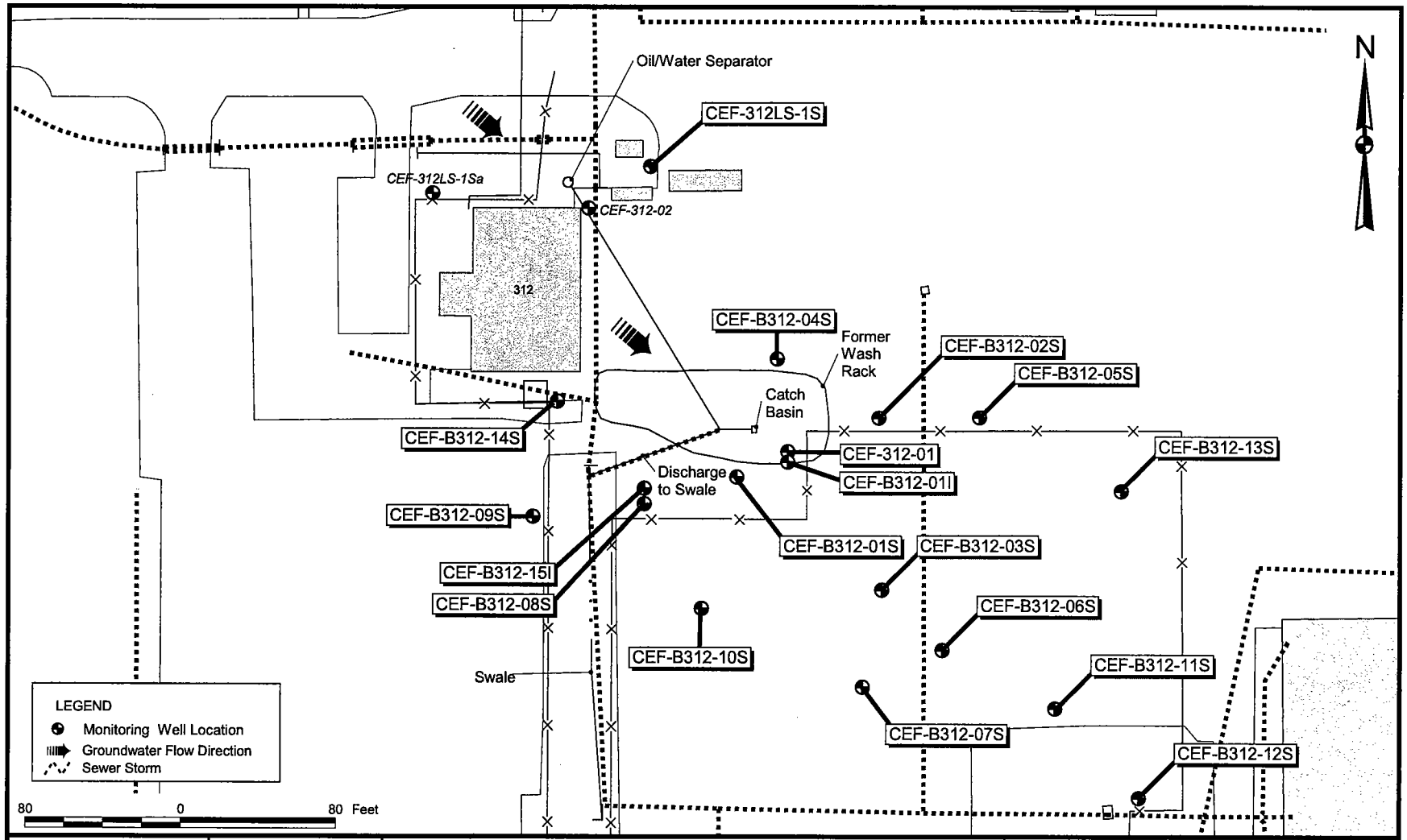
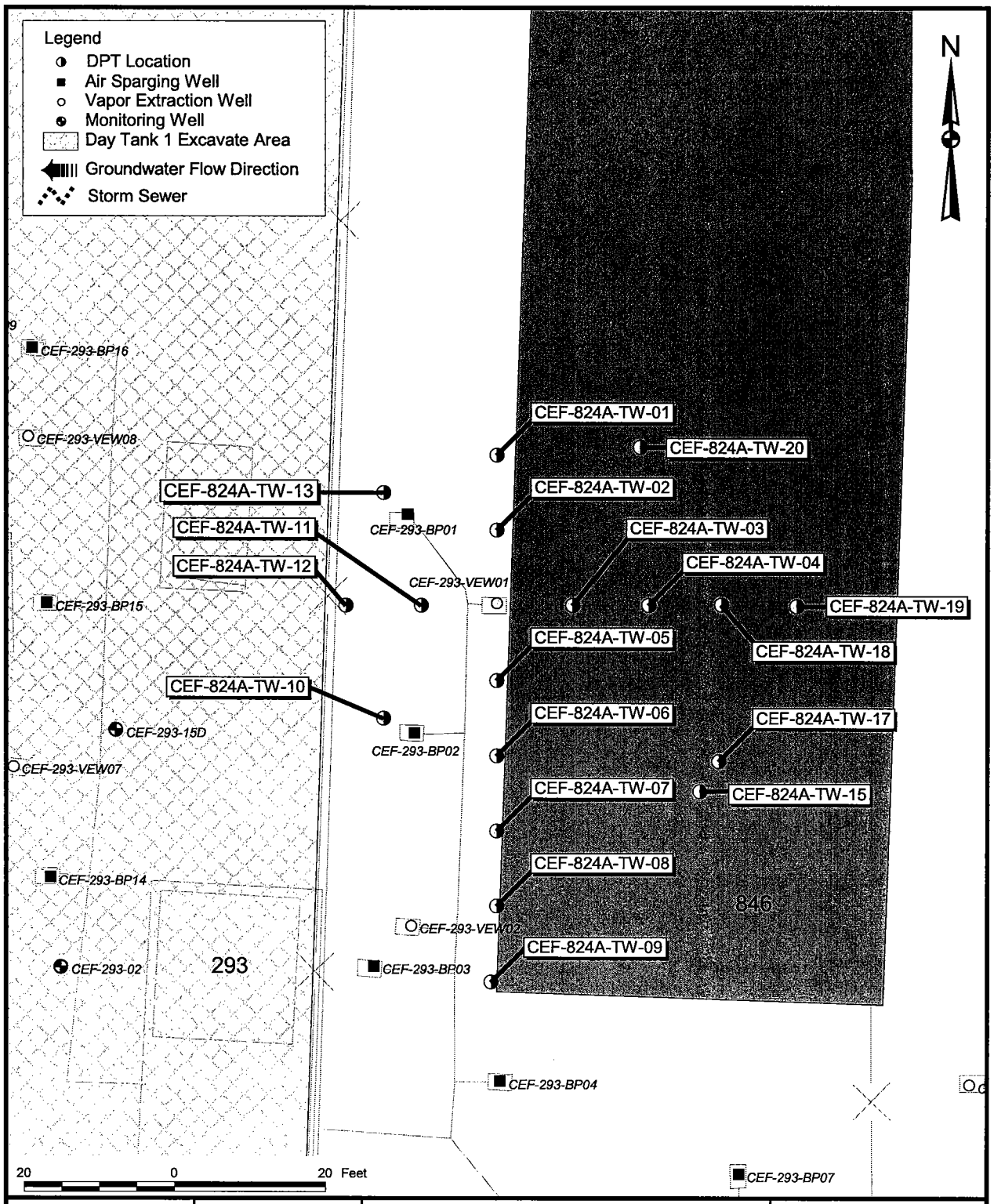

Inset of Free Product Investigation
See Inset
CEF-293-03
CEF-293-05
CEF-293-10
CEF-825LS-1S
CEF-293-08
CEF-824A-11S
CEF-824A-10S
CEF-824A-09S
CEF-293-04
CEF-824A-21I
CEF-293-11
CEF-293-19
CEF-824A-12I
CEF-824A-13D
CEF-293-15D
CEF-293-22
CEF-293-01
CEF-824A-14S
CEF-824A-15I
CEF-824A-16D
CEF-016-38S
CEF-016-39I
CEF-016-40D
CEF-293-14
CEF-293-13
CEF-293-20
CEF-293-21
CEF-824A-02S
CEF-824A-04S
CEF-824A-17I
CEF-824A-01S
CEF-824A-08S
CEF-824A-18S
CEF-824A-01Sa
CEF-824A-06I
CEF-824A-05S
CEF-824A-07S
CEF-824A-03S
CEF-824A-19S
CEF-824A-22S
CEF-824A-20S
Legend
DPT Location (Associated with Free Product Investigation)
Air Sparging Well
Vapor Extraction Well
Monitoring Well
Sampled as part of RI
Day Tank 1 Excavate Area
Groundwater Flow Direction
Storm Sewer
MONITORING WELL LOCATIONS
OU 9, SITE-57 - BUILDING 824A / DAY TANK 1 AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
AS NOTED
FIGURE 2-1

Figure 2-1, backside



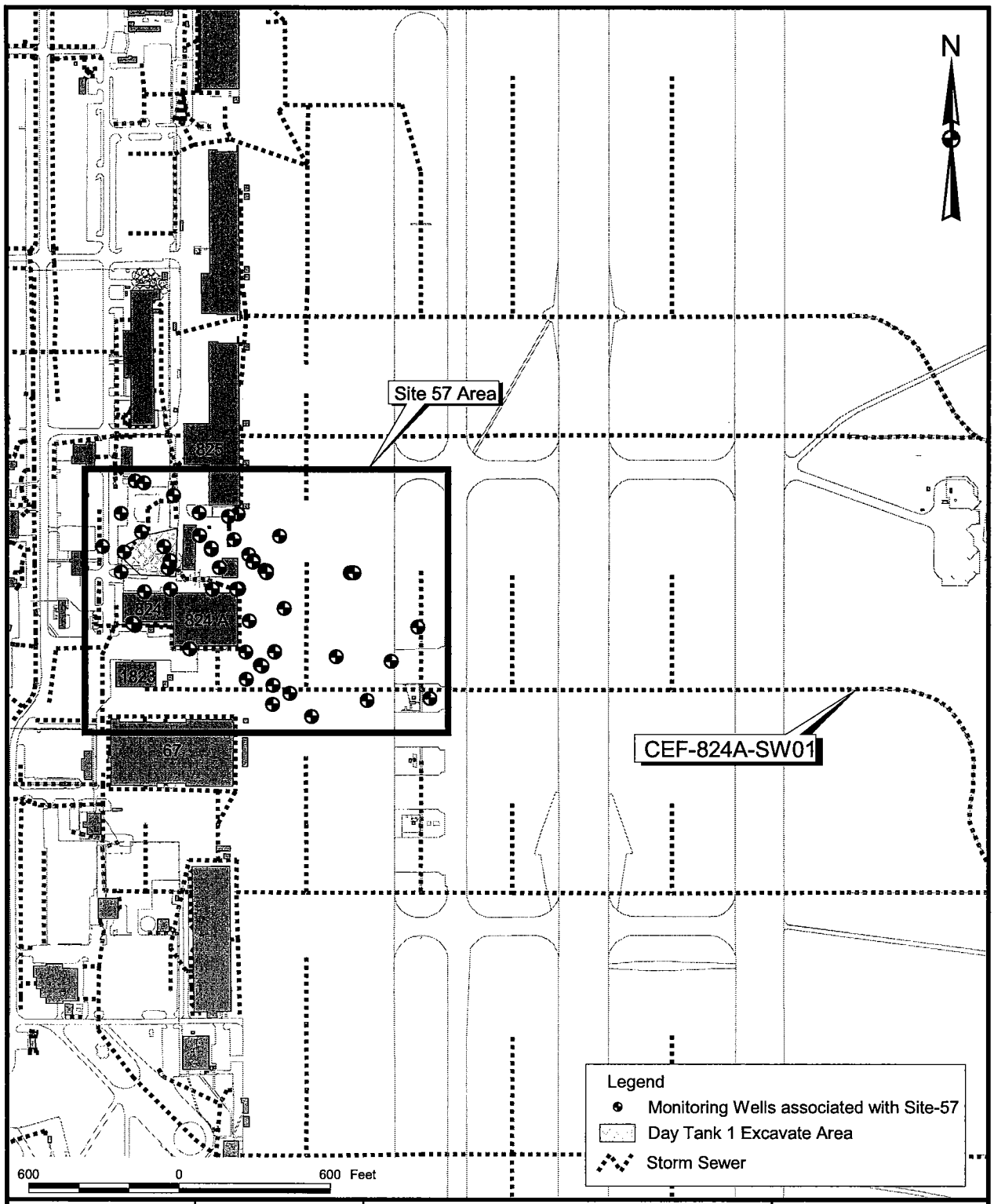
DRAWN BY MJJ	DATE 08Jun01	MONITORING WELL LOCATIONS OU 9, SITE 58 - BUILDING 312 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 0039
CHECKED BY	DATE		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 2-2 / REV 0

P:\GIS\NAS_CecilField\site-58.apr 24Jan02 MJJ Layout 2-2



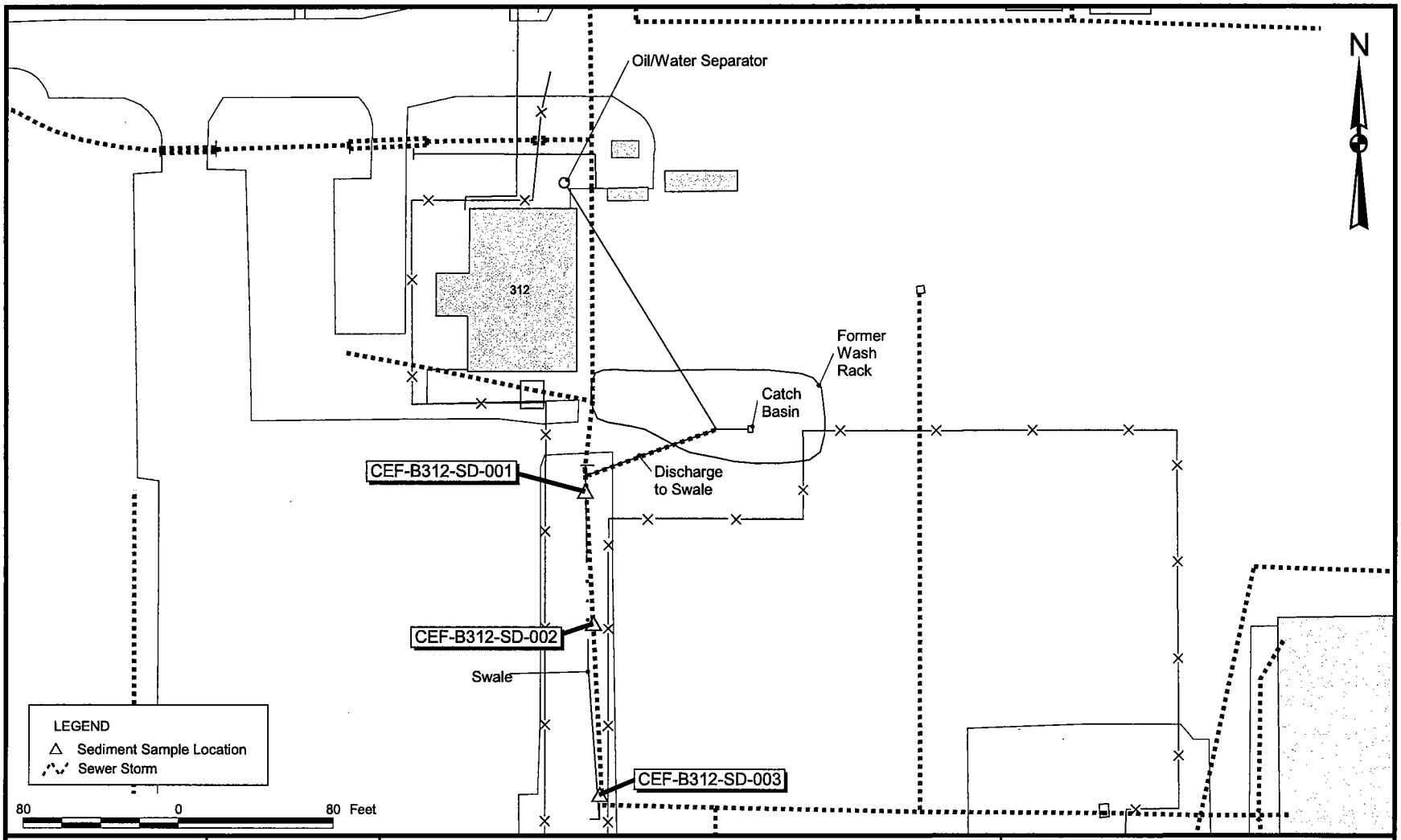
DRAWN BY	DATE			CONTRACT NUMBER
MJJ	24Jan02		TEMPORARY WELL LOCATIONS	0039
CHECKED BY	DATE		OU 9, SITE-57 - BUILDING 824A / DAY TANK 1 AREA	APPROVED BY DATE
COST/SCHEDULE-AREA			NAVAL AIR STATION CECIL FIELD	APPROVED BY DATE
SCALE AS NOTED			JACKSONVILLE, FLORIDA	DRAWING NO. FIGURE 2-3 / REV 0

P:\GIS\NAS_CecilField\site-57.apr 24Jan02 MJJ Layout 2-3



DRAWN BY MJJ	DATE 24Jan02	SURFACE WATER SAMPLE LOCATION OU 9, SITE-57 - BUILDING 824A / DAY TANK 1 AREA NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 0039
CHECKED BY	DATE		APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2-4 / REV 0

P:\GIS\NAS_CecilField\site-57.apr 24Jan02 MJJ Layout 2-4



DRAWN BY MJJ	DATE 08Jun01	SEDIMENT SAMPLE LOCATIONS OU 9, SITE 58 - BUILDING 312 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 0039
CHECKED BY	DATE		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 2-5 / REV 0

P:\GIS\NAS_CecilField\site-58.apr 24Jan02 MJJ Layout 2-5

3.0 GENERAL DATA EVALUATION PROCEDURES

3.1 DATA QUALITY

Various data quality assurance/quality control (QA/QC) measures were implemented during the field investigations performed for Sites 57 and 58. These quality measures were conducted to ensure that the resultant data were suitable for their intended uses (i.e., nature and extent determination, risk assessment, etc.). A brief summary of the measures is provided in this report. Section 3.1.1 contains a summary of the Data Quality Objectives (DQOs). Field quality control samples are discussed in Section 3.1.2. A summary of the data validation procedures and the results of the data validation process appear in Section 3.1.3.

3.1.1 Data Quality Objectives

DQOs established for this project considered existing site information and data, identification of the problem, development of a strategic site plan, specification of control and monitoring criteria, and an evaluation of the data collected during the investigation to determine the nature and extent of contamination.

The data obtained during the investigation were evaluated and used to satisfy and support the DQOs. As part of the evaluation process, and in order to provide data of satisfactory quality, all field and laboratory analyses include requirements for precision, accuracy, and completeness. These parameters are briefly summarized in this section.

3.1.1.1 Precision

Precision characterizes the amount of variability and bias inherent in a data set. This parameter also describes the reproducibility of measurements of the same parameters for samples under similar conditions. Precision is expressed as a relative percent difference (RPD), which is defined as the relation of the range relative to the mean RPDs. RPDs, which are typically expressed as percentages, are used to evaluate laboratory duplicate precision and are calculated as follows:

$$RPD = \frac{|V1 - V2|}{(V1 + V2)/2} \times 100$$

where RPD = relative percent difference

V1, V2 = two results obtained by analyzing duplicate samples

The precision objectives for parameters are specified in the associated analytical protocols. General precision objectives such as ±50 percent for solid matrices and ±30 percent for aqueous matrices were employed for this project.

Field duplicates monitor the consistency with which environmental samples were obtained and analyzed. RPDs were calculated for each set of field and laboratory duplicates generated for the investigation.

At Site 57, six field duplicate pairs were collected for aqueous samples. The total number of aqueous samples collected was 42; therefore, the 10 percent frequency criterion was met. At Site 58, two field duplicate pairs were collected for aqueous samples, and one sediment/soil field duplicate pair was collected. The total number of aqueous samples collected was 18, and the total number of soil samples was 3; therefore, the 10 percent frequency criterion was met.

3.1.1.2 Accuracy

The degree of accuracy of a measurement, which is expressed as a percent recovery, is based on a comparison of the measured value with an accepted reference or true value. Accuracy measurements are determined by the analysis of "spiked" samples (i.e., blank, surrogate, or matrix spikes). These analyses measure the accuracy of the laboratory operations as affected by the sample matrix. Percent recovery is calculated using the following equation:

$$\%R = \frac{Ss - So}{S} \times 100$$

where	%R	=	percent recovery
	Ss	=	result of spiked sample
	So	=	result of non-spiked sample
	S	=	concentration of spiked amount.

In general, a percent recovery range of 75 to 125 defines the accuracy objective for the analytical data. It should be noted, however, that the analytical laboratory details analyte-specific percent recoveries. All accuracy objectives were met; therefore, no qualifiers were assigned for failure to meet the accuracy objectives (per data validation protocols) of the associated analytical data.

3.1.1.3 Completeness

Completeness is a measure of the amount of valid data obtained from the laboratory analyses in relation to the total amount of data collected. Completeness is typically expressed as a percentage and is determined using the following equation:

$$\%C = \frac{V}{T} \times 100$$

where	%C	=	percent completeness
	V	=	number of results determined to be valid
	T	=	total number of results

Under ideal conditions, the completeness objective would be 100 percent. However, samples can be rendered unusable during shipping and preparation (e.g., bottles broken or extracts accidentally destroyed) or analysis (e.g., loss of instrument sensitivity, strong matrix effects). The calculated percent completeness for all chemical analytical data collected during the field investigation is 99.3 percent (i.e., 25 chemical analytical results out of a total of 3,840 data points were qualified as unusable), indicating that the data completeness objective for the project was achieved.

Table 3-1 contains a list of those sample results that were determined to be invalid and unusable via data validation. Section 3.1.3 contains a summary of the data validation results and describes, in general, the rationale for rejecting these analytical results.

3.1.2 Field Quality Control Samples

At Site 57, six field duplicate pairs were collected in support of the groundwater sampling effort (CEF-293-GW-21/CEF-824A-DUP01, CEF-16-GW-38S/CEF-824A-DUP02, CEF-824A-GW-4S/CEF-824A-DUP03, CEF-293-GW-13/CEF-824A-DUP04, CEF-293-GW-4/CEF-824A-DUP05, and CEF-824A-GW-22S/CEF-824A-DU01-GW-01). Samples CEF-824A-DUP01 through CEF-824A-DUP04 and CEF-824A-DU01-GW-01 were analyzed for VOCs, PAHs, and TRPH. CEF-824A-DUP03 was also analyzed for natural attenuation parameters, excluding TOC. CEF-824A-DUP5 was analyzed for TOC only.

At Site 58, two field duplicate pairs were collected in support of the groundwater sampling effort (CEF-B312-GW-08S/CEF-B312-DUP01, CEF-16-GW-05S/CEF-B312-GW-DUP02). These samples were analyzed for VOCs, PAHs, and TRPH. CEF-B312-DUP02 was also analyzed for natural attenuation parameters. A sediment field duplicate pair also was collected at Site 58 (CEF-B312-SD-001/CEF-B312-SD-DUP1). This sample was analyzed for VOCs, PAHs, and TRPH.

Field duplicate imprecision (RPD > 30percent) was noted for TRPH analysis of groundwater sample pair CEF-B312-GW-03S/CEF-B312-GW-DUP2 and PAH analysis of sediment sample pair CEF-B312-SD-001/CEF-B312-DUP-1. Positive results and nondetected results for affected parameters were qualified as estimated.

Trip blanks and rinse blanks were not collected as part of the environmental sampling program as agreed to by the BCT for all investigations at NAS Cecil Field.

3.1.3 Data Validation

All samples were subjected to a limited data validation. Data validation is an objective systematic process in which analytical data are reviewed to ascertain the validity of the reported results and to identify for the data user the possible limitation of these results. The limited data validation review consisted of an evaluation of the data to eliminate false positives and to preclude false negatives. The limited data validation review evaluated environmental samples for data completeness, holding time compliance, calibration compliance, and laboratory blank contamination. The limited data validation review was primarily limited to the aforementioned criteria; however, if noncompliances compromising false negatives or false positives were noted, the reviewer would take appropriate action to qualify the data. This section summarizes the various aspects of the data validation process.

3.1.3.1 General Data Validation Procedures

Validation of data generated for samples collected during the field effort was completed in accordance with the procedures outlined in Navy guidance (Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Restoration Program, NFESC 20.2-047B). A limited data validation was performed for all samples analyzed via the SW-846 methods. Data were validated in accordance with the U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic and Inorganic Data Review.

The limited data validation process included consideration of the following: data completeness, holding time compliance, calibration compliance, laboratory-generated blanks, and detection limits.

Data completeness considered a review and evaluation of the hardcopy data deliverables and the electronic data files received from the analytical laboratory. All hard-copy analytical results and electronic data were reviewed for accuracy.

An evaluation of holding time compliance was performed on all environmental samples. All environmental soil samples met holding time requirements.

Calibration standards were evaluated to assess compliance with the analytical method. An evaluation of the calibration standards aided in the elimination of false negatives. An assessment of calibration non-compliance also was used to qualify positive and non-detected results.

Evaluation of laboratory blank analyses aided in the elimination of false positive results. Laboratory artifacts and contaminants present in method blanks were used to establish action levels and were correlated to associated environmental samples. Positive results in environmental samples less than the established blank action level for an associated group of environmental samples were considered false positives.

The overall determination of data utility or reliability was based upon laboratory compliance with specified methods and adherence to QC requirements. Noncompliances observed during the validation process typically resulted in the qualification of the associated analytical data. The qualifiers alert the data user to imprecise or estimated results and, in the worst case, unreliable and unusable data.

The net results of the validation process were summarized in sample-delivery-group-specific technical reports consisting of a memorandum, a section of qualified analytical results, and a supporting documentation section that provided the rationale for changes and/or qualification of the data. These memoranda provide a detailed explanation of the results of the data validation review.

3.1.3.2 Data Validation Qualifiers

As mentioned previously, the qualification of analytical data during the validation process (i.e., application of U, J, UJ, UR, and R qualifiers) was conducted as required by the U.S. EPA Functional Guidelines. The attachment of the data qualifiers to analytical results signifies the occurrence of QC noncompliances that were noted during the course of data validation. The various data qualifiers are defined as follows:

U - Indicates that the chemical was not detected at the numerical detection limit (sample-specific quantitation limit) noted. Nondetected results from the laboratory are reported in this manner. This qualifier is also added to a positive result (reported by the laboratory) if the detected concentration is determined to be attributable to contamination introduced during field sampling or laboratory analysis.

UJ - Indicates that the chemical was not detected. However, the detection limit (sample-specific quantitation limit) is considered to be estimated based on problems encountered during laboratory analysis. The associated numerical detection limit is regarded as inaccurate or imprecise.

J - Indicates that the chemical was detected. However, the associated numerical result is not a precise representation of the amount that is actually present in the sample. The laboratory-reported concentration is considered to be an estimate of the true concentration.

UR - Indicates that the chemical may or may not be present. The nondetected analytical result reported by the laboratory is considered to be unreliable and unusable. This qualifier is applied in cases of gross technical deficiencies (i.e., holding times missed by a factor of two times the specified time limit, severe calibration noncompliances, and extremely low quality control recoveries).

R - Indicates that the chemical may or may not be present. The positive analytical result reported by the laboratory is considered to be unreliable and unusable. This qualifier is applied in cases of gross technical deficiencies.

The preceding data qualifiers may be categorized as indicative of major or minor problems. Major problems are defined as issues that result in the rejection of data, qualified with UR and R data validation qualifiers. These data are considered invalid and are not used for risk assessment and decision-making purposes. Minor problems are defined as issues resulting in the estimation of data, qualified with U, J, and UJ data validation qualifiers. Estimated analytical results are considered to be suitable for risk assessment and decision-making purposes.

3.1.3.3 Summary of Data Validation Results

Analytes detected in laboratory blanks associated with samples from Sites 57 and 58 included 2-hexanone, 4-methyl-2-pentanone, and iron. Positive results for the aforementioned analytes, at concentrations less than the established action level established for each sample delivery groups (SDG), are considered to be false positives.

In general, analytical results for some analytes were qualified as estimated (J for positive results and UJ for nondetected results) for observed noncompliances with calibrations, holding times, and field duplicate imprecision. Positive results reported at concentrations less than the required quantitation limit (RQL) were also qualified as estimated because of potential uncertainty near the reporting limit. The positive acetone result for one groundwater sample was qualified as estimated (J), although acetone was not detected in the associated laboratory blank, because the positive result was assumed to be due to laboratory contamination. Other single, low-level detections of common laboratory contaminants, such as 2-butanone, chloroform, 4-methyl-2-pentanone, and methylene chloride, were assumed to be due to laboratory contamination, although the results were not qualified as such.

Severe calibration noncompliances (i.e., relative response factors less than 0.050) were noted in the volatile fraction for acetone in soil samples and bromomethane and chloromethane in groundwater samples. This gross noncompliance resulted in the rejection of the associated nondetected results (UR) in the affected samples (see Table 3-1). Minor calibration noncompliances were noted for bromoform in one SDG, and nondetected results in associated samples were qualified as estimated (J). Calibration verification of anthracene and ethane failed to meet quality control criteria in two SDGs, but no data qualifiers were required.

3.2 HUMAN HEALTH RISK ASSESSMENT PROCEDURES

The objective of a human health risk assessment is to characterize the risks associated with potential exposures to site-related constituents. For Sites 57 and 58 at Cecil Field, the human health risk assessments for groundwater were conducted as PREs (see Section 7.0). The human health PRE is a screening-level evaluation of potential risks from site constituents to human receptors at the site. Although a site may have numerous hypothetical receptors, it is common to use the most sensitive human receptor for risk calculations as a site-screening tool. At Sites 57 and 58, the focus of the investigations is on groundwater. Therefore, for groundwater, the residential receptor was used to evaluate potential risks at the site. As part of the Site 58 PRE, sediment samples from the drainage ditch, which is normally dry, were evaluated as surface soil, and a residential scenario was used to evaluate risks from sediment/soil at the site. Also, the potential for constituents to leach to groundwater was considered.

3.2.1 Data Evaluation

3.2.1.1 Groundwater

Groundwater screening values are taken from U.S. EPA's Current Drinking Water Standards (U.S. EPA, 2000) and FDEP GCTLs (FDEP, 1999) as provided in FAC 62-777. These criteria meet or are more restrictive than U.S. EPA federal Maximum Contaminant Levels (MCLs). Selection of the appropriate FDEP GCTL is contingent on the yield and water quality of the aquifer. The aquifer being investigated at Sites 57 and 58 is regarded as being of sufficient yield and quality. Therefore, the groundwater criteria for sufficient-yield aquifers was used in the PRE.

The documents described above contain both primary drinking water standards that are mostly human health based and secondary standards that are established for potability or aesthetic reasons. Risk-based drinking water standards were also developed for those compounds with standards that are not health based. These were developed in accordance with the protocol set forth in FAC 62-777. These values are presented in the human health PRE. Data were also compared to U.S. EPA Region IX

Preliminary Remediation Goals (PRGs) (U.S. EPA, 2002). These four sets of values are presented in the human health PRE.

Analytes detected in groundwater in at least one sample at concentrations greater than their respective groundwater screening values are further evaluated in the human health PRE.

3.2.1.2 Soil

For the Site 58 risk assessment, sediment in the normally dry ditch was considered as soil. Soil screening values are taken from FDEP SCTLs (FDEP, 1999) as provided in FAC 62-777. These cleanup levels address both direct exposure and leachability to groundwater. For direct exposure, residential values were used for screening in the PRE as outlined in the RI work plan.

Analytes detected in soil in at least one sample at concentrations greater than their respective soil screening values were further evaluated in the risk assessment.

3.2.2 Toxicity Screening

The human health PRE for groundwater is conducted in two steps. First, all analytes detected in at least one sample in groundwater are compared to the medium-specific screening values described above. All analytes detected at concentrations less than these screening values are dropped from further consideration. Analytes detected in at least one sample at a concentration greater than the medium-specific screening values are further evaluated. The PRE is conducted by simply generating a ratio between the maximum detected analyte concentration and the appropriate screening value.

For groundwater, a ratio greater than one based on a comparison to a primary health-based drinking water standard suggests a potential risk to human health. It is inappropriate to use secondary drinking water standards to calculate a health-based risk ratio because these standards are based on the aesthetic qualities of water. However, this ratio may serve as a useful risk management tool. To determine potential health risk from these constituents, a comparison was made to the U.S. EPA Region IX PRGs.

For soil, the direct exposure cleanup levels correspond to a carcinogenic risk of 1×10^{-6} for carcinogens and a Hazard Quotient (HQ) of 1.0 for noncarcinogens. The ratio between the exposure concentration and the screening value provides an indication of the total carcinogenic or noncarcinogenic risk associated with the constituents. For example, a ratio of 3 for a carcinogen indicates that the risk associated for that constituent is equivalent to 3×10^{-6}. This risk may exceed Florida's action level but be within the U.S. EPA National Oil and Hazardous Substances Pollution Contingency Plan (NCP) target risk

range of 1×10^{-6} to 1×10^{-4}. A ratio of 3 for a noncarcinogen indicates that the HQ is greater than one and that there is a potential for noncarcinogenic effects to manifest upon exposure to that concentration of constituent.

For soil, the leachability cleanup levels correspond to levels protective of groundwater screening levels. A comparison to these levels is only relevant if groundwater data indicate that the constituent is present in the groundwater based on the assumption that the presence of contaminants in soil is not related to a recent release. This is a valid assumption for Sites 57 and 58. Leachability criteria are based on conservative assumptions regarding site conditions. Therefore, the absence of a constituent's detection in groundwater, in conjunction with an exceedance of its leachability screening value, is sufficient evidence that site-specific conditions do not favor leaching.

3.3 ECOLOGICAL RISK ASSESSMENT PROCEDURES

The assessment of the impacts of site contamination on ecological receptors followed the general approach recommended in the most recent U.S. EPA guidance for performing ecological risk assessments (U.S.EPA, 1997; U.S. EPA, 2000) and was conducted in accordance with Navy policy (Department of the Navy, 1999). The ecological risk assessments for Sites 57 and 58 are in Section 8.0.

An ecological risk assessment starts with preliminary problem formulation. This first phase of an ecological risk assessment includes general descriptions of the site, with emphasis on the habitats and ecological receptors that are present. This phase also involves characterization of contaminant sources and migration pathways and evaluation of routes of contaminant exposure.

For Sites 57 and 58, no suitable habitats were identified, so no additional steps in the assessment were required.

3.4 FLORIDA STANDARDS

Analytical data were compared to FDEP GCTLs, which criteria meet or exceed MCLs. These criteria were originally contained in FAC 62-785. The rules were finalized in August 1999, and these criteria are now in FAC 62-777. FAC 62-777 cites FAC 62-550 for primary and secondary standards. The results of the comparison will serve as the initial step toward determining compliance with state standards. These comparisons to the criteria are provided in Section 5.0, Nature and Extent of Contamination.

For water, there are four sets of criteria to consider: Groundwater Criteria; Freshwater Surface Water Criteria; Marine Surface Water Criteria; and Groundwater of Low Yield/Poor Quality. For each

contaminant, the Groundwater Criteria must be considered. The Low Yield/Poor Quality Criteria were not considered since groundwater at Sites 57 and 58 do not fall into the category covered by these criteria.

TABLE 3-1

SAMPLE REJECTIONS
SITES 57 AND 58 REMEDIAL INVESTIGATION REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Sample Identification	Analyte	Noncompliance
Site 57 - Groundwater		
CEF-293-GW-11	Bromomethane	Calibration
CEF-293-GW-19	Bromomethane	Calibration
CEF-293-GW-19	Chloroethane	Calibration
CEF-293-GW-22	Bromomethane	Calibration
CEF-824A-GW-01SA	Bromomethane	Calibration
CEF-824A-GW-05S	Bromomethane	Calibration
CEF-824A-GW-06I	Bromomethane	Calibration
CEF-824A-GW-09S	Bromomethane	Calibration
CEF-824A-GW-09S	Chloroethane	Calibration
CEF-824A-GW-10S	Bromomethane	Calibration
CEF-824A-GW-10S	Chloroethane	Calibration
CEF-824A-GW-11S	Bromomethane	Calibration
CEF-824A-GW-11S	Chloroethane	Calibration
CEF-824A-GW-12I	Bromomethane	Calibration
CEF-824A-GW-13D	Bromomethane	Calibration
Site 57 - Soil		
CEF-824-IDW-SBTW-01	Acetone	Calibration
Site 58 - Groundwater		
CEF-B312-GW-01S	Bromomethane	Calibration
CEF-B312-GW-01S	Orthophosphate	Holding Time
CEF-B312-GW-01SA	Bromomethane	Calibration
CEF-B312-GW-03S	Bromomethane	Calibration
CEF-B312-GW-03S	Orthophosphate	Holding Time
CEF-B312-GW-04S/Duplicate	Bromomethane	Calibration
CEF-B312-GW-04S/Duplicate	Chloroethane	Calibration
CEF-B312-GW-05S/Duplicate	Bromomethane	Calibration
CEF-B312-GW-05S/Duplicate	Orthophosphate	Holding Time

4.0 PHYSICAL CHARACTERISTICS OF THE STUDY AREA

4.1 SURFACE FEATURES

Sites 57 and 58 are both essentially flat with very little change in elevation. The majority of Site 57 is paved; the concrete flightline apron covers the eastern portion of the site, and buildings and parking lots cover most of the remainder of the site. The only grassy areas surrounding Site 57 are located west of Building 817 and west of Building 846 in the area of the Day Tank 1 excavation (See Figure 1-2). Site 58 is also predominantly covered with parking lots and other paved areas. Grassy areas occur north and west of Building 312, along the drainage swale south of the building, and west of Building 1820 (see Figure 1-5).

4.2 SURFACE HYDROLOGY/STORM SEWERS

Surface water runoff in the Site 57 area is collected by the storm sewer system. The storm sewer system in the Site 57 area generally discharges to an east-west sewer line located approximately 170 feet south of Building 824/824A that eventually discharges to an outfall on the eastern side of the north-south runway. A storm sewer line located north of Building 824A and south of Building 846 connects to a line running along the southern and eastern sides of Building 824A and eventually discharges to the east-west line south of Building 824A. The north-south sewer line, located approximately 2,600 feet east of Building 824A, also discharges to the same east-west line.

Surface water runoff in the Site 58 area is also collected by the storm sewer system and a drainage swale south of Building 312 that discharges into the storm sewer system. Storm sewers generally flow to the south and east, except for a portion that flows north around Building 1820 and eventually discharge to an outfall on the eastern side of the north-south runway.

4.3 SOILS

Soils in the NAS Cecil Field area are generally sandy, moderately well drained to very poorly drained, and nearly level to gently sloping soils occurring in broad flatwoods areas (SCS, 1978). The western portion of the facility has Leon-Ridgeland-Wesconnett soils, and the eastern portion has Pelham-Mascotte-Sapelo soils. Leon-Ridgeland-Wesconnett soils consist of 30 percent soils of the Leon Series, 14 percent of the Ridgeland Series, and 12 percent of the Wesconnett Series. Pelham-Mascotte-Sapelo soils consist of 25 percent Pelham, 15 percent Mascotte, and 12 percent Sapelo soils. Remaining soils in both units consist of other soil types to a minor extent.

Soils of the Leon Series, formed in thick beds of marine sediments, have a typical surface layer including 5 inches of very dark gray fine sand and 3 inches of dark gray fine sand. The subsurface layer consists of dark-colored, weakly cemented, fine sand from approximately 8 to 18 inches bgs, black fine sand from 18 to 26 inches bgs, very dark grey fine sand from 27 to 36 bgs, and dark brown fine sand from 37 to 45 inches bgs. From 45 inches to 80 inches or more, typical Leon Series soils have another layer of dark-colored, weakly cemented, fine sand. The Ridgeland Series consists of a typical surface layer of approximately 6 inches of very dark gray fine sand underlain by 10 inches of dark, weakly cemented fine sand. Below this is very pale brown fine sand from 16 to 31 inches bgs and then another layer of dark-colored, weakly cemented fine sand from 31 to 80 inches bgs. Wesconnett soils formed in thick marine deposits and occur in shallow depressions and drainageways. They typically have an approximately 2-inch surface layer of black fine sand, then dark, weakly cemented fine sand to 32 inches bgs, a pale brown fine sand layer from 32 to 44 inches bgs underlain by dark-colored, weakly cemented fine sand to a depth of 80 inches bgs or more.

Pelham soils formed in marine deposits of sandy and loamy sediments. Typically, these soils have a surface layer consisting of very dark gray loamy fine sand and a subsurface layer consisting of light gray fine sand. The subsoil consists of light brownish-gray fine sandy loam and sandy clay loam from approximately 21 to 69 inches or more bgs. Mascotte soils, also formed in marine deposits of sandy and loamy sediments, typically have a surface layer of black fine sand and a subsurface layer of gray and light brownish-gray fine sand. A layer of black, weakly cemented loamy fine sand occurs from approximately 15 to 24 inches bgs, and a layer of sandy clay loam extends beneath this to a depth of approximately 58 inches. Gray fine sand extends from 58 inches bgs to depths of 80 inches or more. The Sapelo Series, formed in thick deposits of loamy marine sediments, has a typical surface layer of black fine sand to 3 inches bgs and dark gray fine sand to 6 inches bgs and a subsurface layer of light brownish-gray fine sand to 23 inches bgs. This is underlain by a dark-colored weakly cemented sandy layer from 23 to 56 inches bgs and a gray loamy subsoil to depths of 80 inches or more.

Soils at Site 57 and 58 and the surrounding areas are classified as Urban land as a result of disturbances to natural soils by construction activities. Urban land soils are areas that are 85 percent or more covered by streets, buildings, parking lots, and other man-made structures.

4.4 GEOLOGY

4.4.1 Physiography

White (1970) divided the state of Florida into three major physiographic regions: the Northern Zone, the Central Zone, and the Southern Zone. NAS Cecil Field is located within a broad, continuous highland of the Northern Zone called the Duval Upland. The Duval Upland is an irregular flat plain consisting of a

series of marine terraces of Pleistocene age. During the Pleistocene, a series of drops in sea level resulted in the formation of ancient shorelines or “scarps” and ancient seafloors or “terraces” (Cooke, 1945). The eastern boundary of the Duval Upland is formed by a scarp at approximately 25 feet above mean sea level (amsl); the scarp forming the western boundary of this feature is at approximately 100 feet above msl.

Eight marine terraces have been identified in northeastern Florida, and seven of those terraces have been identified in Duval County (Fairchild, 1972). In order of ascending age, the terraces are called Coharie, Sunderland, Wicomico, Penholoway, Talbot, Pamlico, and Silver Bluff. The Wicomico, Penholoway, and Talbot terraces occur between 25 and 100 feet above msl. As previously described, those elevations set the boundaries for the Duval Upland. NAS Cecil Field is located on remnants of the Wicomico and Penholoway terraces.

4.4.2 Regional Geology

The basement rocks of North Florida are Jurassic age and earlier and consist principally of tholeiitic basalts and diabases (Heatherington and Mueller, 1997). A significant structural low called the Jacksonville Basin formed during the Paleocene or Eocene beneath the area now known as Duval County (Goodell and Yon, 1960). The late Mesozoic and early Paleogene were periods of carbonate deposition intersected by evaporite sediments that formed the sub-Floridan confining unit. North Florida’s Paleogene geologic history is principally one of marine carbonate deposition that gave rise to an extensive aquifer system called the Floridan aquifer system (Scott, 1992). These carbonates remained relatively pure without a siliciclastic sediment supply due to the presence of the Gulf Trough (Suwannee Straits). However, in the late Oligocene to early Miocene, the Appalachian mountain range experienced renewed uplift and erosion resulting in a flood of siliciclastics (sands and clays) that filled the Straits (and the Jacksonville Basin) and covered the carbonate platform of Florida. Though there was initial mixing of the carbonates and siliciclastics, the Miocene age sediments were principally sands and clays that formed an effective aquitard called the Hawthorn Group (Scott, 1988). The thickness of the Hawthorn Group sediments, ranging from 250 feet in southern Duval County to about 500 feet in north-central Duval County (Leve, 1965) is a result of the filling of the Jacksonville Basin. The sediments of the Hawthorn Group are principally identifiable by the occurrence of phosphate, as well as a mixture of carbonates and siliciclastics (Scott, 1988). The sediments overlying the Hawthorn consist of siliciclastics (mostly sands), without phosphates and carbonates, deposited during the Pleistocene and Holocene series.

4.4.3 Site Geology

Surficial sediments encountered during drilling at both sites included fine to very fine sands with varying minor amounts of silt and clay. As described in Section 2.4.1, Shelby tube samples were collected from

CEF-824A-15I at approximately 36 to 38 feet bgs and from CEF-B312-10S at approximately 6 to 8 feet bgs. Geotechnical analyses performed on these samples included sieve analysis, moisture content, pH, dry unit weight, specific gravity, and porosity.

The sieve analyses indicated that the sample from the shallow screened interval (6 to 8 feet bgs) of Site 58 was composed of approximately 91 percent fine to very fine sand and approximately 9 percent silt and/or clay. The United Soil Classification System (USCS) soil classification for soils with this composition is well sorted to silty sand (SP/SM). The sample from the intermediate screened interval (36 to 38 feet bgs) of Site 57 was composed of approximately 96 percent fine to very fine sand and 4 percent silt and/or clay and has a USCS classification of well sorted sand (SP). The specific gravity of the Site 57 sample from the intermediate zone was 2.66 and of the Site 58 sample from the shallow zone was 2.65, which corresponds with their overall composition (sand) and mineralogy (quartz). The porosity for the Site 57 sample was 41 percent and for the Site 58 sample was 35 percent, which is in general agreement with that of an unconsolidated, well sorted sand (25 to 50 percent) (Fetter, 1980).

Appendix F contains the geotechnical laboratory data.

4.5 HYDROGEOLOGY

4.5.1 Regional Hydrogeology

Table 4-1 describes the local lithology and associated hydrogeologic units of southern Duval County and adjacent northern Clay County. The table was compiled from well log data from three wells within 10 miles of NAS Cecil Field (Johnson, 1986).

Three main hydrogeologic units underlie the site. These units, in ascending order, are the Floridan aquifer system, the intermediate aquifer system or confining unit, and the surficial aquifer system (Southeastern Geological Society, 1986).

4.5.1.1 Floridan Aquifer System

The Floridan aquifer system in Duval County consists of several units. These units, in ascending order, are the Oldsmar Limestone, Lake City Limestone, Avon Park Limestone, and Ocala Group. Because an effective aquitard is present above the Floridan, only the Ocala Group will be discussed. Several authors (Leve, 1965; Scott, 1992) consider the lower basal deposits of the Hawthorn Group, which are transmissive limestones and sands, as part of the Floridan. The Ocala Group consists of massive, fossiliferous limestones of Eocene age. The top of the Floridan is approximately 290 to 430 feet bgs in

the vicinity of the site. The Ocala Group is about 520 feet thick (Leve, 1965). The Floridan is under confined conditions and is the major source of public water supply in the area.

4.5.1.2 Intermediate Aquifer System or Confining Unit

Overlying the Ocala Group are the sediments of the Hawthorn Group that consist of interbedded phosphatic carbonates and siliciclastics (Scott, 1992). As presented on Table 4-1, the individual formations of the Hawthorn from oldest to youngest are the Coosawhatchie, Marks Head, and Penney Farms. These sediments are predominantly siliciclastic and typically have low permeabilities that restrict groundwater flow and form a confining unit. The top of the Hawthorn is approximately 40 to 100 feet bgs (Halford, 1998) at NAS Cecil Field. Limestone and dolomite units in the Hawthorn may act as isolated intermediate aquifers suitable for small domestic and irrigation wells.

4.5.1.3 Surficial Aquifer System

The surficial aquifer system consists of sandy (nonclayey to clayey) Pleistocene and Recent deposits and sandy, clayey shell beds and limestones of the upper part of the Hawthorn Group. Halford (1998) specifically subdivides these deposits into an upper surficial sand aquifer, a blue-marl confining unit, and an upper-rock aquifer. These deposits are generally 40 feet to 100 feet thick and are 85 feet to 95 feet thick in the Cecil Field area. They are susceptible to contamination because of their shallow depth.

4.5.2 Site Hydrogeology

4.5.2.1 General Description

Depth to groundwater at Site 57, as measured in September 2001, ranged from approximately 3 to 8 feet bgs. In December 2001, depth to groundwater ranged from 7 to 9 feet bgs at Site 57. At Site 58, depth to groundwater in September 2001 ranged from approximately 4 to 7 feet bgs. The surficial aquifer system in which the wells are installed is approximately 85 to 100 feet thick at NAS Cecil Field. Figures 4.1 and 4.2 present groundwater flow maps for Sites 57 and 58, respectively.

4.5.2.2 Aquifer Characteristics

SPECAP tests were performed on one intermediate well at Site 57 (CEF-824A-12I) and one shallow well at Site 58 (CEF-B312-02S). The tests were used to determine each well's specific capacity, hydraulic conductivity, and transmissivity. The data were analyzed and values were estimated using a computerized technique from Bradbury and Rothschild (1985). The data and calculations are provided in Appendix C.

In the calculations, the storage coefficient (S) is the same as the specific yield (Sy) of the aquifer for unconfined aquifers. The storage coefficient used was estimated to be 0.15. This value was estimated based on referenced information published by C.W. Fetter (1988) and by M. Kasenow and P. Pare, (1995). According to Fetter (1988), the storage coefficient in unconfined aquifers ranges from 0.02 to 0.30. In addition, according to Kasenow and Pare (1995), the typical specific yield for gravel and coarse grain sand formations is 0.20 and the typical specific yield for medium to fine grain sand formations equals 0.10.

In general, hydraulic conductivities for unconsolidated sediments like silty sands and fine sands range from 2.8×10^{-2} to 2.8 feet per day (ft/day) (Fetter, 1980). Halford (1998) estimates the horizontal hydraulic conductivity for NAS Cecil Field at 0.6 to 5 ft/day for the surficial aquifer. The calculated hydraulic conductivity values are 13.6 ft/day for the shallow well and 40.1 ft/day for the intermediate well at Site 57 and 14.1 ft/day for the shallow well at Site 58. These are similar to Sites 36 and 37 hydraulic conductivity values of 1 to 4 ft/day for the shallow zone and 25 to 36 ft/day in the intermediate zone.

4.5.2.3 Groundwater Flow

The monitoring wells at Sites 57 and 58 were surveyed to establish top of casing and ground elevations to the nearest 0.01 foot. All elevations are based on NAVD 1988. Tables 4-2 and 4-3 present groundwater level measurements and groundwater elevation data for Sites 57 and 58, respectively.

The direction of groundwater flow at Site 57 is to the southeast, consistent with nearby sites such as Sites 36 and 37. The groundwater gradient changes across Site 57 from approximately 0.01 in the northwest (in the open area associated with the Day Tank 1 excavation) to 0.003 in the southeast (beneath the concrete apron). The average gradient across all of Site 57 is approximately 0.005, similar to the gradients measured at Sites 36 and 37 (0.001 to 0.007). At Site 58, groundwater flow appears to be influenced by the storm sewer system. Flow is to the southeast in the western portion of Site 58, but in the eastern portion of the site, groundwater appears to move to the west toward a portion of the storm sewer. The groundwater gradient at the site averages approximately 0.01.

The velocity of groundwater flow can be calculated from a modified form of Darcy's equation:

$V_h = K_h \times i/n_e$

Where

V_h is horizontal velocity, ft/day
K_h is horizontal hydraulic conductivity, ft/day

i is hydraulic gradient, dimensionless

n_e is effective porosity, dimensionless (assumed at 0.15 for fine sands)

For Site 57, values used to calculate groundwater velocity in the shallow zone were as below:

K_h = 13.6 ft/day

i = 0.005

n_e = 0.15.

The resulting V_h is 0.45 ft/day or 165 ft/year.

For Site 58, values used to calculate groundwater velocity in the shallow zone were as below:

K_h = 14.1 ft/day

i = 0.01

n_e = 0.15.

The resulting V_h is 0.94 ft/day or 343 ft/year.

4.6 FDEP GROUNDWATER CLASSIFICATION

According to FAC 62-520.410 (Classification of Ground Water, Usage, Reclassification), the surficial aquifer system in northeastern Florida comes under the classification of G-II. The code's definition of G-II is as follows: "Potable water use, ground water in aquifers which has a total dissolved solids content of less than 10,000 mg/L, unless otherwise classified by the Commission." The total dissolved solids levels of the surficial aquifer system in the area of NAS Cecil Field have been shown by Fairchild (1972) to be between 146 and 309 mg/L. Also, Leve (1965) has indicated that the surficial aquifer system is suitable for domestic use.

4.7 FUTURE LAND USE

According to the plans made by the City of Jacksonville, the anticipated future land use for the areas around Sites 57 and 58 is aviation-related industrial and commercial activities.

This page intentionally left blank.

TABLE 4-1

REGIONAL HYDROSTRATIGRAPHY
OPERABLE UNIT 9, SITES 57 AND 58
REMEDIAL INVESTIGATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

System	Series	Stratigraphic Unit	Depth to Top of Unit (feet bgs)	Thickness of Unit (feet)	General Lithology	Hydrogeologic Unit	Aquifer Use
Quarternary	Holocene	Undifferentiated	0	40 to 70	Quartz sand, fine- to medium-grained, unconsolidated to poorly indurated, nonclayey to clayey, trace heavy minerals, sandy, clayey shell bed and limestone at base, fossiliferous.	Surficial Aquifer System	Lawn irrigation, stock, and domestic use.
	Pleistocene						
Tertiary	Miocene	Hawthorn Group	40 to 70	252 to 370	Interbedded sand, clay, limestone and dolomite. Also contains phosphate and mollusk molds.	Intermediate Aquifer System or Confining Unit. As a whole, this unit acts as a confining unit. Limestone and dolomite units within the Hawthorn Group may act as small intermediate aquifers.	Small domestic and irrigation wells.
		Coosawhatchie Formation	40 to 70	102 to 119			
		Marks Head Formation	142 to 180	56 to 101			
		Penney Farms Formation	224 to 280	68 to 150			
	Eocene	Ocala Group	292 to 430	110 to 520*	Limestone, white to light gray, grainstone to wackestone, fossiliferous, Bryozoan facies, moderately recrystallized.	Floridan Aquifer System. The top of the aquifer may be present in basal limestone and sand units of the Hawthorn Group.	Public and domestic supply wells and industrial uses.

Notes: Compiled from lithologic logs of Florida Geological Survey wells W-14179, W-14193, and W-14219 (Johnson, 1986).
Some terminology from Scott (1992) and Southeastern Geological Society (1986).
bgs = Below ground surface.
* Thickness of Ocala Group taken from Leve (1966).

TABLE 4-2

WATER LEVELS AND POTENTIOMETRIC SURFACE ELEVATION DATA
SITE 57, BUILDING 824A/DAY TANK 1 AREA
REMEDIAL INVESTIGATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 1 OF 2

Well Number	Ground Surface Elevation (in feet amsl)	Top of Casing Elevation (in feet amsl)	Depth to Water (in feet below T.O.C.)	Elevation (in feet amsl)	Depth to Water (in feet below T.O.C.)	Elevation (in feet amsl)
			Sep-01		Dec-01	
CEF-824A-01Sa	NA	74.88	7.32	67.56	9.08	65.80
CEF-824A-02S	74.88	74.36	6.33	68.03	8.32	66.04
CEF-824A-03S	73.75	73.75	7.05	66.70	8.48	65.27
CEF-824A-04S	74.60	74.60	6.8	67.80	8.77	65.83
CEF-824A-05S	74.15	74.15	7.02	67.13	8.42	65.73
CEF-824A-06I	75.00	75.00	7.17	67.83	9.17	65.83
CEF-824A-07S	74.48	74.48	7.89	66.59	9.13	65.35
CEF-824A-08S	74.39	74.39	NM	--	9.13	65.26
CEF-824A-09S	74.93	74.93	6.42	68.51	8.52	66.41
CEF-824A-10S	74.12	74.12	5.35	68.77	7.43	66.69
CEF-824A-11S	74.95	74.95	5.87	69.08	8.04	66.91
CEF-824A-12I	75.11	75.11	6.55	68.56	8.68	66.43
CEF-824A-13D	75.40	75.20	6.24	68.96	8.43	66.77
CEF-824A-14S	75.50	75.24	6.81	68.43	8.95	66.29
CEF-824A-15I	75.50	75.14	6.73	68.41	8.88	66.26
CEF-824A-16D	75.50	75.28	6.33	68.95	8.61	66.67
CEF-824A-17I	74.70	74.38	6.6	67.78	8.65	65.73
CEF-824A-18S	72.60	72.56	6.42	66.14	8.53	64.03
CEF-824A-19S	74.30	74.00	7.52	66.48	9.45	64.55
CEF-824A-20S	73.30	73.00	5.83	67.17	7.90	65.10
CEF-824A-21I*	75.20	75.03	NM	-	8.21	66.82
CEF-824A-22S*	74.36	74.36	NM	-	8.91	65.45
CEF-293-1	76.30	76.29	14.8	61.49	7.40	68.89
CEF-293-3	77.10	76.91	6.27	70.64	7.91	69.00

TABLE 4-2

WATER LEVELS AND POTENTIOMETRIC SURFACE ELEVATION DATA
SITE 57, BUILDING 824A/DAY TANK 1 AREA
REMEDIAL INVESTIGATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 2 OF 2

Well Number	Ground Surface Elevation (in feet amsl)	Top of Casing Elevation (in feet amsl)	Depth to Water (in feet below T.O.C.)	Elevation (in feet amsl)	Depth to Water (in feet below T.O.C.)	Elevation (in feet amsl)
			Sep-01		Dec-01	
CEF-293-4	75.90	75.72	3.57	72.15	NM	-
CEF-293-5	77.10	76.82	NM	--	7.61	69.21
CEF-293-8	78.20	78.12	3.22	74.90	9.13	68.99
CEF-293-10	75.40	75.25	6.25	69.00	8.29	66.96
CEF-293-11	75.48	75.27	6.31	68.96	8.47	66.80
CEF-293-13	74.61	74.48	5.62	68.86	7.86	66.62
CEF-293-14	75.50	75.08	5.74	69.34	8.10	66.98
CEF-293-15D	77.90	77.60	6.63	70.97	8.75	68.85
CEF-293-19	NA	75.08	6.41	68.67	8.54	66.54
CEF-293-20	NA	74.37	6.20	68.17	8.35	66.02
CEF-293-21	NA	74.45	6.31	68.14	8.46	65.99
CEF-293-22	NA	74.42	5.53	68.89	7.75	66.67
CEF-825LS-01S	75.70	75.56	6.80	68.76	8.80	66.76
CEF-16-38S	NA	75.30	7.10	68.20	9.46	65.84
CEF-16-39I	NA	75.27	7.15	68.12	9.47	65.80
CEF-16-40D	NA	75.07	6.83	68.24	9.20	65.87

Elevation is referenced to 1988 National American Vertical Datum (NAVD).
bgs = Below ground surface.
amsl = Above mean sea level.
Depth to water measured from top of casing on December 20, 2001.
NM = Not measured.
CEF-824A-21I and CEF-824A-22S were installed in December 2001.

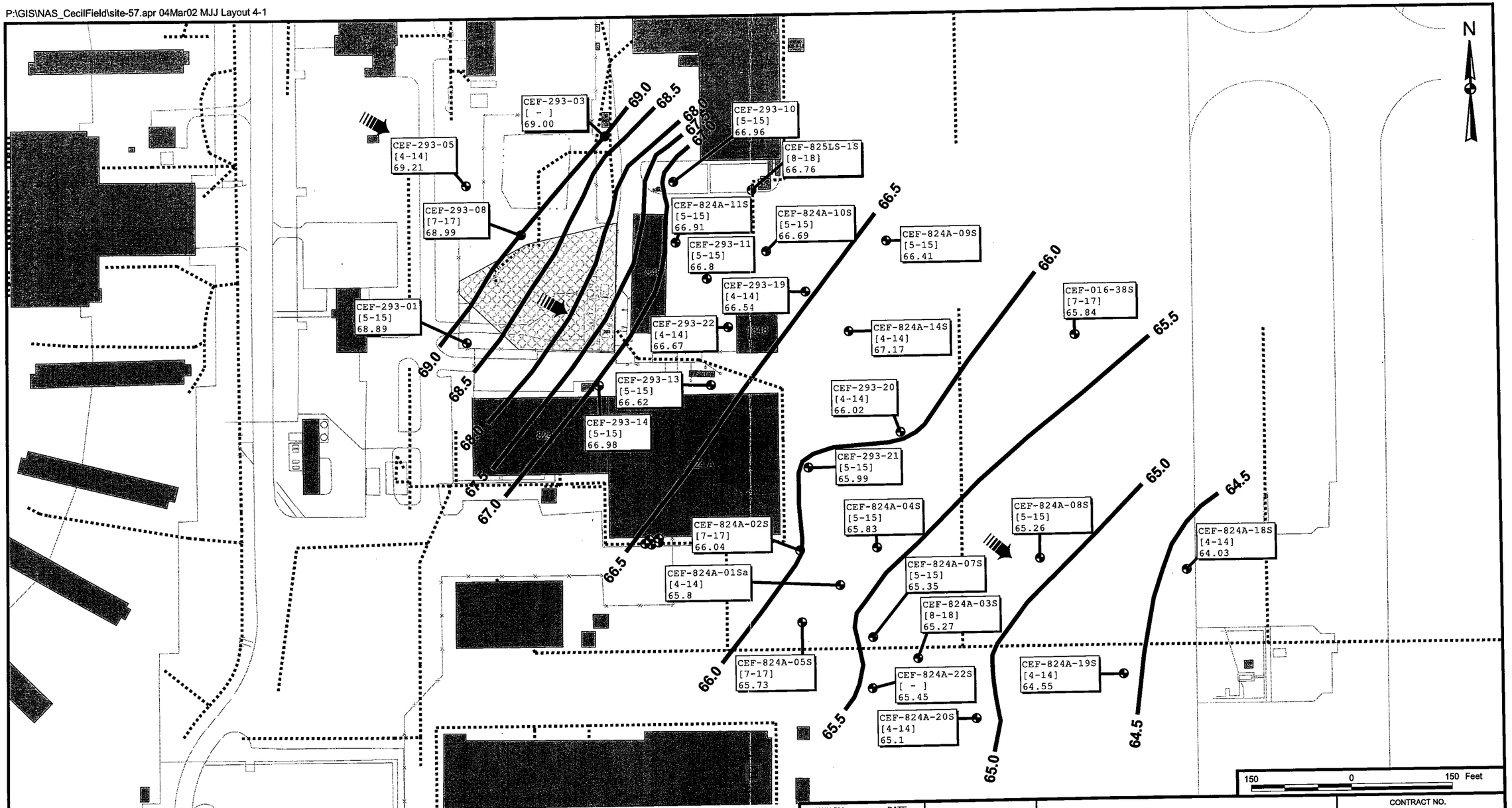
TABLE 4-3

WATER LEVEL AND POTENTIOMETRIC SURFACE ELEVATION DATA
SITE 58, BUILDING 312
REMEDIAL INVESTIGATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Well Number	Ground Surface Elevation (in feet amsl)	Top of Casing Elevation (in feet amsl)	Depth to Water (in feet below T.O.C.)	Elevation (in feet amsl)
CEF-312-01	72.12	71.88	3.96	67.92
CEF-B312-01I	72.26	72.08	4.20	67.88
CEF-B312-01S	73.40	73.22	4.22	69.00
CEF-B312-02S	72.05	71.79	4.01	67.78
CEF-B312-03S	76.35	73.24	4.73	68.51
CEF-B312-04S	72.66	72.45	4.42	68.03
CEF-B312-05S	71.78	71.51	3.93	67.58
CEF-B312-06S	72.75	72.44	5.07	67.37
CEF-B312-07S	73.07	72.75	5.26	67.49
CEF-B312-08S	77.25	74.10	4.98	69.12
CEF-B312-09S	76.97	76.77	7.34	69.43
CEF-B312-10S	74.15	73.93	4.91	69.02
CEF-B312-11S	73.80	73.61	5.62	67.99
CEF-B312-12S	73.27	72.92	5.61	67.31
CEF-B312-13S	73.52	73.34	5.09	68.25
CEF-B312-14S	74.80	74.64	5.17	69.47
CEF-B312-15I	74.50	74.15	4.95	69.20
CEF-312LS-01S	74.70	74.32	4.86	69.37
CEF-312LS-01Sa	75.50	75.25	5.32	69.93

Elevation is referenced to 1988 National American Vertical Datum (NAVD).
bgs = Below ground surface.
amsl = Above mean sea level.
Depth to water measured from top of casing on September 24, 2001.
NA = Not available.
NM = Not measured.

P:\GIS\NAS_CecilField\site-57.apr 04Mar02 MJJ Layout 4-1



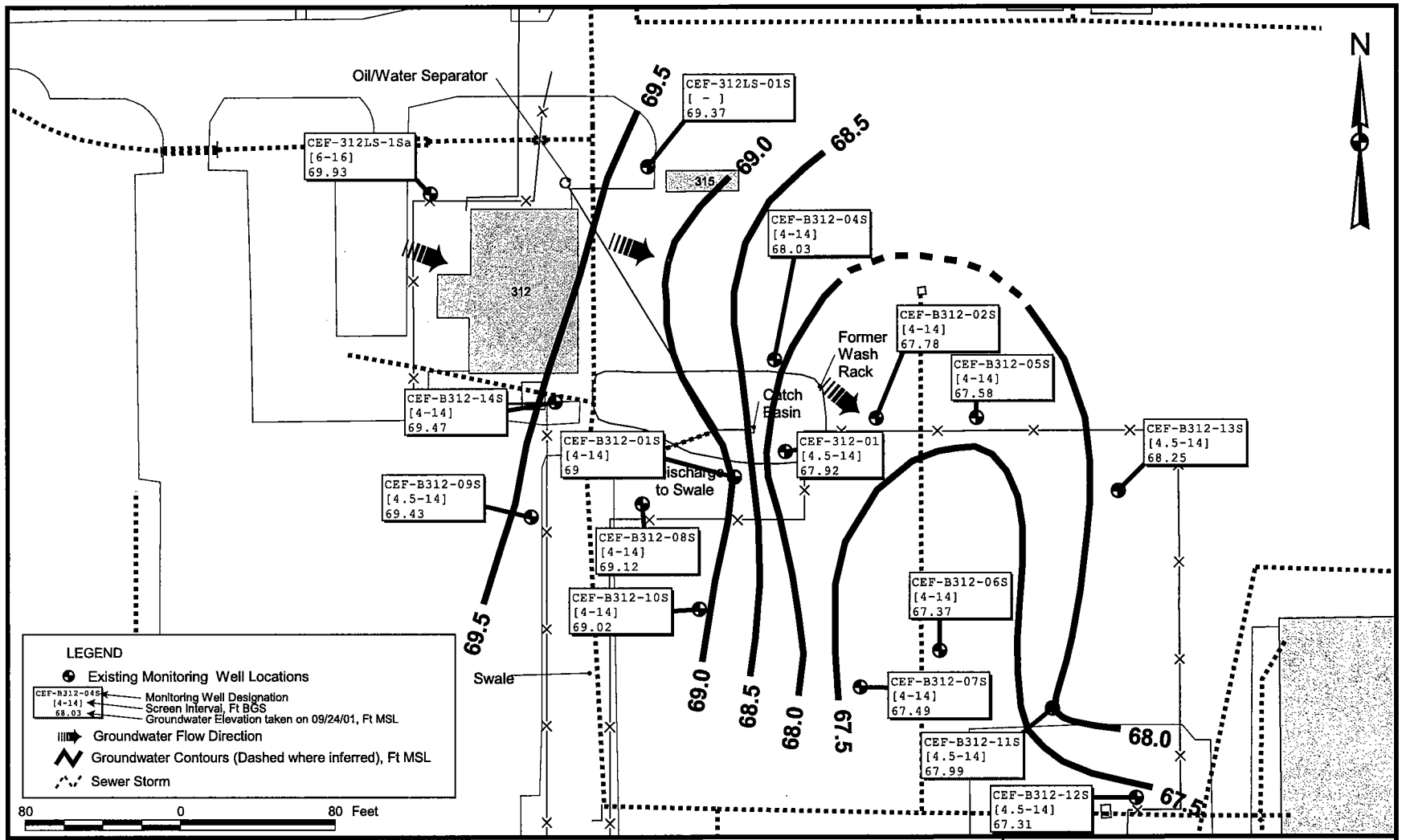
LEGEND

- Existing Monitoring Well Locations
  - CEF-B312-04S — Monitoring Well Designation
  - [4-14] — Screen Interval, Ft BGS
  - 68.03 — Groundwater Elevation taken on 09/24/01, Ft MSL
- Groundwater Flow Direction
- Groundwater Contours (Dashed where inferred), Ft MSL
- Sewer Storm
- Day Tank 1 Excavate Area

DRAWN BY MJJ	DATE 14Feb02	POTENTIOMETRIC SURFACE ELEVATION MAP SHALLOW GROUNDWATER OU 9, SITE-57 - BUILDING 824A / DAY TANK 1 AREA NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA
CHECKED BY	DATE	
COST/SCHED-AREA		
SCALE AS NOTED		

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

Figure 4-1 Backside



DRAWN BY	DATE
MJJ	14Feb02
CHECKED BY	DATE
COST/SCHEDULE-AREA	
SCALE	
AS NOTED	

POTENTIOMETRIC SURFACE ELEVATION MAP - SHALLOW GROUNDWATER

OU 9, SITE 58 - BUILDING 312

NAVAL AIR STATION CECIL FIELD

JACKSONVILLE, FLORIDA

CONTRACT NUMBER	
0039	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 4-2	REV 0

P:\GIS\NAS_CecilField\site-58.apr 04Mar02 MJJ Layout 4-2

5.0 NATURE AND EXTENT OF CONTAMINATION

5.1 SITE 57

Groundwater at Site 57 contaminated with BTEX constituents may be a result of past leaks from Day Tank 1, potential residual soil contamination (being evaluated under the Petroleum Program), and free product remaining in the area (to be removed under the Petroleum Program). Potential sources of chlorinated VOC groundwater contamination include leakage from sewer lines associated with the aircraft wash rack east of Building 846 and mishandling of solvents and other chemicals that were used in the Building 824/824A area.

5.1.1 Groundwater

A total of 41 groundwater samples were collected from permanent monitoring wells and analyzed for VOCs, PAHs, and TRPH as part of the Site 57 RI. In September 2000, 31 previously existing wells and eight new wells installed as part of the RI were sampled as described in Section 2. Based on groundwater data from this sampling event, two additional wells, CEF-824A-21I and CEF-824A-22S, were installed and sampled in December 2001. Also in December 2001, four of the wells sampled in September were resampled, including CEF-293-11, CEF-824A-01Sa, CEF-824A-7S, and CEF-824A-11S. For wells that were sampled in both September and December 2001, the most recent data were used in the site evaluation. For the remaining wells, September 2001 data were used. Frequencies of detection and ranges of detected concentrations are presented in Table 5-1, and positive detections of COCs in groundwater at Site 57 are presented in Table 5-2 and Figures 5-1 through 5-3.

VOCs detected in groundwater at Site 57 during the RI include BTEX, tetrachloroethene (PCE), TCE, 1,1-DCA, 1,1-DCE, cis-1,2-DCE, and trans-1,2-DCE. Single low-level detections of common laboratory contaminants such as acetone, chloroform, 4-methyl-2-pentanone, and methylene chloride are not considered to be site related.

Benzene was detected in 11 of 41 groundwater samples collected during the RI at concentrations ranging from 0.87 J to 248 µg/L. Benzene concentrations in nine shallow wells and one intermediate well exceeded the FDEP GCTL of 1 µg/L (CEF-293-11, CEF-293-19, CEF-293-21, CEF-293-22, CEF-824A-4S, CEF-824A-7S, CEF-824A-08S, CEF-824A-11S, CEF-824A-12I, and CEF-824A-21I). Toluene was detected in seven of 41 wells at concentrations ranging from 1 J to 59.6 µg/L. Concentrations exceeded the toluene GCTL of 40 µg/L in wells CEF-293-11 and CEF-824A-11S. Ethylbenzene was detected in 11 of 41 wells at concentrations ranging from 1 J to 151 µg/L. Ethylbenzene concentrations in CEF-293-11 and CEF-824A-11S exceeded the GCTL of 30 µg/L.

Xylenes were detected in 13 of 41 wells at concentrations ranging from 1.9 J to 549 µg/L. Concentrations of xylenes exceeded the GCTL of 20 µg/L in four shallow wells and one intermediate well (CEF-293-11, CEF-293-19, CEF-824A-4S, CEF-824A-11S, and CEF-824A-12I).

The highest benzene concentration detected during RI sampling at Site 57 was at CEF-824A-4S, located east of the southeastern corner of Building 824A. The highest concentrations of toluene, ethylbenzene, and xylenes were detected in CEF-293-11, located east of Building 846. BTEX components were the only VOCs detected in monitoring wells just east of Buildings 846 and 824A (CEF-824A-11S, CEF-293-11, CEF-824A-21I, CEF-293-22, CEF-293-21, and CEF-824A-4S). A combination of BTEX and chlorinated VOCs was to the east of these wells (CEF-824A-10S, CEF-293-19, CEF-824A-12I, CEF-824A-14S, CEF-824A-15I, CEF-293-20), and CEF-824A-8S). Chlorinated compounds were the only VOCs detected in CEF-824A-19S, the easternmost well with detections of VOCs.

Chlorinated VOCs detected in Site 57 groundwater during the RI include PCE, TCE, and breakdown products 1,1-DCA, 1,1-DCE, and cis- and trans-1,2-DCE. PCE was detected below its GCTL in wells CEF-824A-12I and CEF-824A-15I at estimated concentrations of 1 and 1.5 µg/L, respectively. TCE was detected in five of 41 wells at concentrations ranging from 0.84 J to 43 µg/L. TCE concentrations exceeded the GCTL in three shallow wells, CEF-293-19, CEF-293-20, and CEF-824A-14S. TCE was detected in CEF-824A-07S at 4.8 µg/L in September 2001, but the concentration decreased to an estimated concentration of 0.84 µg/L in December 2001. TCE breakdown products cis-1,2-DCE and trans-1,2-DCE were detected in five of 41 and two of 41 wells, respectively. Concentrations of cis-1,2-DCE ranged from 0.94 to 825 µg/L, with exceedances of the GCTL (70 µg/L) at wells CEF-293-19, CEF-293-20, and CEF-293-14S. Concentrations of trans-1,2-DCE were 0.52 J and 5.1 µg/L, less than the GCTL of 31 µg/L. The highest concentrations of TCE, cis-1,2-DCE, and trans-1,2-DCE were detected in CEF-293-19., located northeast of Building 1848.

1,1-DCE, also a breakdown product of TCE, was detected in CEF-824A-8S and CEF-824A-14S at concentrations of 33.8 and 5 µg/L, respectively. The concentration in CEF-824A-8S exceeded the GCTL of 7 µg/L. 1,1-DCA was detected in seven of 41 wells at concentrations ranging from 1.1 J to 97.2 µg/L. The 1,1-DCA concentration exceeded the GCTL of 70 µg/L in the well with the highest detected concentration, CEF-824A-14S.

PAHs detected in groundwater from Site 57 include acenaphthene, naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene. Acenaphthene was detected in one of 41 wells sampled at a estimated concentration of 2.4 µg/L. Naphthalene was detected in 15 of 41 wells sampled during the RI at concentrations ranging from 1.2 J to 354 µg/L. 1-Methylnaphthalene was detected in 13 of 41 wells at concentrations ranging from 0.93 J to 145 µg/L, and 2-methylnaphthalene was detected in 12 of 41 wells

at concentrations ranging from 1.6 J to 172 µg/L. Concentrations of naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene exceeded GCTLs in wells CEF-293-11, CEF-824A-07S, and CEF-824A-11S. In addition, naphthalene concentrations in CEF-293-19, CEF-824A-4S, CEF-824A-10S, and CEF-824A-12I exceeded GCTLs. The highest detected concentrations of naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene were in well CEF-824A-11S, located just east of Building 846.

TRPH was detected at 23 of 41 wells at concentrations ranging from 0.203 J to 15 mg/L. The TRPH GCTL (5 mg/L) was exceeded in CEF-824A-11S during the September and December 2001 sampling events and in CEF-293-11 during the December 2001 event. The highest detected concentration of TRPH was in CEF-824A-11S.

5.1.2 Surface Water

To evaluate potential contaminant migration via the storm sewer system at the site, a surface water sample was collected from the storm sewer outfall to which the storm sewers in the Site 57 area discharge (see Figure 2-4). The sample, CEF-814A-SW01, was analyzed for VOCs, PAHs, and TRPH. There were no detections of contaminants in this sample. Table 5-3 presents analytical results for COCs from this sample.

5.1.3 Temporary Wells

Nineteen temporary wells were installed as part of the RI to determine the extent of free product in the area of vapor extraction wells CEF-293-VEW01 and CEF-293-VEW02 (see Figure 2-3). Free product was encountered in CEF-824A-TW-11 (0.80 feet), located west of CEF-293-VEW01, and in CEF-824A-TW-3 (0.68 feet) and TW-4 (0.10 feet), east of CEF-293-VEW01. Based on the results of the free-product investigation, the areal extent of free product is approximately 350 square feet. The pipeline that transported fuel from Day Tank 1 to the north-south high-speed refuelers, located along the flightline east of Site 57, is expected to have passed through the area that currently has free product. During Day Tank 1 excavation activities, this line was capped with expansive grout and a rubber cap but was not cleaned and purged.

5.2 SITE 58

5.2.1 Groundwater

Groundwater samples were collected in September 2001 from 18 permanent monitoring wells, including 11 previously existing and seven new wells, and analyzed for VOCs, PAHs, and TRPH. Because of the significant difference in the detected concentration of 1,1,1-TCA in well CEF-B312-08S from the

December 2000 result (9.9 µg/L) to the RI result (871 µg/L), this well was resampled and analyzed for VOCs only in December 2001. The December 2001 VOC data were used in site evaluation. Frequencies of detection and ranges of detected concentrations are presented in Table 5-4, and positive detections of COCs in groundwater at Site 58 are presented in Table 5-5 and Figures 5-4 through 5-6.

VOCs detected in groundwater at Site 58 during the RI include ethylbenzene, toluene, xylenes, 1,1,1-trichloroethane (TCA), 1,1-DCA, and 1,1-DCE. Single low-level detections of common laboratory contaminants such as acetone, 2-butanone, chloroform, and 4-methyl-2-pentanone are not considered site related. Ethylbenzene was detected in three of 18 wells, and toluene was detected in two of 18 wells at concentrations less than their GCTLs of 30 and 40 µg/L, respectively. Xylenes were detected in four of 18 wells at concentrations ranging from 0.6 J to 8.7 µg/L. The concentration of xylenes in CEF-B312-08S (70.3 µg/L) was greater then the GCTL of 40 µg/L during the RI sampling event but decreased to 8.7 µg/L in the December 2001 sampling event.

Chlorinated and BTEX VOCs were detected in wells CEF-312-01 and CEF-B312-01S (located within the former wash rack area), CEF-B312-08S (located south of the wash rack), and CEF-B312-11S (located approximately 180 feet southeast of the wash rack). Chlorinated compounds only were detected in wells located north, east, and southeast of the former catch basin and wash rack area, including CEF-B312-04S, CEF-B312-02S, CEF-B312-05S, CEF-312-01, CEF-B312-06S, CEF-B312-012S, and CEF-B312-13S.

1,1,1-TCA was detected in CEF-B312-08S during the September sampling event at a concentration of 871 µg/L. When this well was resampled in December 2001, the concentration of 1,1,1-TCA was 66.1 µg/L. The GCTL for 1,1,1-TCA is 200 µg/L. 1,1-DCA, a breakdown product of 1,1,1-TCA, was detected in 10 of 18 wells at concentrations ranging from 1.0 J to 24.1 µg/L during December 2001. The highest historic detected concentration of 1,1-DCA was in CEF-B312-08S; it was 426 µg/L during the September sampling event, decreasing to 24.1 µg/L during the December 2001 event. 1,1-DCE was detected in two of 18 wells at concentrations ranging from 1.6 J to 1.8 J µg/L. 1,1-DCE was detected at 131 µg/L in CEF-B312-08S during the September 2001 sampling but was not detected in this well during the December 2001 sampling event.

PAHs detected in groundwater from Site 58 included 1-methylnaphthalene, 2-methylnaphthalene, and naphthalene. 1- and 2-Methylnaphthalene were detected in four of 18 and two of 18 wells, respectively, at concentrations less than their GCTLs (20 µg/L). Naphthalene was detected in nine of 18 wells sampled at concentrations ranging from 0.96 J to 156 µg/L. Naphthalene concentrations in four wells, CEF-312-01, CEF-B312-01S CEF-B312-06S, and CEF-B312-08S, exceeded the GCTL of 20 µg/L. The highest concentrations of 1- and 2-methylnaphthalene were detected in CEF-B312-08S, the well with the

highest detected concentrations of toluene, ethylbenzene, and xylenes. The highest concentration of naphthalene was detected in CEF-B312-01S.

TRPH was detected in nine of 18 wells sampled as part of the Site 58 RI. The concentration in well CEF-B312-01S, 9 mg/L, exceeded the FDEP GCTL of 5 mg/L.

5.2.2 Sediment

Three sediment samples were collected from the drainage ditch south of Building 312 to investigate potential migration of contaminants from the wash rack area (see Figure 5-7). Sample CEF-B312-SD-001 was collected near the discharge point of the storm sewer from the wash rack. CEF-B312-SD-002 was collected approximately 70 feet south (downstream) of CEF-B312-SD-001, and CEF-B312-SD-003 was collected approximately 95 feet south of CEF-B312-SD-002. These samples were analyzed for VOCs, PAHs, and TRPH. No VOCs were detected in sediment samples. PAHs were detected in samples CEF-B312-SD-001 and CEF-B312-SD-002, and TRPH was detected in all three sediment samples collected as part of the RI (see Table 5-6). Average concentrations of three PAHs in CEF-B312-SD-001 and its duplicate exceeded FDEP residential Soil Cleanup Target Levels (SCTLs), including benzo(a)anthracene, benzo(a)pyrene, and dibenzo(a,h)anthracene. The sediment samples downstream of this location did not have PAH concentrations in excess of FDEP SCTLs.

5.3 COMPARISON TO STATE CRITERIA AND U.S. EPA PRGs

Site 57

Groundwater contaminants detected at Site 57 in at least one monitoring well sample at concentrations greater than FDEP criteria include

- Benzene
- 1,1-Dichloroethane
- 1,1-Dichloroethene
- cis-1,2-Dichloroethene
- Ethylbenzene
- 1-Methylnaphthalene
- 2-Methylnaphthalene
- Naphthalene
- Toluene
- Trichloroethene

- TRPH
- Xylenes

Groundwater contaminants detected at Site 57 in at least one monitoring sample at concentrations greater than the Region IX PRGs include

- Benzene
- 1,1-Dichloroethane
- 1,1-Dichloroethene
- cis-1,2-Dichloroethene
- Naphthalene
- Trichloroethene

Site 58

Groundwater contaminants detected at Site 58 in at least one monitoring well sample at concentrations greater than FDEP criteria include

- Naphthalene
- TRPH

Groundwater contaminants detected at Site 58 in at least one monitoring sample at concentrations greater than the Region IX PRGs.

- 1,1-Dichloroethene
- Naphthalene

The following were detected in one sediment sample from Site 58 at concentrations greater than FDEP criteria:

- Benzo(a)anthracene
- Benzo(a)pyrene
- Dibenzo(a,h)anthracene

5.4 SUMMARY

Site 57

The horizontal and vertical extent of groundwater contamination at Site 57 was defined during the RI. Benzene was detected in excess of its FDEP GCTL in eight shallow and two intermediate wells at Site 57. The maximum detected concentration of benzene was 248 µg/L in CEF-824A-04S. Maximum concentrations of ethylbenzene, toluene, and xylenes were detected in CEF-293-11. Ethylbenzene and toluene were detected at concentrations in excess of their GCTL in two shallow wells each and had maximum concentrations of 151 µg/L and 59.6 µg/L, respectively. Xylenes were detected in excess of its GCTL in four shallow and one intermediate wells.

TCE and cis-1,2-DCE were detected at concentrations in excess of their GCTLs in two shallow wells each and had maximum detected concentrations of 43 and 825 µg/L, respectively in CEF-293-19. 1,1-DCE and 1,1-DCA were detected in excess of their GCTLs in one well each. 1,1-DCE was detected at 33.8 µg/L in CEF-824A-08S, and 1,1-DCA was detected at 97.2 µg/L in CEF-824A-14S.

Maximum concentrations of naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene were detected in CEF-824A-11S. Naphthalene was detected in excess of its GCTL in six shallow wells and one intermediate well and had a maximum detected concentration of 354 µg/L. 1-Methylnaphthalene and 2-methylnaphthalene were detected in excess of GCTLs in three shallow wells each and had maximum detected concentrations of 145 and 172 µg/L, respectively. TRPH was detected in excess of its GCTL in two shallow wells and had a maximum concentration of 15 mg/L in CEF-824A-11S.

COCs were not detected in wells screened in the deep zone of the surficial aquifer sampled as part of the RI at Site 57.

A petroleum plume, defined by benzene concentrations greater than 1 µg/L, extends from the eastern side of Building 846 toward the southeast to the area east of Building 824A. This plume outline, defined by benzene exceedances, generally also encompasses exceedances of toluene, ethylbenzene, xylenes, PAHs, and TRPH. The petroleum plume extends into the intermediate zone of the surficial aquifer in the area east of Building 846 (CEF-824A-21I and CEF-8924A-12I) but is generally limited to the shallow zone in other areas. The plume extends approximately 750 feet to the southeast and has an average width of approximately 225 feet.

The source of this petroleum-related contamination may have several components:

- Residual groundwater contamination that leached from contaminated soils in the Day Tank 1 area before they were excavated.

- Leaking fuel and residual free product from the pipeline that passes through the area of highest contamination.

- Smaller past spills, leaks, and/or poor waste-handling practices associated the storage and use of petroleum-related materials in several buildings at the site.

Groundwater contamination in the Day Tank 1 source area is being treated by the biosparge/vapor collection system. The fuel pipeline in the Building 846 area will be purged and associated free product will be removed to prevent this area from being an ongoing source of groundwater contamination. Also, potentially-contaminated soils associated with Day Tank 1 are being further evaluated to ensure that remaining soils do not as a continuing source of groundwater contaminants. These actions are being conducted under the Petroleum Program.

A TCE plume, defined by TCE concentrations greater than 3 µg/L, is centered east of the petroleum plume and partially overlaps that plume. With the exception of the 1,1-DCE exceedance at CEF-824A-08S, the TCE plume outline encompasses other chlorinated exceedances at Site 57. The plume extends to the southeast and is approximately 250 feet by 180 feet.

The source of chlorinated groundwater contamination is thought to be associated with the aircraft wash rack east of Building 846. Solvents used at the wash rack would have entered drains in the sloping paved area and entered the storm sewer system. Based on information from other areas of NAS Cecil Field, these sewer lines are expected to be below the water table, and so, leakage from them would not result in unsaturated soil contamination that could potentially act as a continuing source of groundwater contaminants.

Chlorinated compounds detected during the RI and in previous investigations in wells southeast of this TCE plume (CEF-824A-01Sa, CEF-824A-07S, CEF-824A-08S) do not appear to be associated with the plume as defined by current data. The lack of detections of chlorinated compounds in CEF-293-20, CEF-293-21, and CEF-824A-04S, located between the downgradient edge of the plume and these wells, supports this conclusion.

Exceedances of GCTLs by chlorinated VOCs are limited to the shallow portion of the surficial aquifer in both of these areas. No specific sources of chlorinated VOC contamination were identified in either area. The presence of chlorinated contamination in both areas is likely a result of past spills, leaks, and/or poor

waste-handling practices. Solvents were reportedly used and stored in several buildings associated with the site.

A surface water sample collected from the storm sewer outfall that receives discharge from Site 57 indicates that surface water quality is not being affected by contaminated groundwater potentially infiltrating into the storm sewer.

An area of free product, approximately 350 square feet in size, was delineated during the RI. The area is located east of the Day Tank 1 excavation area and extends beneath Building 846. The suspected source of the free product is a pipeline that transported fuel from Day Tank 1 to the north-south high-speed refueler. The line was capped, but not purged, during Day Tank 1 excavation activities.

Site 58

The horizontal and vertical extent of groundwater contamination at Site 58 was defined during the RI. Naphthalene was detected in excess of its FDEP GCTL in three shallow wells at Site 58. The maximum detected concentration of naphthalene was 156 µg/L in CEF-B312-01S. TRPH was detected in excess of its GCTL in one shallow well, CEF-B312-01S, at a concentration of 9 mg/L. The groundwater plume, as defined by naphthalene concentrations greater then 20 µg/L, is located southeast of Building 312 and is approximately 100 feet by 60 feet in size. The naphthalene plume encompasses the TPRH exceedance and is limited to the shallow zone of the surficial aquifer.

As indicated by results of one sediment sample, a limited area of the drainage ditch that received discharges from the aircraft wash rack had concentrations of PAHs in excess of FDEP direct contact residential criteria. Samples collected downstream did not have PAH exceedances.

This page intentionally left blank.

TABLE 5-1

FREQUENCY OF DETECTION FOR CHEMICALS OF CONCERN IN GROUNDWATER
OPERABLE UNIT 9, SITE 57 - BUILDING 824A/DAY TANK 1 AREA
REMEDIAL INVESTIGATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	FREQUENCY OF DETECTION	RANGE OF DETECTIONS	LOCATION OF MAXIMUM DETECTION	AVERAGE OF DETECTS
VOLATILE ORGANIC COMPOUNDS (ug/L)				
Benzene	11 / 41	0.87 J - 248	CEF-824A-04S	30.4
Toluene	7 / 41	1.0 J - 59.6	CEF-293-11	20.8
Ethylbenzene	11 / 41	1.0 J - 151	CEF-293-11	27.0
Total Xylenes	13 / 41	1.9 J - 549	CEF-293-11	78.5
cis-1,2-Dichloroethene	5 / 41	0.94 J - 825	CEF-293-19	221
trans-1,2-Dichloroethene	2 / 41	0.52 J - 5.1	CEF-293-19	2.8
1,1-Dichloroethene	2 / 41	5 - 33.8	CEF-824A-8S	19.4
1,1-Dichloroethane	7 / 41	1.1 J - 97.2	CEF-824A-14S	24.8
Tetrachloroethene	2 / 41	1.0 J - 1.5 J	CEF-824A-15I	1.25
Trichloroethene	5 / 41	0.84 J - 43	CEF-293-19	11.4
POLYNUCLEAR AROMATIC HYDROCARBONS (ug/L)				
Acenaphthene	1 / 41	2.4 J	CEF-824A-01S	2.4 J
1-Methylnaphthalene	13 / 41	0.93 J - 145	CEF-824A-11S	24.6
2-Methylnaphthalene	12 / 41	1.6 J - 172	CEF-824A-11S	29.9
Naphthalene	15 / 41	1.2 J - 354	CEF-824A-11S	55.1
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (mg/L)				
TRPH	23 / 41	0.203 J - 15.0	CEF-824A-11S	2.06

For wells CEF-293-11, CEF-824A-01Sa, CEF-824A-07S, CEF-824A-11S, CEF-824A-21I, and CEF-824A-22S, December 2001 VOC, PAH, and TRPH results were used.

TABLE 5-2

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
OPERABLE UNIT 9, SITE 57 - BUILDING 824A/DAY TANK 1 AREA
REMEDIAL INVESTIGATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 1 OF 6

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-293-1	CEF-293-3	CEF-293-4	CEF-293-5	CEF-293-8	CEF-293-10	CEF-293-11	
								Sep-01	Dec-01
VOLATILE ORGANIC COMPOUNDS (ug/L)									
Acetone	700	50 U	50 U	50 U	50 U	50 U	50 U	250 U	250 U
Benzene	1	1 U	1 U	1 U	1 U	1 U	1 U	**30.5**	**32**
Chloroform	5.7	2 U	2 U	2 U	2 U	2 U	2 U	10 U	10 U
cis-1,2-Dichloroethene	70	2 U	2 U	2 U	2 U	2 U	2 U	10 U	10 U
1,1-Dichloroethane	70	2 U	2 U	2 U	2 U	2 U	2 U	10 U	10 U
1,1-Dichloroethene	7	2 U	2 U	2 U	2 U	2 U	2 U	10 U	10 U
Ethylbenzene	30	2 U	2 U	2 U	2 U	2 U	2 U	**148**	**151**
4-Methyl-2-pentanone	560	10 U	10 U	10 U	10 U	10 U	10 U	50 U	50 U
Methylene chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	25 U	25 U
Methyl tert-butyl ether	50	2 U	2 U	2 U	2 U	2 U	2 U	10 U	10 U
Tetrachloroethene	3	2 U	2 U	2 U	2 U	2 U	2 U	10 U	10 U
Toluene	40	2 U	2 U	2 U	2 U	2 U	2 U	**66**	**59.6**
trans-1,2-Dichloroethene	31	2 U	2 U	2 U	2 U	2 U	2 U	10 U	10 U
Trichloroethene	3	2 U	2 U	2 U	2 U	2 U	2 U	10 U	10 U
Xylenes, total	20	6 U	6 U	6 U	6 U	6 U	6 U	**572**	**549**
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)									
Acenaphthene	20	4.4 U	4.4 U	4.4 U	4 U	4.4 U	4.4 U	21 U	20 U
1-Methylnaphthalene	20	2.2 U	2.2 U	2.2 U	2 U	2.2 U	2.2 U	**60.4**	**84.8**
2-Methylnaphthalene	20	2.2 U	2.2 U	2.2 U	2 U	2.2 U	2.2 U	**57.5**	**84.8**
Naphthalene	20	2.2 U	2.2 U	2.2 U	2 U	**2.2**	**5.6**	**126**	**155**
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH) (mg/L)									
TRPH	5	**0.254 J**	0.28 U	0.28 U	0.28 U	**0.643**	**0.335**	**2.46**	**5.95**

TABLE 5-2

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
OPERABLE UNIT 9, SITE 57 - BUILDING 824A/DAY TANK 1 AREA
REMEDIAL INVESTIGATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 2 OF 6

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-293-13		CEF-293-14	CEF-293-15D	CEF-293-19	CEF-293-20	CEF-293-21		CEF-293-22
		Sample	Duplicate					Sample	Duplicate	
VOLATILE ORGANIC COMPOUNDS (ug/L)										
Acetone	700	50 U	50 U	50 U	50 U	**190**	50 U	50 U	50 U	50 U
Benzene	1	1 U	1 U	1 U	1 U	**1.8**	**0.87 J**	**30.8**	**28.9**	**5.3**
Chloroform	5.7	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
cis-1,2-Dichloroethene	70	2 U	2 U	2 U	2 U	**825**	**136**	2 U	2 U	2 U
1,1-Dichloroethane	70	2 U	2 U	2 U	2 U	**58.6**	**1.6 J**	2 U	2 U	2 U
1,1-Dichloroethene	7	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Ethylbenzene	30	2 U	2 U	2 U	2 U	**5**	2 U	**2.7**	**2.8**	2 U
4-Methyl-2-pentanone	560	10 U	10 U	10 U	10 U	**76.1**	10 U	10 U	10 U	10 U
Methylene chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Methyl tert-butyl ether	50	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Tetrachloroethene	3	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Toluene	40	2 U	2 U	2 U	2 U	**33.4**	2 U	2 U	2 U	2 U
trans-1,2-Dichloroethene	31	2 U	2 U	2 U	2 U	**5.1**	**0.52 J**	2 U	2 U	2 U
Trichloroethene	3	2 U	2 U	2 U	2 U	**43**	**3.3**	2 U	2 U	2 U
Xylenes, total	20	6 U	6 U	6 U	6 U	**31.8**	6 U	**4.1 J**	**4.9 J**	6 U
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)										
Acenaphthene	20	4 U	4 U	4 U	4.4 U	8 U	4 U	4.4 U	4.4 U	4.4 U
1-Methylnaphthalene	20	**1.4 J**	**2.0**	2 U	2.2 U	4 U	2 U	**2.2**	**2.5**	**10.9**
2-Methylnaphthalene	20	**1.6 J**	**2.4**	2 U	2.2 U	4 U	2 U	**2.2**	**2.6**	**11.6**
Naphthalene	20	2 U	2 U	**2.9**	2.2 U	**46**	**1.2 J**	**2.5**	**3**	**14.7**
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH) (mg/L)										
TRPH	5	**0.404**	**0.372**	**0.944**	0.28 U	**4.44**	**0.58**	**0.269**	**0.242 J**	**0.946**

TABLE 5-2

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
OPERABLE UNIT 9, SITE 57 - BUILDING 824A/DAY TANK 1 AREA
REMEDIAL INVESTIGATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 3 OF 6

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-824A-01S	CEF-824A-01Sa		CEF-824A-2S	CEF-824A-3S	CEF-824A-4S		CEF-824A-5S	CEF-824A-6I
			Sep-01	Dec-01			Sample	Duplicate		
VOLATILE ORGANIC COMPOUNDS (ug/L)										
Acetone	700	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Benzene	1	1 U	1 U	1 U	1 U	1 U	**254**	**242**	1 U	1 U
Chloroform	5.7	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
cis-1,2-Dichloroethene	70	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,1-Dichloroethane	70	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,1-Dichloroethene	7	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Ethylbenzene	30	2 U	2 U	2 U	2 U	2 U	**27.8**	**20.7**	2 U	2 U
4-Methyl-2-pentanone	560	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methylene chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Methyl tert-butyl ether	50	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Tetrachloroethene	3	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Toluene	40	2 U	2 U	2 U	2 U	2 U	**2.3**	**1.7 J**	2 U	2 U
trans-1,2-Dichloroethene	31	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Trichloroethene	3	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Xylenes, total	20	6 U	6 U	6 U	6 U	6 U	**71.6**	**51.9**	6 U	6 U
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)										
Acenaphthene	20	**2.4 J**	4.4 U	4 U	4.4 U	4 U	8.8 U	8.8 U	4.4 U	4.4 U
1-Methylnaphthalene	20	2 U	**2.1 J**	**1.2 J**	**0.93 J**	2 U	**7.8**	**7.4**	2.2 U	2 U
2-Methylnaphthalene	20	2 U	**3.7**	**2**	**1.6 J**	2 U	**8.9**	**8.6**	2.2 U	2 U
Naphthalene	20	2 U	2.2 U	2 U	2.2 U	2 U	**30.3**	**30.8**	2.2 U	2 U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH) (mg/L)										
TRPH	5	0.28 U	**0.482**	**0.438**	0.28 U	0.25 U	**1.72**	**1.69**	0.28 U	**0.267**

TABLE 5-2

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
OPERABLE UNIT 9, SITE 57 - BUILDING 824A/DAY TANK 1 AREA
REMEDIAL INVESTIGATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 4 OF 6

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-824A-7S		CEF-824A-8S	CEF-824A-9S	CEF-824A-10S	CEF-824A-11S		CEF-824A-12I	CEF-824A-13D
		Sep-01	Dec-01				Sep-01	Dec-01		
VOLATILE ORGANIC COMPOUNDS (ug/L)										
Acetone	700	50 U	50 U	50 U	50 U	50 U	50 U	250 U	50 U	50 U
Benzene	1	3.8	2	1.5	1 U	1 U	8.7	7.6	3.5	1 U
Chloroform	5.7	2 U	2 U	2 U	2 U	2 U	2 U	10 U	2 U	2 U
cis-1,2-Dichloroethene	70	2 U	2 U	0.94 J	2 U	3.7	2 U	10 U	2 U	2 U
1,1-Dichloroethane	70	1.1 J	2.9	9.9	2.4	1.1 J	2 U	10 U	2 U	2 U
1,1-Dichloroethene	7	2 U	2 U	33.8	2 U	2 U	2 U	10 U	2 U	2 U
Ethylbenzene	30	2.3	2.1	2 U	2 U	8.6	84.9	85.4	10.4	2 U
4-Methyl-2-pentanone	560	10 U	10 U	10 U	10 U	10 U	10 U	50 U	10 U	10 U
Methylene chloride	5	5 U	5 U	5 U	5 U	3 J	5 U	25 U	5 U	5 U
Methyl tert-butyl ether	50	2 U	2 U	2 U	2 U	2 U	2 U	10 U	2 U	2 U
Tetrachloroethene	3	2 U	2 U	2 U	2 U	2 U	2 U	10 U	1 J	2 U
Toluene	40	2 U	2 U	2 U	2 U	1.0 J	56.6	43.2	2 U	2 U
trans-1,2-Dichloroethene	31	2 U	2 U	2 U	2 U	2 U	2 U	10 U	2 U	2 U
Trichloroethene	3	4.8	0.84 J	2 U	1 J	2 U	2 U	10 U	2 U	2 U
Xylenes, total	20	2.8 J	6 U	1.9 J	6 U	4.0 J	334	305	36.2	6 U
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)										
Acenaphthene	20	4 U	4 U	4.4 U	4 U	20 U	80 U	40 U	4.4 U	4 U
1-Methylnaphthalene	20	25.5	24.6	2.2 U	2 U	15.7	175	145	12.5	2 U
2-Methylnaphthalene	20	30.4	30.9	2.2 U	2 U	16.8	196	172	12.3	2 U
Naphthalene	20	13.9	25.7	2.2 U	2 U	128	438	354	49.1	2 U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH) (mg/L)										
TRPH	5	1.67	2.13	0.30 U	0.352	4.83	13.6	15.0	3.28	0.25 U

TABLE 5-2

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
OPERABLE UNIT 9, SITE 57 - BUILDING 824A/DAY TANK 1 AREA
REMEDIAL INVESTIGATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 5 OF 6

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-824A-14S	CEF-824A-15I	CEF-824A-16D	CEF-824A-17I	CEF-824A-18S	CEF-824A-19S	CEF-824A-20S	CEF-824A-21I**
VOLATILE ORGANIC COMPOUNDS (ug/L)									
Acetone	700	100 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Benzene	1	2 U	1 U	1 U	1 U	1 U	1 U	1 U	**1.8**
Chloroform	5.7	4 U	4 U	**0.92 J**	2 U	2 U	2 U	2 U	2 U
cis-1,2-Dichloroethene	70	**139**	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,1-Dichloroethane	70	**97.2**	2 U	2 U	2 U	2 U	2 U	1 U	2 U
1,1-Dichloroethene	7	**5.0**	2 U	2 U	2 U	2 U	2 U	1 U	2 U
Ethylbenzene	30	**4.4**	**1.0 J**	2 U	2 U	2 U	2 U	1 U	**2.2**
4-Methyl-2-pentanone	560	20 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methylene chloride	5	10 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Methyl tert-butyl ether	50	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Tetrachloroethene	3	4 U	**1.5 J**	2 U	2 U	2 U	2 U	1 U	2 U
Toluene	40	**4.9**	2 U	2 U	2 U	2 U	2 U	1 U	**1.5 J**
trans-1,2-Dichloroethene	31	4 U	2 U	2 U	2 U	2 U	2 U	NA	2 U
Trichloroethene	3	**9.0**	2 U	2 U	2 U	2 U	2 U	1 U	2 U
Xylenes, total	20	**4.9 J**	**5.2 J**	6 U	**4.3 J**	6 U	6 U	1 U	**9**
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)									
Acenaphthene	20	4 U	4 U	4.4 U	4.4 U	4.4 U	4 U	4.4 U	4 U
1-Methylnaphthalene	20	2 U	**2.0**	2.2 U	2.2 U	2.2 U	2 U	2.2 U	**10.5**
2-Methylnaphthalene	20	2 U	2 U	2.2 U	2.2 U	2.2 U	2 U	2.2 U	**13.3**
Naphthalene	20	2 U	**2.4**	2.2 U	2.2 U	2.2 U	2 U	2.2 U	**6.3**
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH) (mg/L)									
TRPH	5	**2.01**	**1.21**	0.28 U	**0.533**	0.28 U	0.28 U	0.28 U	**0.744**

TABLE 5-2

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
OPERABLE UNIT 9, SITE 57 - BUILDING 824A/DAY TANK 1 AREA
REMEDIAL INVESTIGATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 6 OF 6

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-824A-22S**		CEF-825LS-1S	CEF-16-38S		CEF-16-39I	CEF-16-40D	REGION IX PRGs(2)	FEDERAL MCLs(3)
		Sample	Duplicate		Sample	Duplicate				
VOLATILE ORGANIC COMPOUNDS (ug/L)										
Acetone	700	50 U	50 U	50 U	50 U	50 U	50 U	50 U	610	NC
Benzene	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.35	5
Chloroform	5.7	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.16	NC
cis-1,2-Dichloroethene	70	2 U	2 U	2 U	NA	2 U	2 U	2 U	61	70
1,1-Dichloroethane	70	2 U	2 U	2 U	1 U	2 U	2 U	2 U	810	NC
1,1-Dichloroethene	7	2 U	2 U	2 U	1 U	2 U	2 U	2 U	0.046	7
Ethylbenzene	30	2 U	2 U	2 U	1 U	2 U	2 U	2 U	1300	700
4-Methyl-2-pentanone	560	10 U	10 U	10 U	10 U	10 U	10 U	10 U	160	NC
Methylene chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	4.3	NC
Methyl tert-butyl ether	50	2 U	2 U	2 U	2 U	2 U	2 U	2 U	20	NC
Tetrachloroethene	3	2 U	2 U	2 U	1 U	2 U	2 U	2 U	1.1	5
Toluene	40	2 U	2 U	2 U	1 U	2 U	2 U	2 U	720	1000
trans-1,2-Dichloroethene	31	2 U	2 U	2 U	1 U	2 U	2 U	2 U	120	100
Trichloroethene	3	2 U	2 U	2 U	1 U	2 U	2 U	2 U	1.6	5
Xylenes, total	20	6 U	6 U	6 U	6 U	6 U	6 U	6 U	1400	10000
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)										
Acenaphthene	20	4 U	4.8 U	4 U	4.4 U	4.4 U	4.4 U	4.4 U	NC	NC
1-Methylnaphthalene	20	2 U	2.4 U	2 U	2.2 U	2.2 U	2.2 U	2.2 U	NC	NC
2-Methylnaphthalene	20	2 U	2.4 U	2 U	2.2 U	2.2 U	2.2 U	2.2 U	NC	NC
Naphthalene	20	2 U	2.4 U	2 U	2.2 U	2.2 U	2.2 U	2.2 U	6.2	NC
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH) (mg/L)										
TRPH	5	0.28 U	0.28 U	**0.203 J**	0.28 U	0.25 U	0.25 U	0.25 U	NC	NC

U = Not detected at or above method detection limit as listed.
J = Estimated value.
NA = Not analyzed.
NC = No criterion.
Bolded values exceed detection limits.
Shaded values exceed target cleanup goals.

RI sampling was conducted in September/October 2001.
(1) FDEP GCTL, F.A.C. 62-777, 1999.
(2) U.S. EPA Region IX PRGs.
(3) U.S. EPA federal MCLs.
* Total of o-, m-, and p-xylenes.
** Wells CEF-824A-21I and CEF-824A-22S were installed in December 2001.

TABLE 5-3

SURFACE WATER ANALYTICAL RESULTS
OPERABLE UNIT 9, SITE 57 - BUILDING 824A/DAY TANK 1 AREA
REMEDIAL INVESTIGATION
NAVAL AIR STATION CECIL FIELD

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-824A-SW01
VOLATILE ORGANIC COMPOUNDS (ug/L)		
Benzene	71.28	1 U
cis-1,2-Dichloroethene	NC	2 U
1,1-Dichloroethane	NC	2 U
1,1-Dichloroethene	3.2	2 U
Ethylbenzene	605	2 U
Tetrachloroethene	8.85	2 U
Toluene	475	2 U
trans-1,2-Dichloroethene	11000	2 U
Trichloroethene	80.7	2 U
Xylenes, total	370	6 U
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)		
1-Methylnaphthalene	95	2 U
2-Methylnaphthalene	30	2 U
Naphthalene	26	2 U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH) (mg/L)		
TPH	5	0.28 U

(1) Florida Department of Environmental Protection (FDEP) Freshwater Surface Water Criteria, Forida Administrative Code (FAC) Chapter 62-777 (FDEP, 1999).

NC = No criterion.

U = Not detected at or above detection limit (associated value).

CEF-824A-SW01 was collected at Runway Outfall No. 4, the discharge point for storm sewer runoff from the Site 57 area.

TABLE 5-4

FREQUENCY OF DETECTION FOR CHEMICALS OF CONCERN IN GROUNDWATER
OPERABLE UNIT 9, SITE 58 - BUILDING 312
REMEDIAL INVESTIGATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	FREQUENCY OF DETECTION	RANGE OF DETECTIONS	LOCATION OF MAXIMUM DETECTION	AVERAGE OF DETECTS
VOLATILE ORGANIC COMPOUNDS (ug/L)				
Toluene	2 / 18	1.3 J - 1.6 J	CEF-B312-01S	1.5
Ethylbenzene	3 / 18	0.48 J - 1.9 J	CEF-B312-08S	1.2
Total Xylenes	4 / 18	0.60 J - 8.7	CEF-B312-08S	4.1
1,1-Dichloroethene	2 / 18	1.6 J - 1.8 J	CEF-B312-12S	1.7
1,1-Dichloroethane	10 / 18	1.0 J - 24.1	CEF-B312-08S	7.4
1,1,1-Trichloroethane	1 / 18	66.1	CEF-B312-08S	66.1
POLYNUCLEAR AROMATIC HYDROCARBONS (ug/L)				
1-Methylnaphthalene	4 / 18	2 - 5.1	CEF-B312-08S	3.8
2-Methylnaphthalene	2 / 18	3.5 - 4.7	CEF-B312-08S	4.1
Naphthalene	9 / 18	0.96 J - 156	CEF-B312-01S	38.4
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (mg/L)				
TRPH	9 / 18	0.59 - 9.00	CEF-B312-01S	2.56

December 2001 VOC results were used for well CEF-B312-08S.

TABLE 5-5

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
OPERABLE UNIT 9, SITE 58 - BUILDING 312
REMEDIAL INVESTIGATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 1 OF 3

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-						
		312-01	312LS-01Sa	B312-01I	B312-01S	B312-02S	B312-03S	B312-04S
VOLATILE ORGANIC COMPOUNDS (ug/L)								
Acetone	700	50 U	50 U	50 U	**122 J**	50 U	50 U	50 U
Benzene	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Butanone	4200	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroform	5.7	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,1-Dichloroethane	70	**9.1**	2 U	2 U	**6.8**	**14.3**	2 U	**2.2**
1,1-Dichloroethene	7	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Ethylbenzene	30	**0.48 J**	2 U	2 U	2 U	2 U	2 U	2 U
4-Methyl-2-pentanone	560	10 U	10 U	10 U	**36.9**	10 U	10 U	10 U
Methyl tert-butyl ether	50	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Toluene	40	2 U	2 U	2 U	**1.6 J**	2 U	2 U	2 U
Trichloroethene	3	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,1,1-Trichloroethane	200	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Vinyl chloride	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylenes, total	20	**0.60 J**	6 U	6 U	**4.1 J**	6 U	6 U	6 U
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)								
1-Methylnaphthalene	20	2.2 U	2.2 U	2.2 U	16 U	2 U	**2**	2 U
2-Methylnaphthalene	20	2.2 U	2.2 U	2.2 U	16 U	2 U	2 U	2 U
Naphthalene	20	**49.5**	2.2 U	2.2 U	**156**	**8.3**	**1.9 J**	**0.96 J**
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH) (mg/L)								
TRPH	5	**1.36**	0.28 U	0.28 U	**9.00**	**3.10**	**1.85**	0.28 U

TABLE 5-5

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
OPERABLE UNIT 9, SITE 58 - BUILDING 312
REMEDIAL INVESTIGATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 2 OF 3

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-								
		B312-05S		B312-06S	B312-07S	B312-08S*			B312-09S	B312-10S
						Sep-01		Dec-01		
		Sample	Duplicate			Sample	Duplicate			
VOLATILE ORGANIC COMPOUNDS (ug/L)										
Acetone	700	50 U	50 U	50 U	50 U	500 U	500 U	50 U	50 U	50 U
Benzene	1	1 U	1 U	1 U	1 U	10 U	10 U	1 U	1 U	1 U
2-Butanone	4200	10 U	10 U	10 U	10 U	100 U	100 U	10 U	10 U	10 U
Chloroform	5.7	2 U	2 U	2 U	2 U	20 U	20 U	2 U	2 U	**1 J**
1,1-Dichloroethane	70	**1.7 J**	**1.7 J**	**1.0 J**	2 U	**426**	**416**	**24.1**	2 U	2 U
1,1-Dichloroethene	7	2 U	2 U	2 U	2 U	**131**	**129**	2 U	2 U	2 U
Ethylbenzene	30	2 U	2 U	2 U	2 U	**15.1 J**	**12.3 J**	**1.9 J**	2 U	2 U
4-Methyl-2-pentanone	560	10 U	10 U	10 U	10 U	100 U	100 U	10 U	10 U	10 U
Methyl tert-butyl ether	50	2 U	2 U	2 U	2 U	20 U	20 U	2 U	2 U	2 U
Toluene	40	2 U	2 U	2 U	2 U	**24.6**	**21.7**	**1.3 J**	2 U	2 U
Trichloroethene	3	2 U	2 U	2 U	2 U	20 U	20 U	2 U	2 U	2 U
1,1,1-Trichloroethane	200	2 U	2 U	2 U	2 U	**871**	**811**	**66.1**	2 U	2 U
Vinyl chloride	1	1 U	1 U	1 U	1 U	10 U	10 U	1 U	1 U	1 U
Xylenes, total	20	6 U	6 U	6 U	6 U	**70.3**	**59.7 J**	**8.7**	6 U	6 U
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)										
1-Methylnaphthalene	20	2.2 U	2.2 U	**4.5**	2 U	**5.1**	**5.1**	NA	2.2 U	2.2 U
2-Methylnaphthalene	20	2.2 U	2.2 U	**3.5**	2 U	**4.7**	**4.6**	NA	2.2 U	2.2 U
Naphthalene	20	2.2 U	**1.3 J**	**47.6**	2 U	**80**	**76.3**	NA	2.2 U	2.2 U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH) (mg/L)										
TRPH	5	**0.567**	**0.607 J**	**2.89**	0.25 U	**1.29**	**1.18**	NA	0.28 U	0.28 U

TABLE 5-5

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
OPERABLE UNIT 9, SITE 58 - BUILDING 312
REMEDIAL INVESTIGATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 3 OF 3

PARAMETER	TARGET CLEANUP GOAL(1)	CEF-					REGION IX PRGs(2)	FEDERAL MCLs(3)
		B312-11S	B312-12S	B312-13S	B312-14S	B312-15I		
VOLATILE ORGANIC COMPOUNDS (ug/L)								
Acetone	700	50 U	50 U	50 U	50 U	50 U	610	NA
Benzene	1	1 U	1 U	1 U	1 U	1 U	0.35	5
2-Butanone	4200	10 U	**5.1 J**	10 U	10 U	10 U	1900	NA
Chloroform	5.7	2 U	2 U	2 U	2 U	2 U	0.16	NA
1,1-Dichloroethane	70	**5.7**	**3.7**	**5.1**	2 U	2 U	810	NC
1,1-Dichloroethene	7	**1.6 J**	**1.8 J**	2 U	2 U	2 U	0.046	7
Ethylbenzene	30	**1.1 J**	2 U	2 U	2 U	2 U	1300	700
4-Methyl-2-pentanone	560	10 U	10 U	10 U	10 U	10 U	1600	NA
Methyl tert-butyl ether	50	2 U	2 U	2 U	2 U	2 U	20	NA
Toluene	40	2 U	2 U	2 U	2 U	2 U	720	1000
Trichloroethene	3	2 U	2 U	2 U	2 U	2 U	1.6	5
1,1,1-Trichloroethane	200	2 U	2 U	2 U	2 U	2 U	540	200
Vinyl chloride	1	1 U	1 U	1 U	1 U	1 U	0.014	2
Xylenes, total	20	**3 J**	6 U	6 U	6 U	6 U	1400	10000
SEMIVOLATILE ORGANIC COMPOUNDS (ug/L)								
1-Methylnaphthalene	20	**3.5**	2 U	2.2 U	2 U	2.2 U	NC	NC
2-Methylnaphthalene	20	2 U	2 U	2.2 U	2 U	2.2 U	NC	NC
Naphthalene	20	2 U	**1.7 J**	2.2 U	2 U	2.2 U	6.2	NC
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH) (mg/L)								
TRPH	5	**2.19**	0.25 U	**0.84**	0.25 U	0.28 U	NC	NC

NA = Not analyzed.
Bolded values exceed detection limits.
Shaded values exceed GCTLs.
U = Not detected at or above method detection limit as listed.

RI sampling was conducted in September/October 2001.
* CEF-B312-08S was resampled in December 2001.

TABLE 5-6

SEDIMENT SAMPLE ANALYTICAL RESULTS
OPERABLE UNIT 9, SITE 57, BUILDING 312
REMEDIAL INVESTIGATION
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	FDEP Residential SCTL	FDEP Leachability SCTL	CEF-B312-SD-001		CEF-B312-SD-002	CEF-B312-SD-003
			Sample	Duplicate		
POLYNUCLEAR AROMATIC HYDROCARBONS (ug/L)						
Benzo(a)anthracene	1,400	3,200	**2650**(1)	430 U(1)	400 U	420 U
Benzo(a)pyrene	100	8,000	**3030**(1)	**108**(1)	**78.3 J**	84 U
Benzo(b)fluoranthene	1,400	10,000	**1570**(2)	**95**(2)	**70.7 J**	84 U
Benzo(g,h,i)perylene	2,300,000	32,000,000	**3400**	**245**	**152**	84 U
Benzo(k)fluoranthene	15,000	25,000	**775**	**59.1 J**	**44.4 J**	84 U
Chrysene	140,000	77,000	**2770**	430 U	400 U	420 U
Dibenzo(a,h)anthracene	100	30,000	**301 J**(1)	86 U(1)	80 U	84 U
Fluoranthene	2,900,000	1,200,000	**6790**	**240 J**	**169 J**	420 U
Indeno(1,2,3-cd)pyrene	1,500	28,000	**2030**(2)	**134**(2)	**87.7**	84 U
Phenanthrene	2,000,000	250,000	**5790**	430 U	400 U	420 U
Pyrene	2,200,000	880,000	**5820**	**209 J**	**178 J**	420 U
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS (TRPH) (mg/kg)						
TRPH	340	340	**192**(2)	**426**(2)	**127**	**83.8**

U = Not detected at or above detection limit (associated value).

J = Estimated concentration.

FDEP SCTLs = Florida Department of Environmental Protection soil target cleanup levels from Florida Administrative Code (FAC) 62-777 (FDEP, 1999).

Bolded values exceed detection limit.

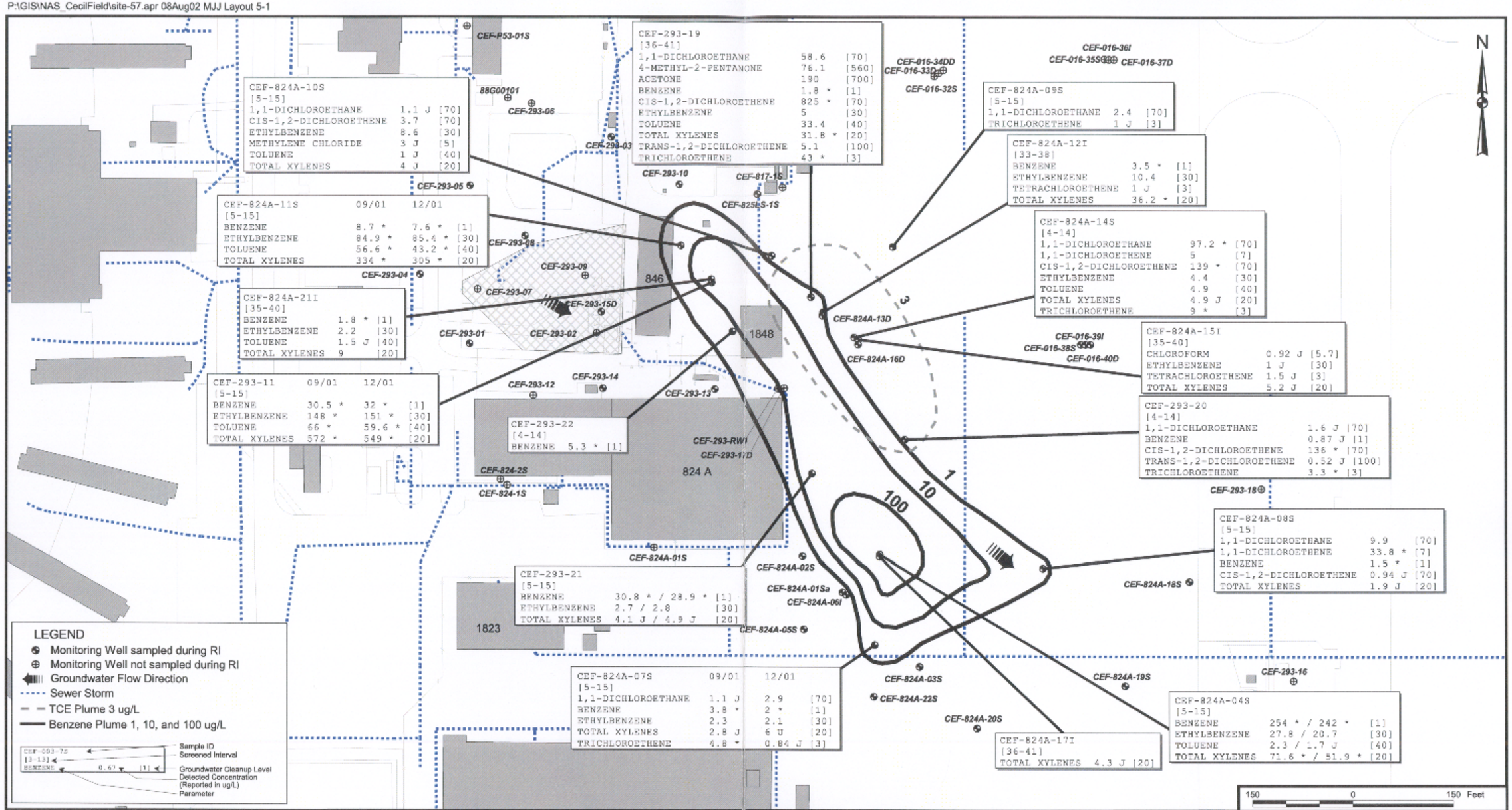
Shaded values exceed residential SCTL.

1 Average of sample and duplicate exceeds residential SCTL. If sample or duplicate is non-detect, one-half the detection limit used to calculate average.

2 Average of sample and duplicate does not exceed residential SCTL. If sample or duplicate is non-detect, one-half the detection limit used to calculate average.

This page intentionally left blank.

P:\GIS\NAS_CecilField\site-57.apr 08Aug02 MJJ Layout 5-1



NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

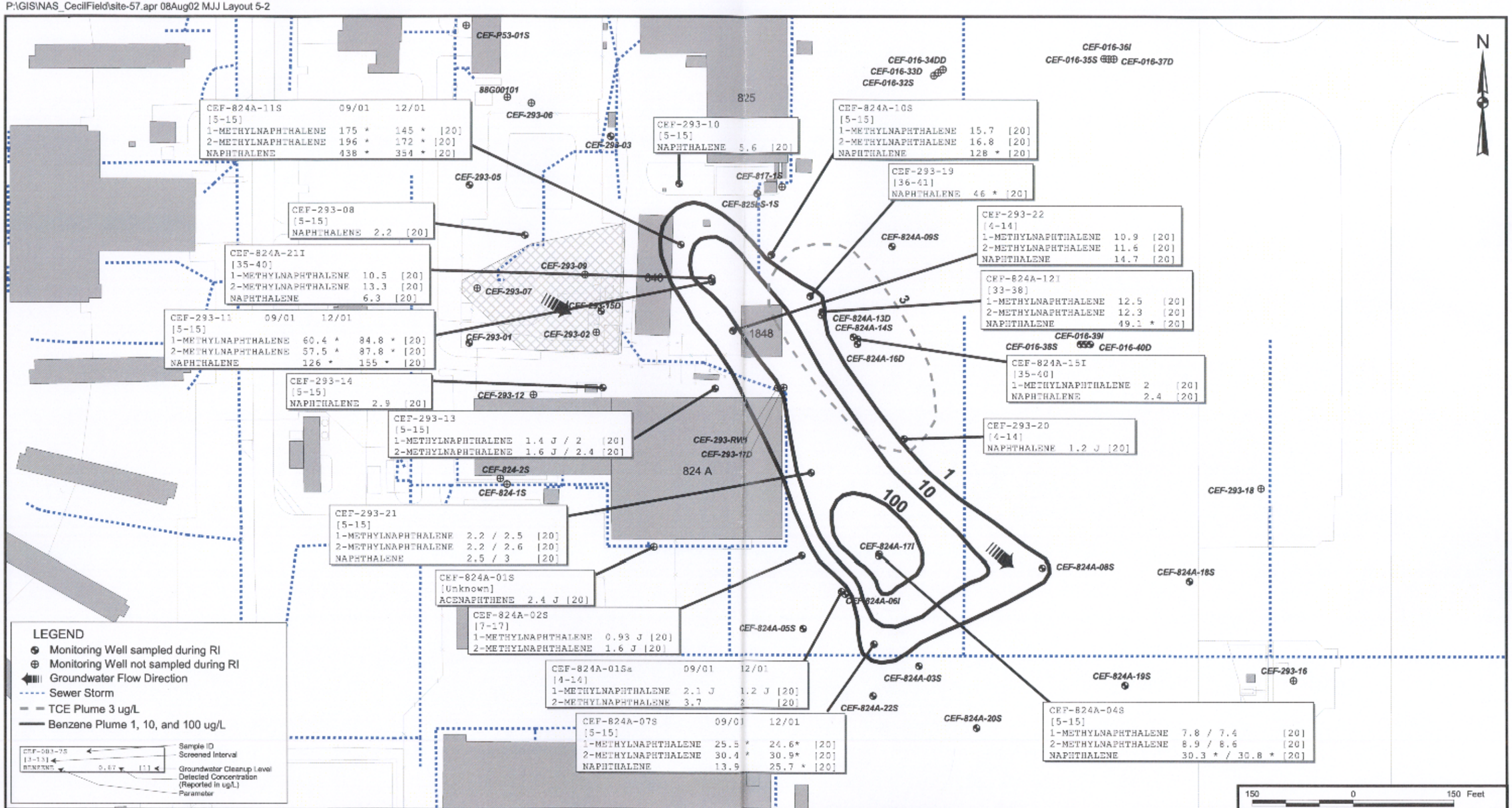
DRAWN BY MJJ DATE 04Feb02
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

VOCs IN GROUNDWATER - RI DATA
OU 9, SITE-57
BUILDING 824A / DAY TANK 1 AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 0039
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 5-1 REV. 0

Figure 5-1 Backside

P:\GIS\NAS_CecilField\site-57.apr 08Aug02 MJJ Layout 5-2



NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

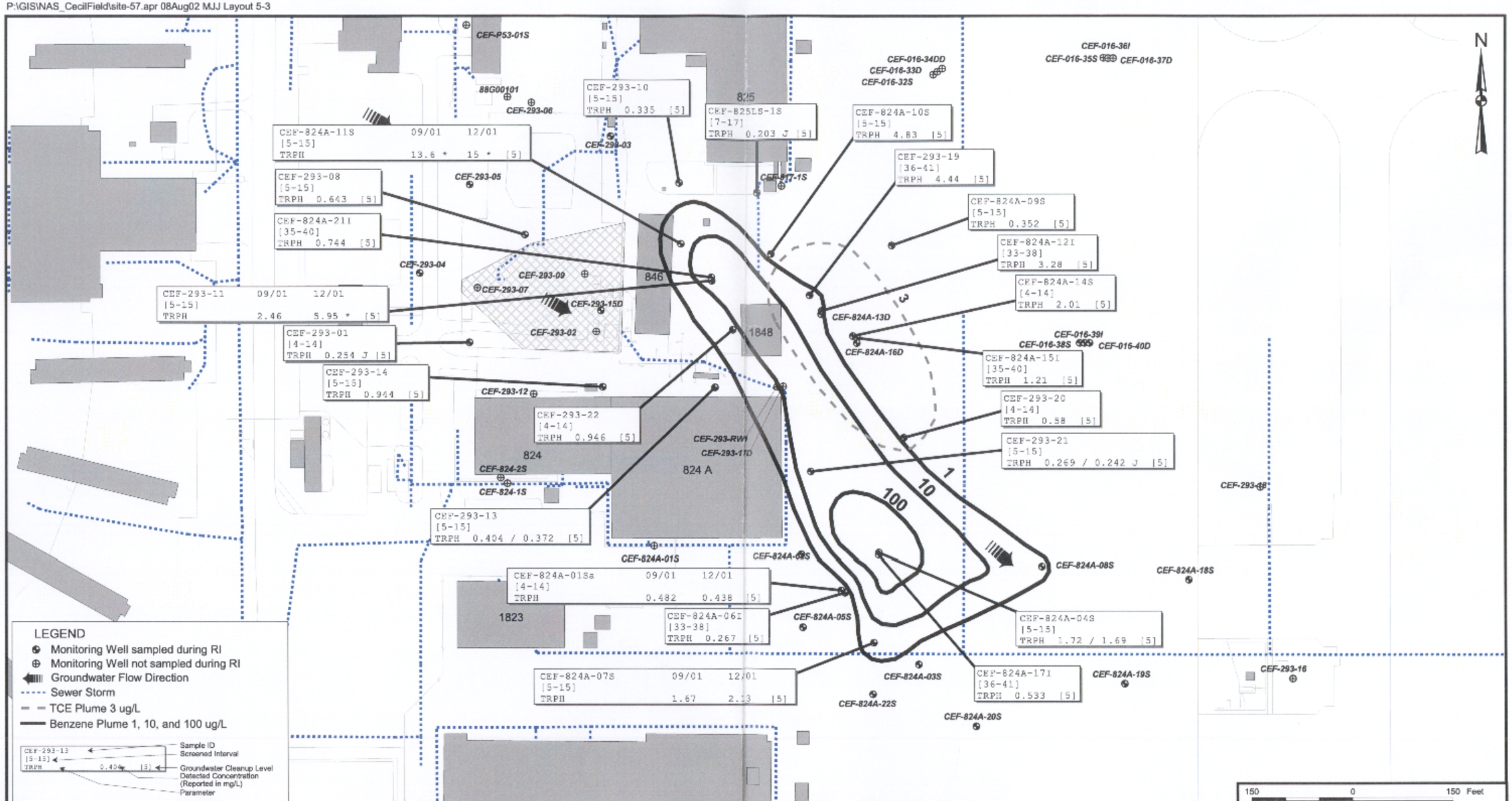
DRAWN BY MJJ DATE 04Feb02
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

PAHs IN GROUNDWATER - RI DATA
OU 9, SITE-57
BUILDING 824A / DAY TANK 1 AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 0039
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 5-2 REV. 0

Figure 5-2 Backside

P:\GIS\NAS_CecilField\site-57.apr 08Aug02 MJJ Layout 5-3



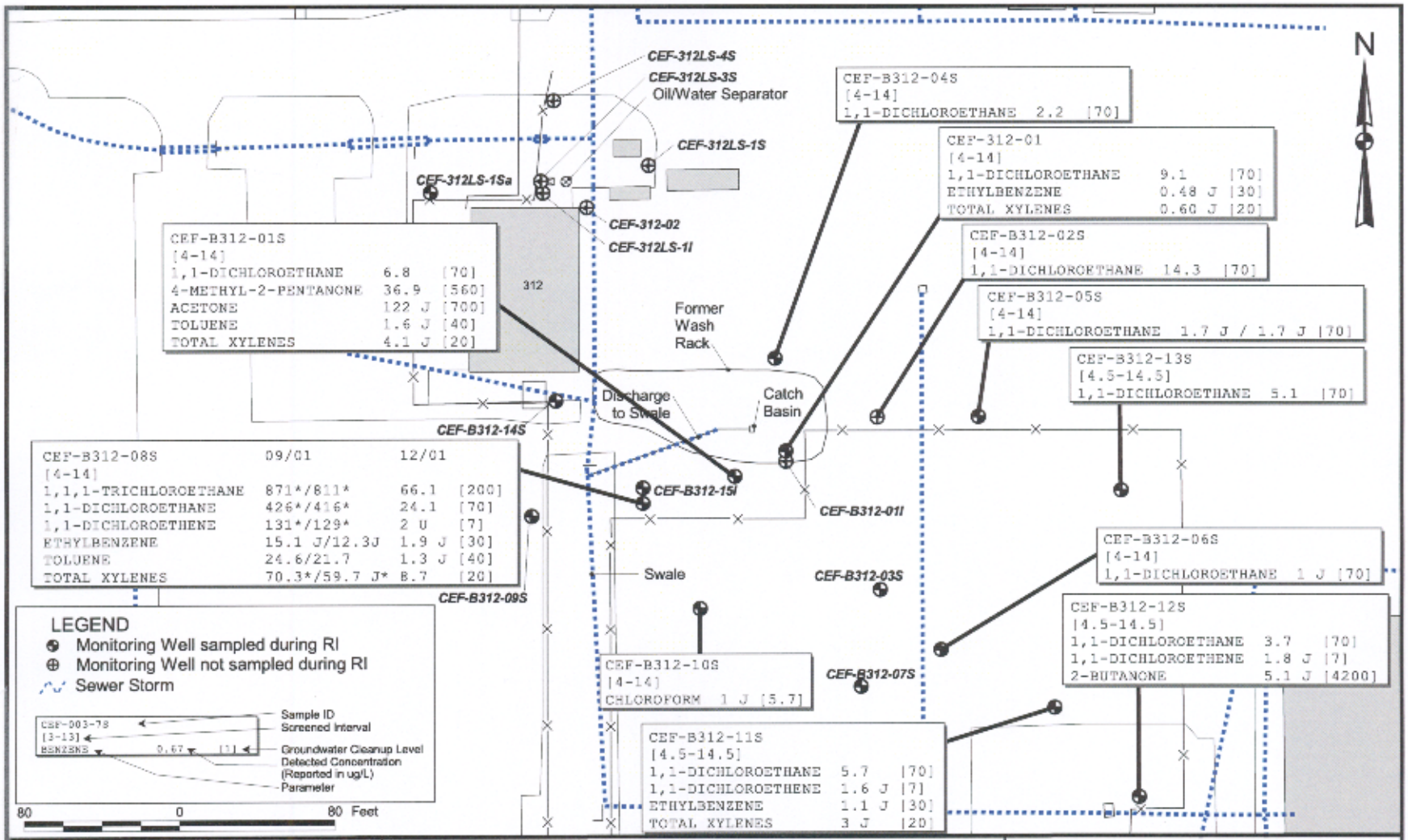
NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY MJJ	DATE 04Feb02
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	

TRPH IN GROUNDWATER - RI DATA
OU 9, SITE-57
BUILDING 824A / DAY TANK 1 AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 0039	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 5-3	REV. 0

Figure 5-3 Backside



DRAWN BY	DATE
MJJ	05Feb02
CHECKED BY	DATE
COST/SCHEDULE-AREA	
SCALE	AS NOTED

VOCs IN GROUNDWATER - RI DATA

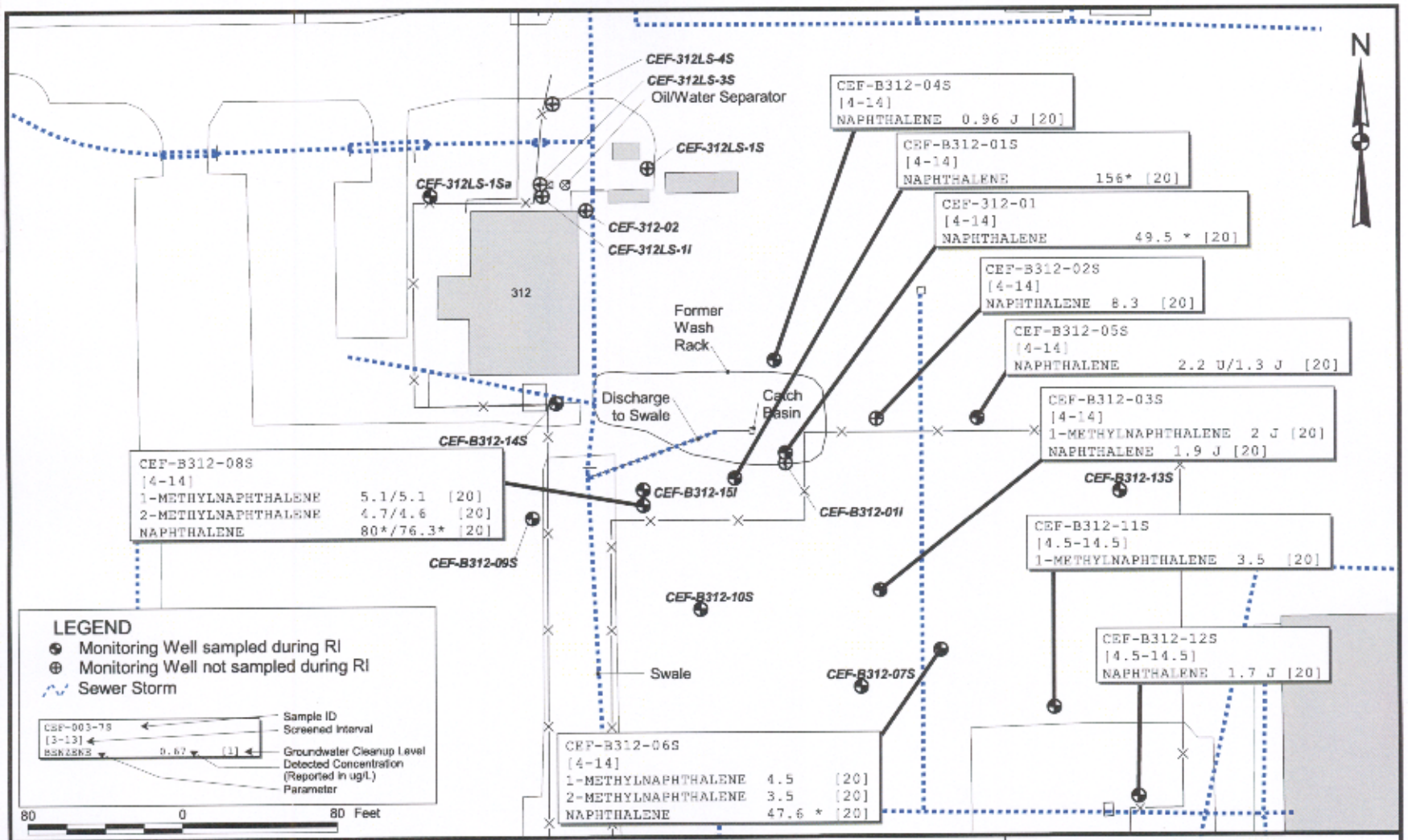
OU 9, SITE 58 - BUILDING 312

NAVAL AIR STATION CECIL FIELD

JACKSONVILLE, FLORIDA

CONTRACT NUMBER	
0039	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 5-4	REV 0

P:\GIS\NAS_CecilField\site-58.apr 08Aug02 MJJ Layout 6-4

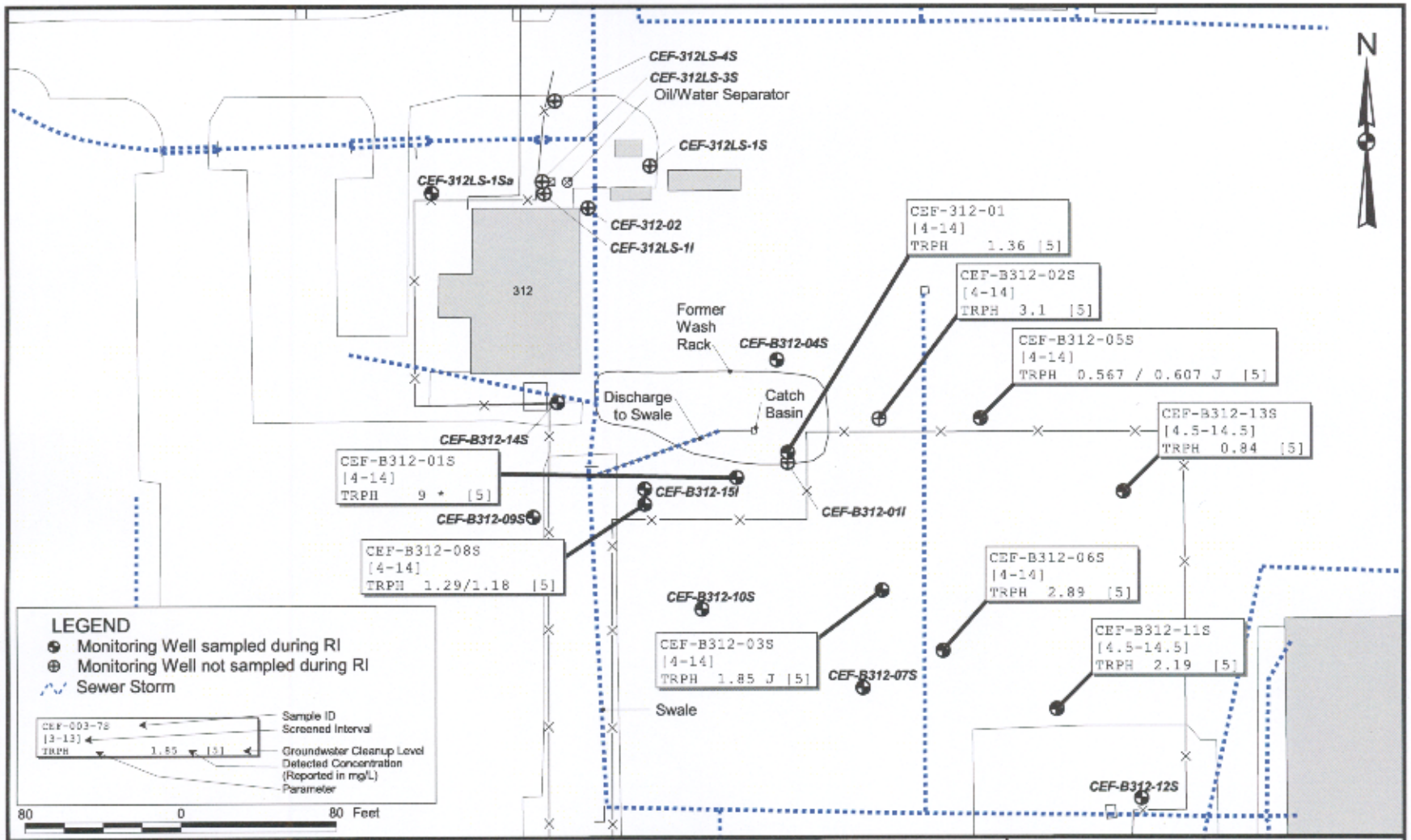


DRAWN BY	DATE
MJJ	05Feb02
CHECKED BY	DATE
COST/SCHEDULE-AREA	
SCALE	AS NOTED

PAHs IN GROUNDWATER - RI DATA
OU 9, SITE 58 - BUILDING 312
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

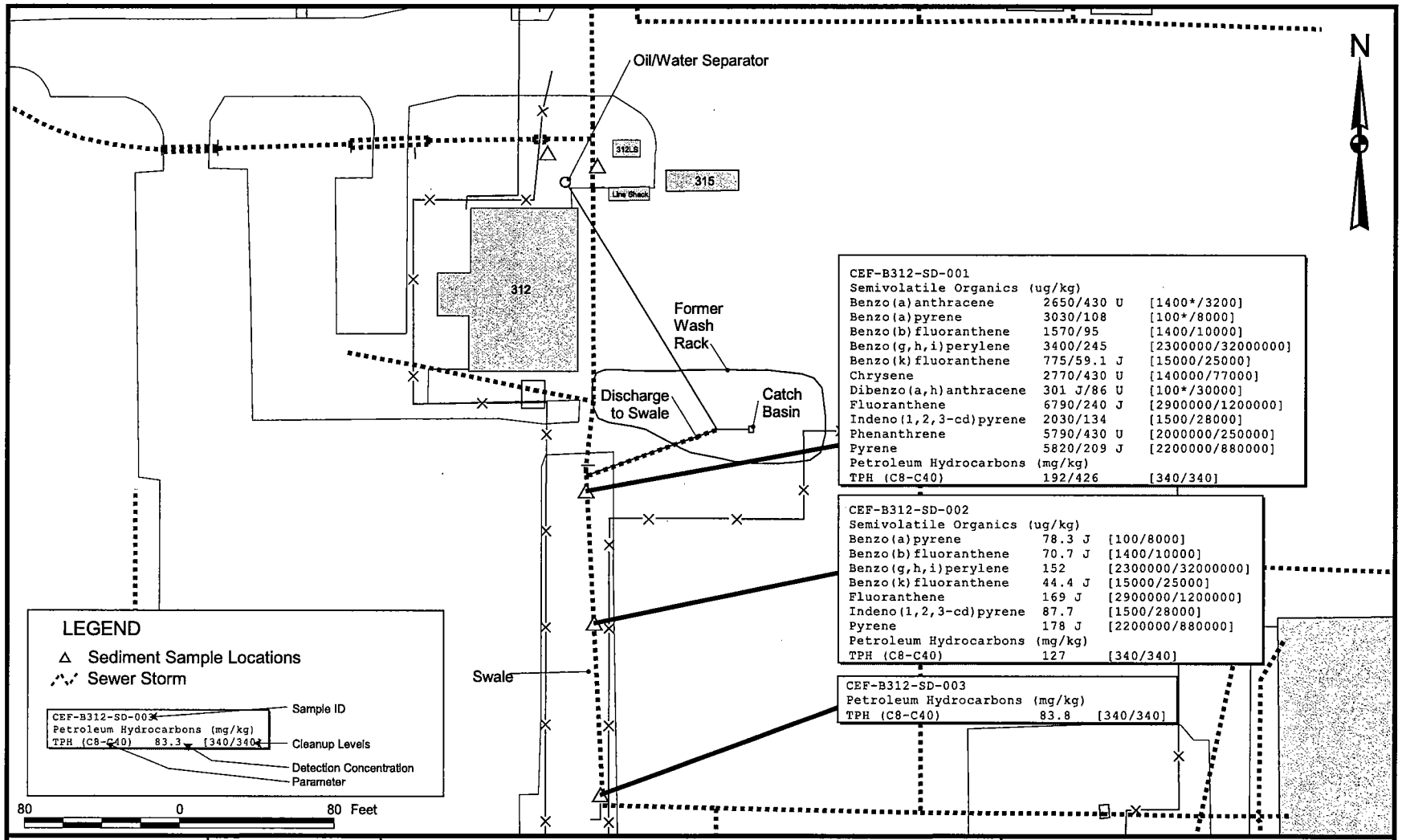
CONTRACT NUMBER	
0039	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 5-5	REV 0

P:\GIS\NAS_CecilField\site-58.apr 05Aug02 MJJ Layout 5-5



DRAWN BY	DATE		CONTRACT NUMBER 0039
MJJ	05Feb02	TRPH IN GROUNDWATER - RI DATA	APPROVED BY — DATE —
CHECKED BY —	DATE —	OU 9, SITE 58 - BUILDING 312	APPROVED BY — DATE —
COST/SCHEDULE-AREA		NAVAL AIR STATION CECIL FIELD	DRAWING NO. FIGURE 5-6
SCALE AS NOTED		JACKSONVILLE, FLORIDA	REV 0

P:\GIS\NAS_CecilField\site-58.apr 08Aug02 MJJ Layout: 5-6



DRAWN BY	DATE
MJJ	07Feb02
CHECKED BY	DATE
COST/SCHEDULE-AREA	
SCALE	AS NOTED

SEDIMENT SAMPLE RESULTS - RI DATA
OU 9, SITE 58 - BUILDING 312
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NUMBER	
0039	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 5-7	REV 0

P:\GIS\NAS_CecilField\site-58.apr 04Mar02 MJJ Layout 5-7

6.0 CONTAMINANT FATE AND TRANSPORT

Groundwater contaminants at Site 57 may include components of JP-5, the fuel stored in Day Tank 1, other petroleum products used n the area, and solvents used at the wash rack east of Building 846 and in the area of Building 824/824A. Groundwater contamination at Site 58 is also thought to be related to chemicals entering drains at an aircraft wash rack including petroleum products and solvents.

Kerosene is the main ingredient of JP-5; however, the exact composition is dependent on the composition of the crude oil from which it is refined and on the specific additives used. In general, JP-5 is a complex mixture of aliphatic and aromatic hydrocarbons with carbon numbers mostly in the C_9 to C_{16} range including n-alkanes, branched alkanes, benzene, alkylbenzenes, naphthalenes, and PAHs (ASTDR, 1998).

6.1 CHEMICAL AND PHYSICAL PROPERTIES

Various chemical and physical properties of the detected site compounds are presented and discussed in this section. These parameters may be used to estimate the environmental behavior of site chemicals. Physical and chemical properties of the chemicals found at Sites 57 and 58 are summarized in Table 6-1.

Literature values for specific gravity, vapor pressure, water solubility, octanol/water partition coefficient, organic carbon partition coefficient, Henry's Law constant, and distribution coefficient are presented when available. Calculated values, obtained using approximation methods, are presented when literature values are not available. A discussion of the environmental significance of each of these parameters follows.

Specific Gravity

Specific gravity is the ratio of the weight of a given volume of pure chemical at a specified temperature to the weight of the same volume of water at a given temperature. Its primary use is to determine whether a contaminant will have a tendency to float or sink in water if it is present as a pure compound or at very high concentrations. Contaminants with a specific gravity greater than 1 will tend to sink, whereas contaminants with a specific gravity less than 1 will tend to float. This parameter becomes important in discussions regarding the potential presence of free product or nonaqueous-phase liquids.

Vapor Pressure

Vapor pressure provides an indication of the rate at which a chemical volatilizes from both soil and water. It is of primary importance at environmental interfaces, such as surface soil/air and surface water/air.

Volatilization is not as important when evaluating contaminated groundwater and subsurface soils that are not exposed to the atmosphere. Chemicals with higher vapor pressures are expected to enter the atmosphere much more readily than chemicals with lower vapor pressures. Compounds with vapor pressures greater than 10^{-2} millimeters of mercury are more likely to be present in the vapor phase than in the liquid phase, and compounds with vapor pressures less than 10^{-7} millimeters of mercury are more likely to be associated with the liquid phase.

Solubility

Solubility is an expression of the amount of a contaminant that can enter into solution with water at a given temperature. The rate at which a chemical is leached from a waste deposit by infiltrating precipitation is proportional to its water solubility; therefore, soluble chemicals are more readily leached than less soluble chemicals. The water solubilities presented in Table 6-1 indicate that the VOCs (monocyclic aromatics and halogenated aliphatics) are at least one order of magnitude more water soluble than PAHs.

Octanol/Water Partition Coefficient

The octanol/water partition coefficient (K_{ow}) is expressed as the ratio of a contaminant's concentration in octanol to its concentration in water. Because octanol is chemically similar to biological lipids, this ratio can be used to approximate the partitioning of a chemical between aqueous environments and biomass. A linear relationship between the K_{ow} and the uptake of chemicals by fatty tissues of animal and human receptors, the bioconcentration factor, has been determined (Lyman et al., 1990). Chemicals with K_{ow} values greater than 1 are more soluble in octanol than water and can be expected to be found at higher concentrations in biomass than the surrounding aqueous environment.

Distribution Coefficient and Organic Carbon Partition Coefficient

The soil/water distribution coefficient (K_d) is an expression of the equilibrium distribution of an organic compound between the soil matrix of aquifer and the aqueous phase of the aquifer. It is a ratio of the sorbed contaminant concentration to the dissolved contaminant concentration. The higher the K_d, the higher the potential for sorption to the aquifer matrix. K_d varies with the solubility of a contaminant and the total surface area of the aquifer matrix available for sorption. Organic carbon and clay minerals, with high ratios of surface area to volume, generally present the majority of sorption sites in an aquifer. Values of K_d normalized relative to the total organic content of the aquifer matrix (ratio of K_d to TOC) are expressed as organic carbon partition coefficients (K_{oc}). Chemicals with high K_{oc} values generally have low water solubilities and vice versa. This parameter may be used to infer the relative rates at which more mobile chemicals (monocyclic aromatics and halogenated aliphatics) are transported in

groundwater. PAHs are relatively immobile in the soil and are preferentially bound to the soil. These compounds are not subject to groundwater transport to the same extent as compounds with lower K_{oc} values. Contaminants with K_{oc} values lower than 50 are considered very mobile, 50 to 150 are considered mobile, and 150 to 500 are considered moderately mobile.

Henry's Law Constant

Henry's Law governs the partitioning of a contaminant between the liquid phase and the gaseous phase. This law states that the concentration of a contaminant in the gaseous phase is directly proportional to the contaminant's concentration in the liquid phase and is a fixed chemical characteristic. The Henry's Law constant, or the air/water partition coefficient, is an expression of the tendency of a contaminant to volatilize from groundwater into soil gas. In general, chemicals having a Henry's Law constant of less than or equal to 1×10^{-5} atm-m^3/mole, such as pesticides and polychlorinated biphenyls (PCBs), should volatilize very little and be present only in minute amounts in the atmosphere or soil gas. For chemicals with a Henry's Law constant greater than 5×10^{-3} atm-m^3/mole, volatilization and diffusion in soil gas could be significant.

6.1.1 Volatile Organic Compounds

VOCs detected at Sites 57 and 58 include BTEX, TCE, and several other chlorinated hydrocarbons. When exposed to the atmosphere, these compounds partition predominantly into the vapor phase. VOCs in general are considered moderately soluble in water. Chlorinated VOCs detected at Sites 57 and 58 are generally more dense (specific gravity greater than 1) and more soluble in water than BTEX constituents. TCE (the most chlorinated aliphatic) and ethylbenzene, toluene, and xylenes have the highest K_{oc} values and are preferentially bound to soil and less mobile than the remaining VOCs detected at the sites. K_{ow} values vary among the VOCs detected at the sites, but bioaccumulation/bioconcentration of these compounds is relatively low compared to chemicals such as PCBs and certain pesticides. Henry's Law constants for the VOCs detected at the sites indicate that these compounds can readily volatilize from groundwater to soil gas.

6.1.2 Polynuclear Aromatic Hydrocarbons

Naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene, the PAHs detected at Sites 57 and 58, have specific gravity values slightly greater than water and have lower water solubility than VOCs. Vapor pressure values are significantly lower than for VOCs but volatilization when exposed to the atmosphere is still a significant transport mechanism for these compounds. K_{oc} values are high and indicate that these compounds are more likely to sorb to soil and so are less mobile than the VOCs detected at the sites. These PAHs, especially the methylnaphthalenes, have higher K_{ow} values and so may have higher

bioaccumulation/bioconcentration rates than VOCs. Henry's Law constants for the PAHs detected at the sites indicate that these compounds have a moderate tendency to partition from groundwater to soil gas.

6.2 CONTAMINANT PERSISTENCE

The persistence of various classes of chemicals is discussed in this section. Several transformation mechanisms affect chemical persistence, such as hydrolysis, biodegradation, photolysis, and oxidation/reduction reactions. The following general classes of compounds are discussed:

- Monocyclic aromatics
- Halogenated aliphatics
- PAHs

Site-specific discussions of biodegradation in groundwater are presented in Section 6.3.2.

6.2.1 Monocyclic Aromatics

Monocyclic aromatic compounds such as BTEX are not considered to be persistent in the environment, particularly in comparison to chemicals such as PCBs and pesticides. Monocyclic aromatics are subject to degradation via the action of both soil and aquatic microorganisms. The biodegradation of these compounds in the soil matrix is dependent on the abundance of microflora, macronutrient availability, soil reaction (pH), temperature, and other factors.

In the event that these compounds discharge to surface water bodies, volatilization and biodegradation may occur relatively rapidly. For example, a reported first-order biodegradation rate constant for benzene is 0.11 day^{-1} in aquatic systems (Lyman et al., 1990). This corresponds to an aquatic half life of approximately 6 days. Other monocyclic aromatics are subject to similar degradation processes in aquatic environments (U.S. EPA, December 1982). Other degradation processes, such as hydrolysis and photolysis, are considered to be insignificant fate mechanisms for monocyclic aromatics in aquatic systems (U.S. EPA, December 1982). However, some monocyclic aromatics such as benzene and toluene have been shown to undergo clay-, mineral-, and soil-catalyzed oxidation (Dragun, 1988).

6.2.2 Halogenated Aliphatics

Halogenated aliphatic hydrocarbons such as 1,1,2,2-tetrachloroethane and TCE are subject to abiotic dehalogenation. This process is an elimination reaction that results in the formation of an ethene from a saturated halogenated compound (Olsen and Davis, 1990). Therefore, the presence of DCA in groundwater in association with ethanes may be a result of this process. Hydrolysis, photolysis, and

oxidation are generally not considered to be significant fate processes for the chlorinated ethanes. Limited hydrolysis of saturated aliphatics (i.e., alkanes) may occur, but it does not appear to be a significant degradation mechanism for unsaturated species (i.e., alkenes) (U.S. EPA, December 1982).

6.2.3 Polynuclear Aromatic Hydrocarbons

PAHs have very low solubilities, vapor pressures, and Henry's Law constants and high K_{oc}s and K_{ow}s. The low-molecular-weight PAHs (e.g., acenaphthene, anthracene, fluorene, phenanthrene) may volatilize from surface waters, while the high-molecular-weight PAHs [e.g., benzo(a)pyrene, benzo(a)anthracene, chrysene, etc.] are less likely to volatilize. PAHs in soil are much more likely to bind to soil and be transported via mass transport mechanisms than to go into solution and be transported by groundwater movement. PAHs are subject to degradation via aerobic bacteria but may be relatively persistent in the absence of microbial population or macronutrients such as phosphorus and nitrogen.

Bioconcentration of PAHs in aquatic organisms is greater for the higher-molecular-weight compounds than the lower-molecular-weight compounds. PAHs can be bioaccumulated from water, sediments, or lower organisms in the food chain.

Landspreading applications have indicated that PAHs are highly amenable to microbial degradation in soil. The rate of degradation is influenced by temperature, pH, oxygen concentrations, initial chemical concentrations, and moisture. Photolysis, hydrolysis, and oxidation are not important fate processes for the degradation of PAHs in soil (ATSDR, 1990).

The most important processes that affect the fate of PAHs in water are photo-oxidation, chemical oxidation, and biodegradation. PAHs do not contain functional groups that are susceptible to hydrolytic action, and hydrolysis is considered to be an insignificant degradation mechanism. The rate of photodegradation is influenced by water depth, turbidity, and temperature. Benzo(a)pyrene, chrysene, fluorene, and pyrene are reported to be resistant to photodegradation. PAHs may also be oxidized by chlorination and ozonation and may be metabolized by microbes under oxygenated conditions (ATSDR, 1990).

6.3 NATURAL ATTENUATION

Fixed-base laboratory analyses and field analytical tests were performed on groundwater samples from selected wells at Sites 57 and 58 for biodegradation-related natural attenuation parameters. The fixed-base laboratory parameters included alkalinity, chloride, dissolved iron, methane, ethane, ethene, nitrate, nitrite, orthophosphate, sulfate, and dissolved sulfide. The upgradient sample from each site was also analyzed for total organic carbon (TOC). Field analytical tests included pH, specific conductivity,

temperature, turbidity, dissolved oxygen, hydrogen sulfide, sulfide, dissolved carbon dioxide, ferrous iron, ORP, and alkalinity. Fixed-base and field natural attenuation sampling method information is presented Tables 6-1 and 6-2, respectively. Natural attenuation parameter results from Site 58 are presented in Figures 6-1 through 6-6, and results for Site 58 are presented in Figures 6-7 through 6-12.

6.3.1 Natural Attenuation Overview

The following provides a general overview of the processes involved in natural attenuation via biodegradation and of the parameters collected to evaluate natural attenuation at Sites 57 and 58. Section 6.3.2 provides a site-specific evaluation of the results of natural attenuation sampling at Sites 57 and 58.

Dissolved oxygen (DO) is utilized as an electron acceptor during microbial aerobic respiration to mineralize hydrocarbons such as BTEX, which act as electron donors, into carbon dioxide and water, providing microorganisms with carbon and energy. Aerobic respiration, or oxygen reduction, is generally the most efficient process by which BTEX constituents are degraded. For chlorinated hydrocarbons, anaerobic degradation pathways are generally more efficient than aerobic pathways.

At DO concentrations greater than approximately 0.5 to 1 mg/L (aerobic conditions), microorganisms can break down natural or anthropogenic sources of carbon, including BTEX, through aerobic respiration. DO decreases as oxygen in the aquifer is consumed by these reactions, and anaerobic microbes become more successful than aerobic microbes. At DO concentrations less than 0.5 mg/L and if nitrate is present in the aquifer, microbes that use nitrate as an electron acceptor begin to increase hydrocarbon degradation through nitrate-reducing biodegradation processes. As the supply of nitrate in the aquifer is utilized, iron-reducing microbes begin to degrade hydrocarbons via iron reduction. As bio-available iron becomes depleted, sulfate-reducing microbes begin degradation of hydrocarbons via sulfate reduction. Following sulfate reduction, degradation via methanogenesis is the dominant process. In the degradation of fuel hydrocarbons, the contaminant is the carbon source and electron donor for the microbes during these reactions.

These same processes are involved in biodegradation of chlorinated compounds via reductive dechlorination. The microbial breakdown of anthropogenic organic carbon (or co-located BTEX constituents) via nitrate, iron, or sulfate reduction or methanogenesis releases hydrogen, and the hydrogen reacts with the chlorinated compounds (electron acceptors) by replacing a chlorine. Many factors, including the natural geochemical makeup of the aquifer and complex oxidation-reduction conditions, affect whether and to what degree each process can occur.

Dissolved Oxygen

In aquifers that typically exhibit aerobic conditions, DO concentrations less than 1.0 to 0.5 mg/L in contaminated areas suggest that indigenous anaerobic bacterial populations are established and actively degrading natural organic carbon or anthropogenic carbon sources (e.g., petroleum hydrocarbons) in these areas. As stated above, anaerobic biodegradation is more efficient at reducing concentrations of chlorinated contaminants compared to BTEX constituents.

Nitrate and Nitrite

During nitrate reduction, bacteria can use nitrate as an electron acceptor to degrade hydrocarbons, generating nitrite and carbon dioxide. However, nitrate may compete with chlorinated hydrocarbons as electron acceptors if present at moderate concentrations (greater than 1 mg/L). Therefore, in order for reductive dechlorination to occur, nitrate concentrations should be between 0.5 mg/L and 1.0 mg/L.

Ferrous Iron

Under anaerobic conditions, ferric iron (iron III) can be used as an electron acceptor. Ferric iron available to microorganisms cannot be measured since it is insoluble; however, soluble ferrous iron can be used as an indicator. Increasing concentrations of ferrous iron along the flow path within the plume area indicate that biodegradation by iron reduction may be occurring.

Sulfate, Sulfide, and Hydrogen Sulfide

Sulfate reduction occurs after the ferric iron electron acceptors have been exhausted. During sulfate reduction, anaerobic bacteria can use sulfate as an electron acceptor to degrade hydrocarbons. However, the chlorinated solvents themselves can be used as electron acceptors during reductive dechlorination, and sulfate may compete as an electron acceptor if present at moderate concentrations (greater than 20 mg/L). Therefore, in order for reductive dechlorination to occur, sulfate should be present but should be less than 20.0 mg/L in the plume. The process of sulfate reduction results in the generation of hydrogen sulfide. A decreasing trend in sulfate concentration, coupled with an increasing trend in hydrogen sulfide/sulfide in the direction of groundwater flow, is a strong positive indicator of a sulfate-reducing environment.

Methane, Ethene, and Ethane

During methanogenesis (an anaerobic biodegradation process), some types of bacteria utilize carbon dioxide as an electron acceptor, generating methane as a by-product of fermentation. Methane in groundwater is indicative of strong reducing conditions. The presence of methane above background

concentrations in areas of contaminated groundwater is a key indicator of biodegradation of hydrocarbons. Ethene and ethane are by-products from the reductive dechlorination of chlorinated ethanes. The presence of ethene and ethane in areas of contaminated groundwater is a key indicator of biodegradation of the chlorinated ethanes.

Oxidation-Reduction Potential

ORP of groundwater is a measure of the relative tendency of the groundwater solution to accept or donate electrons, as well as the amount of energy released during electron transfers within the solution. ORP depends upon and influences the rates and types of biodegradation processes; therefore, measurement of ORP can provide evidence of the types of biodegradation processes that are active in a particular plume or even within different portions of the same plume. In general, reductive dechlorination is possible at ORP levels of less than 50 millivolts, and reductive pathways are likely at ORP levels of less than -100 millivolts. However, great care must be taken during the evaluation of ORP data because most natural waters usually have mixed potentials that cannot be related to a single electron couple. ORP should only be used as a qualitative indicator of the overall oxidation-reduction state of an aquifer.

Total Organic Carbon

Because chlorinated hydrocarbons are used as electron acceptors during reductive dechlorination, there needs to be a sufficient supply of organic carbon as the primary substrate for microbial growth. Such a supply can come from native organic carbon in the aquifer or other anthropogenic sources such as BTEX. Organic carbon concentrations greater than 20 mg/L in the aquifer indicate a sufficient supply of carbon to act as the primary substrate. TOC is a measure of the natural and anthropogenic carbon present in the aquifer.

Carbon Dioxide and Alkalinity

Carbon dioxide is both produced and utilized during the biodegradation of hydrocarbons. Carbon dioxide is produced during aerobic respiration and during anaerobic processes of denitrification, iron reduction, and sulfate reduction. Carbon dioxide is utilized during the anaerobic process of methanogenesis as an electron receptor in the generation of methane as a by-product of fermentation. Carbon dioxide concentrations approximately two times the concentrations in the background wells are an indication that biodegradation processes (except methanogenesis) are occurring.

Alkalinity is a measure of the aquifier's buffering (neutralizing) capacity of acids in water and is expressed as a concentration of calcium carbonate. Alkalinity can give a general indication of the amount of carbon dioxide generated in a plume.

Chloride

Chloride is released into groundwater during dechlorination of a solvent plume. Therefore, an increase in chloride ion concentration in the downgradient direction can provide direct evidence that dechlorination is occurring.

pH

pH is a measurement of the hydrogen ion (H^+) concentration in terms of its negative. The scale ranges from 0 to 14; values less than 7 are considered acidic and values greater than 7 are considered basic. pH affects the presence and efficiency of bacterial populations in natural groundwater conditions. Neutral groundwater (i.e., pH 7) is the preferred condition for most microbes.

Temperature

The temperature of groundwater affects the solubility of oxygen and other geochemical species, as well as the metabolic activity of bacteria. Microbes are generally more active and efficient in warmer water. Biochemical processes are accelerated at temperatures greater than approximately 20 degrees Celsius.

6.3.2 Natural Attenuation Evaluation

6.3.2.1 Site 57

DO concentrations at Site 57 were 1.0 mg/L or less in eight of the nine wells sampled for natural attenuation indicator parameters, indicating that groundwater conditions are generally anaerobic across the majority of the site (with the exception of the immediate area of the biosparge system). Nitrate was detected in CEF-293-22 and CEF-293-11 at concentrations ranging from 2.6 to 42.4 mg/L, respectively. At these levels, nitrate could limit reductive dechlorination by competing with chlorinated hydrocarbons as electron acceptors; however, only BTEX components were detected in this area of the site. Nitrite was detected in wells farther downgradient of the area, suggesting that nitrate reduction may be occurring at the site. Ferrous iron concentrations greater than 1 mg/L were detected in CEF-293-19 (1.18 mg/L) and CEF-824A-09S (1.06 mg/L). Iron reduction may be occurring in the areas of these wells. Concentrations of sulfate generally decreased and concentrations of sulfide and hydrogen sulfide generally increased in a downgradient direction, suggesting sulfide reduction.

Methane concentrations were more than two times the background concentration in six of the eight downgradient wells sampled for natural attenuation parameters, suggesting methanogenesis in these areas. ORP values were less than 50 millivolts in eight of nine wells sampled and less than -100 millivolts

in seven of nine wells. This indicates that reductive pathways are generally favored across the site. The TOC concentration in the upgradient well was 39.5 mg/L, indicating an adequate supply of natural carbon to be used in reductive dechlorination processes. In addition to this natural energy source, anthropogenic carbon in the form of BTEX contamination is also available at the site.

Carbon dioxide and alkalinity data do not provide any supporting evidence for biodegradation at the site because source area and downgradient concentrations were less than two times the upgradient concentrations. Chloride was not detected in the upgradient well but was detected in five of the source area and downgradient wells, suggesting that chloride is being released in these areas as a result of reductive dechlorination. At Site 57, pH values ranged from 4.80 to 6.31, indicating a generally favorable environment for reductive pathways. Temperature values ranged from 24.82 to 29.09 degrees Celsius indicating favorable conditions for biochemical processes.

Natural attenuation indicator parameter data from Site 57 suggest that anaerobic biodegradation processes occurring at the site include nitrate reduction, iron reduction, sulfate reduction, and methanogenesis. In the area of the site east of Building 846, data support biodegradation via sulfate reduction and methanogenesis and, in the CEF-293-19 and CEF-824A-09S areas, iron reduction. In addition, chlorinated compound breakdown products were detected in several wells in this area, also suggesting reductive dechlorination processes. Evaluation of contaminant concentration trends in this area is complicated by the free product west of this area potentially acting as a continuing source of groundwater contamination.

Data from CEF-293-20 suggest that reductive dechlorination of TCE by methanogenesis and sulfate reduction using BTEX as a carbon source is occurring in this area. This is supported by a decrease in TCE and BTEX constituents and an increase in the TCE breakdown product cis-1,2-DCE. Southeast of Building 824A, data suggest sulfate and nitrate reduction in the areas of CEF-824A-04S and CEF-824A-07S and methanogenesis and iron reduction in the CEF-824A-07S area. In CEF-824A-07S, the expected decreases in BTEX and TCE and increase in breakdown products are observed.

6.3.2.2 Site 58

DO concentrations in source area and downgradient wells were less than 1.0 mg/L, indicating anaerobic conditions across the site. Upgradient aerobic conditions and anaerobic conditions in the area of contamination may indicate that aerobic biodegradation of BTEX constituents has depleted DO levels. Nitrate was detected in the upgradient well only at a concentration of 0.14 mg/L, and nitrite was not detected in the five wells sampled for natural attenuation parameters. The lack of nitrate indicates that it is not competing with chlorinated hydrocarbons as an electron acceptor. The lack of nitrite indicates that nitrate reduction is not a viable biodegradation pathway at the site. Iron reduction is suggested by

concentrations of ferrous iron (greater than 1 mg/L) in source area and downgradient wells. Sulfate was detected in CEF-B312-01S only at a concentration of 24.3 mg/L. Hydrogen sulfide and field sulfide concentrations were highest in CEF-B312-01S also. The lack of a trend of decreasing sulfate and increasing hydrogen sulfide and sulfide in a downgradient direction suggests that sulfate reduction is not a major biodegradation pathway at the site.

Methane was not detected in the upgradient well, and concentrations in source and downgradient wells ranged from 91.6 to 1,290 µg/L. These results suggest the biodegradation via methanogenesis is occurring at the site. ORP values generally suggest conditions favorable to reductive pathways; three of the four source and downgradient wells had ORP values of less than -100 millivolts. The TOC concentration in the upgradient well was 25.6 mg/L, indicating a sufficient supply of naturally occurring carbon in the site area to be used as an energy source. In addition, petroleum hydrocarbon-related contaminants at the site can also be used as an energy source for biochemical reactions.

Carbon dioxide results do not provide evidence of biodegradation; source area and downgradient concentrations are less than two times the upgradient concentration. However, field and laboratory alkalinity results in CEF-B312-01S and CEF-B312-03S are greater than two times the background concentration, which may suggest the generation of carbon dioxide as a result of biodegradation. Chloride was not detected in wells analyzed for natural attenuation parameters. At Site 58, pH values, ranging from 4.92 to 6.72, indicated an environmental generally favorable to reductive pathways. Groundwater temperature readings at the site indicated an environment favorable to biochemical processes.

Natural attenuation indicator parameter data from Site 58 suggest that anaerobic biodegradation is occurring at the site via processes including iron reduction and methanogenesis. In addition, chlorinated compound breakdown products were detected in several wells (CEF-B312-01S, CEF-B312-2S, CEF-B312-03S, and CEF-B312-05S), also suggesting reductive dechlorination processes.

This page intentionally left blank.

TABLE 6-1

ENVIRONMENTAL FATE AND TRANSPORT PARAMETERS FOR ORGANIC CHEMICALS
OPERABLE UNIT 9, SITES 57 AND 58 REMEDIAL INVESTIGATION REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Parameter	Specific Gravity (g/mL at 20/4°C)	Vapor Pressure (mm Hg at 20°C)	Solubility in Water (mg/L at 25°C)	Octanol/Water Partition Coefficient	Organic Carbon Partition Coefficient	Henry's Law Constant (atm-m^3/mole at 25°C)
MONOCYCLIC AROMATICS						
Benzene	0.8765 (15 °C)	75	1750 [1]	135	58.9 [1]	5.50E-3
Ethylbenzene	0.8670	7	152 (20°C)	1413	363 [1]	7.90 to 8.43E-3
Toluene	0.8669	28 (25°C)	535	525	182 [1]	5.94E-3
Xylenes (Total)	0.86104 to 0.8801	6 to 16	134 to 213	1318 to 1585	363 to 407 [1]	5.19E-3 to 7.66E-3
HALOGENATED ALIPHATICS						
1,1-Dichloroethane	1.1747	182	5500 (20°C)	61.7	31.3 [1]	0.042
1,1-Dichloroethene	1.213	500	2500	20.9	58.9 [1]	0.19
cis-1,2-Dichloroethene	1.2837	180	3500	72.4	35.5 [1]	4.08E-3 (24.8°C)
Trichloroethene	1.465	74 (25°C)	1366	263	166 [1]	0.011
Vinyl chloride	0.9106	2,530	2763	22.9	18.6 [1]	2.78E-2 [1]
POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)						
1-Methylnaphthalene	1.0202	0.068	24.6	1950	NA	3.60E-4
2-Methylnaphthalene	1.0058	0.054	25.8 (20°C)	7413	2455	4.99E-4
Naphthalene	1.162	0.087	31.7 (20°C)	7244	2000 [1]	4.60E-4

NA = Not available.
References, unless otherwise noted, ATSDR Toxicological Profiles.

Benzene: ATSDR, 1997.
Ethylbenzene: ATSDR, 1999.
Toluene: ATSDR, 2000.
Xylenes: ATSDR, 1995.
1,1-DCA: ATSDR, 1990.
Naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene: ATSDR, 1995.
1,1-DCE: ATSDR, 1994.
1,2-DCE: ATSDR, 1996.
TCE: ATSDR, 1997.
Vinyl chloride: ATSDR, 1997.

1 U.S. EPA, July 1996b, Soil Screening Guidance.

TABLE 6-2

SUMMARY OF NATURAL ATTENUATION INDICATOR PARAMETERS IN GROUNDWATER
OPERABLE UNIT 9, SITE 57, BUILDING 824A/DAY TANK 1 AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 1 OF 2

PARAMETER	UNITS	CEF-293-4	CEF-293-11	CEF-293-13	CEF-293-19	CEF-293-20
Alkalinity	mg/L	41.8	20.6	5 U	20	5.7
Alkalinity, field	mg/L	164	65	<10	66.4	23.9
Carbon dioxide	mg/L	155	190	19	300	225
Chloride	mg/L	20 U	23.1	20 U	40.9	20 U
Ferrous iron	mg/L	0.05	0.02	0.03	1.18	0.46
Dissolved oxygen	mg/L	1.0	0.25	1.0	0.2	1.0
Dissolved sulfide	mg/L	2 U	2 U	2 U	3.2	2 U
Hydrogen sulfide	mg/L	0	2.0	0	2.0	>5
Field sulfide	mg/L	0.02	>0.80	0.05	>0.80	>0.80
Nitrate	mg/L	0.1 U	2.6	9.2	0.1 U	0.1 U
Nitrite	mg/L	0.1 U	0.1 U	0.5 U	0.1 U	0.1 U
Orthophosphate	mg/L	0.1 U	0.1 UJ	0.1 U	0.1 UJ	0.1 UJ
pH	St. units	6.31	5.83	5.43	5.65	5.11
ORP	mV	-125	-155	-81	-167	-140
Specific conductance	mS/cm	0.299	0.232	0.192	0.201	0.118
Sulfate	mg/L	20 U	20 U	21.8	20 U	20 U
Temperature	°C	24.82	26.82	25.90	29.09	26.00
TOC (1)	mg/L	39.5	NA	NA	NA	NA
Turbidity	NTU	0	0	12.4	2.8	8.9
Ethane	ug/L	1 U	1 U	1 U	1 U	1 U
Ethene	ug/L	1 U	1 U	1 U	1 U	1 U
Methane	ug/L	90.2	1693	4.8	5352	500
Iron, filtered	ug/L	96.4	26.9 U	26.0 U	1170	499

TABLE 6-2

SUMMARY OF NATURAL ATTENUATION INDICATOR PARAMETERS IN GROUNDWATER
OPERABLE UNIT 9, SITE 57, BUILDING 824A/DAY TANK 1 AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 2 OF 2

PARAMETER	UNITS	CEF-293-22	CEF-824A-4S	CEF-824A-7S	CEF-824A-9S
Alkalinity	mg/L	14.3	5 U	5 U	5 U
Alkalinity, field	mg/L	45	10.5	<10	144
Carbon dioxide	mg/L	140	220	170	210
Chloride	mg/L	39.2	20 U	20 U	22.7
Ferrous iron	mg/L	0.02	0.43	0.62	1.06
Dissolved oxygen	mg/L	0.6	0.5	0.9	1.1
Dissolved sulfide	mg/L	2 U	8.7	2 U	2 U
Hydrogen sulfide	mg/L	0	>5	>5	5
Field sulfide	mg/L	0.02	>0.80	>0.80	>0.80
Nitrate	mg/L	42.4	0.1 U	0.1 U	0.1 U
Nitrite	mg/L	2 U	0.1	0.13	0.1 U
Orthophosphate	mg/L	0.1 UJ	0.1 UJ	0.1 UJ	0.1 UJ
pH	St. units	5.38	4.88	4.81	4.80
ORP	mV	168	-152	-148	-103
Specific conductance	mS/cm	0.96	0.073	0.056	0.080
Sulfate	mg/L	120	20 U	20 U	20 U
Temperature	°C	27.60	28.47	28.10	29.00
TOC (1)	mg/L	NA	NA	NA	NA
Turbidity	NTU	7.2	1.08	0	0
Ethane	ug/L	1 U	1 U	1 U	1 U
Ethene	ug/L	1 U	1 U	1 U	1 U
Methane	ug/L	232	2040	370	534
Iron, filtered	ug/L	59.5	474	503	1210

U = Not detected at or above method detection limit (associated value).
J = Estimated concentration.
NA = Not analyzed.
mS/Cm = microSiemens/centimeter.
°C = degrees Celcius.
1 TOC analysis for upgradient well (CEF-293-04) only.

NTU = Nephelometric turbidity units.
BOD = Bioloigcal oxygen demand.
COD = Chemical oxygen demand.
TOC = Total organic carbon.
ORP = Oxidation-reduction potential.

TABLE 6-3

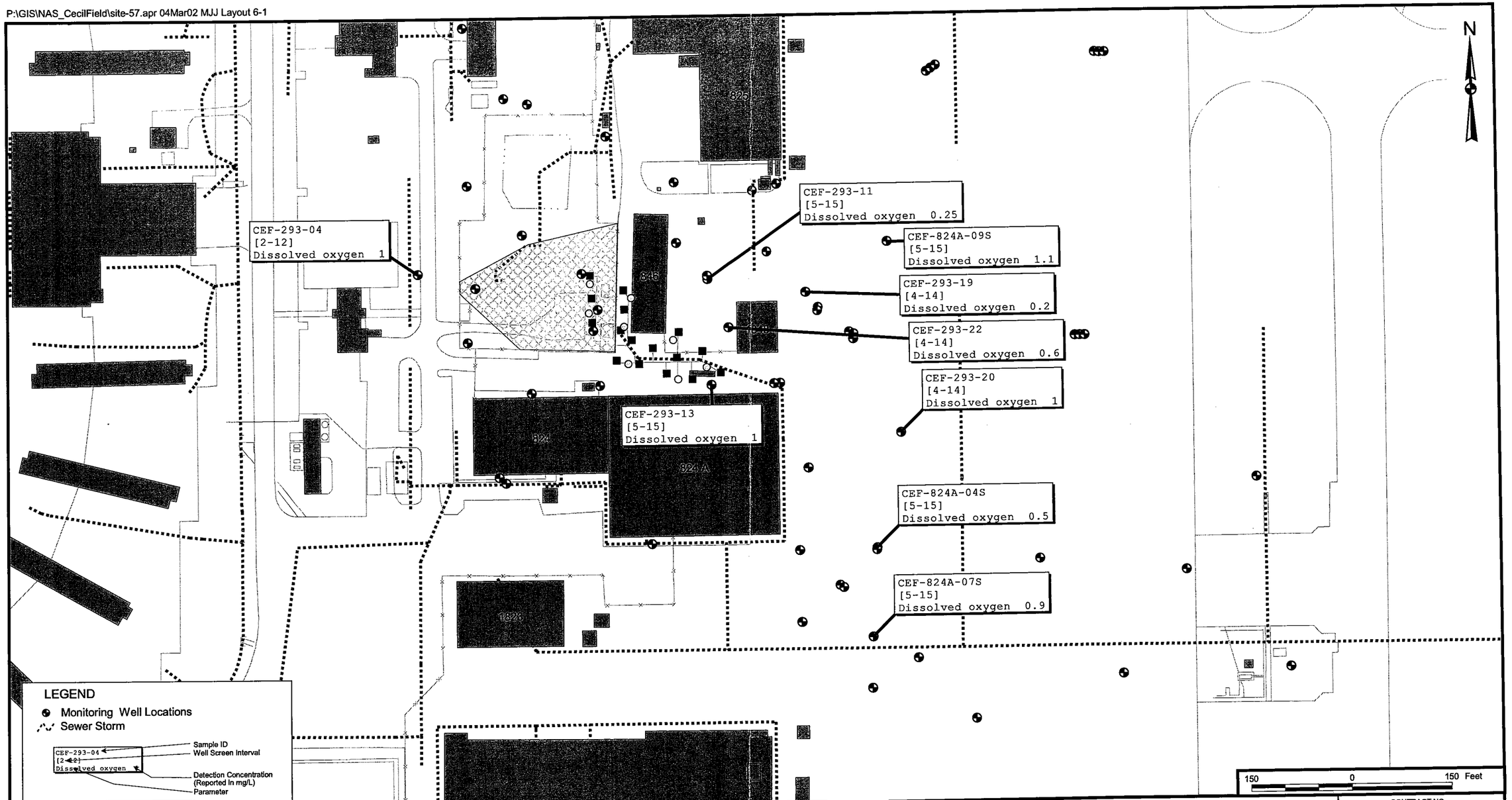
SUMMARY OF NATURAL ATTENUATION INDICATOR PARAMETERS IN GROUNDWATER
OPERABLE UNIT 9, SITE 58 - BUILDING 312
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

PARAMETER	UNITS	CEF-B312-01S	CEF-B312-02S	CEF-B312-03S	CEF-B312-05S	CEF-312LS-01Sa
Alkalinity	mg/L	60.1	10.3	104	5 U	29.2
Alkalinity, field	mg/L	222	45.2	414	3.5	112
Carbon dioxide	mg/L	<10	140	110	70	112
Chloride	mg/L	20 U	20 U	20 U	20 U	20 U
Ferrous iron	mg/L	>3.3	5.8	>3.3	>3.3	0.01
Dissolved oxygen	mg/L	0.1	0.07	0.4	0.07	2.0
Dissolved sulfide	mg/L	2 U	2 U	2 U	2 U	2 U
Hydrogen sulfide	mg/L	1.0	0.7	0.5	0.5	0
Field sulfide	mg/L	0.48	0.16	0.13	0.19	0
Nitrate	mg/L	0.1 U	0.1 U	0.1 U	0.1 U	0.14
Nitrite	mg/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Orthophosphate	mg/L	0.1 UR	0.1 U	0.1 UR	0.1 UR	0.1 U
pH	St. units	6.10	5.54	6.72	4.92	6.68
ORP	mV	-143	-141	-156	61	66
Specific conductance	mS/cm	0.451	0.168	0.613	0.094	0.236
Sulfate	mg/L	24.3	20 U	20 U	20 U	20 U
Temperature	°C	26.1	27.0	30.2	27.2	27.0
TOC (1)	mg/L	NA	NA	NA	NA	25.6
Turbidity	NTU	2.1	0	0.85	3.2	0
Ethane	ug/L	1 U	1 U	1 U	1 U	1 U
Ethene	ug/L	1 U	1 U	1 U	1 U	1 U
Methane	ug/L	1290	734	375	86.6	0.5 U
Iron, filtered	ug/L	418	20200	5400	5460	33.2 U

U = Not detected at or above method detection limit (associated value).
J = Estimated concentration.
UR - Nondetected result rejected due to holding time noncompliance.
NA = Not analyzed.
mS/Cm = microSiemens/centimeter.
°C = degrees Celcius.
1 TOC analysis for upgradient well (CEF-312LS-01Sa) only.

NTU = Nephelometric turbidity units.
BOD = Bioloigcal oxygen demand.
COD = Chemical oxygen demand.
TOC = Total organic carbon.
ORP = Oxidation-reduction potential.

P:\GIS\NAS_CecilField\site-57.apr 04Mar02 MJJ Layout 6-1



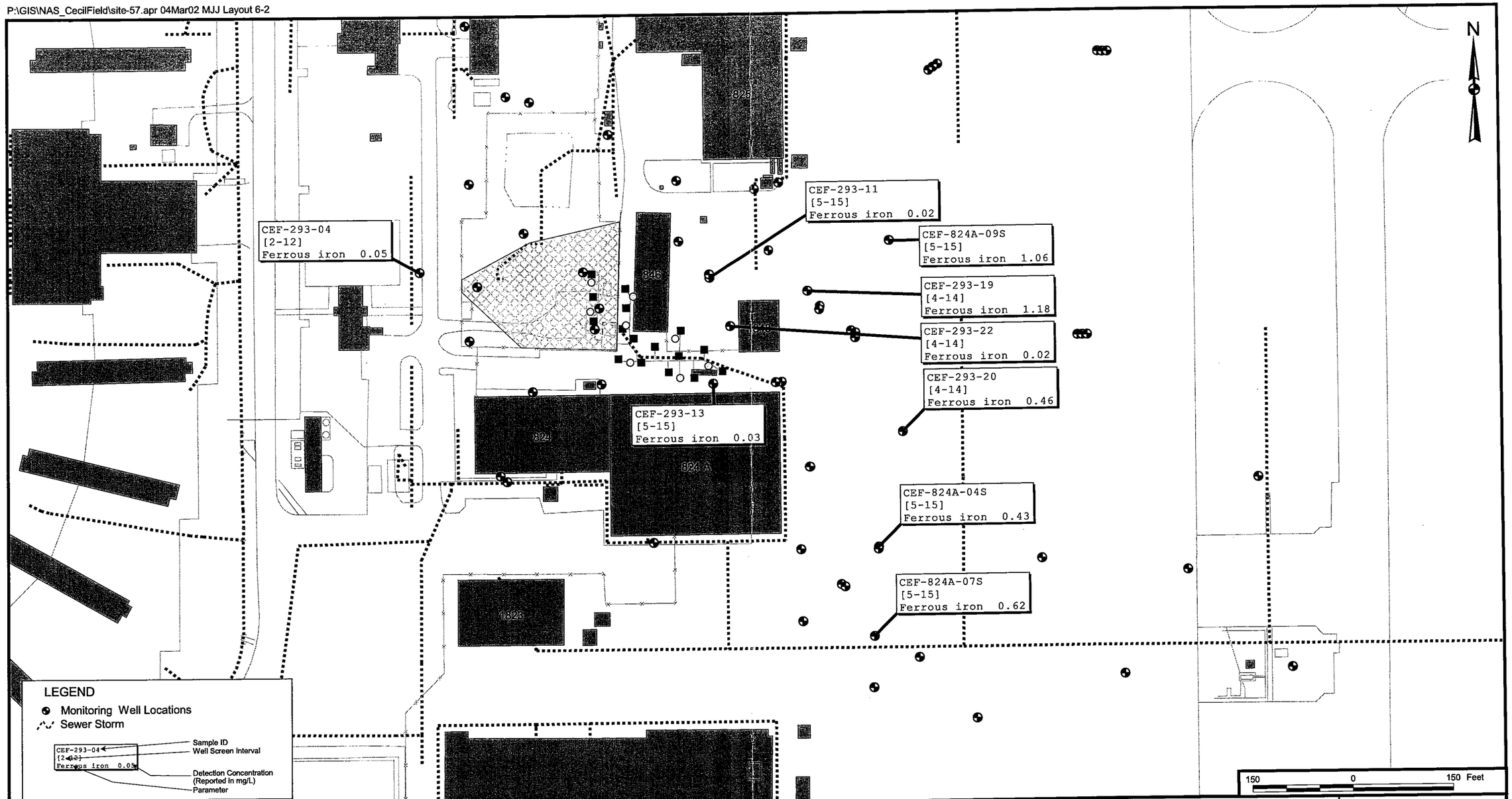
NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY MJJ — DATE 12Feb02
CHECKED BY — DATE
COST/SCHED-AREA
SCALE AS NOTED

DISSOLVED OXYGEN - RI DATA
OU 9, SITE-57
BUILDING 824A / DAY TANK 1 AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 0039
APPROVED BY — DATE
APPROVED BY — DATE
DRAWING NO. FIGURE 6-1 — REV. 0

P:\GIS\NAS_CecilField\site-57.apr 04Mar02 MJJ Layout 6-2



NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

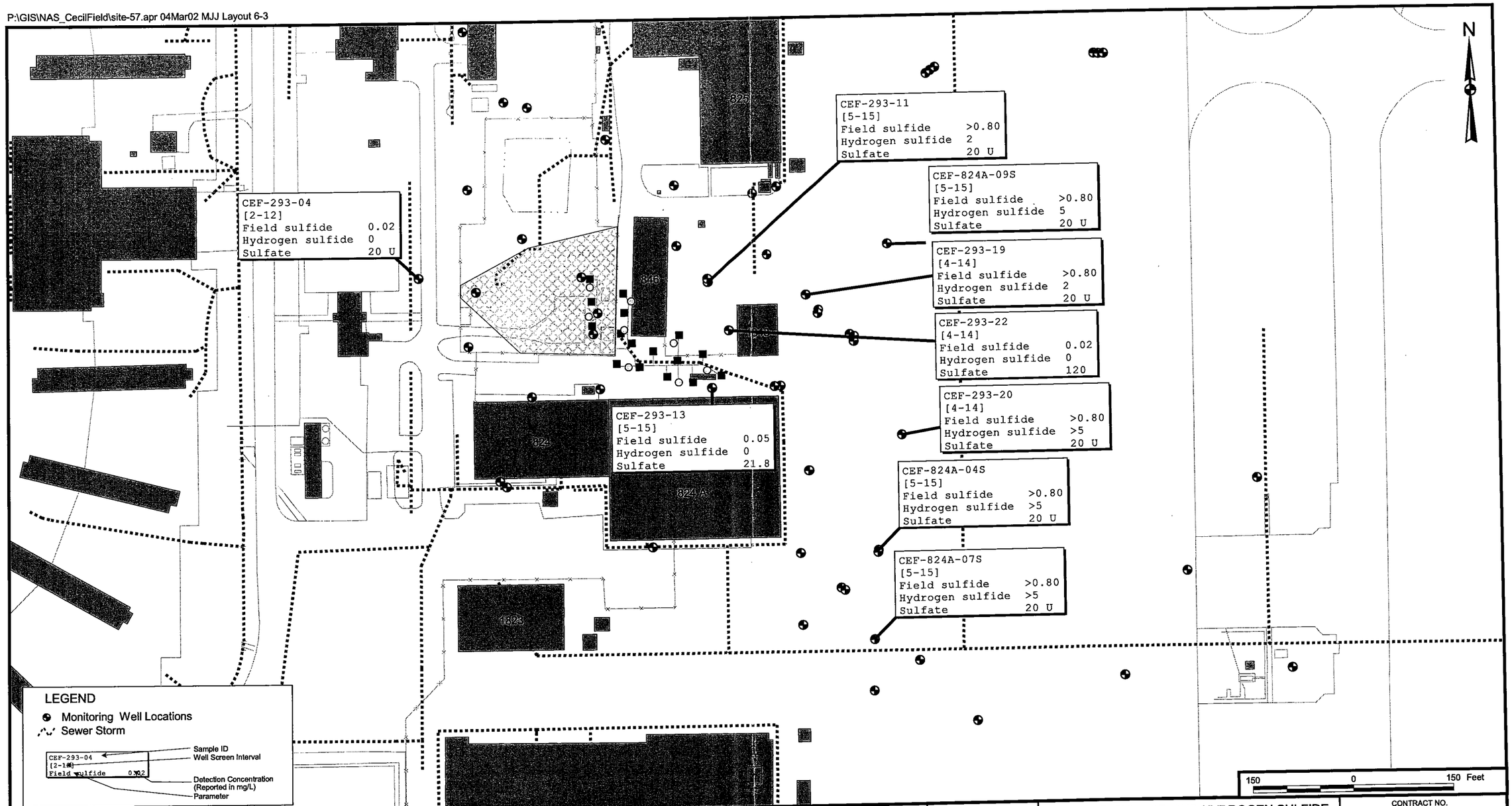
DRAWN BY MJJ	DATE 12Feb02
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	

FERROUS IRON - RI DATA
OU 9, SITE-57
BUILDING 824A / DAY TANK 1 AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 0039	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 6-2	REV. 0

Figure 6-2 Backside

P:\GIS\NAS_CecilField\site-57.apr 04Mar02 MJJ Layout 6-3



NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

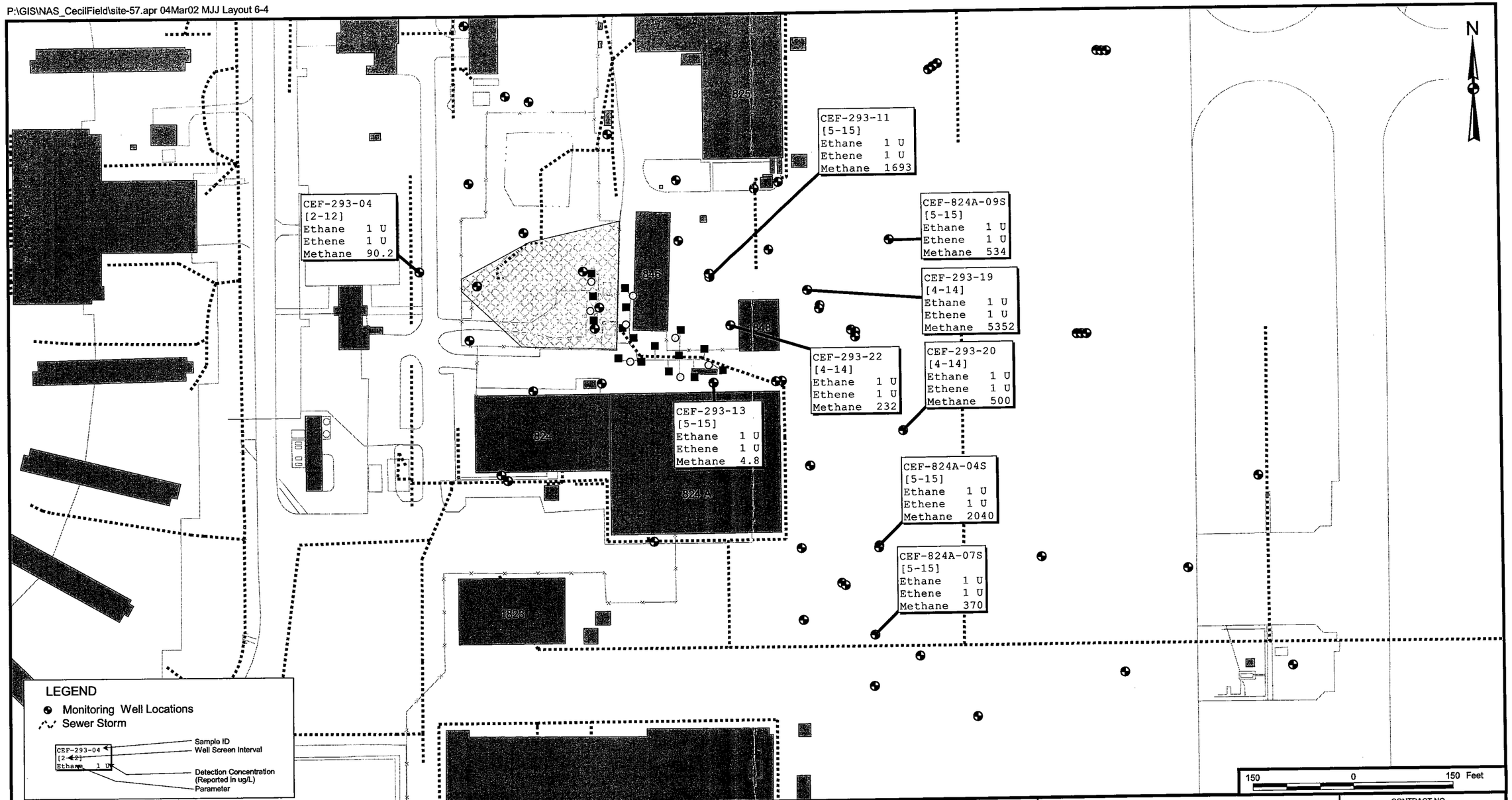
DRAWN BY MJJ	DATE 12Feb02
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	

SULFATE, SULFIDE, AND HYDROGEN SULFIDE
RI DATA
OU 9, SITE-57
BUILDING 824A / DAY TANK 1 AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 0039	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 6-3	REV. 0

Figure 6-3 Backside

P:\GIS\NAS_CecilField\site-57.apr 04Mar02 MJJ Layout 6-4



NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

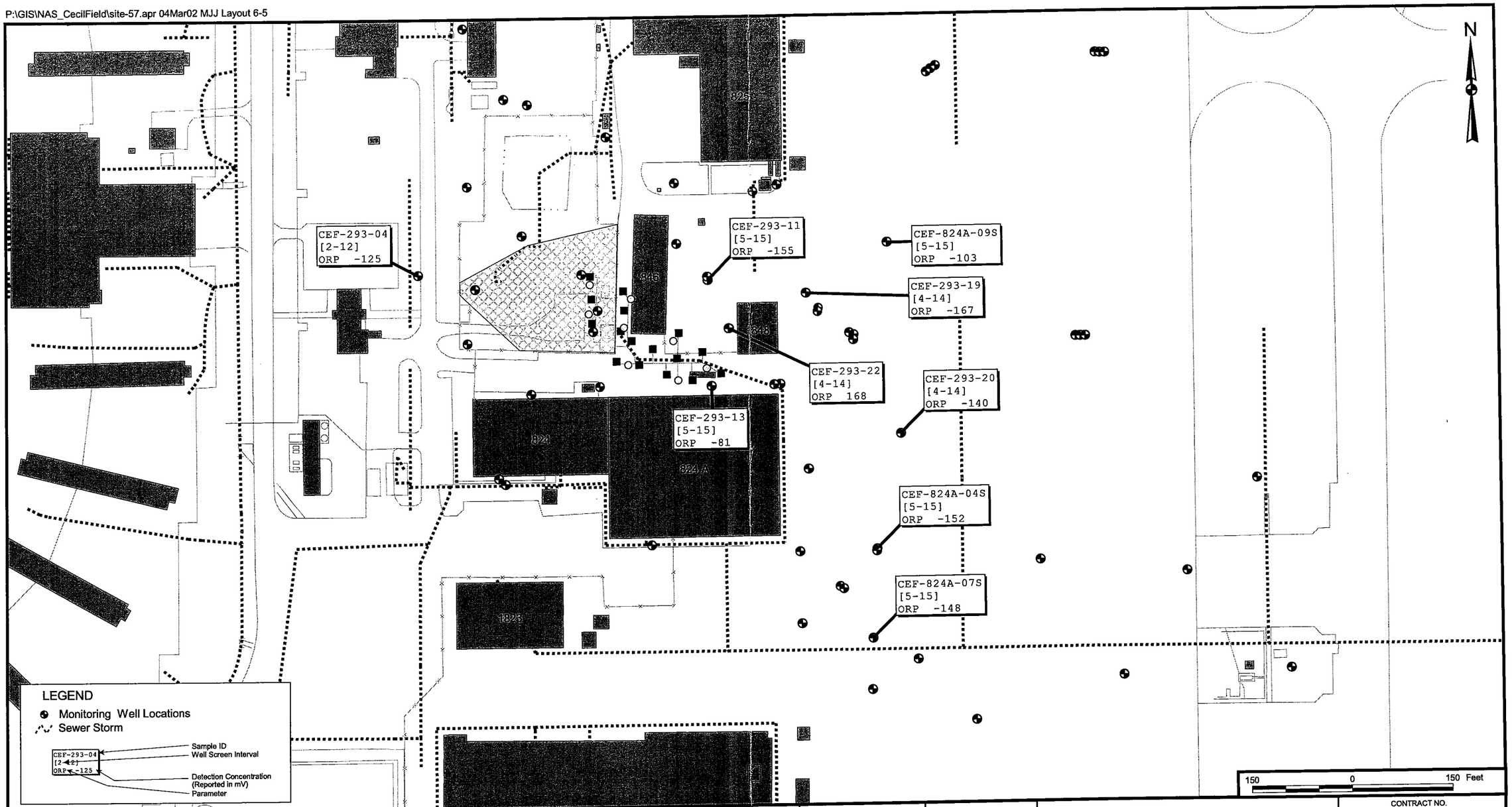
DRAWN BY MJJ	DATE 12Feb02
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	

METHANE, ETHANE, AND ETHENE - RI DATA
OU 9, SITE-57
BUILDING 824A / DAY TANK 1 AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 0039	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 6-4	REV. 0

Figure 6-4 Backside

P:\GIS\NAS_CecilField\site-57.apr 04Mar02 MJJ Layout 6-5



NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

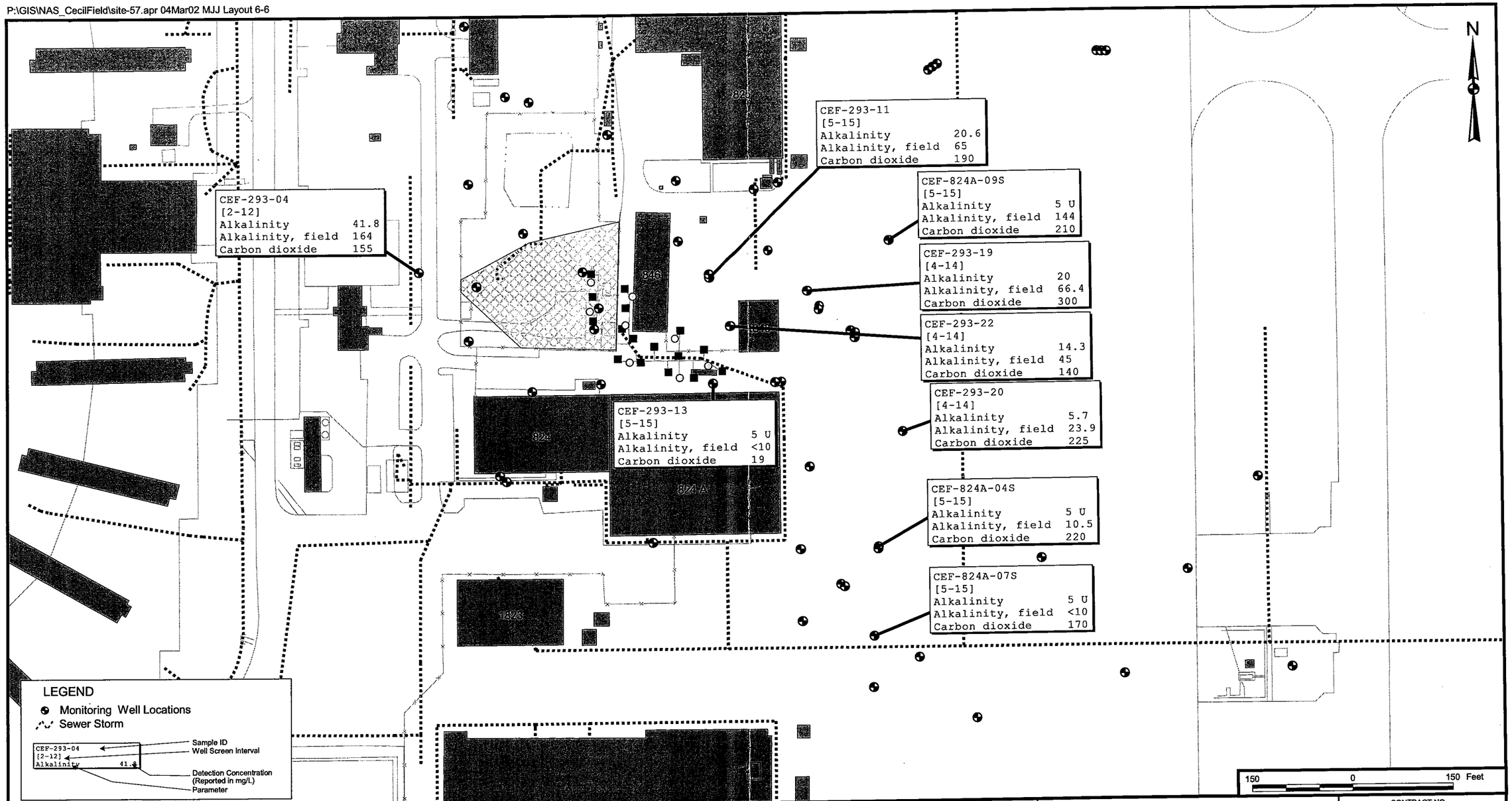
DRAWN BY MJJ	DATE 12Feb02
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	

OXYGEN REDUCTION POTENTIAL - RI DATA
OU 9, SITE-57
BUILDING 824A / DAY TANK 1 AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 0039	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 6-5	REV. 0

Figure 6-5 Backside

P:\GIS\NAS_CecilField\site-57.apr 04Mar02 MJJ Layout 6-6



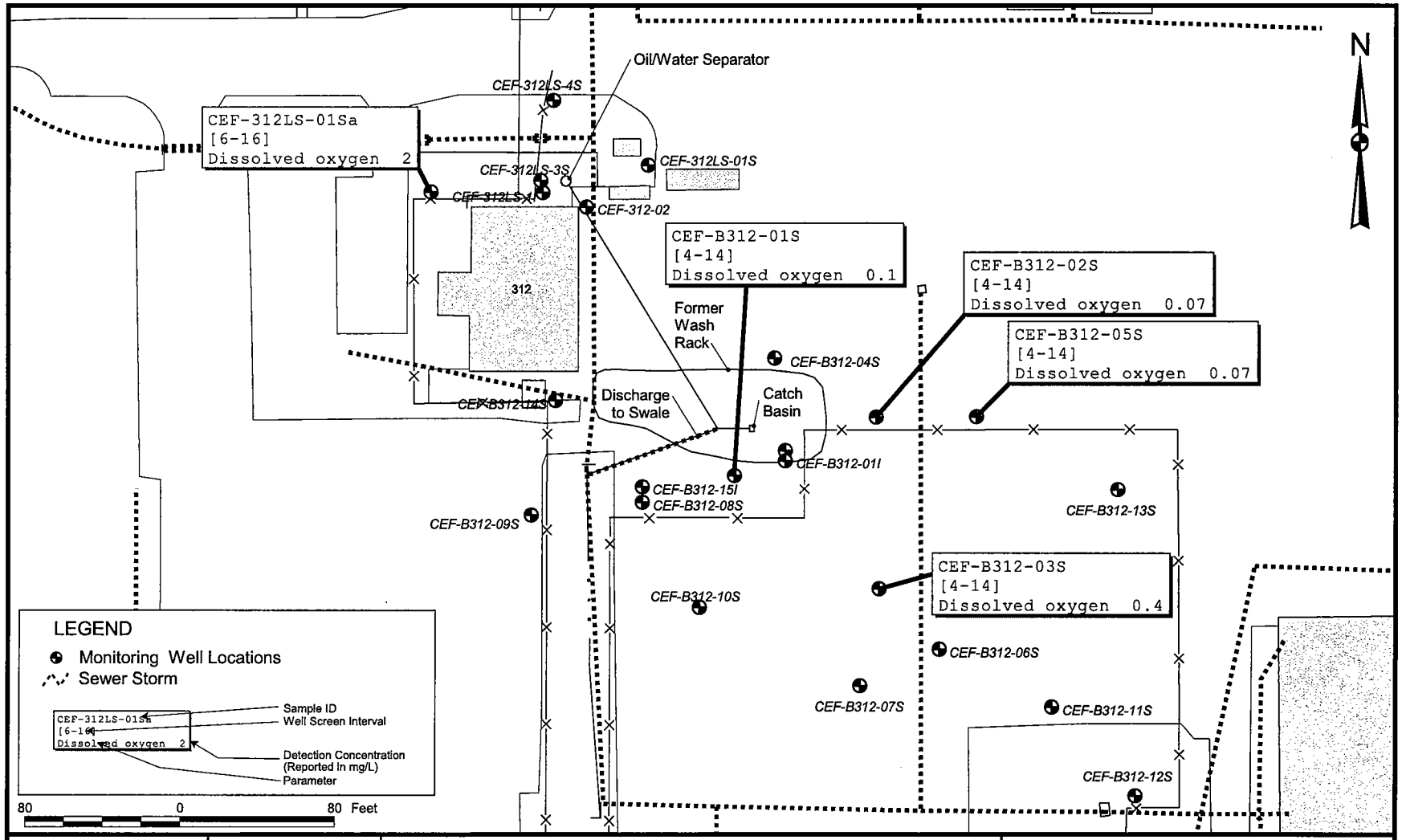
NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY MJJ	DATE 12Feb02
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	

CARBON DIOXIDE AND ALKALINITY - RI DATA
OU 9, SITE-57
BUILDING 824A / DAY TANK 1 AREA
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 0039	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 6-6	REV. 0

Figure 6-6 Backside

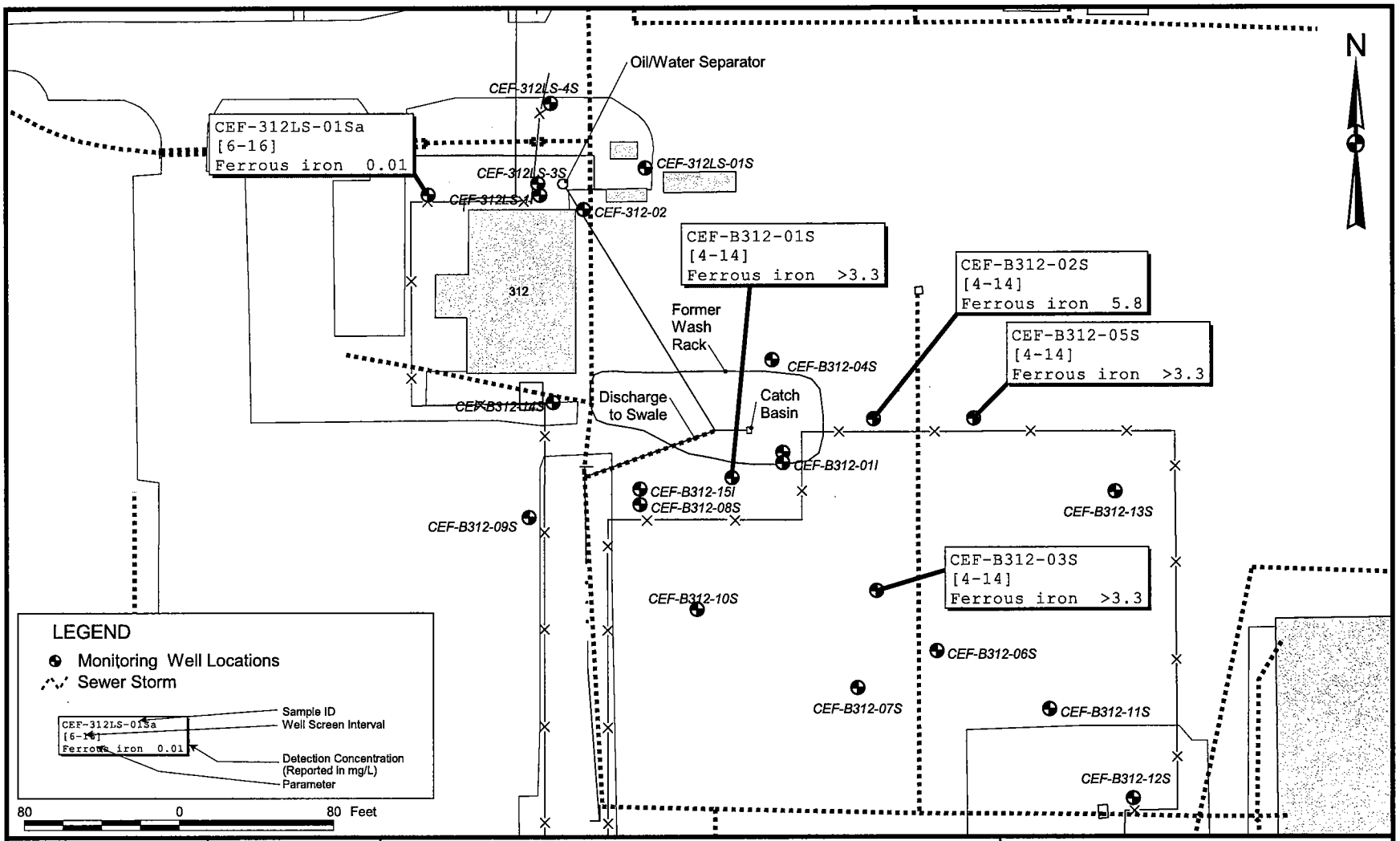


DRAWN BY	DATE
MJJ	12Feb02
CHECKED BY	DATE
COST/SCHEDULE-AREA	
SCALE	AS NOTED

DISSOLVED OXYGEN - RI DATA
OU 9, SITE 58 - BUILDING 312
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

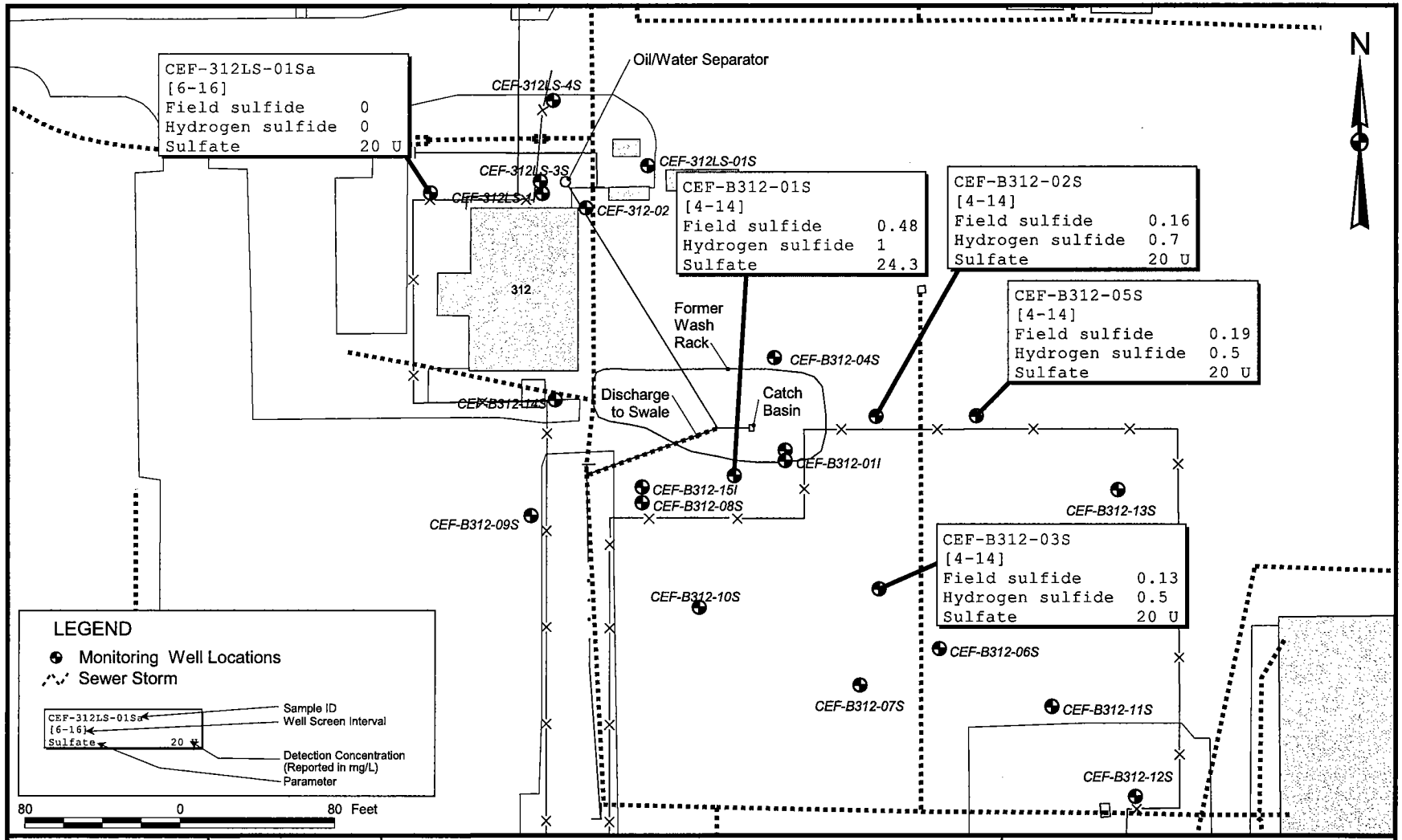
CONTRACT NUMBER	
0039	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 6-7	REV 0

P:\GIS\NAS_CecilField\site-58.apr 12Feb02 MJJ Layout 6-7



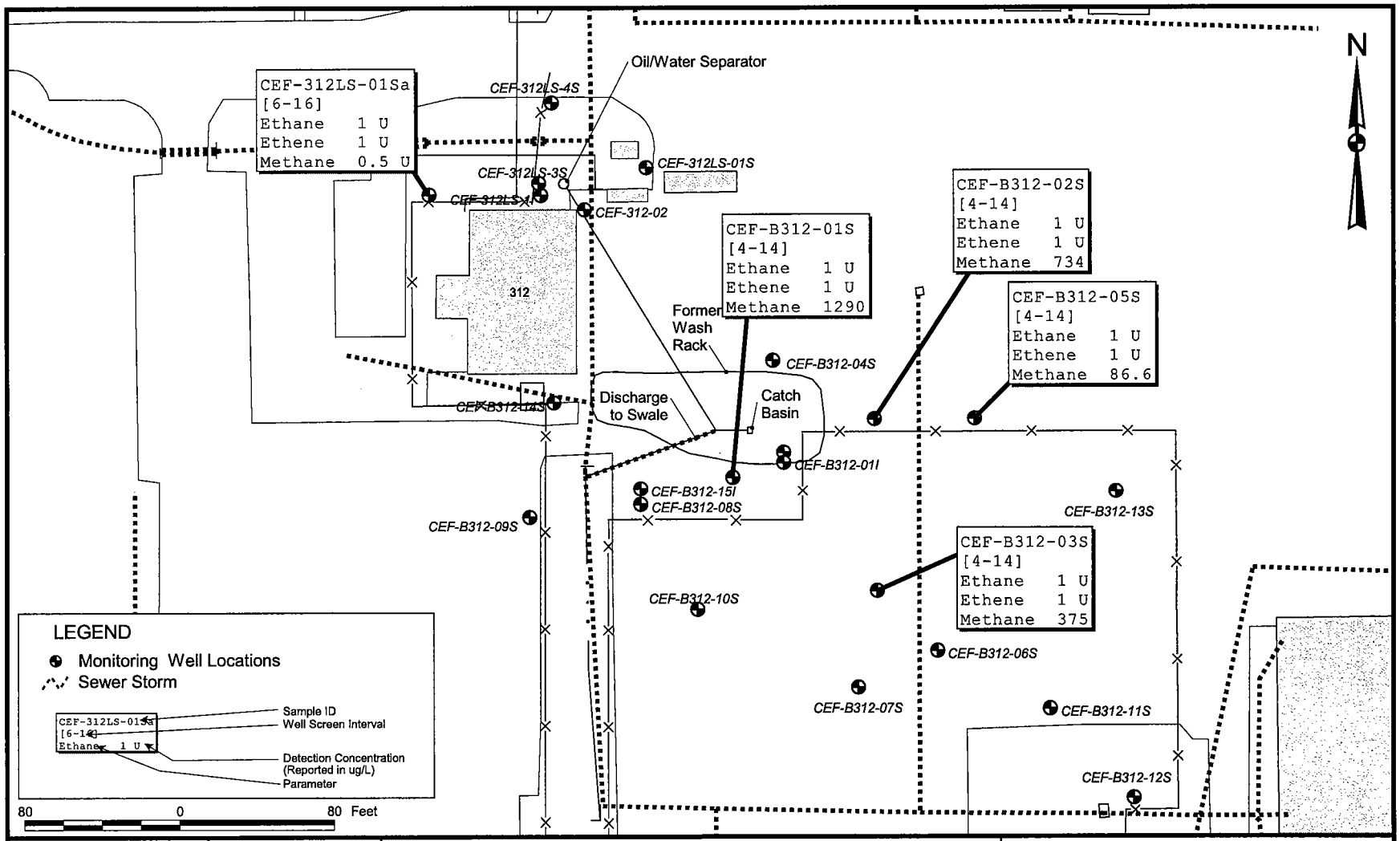
DRAWN BY	DATE			CONTRACT NUMBER
MJJ	12Feb02		FERROUS IRON - RI DATA	0039
CHECKED BY	DATE		OU 9, SITE 58 - BUILDING 312	APPROVED BY / DATE
COST/SCHEDULE-AREA			NAVAL AIR STATION CECIL FIELD	APPROVED BY / DATE
SCALE			JACKSONVILLE, FLORIDA	DRAWING NO. FIGURE 6-8 / REV 0
AS NOTED				

P:\GIS\NAS_CecilField\site-58.apr 12Feb02 MJJ Layout 6-8



DRAWN BY MJJ	DATE 12Feb02	SULFATE, SULFIDE, AND HYDROGEN SULFIDE - RI DATA OU 9, SITE 58 - BUILDING 312 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 0039
CHECKED BY	DATE		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 6-9 REV 0

P:\GIS\NAS_CecilField\site-58.apr 12Feb02 MJJ Layout 6-9

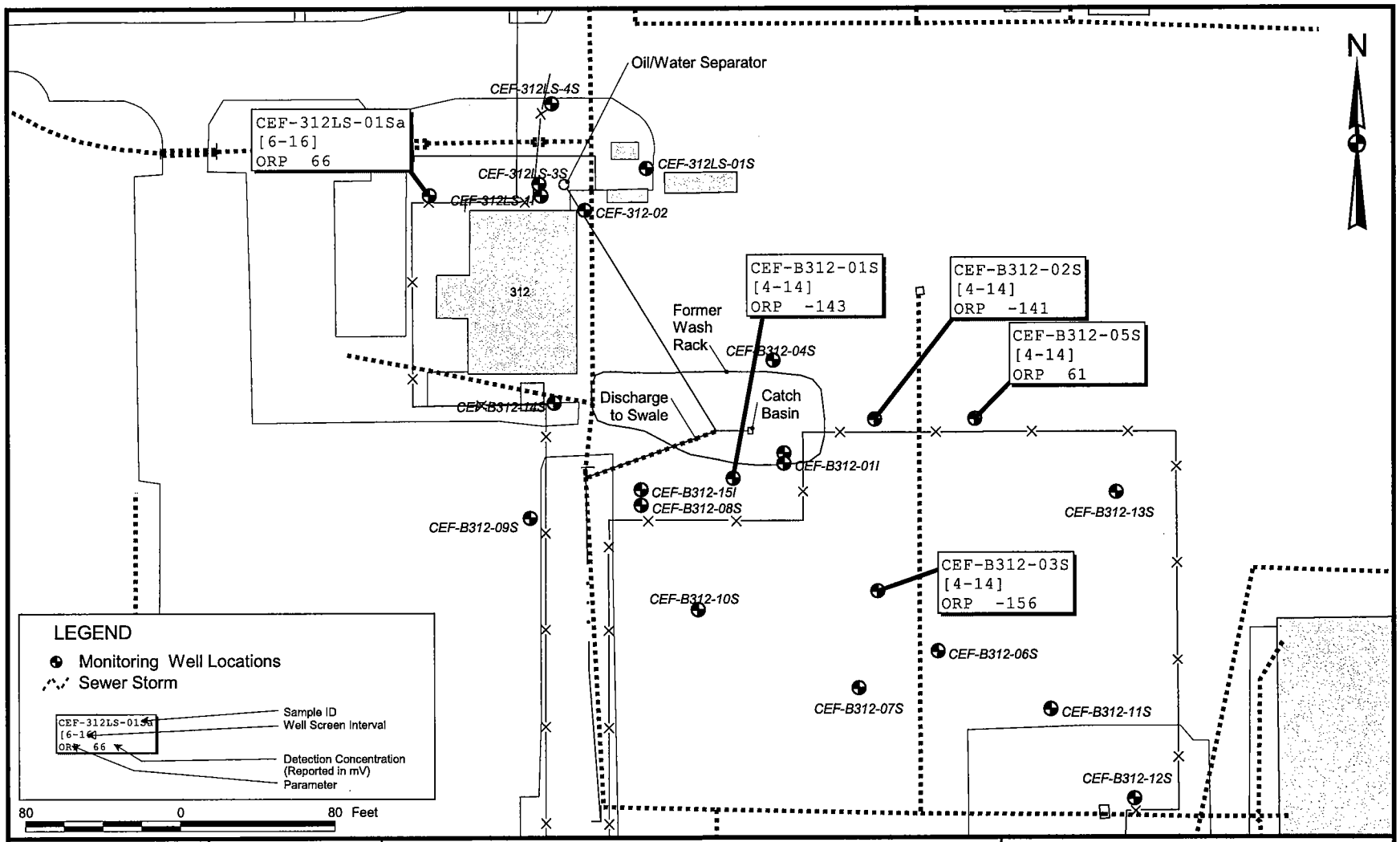


DRAWN BY	DATE
MJJ	12Feb02
CHECKED BY	DATE
COST/SCHEDULE-AREA	
SCALE AS NOTED	

METHANE, ETHANE, AND ETHENE - RI DATA
OU 9, SITE 58 - BUILDING 312
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

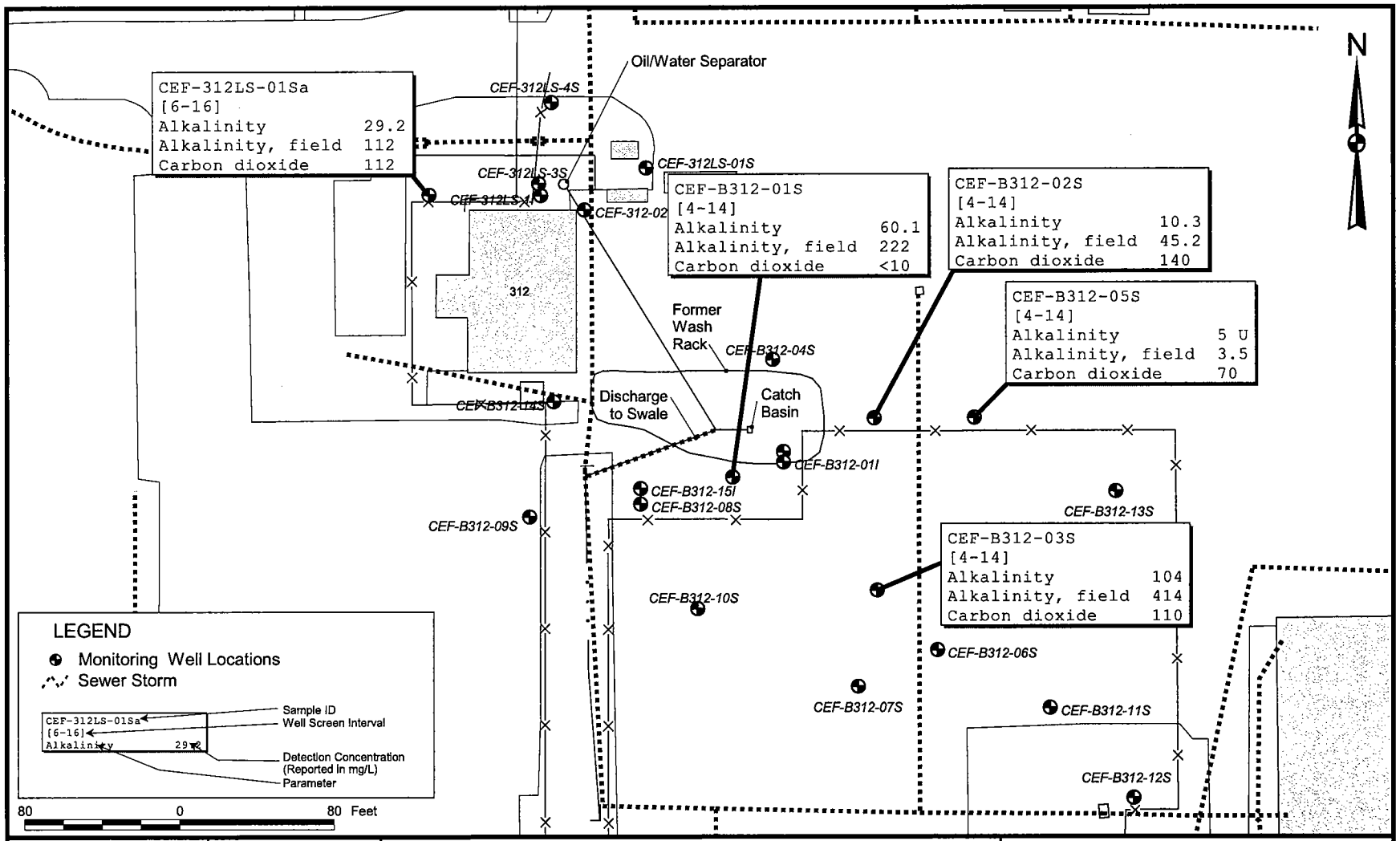
CONTRACT NUMBER 0039	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 6-10	REV 0

P:\GIS\NAS_CecilField\site-58.apr 12Feb02 MJJ Layout 6-10



DRAWN BY	DATE			CONTRACT NUMBER
MJJ	12Feb02		OXYGEN REDUCTION POTENTIAL - RI DATA	0039
CHECKED BY	DATE		OU 9, SITE 58 - BUILDING 312	APPROVED BY / DATE
COST/SCHEDULE-AREA			NAVAL AIR STATION CECIL FIELD	APPROVED BY / DATE
SCALE			JACKSONVILLE, FLORIDA	DRAWING NO. FIGURE 6-11 / REV 0
AS NOTED				

P:\GIS\NAS_CecilField\site-58.apr 12Feb02 MJJ Layout 6-11



DRAWN BY	DATE
MJJ	12Feb02
CHECKED BY	DATE
COST/SCHEDULE-AREA	
SCALE	AS NOTED

CARBON DIOXIDE AND ALKALINITY - RI DATA
OU 9, SITE 58 - BUILDING 312
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NUMBER	
0039	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 6-12	REV 0

P:\GIS\NAS_CecilField\site-58.apr 12Feb02 MJJ Layout 6-12

7.0 HUMAN HEALTH PRELIMINARY RISK EVALUATION

Human health PREs were conducted to evaluate the potential risks to human receptors at Sites 57 and 58. The risk evaluations assume residential use of groundwater and soil. The risk assessment methodology was discussed in Section 3.2.

7.1 SITE 57 GROUNDWATER EVALUATION

Table 7-1 presents the VOCs and SVOCs detected at concentrations exceeding U.S. EPA's current drinking water standards (U.S. EPA, 2000), FDEP GCTLs (FDEP, 1999), or U.S. EPA Region IX PRGs (U.S. EPA, 2002). Benzene, 1,1-DCE, cis-1,2-DCE, and TCE were detected at concentrations greater than their respective MCLs and FDEP GCTLs. Ethylbenzene, toluene, and xylenes were not detected at concentrations greater than their respective MCLs but were detected at concentrations greater than their respective FDEP GCTLs, which are secondary standards. 1,1-DCA, 1-methylnaphthalene, 2-methylnaphthalene, and naphthalene, detected at concentrations greater than their respective FDEP GCTLs, do not have MCLs. The FDEP criteria for naphthalene compounds are based on organoleptic properties.

To assess potential risks, the maximum detected concentrations of these constituents were compared to their respective Region IX PRGs. The maximum detected concentrations of benzene, 1,1-DCE, and TCE were 709, 735, and 27 times greater, respectively, than their Region IX PRGs. These correspond to cancer risks of 7.09×10^{-4}, 7.35×10^{-4}, and 2.70×10^{-5}, respectively, which exceed U.S. EPA's target risk range of 1×10^{-4} to 1×10^{-6}. The maximum detected concentrations of cis-1,2-DCE and naphthalene were 13.5 and 31.6 times greater, respectively, than their Region IX PRGs. These correspond to HQs greater than 1, which is greater than U.S. EPA's and FDEP's target.

Maximum detected concentrations of 1,1-DCA, ethylbenzene, toluene, and xylenes were less than their respective Region IX PRGs. Region IX PRGs are not available for 1-methylnaphthalene and 2-methylnaphthalene.

7.2 SITE 58 GROUNDWATER EVALUATION

Table 7-2 presents the parameters detected at concentrations exceeding U.S. EPA's current Drinking Water Standards (U.S. EPA, 2000), FDEP GCTLs (FDEP, 1999), or U.S. EPA Region IX PRGs (U.S. EPA, 2002). The maximum detected concentration of 1,1-DCE was greater than its Region IX PRG, but less than its MCL and FDEP criterion. The maximum detected concentration of naphthalene was greater than its FDEP GCTL, which is a primary standard. An MCL is not available for naphthalene.

The maximum detected concentration of 1,1-DCE was 39.1 times greater than its Region IX PRG. This corresponds to a risk ratio of 3.91 x 10^{-5}, which is within U.S. EPA's target risk range. The maximum detected concentration of naphthalene was 25 times greater than its Region IX PRG. This corresponds to a HQ greater than 1, which exceeds U.S. EPA's and FDEP's target.

7.3 SITE 58 SOIL EVALUATION

At Site 58, PAHs were detected in soil at concentrations greater than direct exposure residential and industrial/commercial criteria. Because carcinogenic PAHs (cPAHs) were detected at concentrations greater than SCTLs, the BCT agreed that cPAHs should be regarded as a family of compounds, and their concentrations should be defined in terms of benzo(a)pyrene equivalents (BaPEqs). Total BaPEq concentrations were derived for each sample using U.S. EPA toxicity equivalent factors (U.S. EPA, 1995). If a specific cPAH was not detected in a sample, one-half the detection limit was used in the calculation of BaPEqs. If no cPAHs were detected, one-half the detection limit for benzo(a)pyrene was used as the total BaPEq concentration. The potential risks associated with the maximum detected concentration of BaPEqs are 4.16 x 10^{-6} for industrial exposure and 2.1 x 10^{-5} for residential exposure, which are within U.S. EPA's target risk range but which exceed FDEP's target risk of 1 x 10^{-6}. The maximum detected concentration of BaPEqs is less than the FDEP leachability to groundwater criterion; therefore, it is unlikely that cPAHs would impact groundwater at the site.

7.4 HUMAN HEALTH PRE CONCLUSIONS

7.4.1 Site 57

The PRE analysis for Site 57 indicates that exposure to groundwater could potentially result in adverse health effects. These effects would stem primarily from exposure to benzene, 1,1-DCE, TCE, cis-1,2-DCE, and naphthalene.

7.4.2 Site 58

The PRE analysis for Site 58 indicates that exposure to groundwater could potentially result in adverse health effects. These effects would stem primarily from exposure to naphthalene. The PRE indicates that risks as a result of direct exposure to soil in an industrial or residential setting are within U.S. EPA's risk range but exceed FDEP's target risk.

TABLE 7-1

GROUNDWATER ANALYTES DETECTED ABOVE SCREENING CRITERIA
SITE 57 – BUILDING 824A/DAY TANK 1 AREA
REMEDIAL INVESTIGATION REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Parameter	Frequency Of Detection[1]	Screening Concentration[2]	NAS Cecil Field IBDS[3]	Regulatory Level[4]	FDEP Criterion[5]	Region IX PRG[6]	Risk Ratio[7]	C or N[8]
Volatile Organic Compounds (µg/L)								
Benzene	11 / 41	248	NA	5 MCL	1 P	0.35	709	C
1,1-DCA	7 / 41	97.2	NA	NA	70	810	0.12	N
1,1-DCE	2 / 41	33.8	NA	7 MCL	7 P	0.046	735	C
cis-1,2-DCE	5 / 41	825	NA	70 MCL	70 P	61	13.5	N
Ethylbenzene	11 / 41	148	NA	700 MCL	30 S	1300	0.11	N
Toluene	7 / 41	66	NA	1000 MCL	40 S	720	0.09	N
TCE	5 / 41	43	NA	5 MCL	3 P	1.6	27	C
Xylenes	13 / 41	572	NA	10000 MCL	20 S	1400	0.41	N
Semivolatile Organic Compounds (µg/L)								
1-Methylnaphthalene	15 / 41	438	NA	NA	20	NA	-	N
2-Methylnaphthalene	13 / 41	175	NA	NA	20	NA	-	N
Naphthalene	12 / 41	196	NA	NA	20	6.2	31.6	N

1. Frequency of detection is the number of samples in which the analyte was detected over the total number of samples analyzed.
2. Maximum detected concentration selected for screening criteria.
3. NAS Cecil Field Inorganic Background Data Set.
4. Maximum Contaminant Level (MCL) or Secondary Maximum Contaminant Level (SMCL).
5. FDEP Groundwater Cleanup Target Levels (FAC 62-777 and FAC 62-550) (August 1999).
6. U.S. EPA Region IX Preliminary Remediation Goal (PRG).
7. Ratio of screening concentration and Region IX PRG.
8. Carcinogen (C) or noncarcinogen (N).

NA Not available.
P Primary standard.
S Secondary standard.

TABLE 7-2

GROUNDWATER ANALYTES DETECTED ABOVE SCREENING CRITERIA
SITE 58 – BUILDING 312
REMEDIAL INVESTIGATION REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Parameter	Frequency Of Detection[1]	Screening Concentration[2]	NAS Cecil Field IBDS[3]	Regulatory Level[4]	FDEP Criterion[5]	Region IX PRG[6]	Risk Ratio[7]	C or N[8]
Volatile Organic Compounds (µg/L)								
1,1-DCE	2 / 18	1.8	NA	7 MCL	7 P	0.046	39.1	C
Semivolatile Organic Compounds (µg/L)								
Naphthalene	9 / 18	156	NA	NA	20	6.2	25.2	N

1. Frequency of detection is the number of samples in which the analyte was detected over the total number of samples analyzed.
2. Maximum detected concentration selected for screening criteria.
3. NAS Cecil Field Inorganic Background Data Set.
4. Maximum Contaminant Level (MCL) or Secondary Maximum Contaminant Level (SMCL).
5. FDEP Groundwater Cleanup Target Levels (FAC 62-777 and FAC 62-550) (August 1999).
6. U.S. EPA Region IX Preliminary Remediation Goal (PRG).
7. Ratio of screening concentration and Region IX PRG.
8. Carcinogen (C) or noncarcinogen (N).

NA Not available.
P Primary standard.
S Secondary standard.

TABLE 7-3

SOIL ANALYTES DETECTED ABOVE SCREENING CRITERIA
SITE 58 – BUILDING 312
REMEDIAL INVESTIGATION REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Parameter	Frequency Of Detection[1]	Screening Concentration[2]	NAS Cecil Field IBDS[3]	FDEP Direct Exposure Residential[4]	FDEP Direct Exposure Industrial[4]	FDEP Leachability to Groundwater[5]	RiskRatio[6]	C or N[7]
Volatile Organic Compounds (µg/L)								
None detected above screening levels								
Semivolatile Organic Compounds (µg/L)								
BaP Equivalents	2 / 3	2082	NA	100	500	8000	20.82	C

1. Frequency of detection is the number of samples in which the analyte was detected over the total number of samples analyzed.
2. Maximum detected concentration selected for screening criteria.
3. NAS Cecil Field Inorganic Background Data Set (HLA, 1998).
4. FDEP Soil Cleanup Target Level (FAC 62-777) (FDEP, 1999).
5. FDEP Groundwater Cleanup Target Levels (FAC 62-777 and FAC 62-550) (August 1999).
6. Ratio of screening concentration and FDEP direct exposure residential value.
7. Carcinogen (C) or noncarcinogen (N).

NA Not available.

8.0 ECOLOGICAL RISK ASSESSMENT

8.1 SITE 57

Site 57 is located in a highly developed portion of NAS Cecil Field. The site consists of buildings and parking lots. The only terrestrial habitat consists of small areas of turf grass and ornamental shrubbery. The majority of Site 57 is paved; the concrete flightline apron covers the eastern portion of the site, and buildings and parking lots cover most of the remainder of the site. The only grassy areas surrounding Site 57 are located west of Building 817 and west of Building 846 in the area of the Day Tank excavation. No surface water is present at or near the site. Surface water runoff in the Site 57 area is collected by the storm sewer system. Thus, Site 57 and the adjacent areas provide only limited terrestrial habitat of poor quality in an urban or industrial-type setting. Ecological receptors in the vicinity of Site 57 consist of those typically found in urban areas, such as terrestrial invertebrates, lizards, songbirds, and exotic rodents such as the Norway rat, black rat, and house mouse.

Groundwater flow at Site 57 is primarily toward the southeast and may be locally affected by infiltration to storm sewers. Data from the RI groundwater investigation indicate that the leading edge of the plume is approximately 2,200 feet from the associated storm sewer outfall and approximately 8,000 feet from Sal Taylor Creek in the direction of groundwater flow. It is unlikely that groundwater contaminated at concentrations of concern could travel the distance necessary to reach the outfall or Sal Taylor Creek and impact surface water. For this reason, the groundwater exposure route is not applicable for ecological receptors.

A complete exposure pathway has three components: a source of contaminants that can be released to the environment, a route of contaminant transport through an environmental medium, and an exposure or contact point for an ecological receptor. Because ecological receptors will not directly contact the groundwater and the groundwater does not discharge to a nearby surface water body, the groundwater exposure pathway for ecological receptors is not complete. Therefore, this exposure pathway was not evaluated.

Terrestrial wildlife receptors at the site consist only of species acclimated to urban conditions. The gravel and paved areas effectively preclude exposure of these receptors to soil contaminants. In addition, surface water bodies do not exist at the site. Thus, a route of contaminant exposure to terrestrial species is largely absent. Potential effects to soil invertebrates (if any) would not be widespread. For these reasons, a significant exposure pathway to terrestrial receptors does not exist at Site 57, so this exposure pathway was not evaluated.

8.2 SITE 58

Site 58 is located in a highly developed portion of NAS Cecil Field. The site consists of buildings and parking lots. The only terrestrial habitat consists of small areas of turf grass and ornamental shrubbery. Site 58 is predominantly covered with parking lots and other paved areas. Grassy areas occur north and west of Building 312, along the drainage swale south of the building, and west of Building 1820. Surface water runoff in the Site 58 area is collected by the storm sewer system and a drainage swale south of Building 312 that discharges into the storm sewer system. The drainage swale contains flowing water only during rain events. Thus, Site 58 and the adjacent areas provide only limited terrestrial habitat of poor quality in an urban or industrial-type setting. Ecological receptors in the vicinity of Site 58 consist of those typically found in urban areas, such as terrestrial invertebrates, lizards, songbirds, and exotic rodents such as the Norway rat, black rat, and house mouse.

Groundwater flow at Site 58 is primarily toward the southeast and appears to be locally affected by infiltration to storm sewers. Data from the RI groundwater investigation indicate that the leading edge of the plume is approximately 2,800 feet from the associated storm sewer outfall and approximately 7,300 feet from Sal Taylor Creek in the direction of groundwater flow. It is unlikely that groundwater contaminated at concentrations of concern could travel the distance necessary to reach the outfall or Sal Taylor Creek and impact surface water. For this reason, the groundwater exposure route is not applicable for ecological receptors.

Because ecological receptors will not directly contact the groundwater and the groundwater does not discharge to a nearby surface water body, the groundwater exposure pathway for ecological receptors is not complete. Therefore, this exposure pathway was not evaluated.

Terrestrial wildlife receptors consist only of species acclimated to urban conditions. The gravel and paved areas largely preclude exposure of these receptors to soil contaminants. As presented in Section 5.0, elevated levels of PAHs were detected in the upgradient drainage swale sample (CEF-B312-SD-001). The concentrations in the next downstream sample (CEF-B312-SD-002) were much lower, and PAHs were not detected in the next downstream sample (CEF-B312-SD-003). The total length of the drainage swale, which is a surface component of the storm sewer system, is approximately 180 feet, and the distance from the beginning of the swale to CEF-B312-SD-002 is approximately 80 feet. In addition, the drainage swale is surrounded on both sides by concrete (see Figure 2-5). PAHs could pose risks to soil invertebrates (because the ditch is usually dry, the substrate is considered soil rather than sediment). However, potential risks would be limited to an extremely small area and would not be ecologically significant. For these reasons, a significant exposure pathway to terrestrial receptors does not exist at Site 58, and ecological risks were not evaluated further.

9.0 SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

9.1 SUMMARY

9.1.1 Site 57

9.1.1.1 Nature and Extent of Contamination

The horizontal and vertical extent of groundwater contamination at Site 57 was defined during the RI. A petroleum plume, defined by benzene concentrations greater than 1 µg/L, extends from the eastern side of Building 846 toward the southeast to the area east of Building 824A. This plume outline, defined by benzene exceedances, generally also encompasses exceedances of toluene, ethylbenzene, xylenes, PAHs, and TRPH. Just east of Building 846, the plume is limited to the shallow portion of the surficial aquifer but extends into the intermediate zone to the west (CEF-824A-12I). The plume extends approximately 750 feet to the southeast and has an average width of approximately 225 feet.

A TCE plume, defined by TCE concentrations greater than 3 µg/L, is centered to the east of the petroleum plume and partially overlaps that plume. With the exception of the 1,1-DCE exceedance at CEF-824A-08S, the TCE plume outline encompasses other chlorinated exceedances at Site 57. The plume extends to the southeast and is approximately 250 feet by 180 feet.

Chlorinated compounds detected during the RI and in previous investigations in wells southeast of this TCE plume (CEF-824A-01Sa, CEF-824A-07S, CEF-824A-08S) do not appear to be associated with the plume as defined by current data. The lack of detections of chlorinated compounds in CEF-293-20, CEF-293-21, and CEF-824A-04S, located between the downgradient edge of the plume and these wells, supports this conclusion.

Exceedances of GCTLs by chlorinated VOCs are limited to the shallow portion of the surficial aquifer in both of these areas. No specific sources of chlorinated VOC contamination was identified either area. The presence of chlorinated contamination in both areas is likely a result of past spills, leaks, and/or poor waste handling practices. Solvents were reportedly used and stored in several buildings associated with the site.

A surface water sample collected from the storm sewer outfall that receives discharge from Site 57 indicates that surface water quality is not being affected by contaminated groundwater potentially infiltrating into the storm sewer.

An area of free product, approximately 350 square feet in size, was delineated during the RI. The area is located east of the Day Tank 1 excavation area and extends beneath Building 846. The suspected source of the free product is a pipeline that transported fuel from Day Tank 1 to the north-south high-speed refueler. The line was capped, but not purged, during Day Tank 1 excavation activities.

9.1.1.2 Human Health Risk Assessment

The PRE for Site 57 indicates that residential exposure to groundwater could potentially result in adverse health effects. Constituents resulting in risks exceeding U.S. EPA's risk range and FDEP's target risk include benzene, 1,1-DCE, and TCE. Constituents resulting in risks exceeding a HQ of one include cis-1, 2-DCE and naphthalene.

9.1.1.3 Ecological Risk Assessment

The site consists primarily of buildings and parking lots. Most areas are either paved or consist of buildings. The limited terrestrial habitat is of marginal quality and results in little use of the site by terrestrial wildlife; therefore, the soil exposure pathway is negligible, and soil contaminants were not investigated.

9.1.2 Site 58

9.1.2.1 Nature and Extent of Contamination

The horizontal and vertical extent of groundwater contamination at Site 58 was defined during the RI. Naphthalene was detected in excess of its FDEP GCTL in three shallow wells at Site 57. The shallow plume defined by these wells is located southeast of Building 312 and is approximately 100 feet by 60 feet in size. This plume encompasses the TRPH exceedance at CEF-B312-01S, the only other GCTL exceedance detected during the RI.

As indicated by results of one sediment sample, a limited area of the drainage ditch that received discharges from the aircraft wash rack had concentrations of PAHs in excess of FDEP direct contact residential criteria. Samples collected downstream did not have PAH exceedances.

9.1.1.2 Human Health Risk Assessment

The PRE for Site 58 indicates that exposure to residential groundwater and sediment/soil could potentially result in adverse health effects. Some naphthalene concentrations could result in risks exceeding a HQ of one.

9.1.2.3 Ecological Risk Assessment

The site consists primarily of buildings and parking lots. Most areas are either paved or consist of buildings. The limited terrestrial habitat is of marginal quality and results in little use of the site by terrestrial wildlife; therefore, the soil exposure pathway is negligible, and soil contaminants were not investigated.

9.2 CONCLUSIONS

9.2.1 Site 57

9.2.1.1 Data Limitations and Recommendations for Future Work

The primary purpose of the RI at Site 57 was to delineate the contaminant plume in groundwater. Data from previous investigations indicate that BTEX and chlorinated VOCs, PAHs, and TRPH were the primary contaminants; therefore, these were the analytical parameters chosen for groundwater samples. The results of the RI were successful in identifying the nature and extent of the contaminant plume as defined by FDEP GCTLs. Because remediation alternatives have yet to be evaluated, there may be data gaps for particular alternatives. Some additional data may be required for a particular remedial option.

9.2.1.2 Recommended Remedial Action Objectives

Based on the results of the investigation, the following Remedial Action Objective (RAO) is recommended:

- Prevent ingestion of groundwater with concentrations of VOCs, PAHs, and TRPH greater than FDEP GCTLs.

Recommended actions to meet this objective include

- Free-product removal
- Remediation of contaminated groundwater to conform to FDEP criteria, or
- Implementation of institutional controls to prevent the use of the groundwater as a potable water source
- Continued monitoring of the plume.

9.2.2 Site 58

9.2.2.1 Data Limitations and Recommendations for Future Work

The primary purpose of the RI at Site 58 was to delineate the contaminant plume in groundwater. Data from previous investigations indicate that BTEX and chlorinated VOCs, PAHs, and TRPH were the primary contaminants; therefore, these were the analytical parameters chosen for groundwater samples. The results of the RI were successful in identifying the nature and extent of the contaminant plume as defined by FDEP GCTLs. Because remediation alternatives have yet to be evaluated, there may be data gaps for particular alternatives. Some additional data may be required for a particular remedial option.

BaPEq concentrations in soil/sediment samples pose adverse effects for residential use.

9.2.2.2 Recommended Remedial Action Objectives

Based on the results of the investigation, the following Remedial Action Objectives are recommended:

- Prevent ingestion of groundwater with naphthalene and TRPH concentrations greater than FDEP GCTLs

- Prevent exposure to site soils with BaPEq concentrations that exceed the FDEP residential risk criteria

Recommended actions to meet these objectives include

- Removal of soil with BaPEq concentrations in excess of FDEP residential SCTLs, or
- Implementation of institutional controls to prevent residential exposure to soil at the site
- Remediation of contaminated groundwater to conform to FDEP criteria, or
- Implementation of institutional controls to prevent the use of the groundwater as a potable water source
- Continued monitoring of the plume.

REFERENCES

ABB-ES (ABB Environmental Services, Inc.), 1994. Environmental Baseline Survey Report. Base Realignment and Closure, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina. November.

ABB-ES, 1997. Remedial Action Plan, Day Tank 1, Facility 293. Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina. January.

ATSDR (Agency for Toxic Substances and Disease Registry), 1990. Toxicological Profile for 1,1-Dichloroethane. U.S. Public Health Service, Atlanta, Georgia, December.

ATSDR, 1994. Toxicological Profile for 1.1-Dichloroethene. U.S. Public Health Service, Atlanta, Georgia, May.

ATSDR, 1995a. Toxicological Profile for Naphthalene, 1-Methylnaphthalene, and 2-Methylnaphthalene. U.S. Public Health Service, Atlanta, Georgia, August.

ATSDR, 1995b. Toxicological Profile for Xylenes. U.S. Public Health Service, Atlanta, Georgia, August.

ATSDR, 1996. Toxicological Profile for 1.2-Dichloroethene. U.S. Public Health Service, Atlanta, Georgia, August.

ATSDR, 1997a. Toxicological Profile for Benzene. U.S. Public Health Service, Atlanta, Georgia, September.

ATSDR, 1997b. Toxicological Profile for Trichloroetheylene. U.S. Public Health Service, Atlanta, Georgia, September.

ATSDR, 1998. Toxicological Profile for JP-5 and JP-8. U.S. Public Health Service, Atlanta, Georgia, August.

ATSDR, 1999a. Toxicological Profile for Ethylbenzene. U.S. Public Health Service, Atlanta, Georgia, July.

ATSDR, 1999b. Toxicological Profile for Total Petroleum Hydrocarbons. U.S. Public Health Service, Atlanta, Georgia, September.

ATSDR, 2000. Toxicological Profile for Toluene. U.S. Public Health Service, Atlanta, Georgia.

Bradbury, K. R., and E. R. Rothschild, 1985. "A computerized technique for estimating the hydraulic conductivity of aquifers from specific capacity data," In Ground Water, 23 (2): 240-246.

Cooke, C.W., 1945. Geology of Florida. Florida Geological Survey, Bulletin No. 29, Tallahassee, Florida.

Department of the Navy, 1999. Navy Policy for Conducting Ecological Risk Assessments. Office of the Chief of Naval Operations, Washington, D.C., April.

Dragun, J., 1988. The Soil Chemistry of Hazardous Materials. Hazardous Materials Control Research Institute, Silver Spring, Maryland.

Fairchild, R.W., 1972. The Shallow-Aquifer System in Duval County, Florida. Florida Geological Survey, Report of Investigations No. 59, Tallahassee, Florida.

FDEP (Florida Department of Environmental Protection), 1994. Determining Representative Ground Water Samples, Filtered or Unfiltered. Bureau of Drinking Water and Ground Water Resources, Tallahassee, Florida. January.

FDEP, 1999. Groundwater Cleanup Target Levels and Soil Cleanup Target Levels. FAC Chapter 62-777. August.

Fetter, C.W., 1988. Applied Hydrogeology, Second Edition, Merrill Publishing Co., Columbus, Ohio.

Goodell, H. G., and J. W. Yon, Jr., 1960. "The regional lithostratigraphy of the post-Eocene rocks of Florida." Southeastern Geological Society, 9th Field Trip Guidebook.

Halford, Keith J., 1998. Ground-Water Flow in the Surficial Aquifer System and Potential Movement of Contaminants from Selected Waste-Disposal Sites at Cecil Field Naval Air Station, Jacksonville, Florida. United States Geological Survey Water-Resources Investigations Report 97-4278.

Heatherington, A. L., and P. A. Mueller, 1997. "Geochemistry and Origin of Florida Crustal Basement Terranes." In The Geology of Florida. Edited by A. F. Randazzo and D. S. Jones, University Press of Florida, Gainesville, Florida.

HLA (Harding Lawson Associates), 1998. Sampling and Analysis Outline and Report for Main Base Open Area 18, Revision 1.0, Base Realignment and Closure, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina. November.

HLA, 1998. NAS Cecil Field Inorganic Background Data Set. Prepared for Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina, July.

Hoaglin, D.C., Mosteller, F. and Tukey, J.W., 1983. Understanding Robust and Exploratory Data Analysis. John Wiley and Sons, Inc.

Johnson, R. A., 1986. Shallow stratigraphic core tests on file at the Florida Geological Survey, Florida Geological Survey. Information Circular No. 103, Tallahassee, Florida.

Kasenow, M., and P. Pare, 1995. Using Specific Capacity to Estimate Transmissivity Field and Computer Methods. Water Resources Publications, Highlands Ranch, Colorado.

Leve, G. W., 1965. Ground Water in Duval and Nassau Counties, Florida. Florida Geological Survey, Report of Investigations No. 43, Tallahassee, Florida.

Lohman, S.W., 1972. Ground-Water Hydraulics. U.S. Geological Survey Professional Paper 708.

Lyman, W.J., W.F. Reehl, and D.H. Rosenblatt, 1990. Handbook of Chemical Property Estimation Methods. American Chemical Society, Washington, D.C.

Scott, T. M., 1988. The Lithostratigraphy of the Hawthorn Group (Miocene) of Florida. Florida Geological Survey, Bulletin No. 59, Tallahassee, Florida.

Scott, T. M., 1992. A Geological Overview of Florida. Florida Geological Survey, Open File Report No. 50, Tallahassee, Florida.

SCS (Soil Conservation Service), 1978. Soil Survey for Duval County, Florida. U.S. Department of Agriculture.

Southeastern Geological Society, 1986. Hydrogeological Units of Florida. Florida Geological Survey, Special Publication No. 28.

TtNUS (Tetra Tech NUS, Inc.), 1998. Remedial Investigation Field Sampling Plan for Site 36 - Control Tower TCE Plume and Site 37 - Hangars 13 and 14 DCE Plume, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina, October.

TtNUS, 1999. Remedial Investigation Report for Site 36 - Control Tower TCE Plume and Site 37 - Hangars 13 and 14 DCE Plume, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina, August.

TtNUS, 2000. Sampling and Analysis Work Plans (Phases I through IV), Building 824 Groundwater Resampling, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina, April, June, September, and December.

TtNUS, 2001a. Remedial Investigation Work Plans for Operable Unit 9, Sites 57 and 58 at Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina, August.

TtNUS, 2001b. Remedial Investigation Work Plans Addendum for Operable Unit 9, Sites 57 and 58 at Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina, December.

U.S. EPA (United States Environmental Protection Agency), 1982. Aquatic Fate Process Data for Organic Priority Pollutants. EPA/440/4-81/014, Washington, D.C., December.

U.S. EPA, 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. EPA/540/G-89-004, October.

U.S. EPA, 1992. Handbook of RCRA Ground-Water Monitoring Constituents: Chemical and Physical Properties. Office of Solid Waste, September.

U.S. EPA, 1993. Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons. EPA/600/R93/089, July.

U.S. EPA, 1996a. Region IV Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM). Athens, Georgia, May.

U.S. EPA, 1996b. Soil Screening Guidance: Technical Background Document. EPA/540/R-95/128. Office of Solid Waste and Emergency Response, Washington, D.C., July.

U.S. EPA, 1997. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments. Edison, New Jersey, June.

U.S. EPA, 1998. Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities, and Inclusion of Stakeholders. Memorandum from Ted. W. Simon, Region 4 U.S. EPA Office of Technical Services, Atlanta, Georgia, December 22.

U.S. EPA, 2000. Amended Guidance on Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities, and Inclusion of Stakeholders. Memorandum from Ted. W. Simon, Region 4 U.S. EPA Office of Technical Services, Atlanta, Georgia, June 23.

U.S. EPA, 2002. Preliminary Remediation Goals (PRG), Region IX, San Francisco, California.

U.S. EPA, 2000. Drinking Water Standards and Health Advisories, Office of Water. Washington, D.C.

White, W.A. 1970. The Geomorphology of the Florida Peninsula. Florida Geological Survey, Bulletin No. 51, Tallahassee, Florida.

APPENDIX A

SAMPLE LOG SHEETS, CHAIN OF CUSTODY RECORDS, AND SURVEY DATA

A.1 Groundwater Sample Log Sheets and Low Flow Purge Data Sheets

- Site 57
- Site 58

A.2 Site 57 Surface Water Sample Log Sheet

A.3 Site 58 Sediment Sample Log Sheets

A.4 Chain of Custody Records

- Site 57
- Site 58

A.5 Survey Data

- Site 57
- Site 58

A.1 Groundwater Sample Log Sheets and Low Flow Purge Data Sheets

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-824A-GW-015-02
Sample Location: CEF-824A-015
Sampled By: T. ROJAHN
C.O.C. No.: 10/01/01-002
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/30/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 1425								
Method: Low Flow Peristaltic	CLEAR	6.78	0.536	26.0	0.00	1.62	—	+45

PURGE DATA

Date: 9/30/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0.0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 14.8								
Static Water Level (WL): 6.22		SEE LOW FLOW PURGE DATA SHEET						
One Casing Volume(gal/L): 5.3								
Start Purge (hrs): 1200								
End Purge (hrs): 1420								
Total Purge Time (min): 140								
Total Vol. Purged (gal/L): 11								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	✓
PAHs (8310)	None	2-1 liter glass ambers	✓
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	✓
~~Lead~~ (6010B) *Dissolved IRON (Filter)	HNO_3	500 ml ~~1-1 liter~~ plastic	NO
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250 ml~~ plastic	↓
Sulfide (376.1) * Dissolved (Filter)	NaOH	500 ml ~~1-1 liter~~ plastic	↓
TOC (415.1)	HCl	1-125 ml glass amber	↓
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	↓

OBSERVATIONS / NOTES

14.8 - 6.22 = 8.58 x .163 = 1.4 gal or 5.3
MIN. VOL = 10.6
INTAKE ~ MID WELL SCREEN

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Tony Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-824A-01
DATE: 09/30/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1200	6.22	—	—	—	—	—	—	—	Start PURGE
1210	7.23	100	6.77	0.517	112	1.92	27.1	33	1000ml Cloudy
1220	7.38	100	6.78	0.520	52	0.90	27.4	17	2000ml CLEAR
1230	7.32	75	6.77	0.521	41	0.86	26.8	12	2750ml "
1240	7.21	75	6.78	0.521	26	0.78	27.3	5	3500ml "
1250	7.23	75	6.76	0.521	9.0	0.74	27.3	10	4250ml "
1300	7.28	75	6.78	0.518	3.6	0.85	26.4	15	5000ml "
1310	7.26	75	6.78	0.577	1.1	1.16	27.4	22	5750ml "
1320	7.23	75	6.76	0.550	0.34	1.12	26.1	26	6500ml "
1330	7.24	75	6.77	0.543	0.00	1.19	26.1	29	7250ml "
1340	7.23	75	6.77	0.543	0.00	1.38	26.1	34	8000ml "
1350	7.22	75	6.78	0.536	0.00	1.45	25.9	36	8750ml "
1400	7.25	75	6.78	0.536	0.00	1.54	26.3	40	9500ml "
1410	7.26	75	6.78	0.536	0.00	1.67	26.1	43	10.250ml "
1420	7.26	75	6.78	0.536	0.00	1.62	26.0	45	11.000ml "
1425									→ Start SAMPLING

SIGNATURE(S): [signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF 824A-GW-01Sa-05
Sample Location: BLD 824 CEF-824A-01Sa
Sampled By: DS
C.O.C. No.: 09/25/01-005
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/25/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 1705								
Method: Low Flow Peristaltic	CLEAR	5.16	.096	29.6	3.2	.66	0.0	-109

PURGE DATA

Date: 9/25/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 14.2								
Static Water Level (WL): 7.39								
One Casing Volume (gal/L): 1.11								
Start Purge (hrs): 1613								
End Purge (hrs): 1705								
Total Purge Time (min): 52								
Total Vol. Purged (gal/L): 5.49								

See Page 2 Low Flow Purge Data Sheet

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	DS
PAHs (8310)	None	2-1 liter glass ambers	DS
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	DS
Lead (6010B) *Dissolved (Filter)	HNO_3	1-1 litter plastic	No
Alkalinity (310.1) Anions (300.0)	None	1-250 ml plastic	
Sulfide (376.1) * Dissolved (Filter)	NaOH	1-1 liter plastic	
TOC (415.1)	HCl	1-125 ml glass amber	
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

Casing Volume =
22 X 0.0408 X 6.81 = 1.11 gallons X 2 = 2.22 gallons
2 Saturated Screens - Minimum Purge Volume
Pump Intake ~ 11.0'

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF 824A-GW-01Sa-05
DATE: 09/25/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1613	7.39	400							BEGIN PURGE
1620	7.48	400	5.16	.096	45	2.05	30.0	-71	
1630	7.50	400	5.15	.099	15	.76	29.8	-86	
1640	7.49	400	5.14	.103	7.3	.74	29.7	-101	
1650	7.48	400	5.14	.097	4.8	.68	29.6	-109	
1700	7.48	400	5.14	.096	3.2	.66	29.6	-109	
1705	Sample								

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEP 824A GW-025-03
Sample Location: BLD 824 - 025
Sampled By: DS
C.O.C. No.: CFST-092801
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/28/01 Time: 0905	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Method: Low Flow Peristaltic	CLEAR	5.03	.080	28.11	4.2	2.10	/	-64

PURGE DATA

Date: 9/28/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 2.2								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 16.9	SEE	LOW	FLOW	PURGE	DATA	SHEET		
Static Water Level (WL): 6.56								
One Casing Volume(gal/L):								
Start Purge (hrs): 0825								
End Purge (hrs): 0905								
Total Purge Time (min): 40								
Total Vol. Purged (gal/L): 16								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	DS
PAHs (8310)	None	2-1 liter glass ambers	DS
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	DS
~~Lead~~ (6010B) *Dissolved Iron (Filter)	HNO_3	1-1 litter plastic	T
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250 ml~~ plastic	
Sulfide (376.1) * Dissolved (Filter)	NaOH	1-1 liter plastic	
TOC (415.1)	HCl	1-125 ml glass amber	
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

One Casing (Saturated Screen) Volume =
$2^2 \times 0.0408 \times 10.34 = 1.69$ gallons $\times 2 =$
3.37 gallons (Minimum Purge Volume)
Pump Intake 9.5-10.0'

TD 16.9
SWL 6.56
10.34

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF 824A GW 025-03
DATE: 09/28/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0825	6.56 BOS	400							BEGIN PURGE
0830	6.61	400	4.92	.096	18	3.64	27.38	166	
0835	6.61	400	4.96	.089	15	2.19	28.04	55	
0845	6.62	400	4.97	.082	11	2.03	28.11	-47	
0855	6.62	400	5.01	.081	5	2.05	28.08	-56	
0900	6.62	400	5.02	.081	5	2.08	28.10	-58	
0905	6.62	400	5.03	.080	4.2	2.10	28.11	-64	

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-824A-GW-03S-03
Sample Location: NAS CF
Sampled By: L. KNIGHT
C.O.C. No.: CF57-092801
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/28/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	~~Salinity~~ %	~~Other~~ ORP
Time: 0910								
Method: Low Flow Peristaltic	CLEAR	4.65	0.056	28.1	0.0	1.30	/	-108

PURGE DATA

Date: 9/28/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0.0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 18.0		SEE	LOW	FLOW	PURGE	DATA	SHEET	
Static Water Level (WL): 7.19								
One Casing Volume(gal/L):								
Start Purge (hrs): 0837								
End Purge (hrs): 0905								
Total Purge Time (min): 28								
Total Vol. Purged (gal/L) ~14L								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	~~NO~~
PAHs (8310)	None	2-1 liter glass ambers	~~NO~~
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	~~NO~~
~~Lead (6010B) *Dissolved Lead (Filter)~~	HNO_3	1-1 litter plastic	No
~~Alkalinity (310.1) Anions (300.0)~~	None	1 L ~~1-250~~ ml plastic	
~~Sulfide (376.1) * Dissolved (Filter)~~	NaOH	1-1 liter plastic	
~~TOC (415.1)~~	HCl	1-125 ml glass amber	
~~Methane-Ethane-Ethene (RSKSOP 147/175)~~	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

One Casing (Saturated Screen) Volume =
TD 18.0
SWL 7.19
SWC 10.81

$2^2 \times 0.0408 \times 10.81 = 1.76$ gallons $\times 2 =$
3.52 gallons (Minimum Purge Volume)

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Pump Intake ~ 13.0'

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Louis Knight

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-824A-03S
DATE: 09/28/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0837	7.19								
0838	7.26	450							
0839	7.26	450							
0840	7.27	450	4.66	0.060	2.7	7.48	26.4	-84	
0845	7.27	450	4.66	0.057	0.35	5.55	27.8	-91	
0850	7.27	500	4.66	0.056	0.05	1.82	28.0	-102	
0855	7.27	500	4.65	0.056	0.0	1.71	28.0	-106	
0900	7.27	500	4.66	0.056	0.0	1.39	28.0	-109	
0905	7.27	500	4.65	0.056	0.0	1.30	28.1	-108	

SIGNATURE(S): Louis Kryfd

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

CEF-824A-GW-45-03

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF 824A-GW-45-03
Sample Location: BLD 824A 45
Sampled By: DS
C.O.C. No.: 10/01/01-001
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 10/01/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	~~Other~~ ORP
Time: 0916								
Method: Low Flow Peristaltic	CLEAR	4.88	.073	28.47	1.08	5.75	—	-152

PURGE DATA

Date: 10/01/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0								
Well Casing Diameter: 2								
Well Casing Material: PVC		SEE PAGE 2 DATA SHEET						
Total Well Depth (TD): 14.40								
Static Water Level (WL): 7.21								
One Casing Volume(~~gal~~/L): 1.19								
Start Purge (hrs): 0830								
End Purge (hrs): 0910								
Total Purge Time (min): 40								
Total Vol. Purged (~~gal~~/L): 14L or 3.70 Gallons								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	DS
PAHs (8310)	None	2-1 liter glass ambers	DS
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	DS
~~Lead~~ (6010B) *Dissolved IRON (Filter)	HNO_3	500ml ~~1-1 liter~~ plastic	DS
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250 ml~~ plastic	DS
Sulfide (376.1) * Dissolved (Filter)	NaOH	500ml ~~1-1 liter~~ plastic	DS
~~TOC (415.1)~~	HCl	1-125 ml glass amber	—
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	DS

OBSERVATIONS / NOTES

One Casing Volume =
$2^2 \times 0.0408 \times 7.19 = 1.17 \times 2$ Saturated Screens =
2.34 gallons Minimum Purge Volume Required
Pump Intake - 10-11.0'

Laboratory
Contact: L. Williams
4405 Vineland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD

Duplicate ID No.: CEF 824A-DUP3

Signature(s): DS

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-824A-045-0
DATE: 10-09/01/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0830	7.21								
0835	7.41	350	4.87	.076	7.0	2.54	27.36	-124	
0845	7.44		4.88	0.073	5.08	3.62	28.47	-138	
0855	7.45		4.89	0.073	2.28	5.04	28.44	-146	
0900	7.46		4.88	0.073	2.26	5.31	28.38	-151	
0905	7.46		4.88	0.073	1.22	5.68	28.49	-154	
0910	7.46		4.88	0.073	1.08	5.75	28.47	-152	

SIGNATURE(S):

PAGE 1 OF 1

Dup 3

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DS005H125
Sampled By: D.S.
Field Analyst: T. ROJAHN
Field Form Checked as per QA/QC Checklist (Initials):

Sample ID No.: CEF-824A-GW-045-03
Sample Location: CEF-824A-045
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

Date: 10-01-01	Color	pH	S.C.	Turbidity	DO	Temp.	ORP (Eh)	
Time: 0916	(Visual)	(SU)	(mS/cm)	(NTU)	(Meter, mg/l)	(°C)	(+/- mv)	
Method: Peristaltic	CLEAR	4.88	.073	408	5.75	28.47	-152	

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment:
CHEMetrics Range ☑ 0 - 1.0 mg/L ☐ 1 - 12 mg/L
Analysis Time: 0930
CHEMetrics: 0.5 mg/L
Notes:

Carbon Dioxide:

Range Used:	CHEMetrics Range		Concentration
☐	10-100 mg/L	(K-1910)	= mg/L
☑	100-1000 mg/L	(K-1920)	= 220 mg/L
☐	250-2500 mg/L	(K-1925)	= mg/L

Analysis Time: 0950
Notes:

Alkalinity:

Equipment: HACH Digital Titrator AL-DT
CHEMetrics (Range: _____ mg/L)
Analysis Time: 1009
Filtered: ☐

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☑	10-40 mg/L	100 ml	0.1600 N	0.1	0 & 105.5	x 0.1	= 10.5 mg/L
☐	40-160 mg/L	25 ml	0.1600 N	0.4	0 & 32	x 0.4	= 13 mg/L
☐	100-400 mg/L	100 ml	1.600 N	1.0	0 & 15	x 1.0	= 15 mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	= mg/L
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	= mg/L
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	= mg/L

Parameter:	Hydroxide	Carbonate	Bicarbonate
Relationship:	0	0	10.5

CHEMetrics: _____ mg/L
Notes:
Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

Sep 25 2001 9:28 P.03

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DSO05H125
Sampled By: DS
Field Analyst: T. Rojano
Field Form Checked as per QA/QC Checklist (initials):

Sample ID No.: CEF-824A-GW-045-03
Sample Location: CEF-824A-045
Duplicate: ☐
Blank: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION

Ferrous Iron (Fe^{2+}):

Equipment: DR-700 DR-890 IR-18C Color Wheel Other: Analysis Time: 0945
Program/Module: 500nm 33
Concentration: 0.43 mg/L Filtered: ☐
Notes:

Sulfide (S^{2-}):

Equipment: DR-700 DR-890 HS-C Color Chart HS-WR Color Wheel Analysis Time: 0936
Program/Module: 610nm 93 Other:
Concentration: >0.80 mg/L Filtered: ☐
Notes: Results Above the limits of Colorimeter

Hydrogen Sulfide (H_2S):

Equipment: HS-C Other: Analysis Time: 0941
Concentration: >5.0 mg/L Exceeded 5.0 mg/L range on color chart: ☑
Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☐
Correct measurement units are cited in the SAMPLING DATA block: ☐
Multiplication is correct for each *Multiplier* table: ☐
Final calculated concentration is within the appropriate *Range Used* block: ☐
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐
Title block is initialized by person who performed the QA/QC Checklist: ☐

TTNUS JACKSONVILLE Fax:9042810070 Sep 25 2001 9:28 P.02

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-824A-GW-058-03
Sample Location: CEF-824A-058
Sampled By: Tom Dickson
C.O.C. No.: 09/25/01-005
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/25/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 1515								
Method: Low Flow Peristaltic	Clear	4.47	0.077	29.5	5.3	1.24	0.0	-62

PURGE DATA

Date: 9/25/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 8.3								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 16.85								
Static Water Level (WL): 7.05								
One Casing Volume (gal/L): 1.6								
Start Purge (hrs): 1402								
End Purge (hrs): 1515								
Total Purge Time (min): 73								
Total Vol. Purged (gal/L): 3.97 Gallons or 15.0 Liters								

See Low Flow Data Sheet (Page 2) Purge Data Attached

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	✓
PAHs (8310)	None	2-1 liter glass ambers	✓
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	✓
Lead (6010B) *Dissolved (Filter)	HNO_3	1-1 liter plastic	
Alkalinity (310.1) Anions (300.0)	None	1-250 ml plastic	
Sulfide (376.1) * Dissolved (Filter)	NaOH	1-1 liter plastic	
TOC (415.1)	HCl	1-125 ml glass amber	
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

Casing Volume =
$2^2 \times 0.0408 \times 9.8 = 1.60$ gallons $\times 2 = 3.20$ gallons
3.2 Gallons - Minimum Purge Volume

Pump Intake @ 12'

Laboratory
Contact: L. Williams
4405 Vineland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:	Signature(s): Thomas N. Dickson

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-824A-05S
DATE: 09/25/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1402	7.05	250		No odors; Clear discharge					Purge Start
1405	7.12		4.46	0.080	9.4	7.2	6.76	29.8	-33
1410	7.13		4.44	0.080	4.5	5.0	5.98	29.7	-37
1420	7.13		4.44	0.079	3.7	5.6	5.40	29.7	-46
1430	7.13		4.45	0.079	9.3	9.5	3.28	29.7	-50
1433	Reduce Flowrate 175					9.10			7750 mL: 2.04 Gallons
1445	7.11		4.45	0.078	5.3	9.1	1.35	29.7	-54
1500	7.11		4.46	0.078	0.4	7.3	1.23	29.6	-60
1515	7.11		4.47	0.077	-0.3	5.3	1.24	29.5	-62

1.24 Gallon (3.28 Total)
Sample 0.69
total 3.97 Gallons

SIGNATURE(S): Thomas M. Jackson

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-824A-GW-06I-02
Sample Location: NAS CF
Sampled By: L. KNIGHT
C.O.C. No.: 09/25/01-005
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/25/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 1700								
Method: Low Flow Peristaltic	MILKY BROWN	5.05	0.093	25.98	700	4.73	0.0	-135

PURGE DATA

Date: 9/25/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0.0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 38.2								
Static Water Level (WL): 7.20								
One Casing Volume(gal/L): 0.816								
Start Purge (hrs): 1612								
End Purge (hrs): 1655								
Total Purge Time (min): 43								
Total Vol. Purged (gal/L): 176								

See Low Flow Purge Data Sheet (Page 2)

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	YES
PAHs (8310)	None	2-1 liter glass ambers	YES
~~TRPH (FL PRO)~~	H_2SO_4	2-1 liter glass ambers	YES
Lead (6010B) *Dissolved (Filter)	HNO_3	1-1 litter plastic	NO
~~Alkalinity (310.1) Anions (300.0)~~	None	1-250 ml plastic	
~~Sulfide (376.1) * Dissolved~~ (Filter)	NaOH	1-1 liter plastic	
~~TOC (415.1)~~	HCl	1-125 ml glass amber	
~~Methane-Ethane-Ethene (RSKSOP-147/175)~~	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

One Casing (Saturated Screen) Volume =
$2^2 \times 0.0408 \times 5$ (screen length) = 0.816 gallons
$0.816 \times 2 = 1.63$ (Minimum Purge Requirement)

Pump Intake @ 35.0'

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Louis Knight

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF. 824A - 06I
DATE: 09/25/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1612	7.23								
1613	7.31								
1614	7.32			(LK)	500				
1615	7.33	400	5.42	0.107	>K	2.49	26.80	-131	
1620	7.34	400	5.18	0.100	~~2.18~~	2.18	26.47	-127	
1625	7.34	400	5.05	0.092	>K	3.66	25.99	-117	
1630	7.33	400	4.96	0.095	>K	2.42	25.93	-121	
1635	7.32	400	4.97	0.097	>K	3.08	25.90	-125	
1640	7.31	400	4.99	0.094	>K	3.18	25.93	-126	
1645	7.31	400	4.99	0.094	>K	3.32	25.92	-128	
1650	7.31	400	5.00	0.093	850	3.99	25.88	-131	
1655	7.26	200	5.05	0.093	700	4.73	25.98	-135	
1700	COLLECT	SAMPLE							

SIGNATURE(S): [signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-824A-GW-TS-02
Sample Location: NAS CF
Sampled By: L. KNIGHT
C.O.C. No.: 10/01/01-001
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 10/01/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	~~Salinity~~ ~~%~~	~~Other~~ ORP
Time: 0915								
Method: Low Flow Peristaltic	CLEAR	4.81	0.056	28.1	0.0	0.53		-148

PURGE DATA

Date: 10/01/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 8.7								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 14.9								
Static Water Level (WL): 8.15								
One Casing Volume(gal/L):								
Start Purge (hrs): 0833								
End Purge (hrs): 0903								
Total Purge Time (min): 30								
Total Vol. Purged (gal/L): ~12								

See Page 2 Low Flow Purge Data Sheet

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	XXX
PAHs (8310)	None	2-1 liter glass ambers	XXX
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	XXX
~~Lead~~ (6010B) *Dissolved IRON (Filter)	HNO_3	500ml ~~1-1 liter~~ plastic	XXX
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250 ml~~ plastic	XXX
Sulfide (376.1) * Dissolved (Filter)	NaOH	500ml ~~1-1 liter~~ plastic	XXX
~~TOC (415.1)~~	HCl	1-125 ml glass amber	—
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	XXX

OBSERVATIONS / NOTES

One Casing Volume = (Saturated Screen)
$2^2 \times 0.0408 \times 6.75 = 1.10$ gallons x 2 Saturated Screen
= 2.20 gallons (minimum Purge Volume Required)
Pump Intake - 10-11 feet

Laboratory
Contact: L. Williams
4405 Vineland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:
X	→ CEF-824A-MSD2

Signature(s): Lonnie Knight

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-824A-07S
DATE: 10-~~09~~/01/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0833	8.15								
0834	8.24								
0835	8.26	400	4.74	0.057	12	2.45	27.0	-115	
0840	8.27	400	4.80	0.055	10	6.08	28.0	-127	
0845	8.27	400	4.78	0.055	2.8	0.86	28.1	-143	
0850	8.28	400	4.79	0.055	0.25	0.62	28.2	-146	
0855	8.29	400	4.80	0.056	0.0	0.60	28.2	-147	
0900	8.28	400	4.81	0.056	0.0	0.53	28.1	-148	
0903	END PURGE								
0915	COLLECT SAMPLES								

SIGNATURE(S): [illegible]

ALSO:
[illegible]

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DSO05H125
Sampled By: LK
Field Analyst: T. ROJAHN
Field Form Checked as per QA/QC Checklist (Initials):

Sample ID No.: CEF-824A-GW-075-02
Sample Location: CEF-824A-075
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

Date: 10-01-01	Color (Visual)	pH (SU)	S.C. (mS/cm)	Turbidity (NTU)	DO (Meter, mg/l)	Temp. (°C)	ORP (Eh) (+/- mv)
Time: 0915							
Method: Peristaltic	CLEAR	4.81	0.056	0.0	0.53	28.1	-148

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment:
CHEMetrics Range ☑ 0 - 1.0 mg/L ☐ 1 - 12 mg/L
Analysis Time: 1019
CHEMetrics: 0.9 mg/L
Notes:

Carbon Dioxide:

Range Used:	CHEMetrics Range		Concentration
☐	10-100 mg/L	(K-1910)	= mg/L
☑	100-1000 mg/L	(K-1920)	= 170 mg/L
☐	250-2500 mg/L	(K-1925)	= mg/L

Analysis Time: 1032
Notes:

Alkalinity:

Equipment: HACH Digital Titrator AL-DT CHEMetrics (Range: _____ mg/L)
Analysis Time: 1057
Filtered: ☐

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☑	10-40 mg/L	100 ml	0.1600 N	0.1	0 & 73	x 0.1	= 7.3 mg/L
☐	40-160 mg/L	25 ml	0.1600 N	0.4	0 & 15	x 0.4	= mg/L
☐	100-400 mg/L	100 ml	1.600 N	1.0	0 & 12	x 1.0	= 12 mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	= mg/L
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	= mg/L
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	= mg/L

Parameter:	Hydroxide	Carbonate	Bicarbonate
Relationship:	0	0	<10

CHEMetrics: _____ mg/L
Notes: 10-40 RANGE UNDER limit of Range

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

TTNUS CHARLESTON,LLC FAX:9049210070 Sep 25 2001 9:28 P.01

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DSO05H125
Sampled By: L.K.
Field Analyst: T. Rojahn
Field Form Checked as per QA/QC Checklist (initials):

Sample ID No.: CEF-824A-GW-075-02
Sample Location: CEF-824A-075
Duplicate: ☐
Blank: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Ferrous Iron (Fe^{2+}):

Equipment: DR-700 DR-8 90 33 IR-18C Color Wheel Other: Analysis Time: 1030
Program/Module: 500nm
Concentration: 0.62 mg/L Filtered: ☐
Notes:

Sulfide (S^{2-}):

Equipment: DR-700 DR-8 90 93 HS-C Color Chart HS-WR Color Wheel Other: Analysis Time: 1042
Program/Module: 610nm
Concentration: >0.90 mg/L Filtered: ☐
Notes: Results Above the limits of Colorimeter

Hydrogen Sulfide (H_2S):

Equipment: HS-C Other: Analysis Time: 1021
Concentration: >5.0 mg/L Exceeded 5.0 mg/L range on color chart: ☑
Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☐
Correct measurement units are cited in the SAMPLING DATA block: ☐
Multiplication is correct for each *Multiplier* table: ☐
Final calculated concentration is within the appropriate *Range Used* block: ☐
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐
Title block is initialized by person who performed the QA/QC Checklist: ☐

TTNUS JACKSONVILLE Fax:9042810070 Sep 25 2001 9:26 P.02

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-824A-GW-085-02
Sample Location: CEF-824A-085
Sampled By: T. ROJAHN
C.O.C. No.: 10/01/01-002
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/30/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 0955								
Method: Low Flow Peristaltic	CLEAR	4.74	0.062	28.1	4.2	0.45	—	-130

PURGE DATA

Date: 9/30/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0.0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 15.0								
Static Water Level (WL): 7.44		SEE	LOW	FLOW	PURGE	DATA	SHEET	
One Casing Volume(gal/L): 4.7								
Start Purge (hrs): 0900								
End Purge (hrs): 0950								
Total Purge Time (min): 50								
Total Vol. Purged (gal/L): 11.5								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	✓
PAHs (8310)	None	2-1 liter glass ambers	✓
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	✓
~~Lead~~ (6010B) *Dissolved IRON (Filter)	HNO_3	500ml ~~1-1 liter~~ plastic	NO
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250~~ ml plastic	↓
Sulfide (376.1) * Dissolved (Filter)	NaOH	500ml ~~1-1 liter~~ plastic	↓
TOC (415.1)	HCl	1-125 ml glass amber	↓
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	↓

OBSERVATIONS / NOTES

15.0 - 7.44 = 7.56 x .163 = 1.23 gal or 4.7L
MIN VOL = 9.4L
PUMP INTAKE ~ 3.75' OFF BOTTOM
SULFUR ODOR

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle If Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s): Troy Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-824A-085
DATE: 09/30/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments SULFUR ODOR
0900	7.44	—	—	—	—	—	—	—	Start PURGE
0910	7.52	250	4.75	0.061	78	0.71	28.1	-113	2500ml Sl. Cloudy
0920	7.52	250	4.79	0.061	36	0.53	28.1	-122	5000ml CLEAR
0930	7.52	250	4.81	0.060	20	0.45	28.2	-128	7500ml "
0940	7.51	200	4.81	0.061	7.7	0.50	28.0	-130	9500ml "
0950	7.51	200	4.74	0.062	4.2	0.45	28.1	-130	11500ml "
0955									→ Start SAMPLING

MIN. VOL. = 9.4L

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CFF-824A-GW-095-02
Sample Location: NAS CF
Sampled By: L. KNIGHT
C.O.C. No.: CF57-092701
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/27/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 1105								
Method: Low Flow Peristaltic	CLEAR	4.80	0.080	29.0	0.0	1.28		-103

PURGE DATA

Date: 9/27/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 82								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 15.0		SEE LOW FLOW PURGE DATA SHEET						
Static Water Level (WL): 6.64								
One Casing Volume(gal/L): 5.2								
Start Purge (hrs): 1030								
End Purge (hrs): 1100								
Total Purge Time (min): 30								
Total Vol. Purged (gal/L): ~12L								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	✓
PAHs (8310)	None	2-1 liter glass ambers	✓
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	✓
~~Lead~~ (6010B) *Dissolved Iron (Filter)	HNO_3	500ml ~~1-1 liter~~ plastic	✓
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250 ml~~ plastic	✓
Sulfide (376.1) * Dissolved (Filter)	NaOH	500ml ~~1-1 liter~~ plastic	✓
TOC (415.1)	HCl	1-125 ml glass amber	✓
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	✓

OBSERVATIONS / NOTES

TOC - Collected in Error, Only to be collected and analyzed for background locations
One Casing (Saturated Screen) Volume =
$2^2 \times 0.0408 \times 8.36 = 1.36$ gallons $\times 2 = 2.73$ gallons (Minimum Purge Volume)
Pump Intake 9.0-10.0'

Laboratory
Contact: L. Williams
4405 Vineland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): James Knight

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-824A-09S
DATE: 09/27/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1030	6.64	400							
1031	6.73	400							
1032	6.76	400							
1033	6.78	400							
1034	6.80	400							
1035	6.81	400	4.90	0.095	0.1	5.11	28.2	-96	
1040	6.83	400	4.85	0.088	0.0	4.89	28.9	-100	
1045	6.84	400	4.85	0.091	0.0	4.33	28.9	-102	
1050	6.84	400	4.83	0.085	0.0	3.88	29.0	-104	
1055	6.85	400	4.82	0.083	0.0	1.61	29.0	-104	
1100	6.85	400	4.80	0.080	0.0	1.28	29.0	-103	
1105	COLLECT	SAMPLE							

SIGNATURE(S): Louis Knight

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DSO05H125
Sampled By: L.H.
Field Analyst: T. ROJAHN
Field Form Checked as per QA/QC Checklist (Initials):

Sample ID No.: CEF- 824A-GW-095-02
Sample Location: CEF- 824A - 095
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

	Color (Visual)	pH (SU)	S.C. (mS/cm)	Turbidity (NTU)	DO (Meter, mg/l)	Temp. (°C)	ORP (Eh) (+/- mv)
Date: 9-27-01							
Time: 1105							
Method: Peristaltic	CLEAR	4.80	0.080	0.0	1.28	29.0	-103

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment:
CHEMetrics Range ☐ 0 - 1.0 mg/L ☑ 1 - 12 mg/L
Analysis Time: 1153
CHEMetrics: 1.1 mg/L
Notes:

Carbon Dioxide:

Range Used:	CHEMetrics Range		Concentration	
☐	10-100 mg/L	(K-1910)		= mg/L
☑	100-1000 mg/L	(K-1920)	210	= 210 mg/L
☐	250-2500 mg/L	(K-1925)		= mg/L

Analysis Time: 1135
Notes:

Alkalinity:

Equipment: HACH Digital Titrator AL-DT
CHEMetrics (Range: NA mg/L)
Analysis Time
Filtered: ☐

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	&	x 0.1	= mg/L
☐	40-160 mg/L	25 ml	0.1600 N	0.4	&	x 0.4	= mg/L
☑	100-400 mg/L	100 ml	1.600 N	1.0	0 & 144	x 1.0	= 144 mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	= mg/L
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	= mg/L
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	= mg/L

Parameter:	Hydroxide	Carbonate	Bicarbonate
Relationship:	0	0	144

CHEMetrics: NA mg/L
Notes:
Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

TINUS CHOKSDNVILLE Fax:9042810070 Sep 25 2001 9:28 P.01

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DSO05H125
Sampled By: L.K
Field Analyst: T. ROJAHN
Field Form Checked as per QA/QC Checklist (initials):

Sample ID No.: CEF- 824A-GW-095-02
Sample Location: CEF- 824A - 095
Duplicate: ☐
Blank: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Ferrous Iron (Fe^{2+}):

Equipment: DR-700 DR-8 9 0 33 IR-18C Color Wheel Other: _____ Analysis Time: 1126
Program/Module: 500nm
Concentration: 1.06 mg/L Filtered: ☐
Notes:

Sulfide (S^{2-}):

Equipment: DR-700 DR-8 9 0 93 HS-C Color Chart HS-WR Color Wheel Other: _____ Analysis Time: 1118
Program/Module: 610nm
Concentration: >0.80 mg/L Filtered: ☐
Notes: ABOVE Limit of Colorimeter

Hydrogen Sulfide (H_2S):

Equipment: HS-C Other: _____ Analysis Time: 1110
Concentration: 5.0 mg/L Exceeded 5.0 mg/L range on color chart: ☐
Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☐
Correct measurement units are cited in the SAMPLING DATA block: ☐
Multiplication is correct for each *Multiplier* table: ☐
Final calculated concentration is within the appropriate *Range Used* block: ☐
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐
Title block is initialized by person who performed the QA/QC Checklist: ☐

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: 824A 57 (TL) B.~~012~~ SITE ~~58~~
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF 824A-GW-10S-02
Sample Location: NAS CF
Sampled By: L. KNIGHT
C.O.C. No.: CF57-092801
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/27/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	~~Salinity~~ %	~~Other~~ ORP
Time: 1425								
Method: Low Flow Peristaltic	CLEAR	4.68	0.089	28.3	0.1	0.93		-125

PURGE DATA

Date: 9/27/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0.3								
Well Casing Diameter: 2"								
Well Casing Material: PVC		SEE	LOW	FLOW	PURGE	DATA	SHEET	
Total Well Depth (TD): 14.9								
Static Water Level (WL): 5.52								
One Casing Volume (gal/L): 1.53								
Start Purge (hrs): 1358								
End Purge (hrs): 1425								
Total Purge Time (min): 27								
Total Vol. Purged (gal/L): ~14L or 3.69 gallons								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	[illegible]
PAHs (8310)	None	2-1 liter glass ambers	[illegible]
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	[illegible]
~~Lead (6010B) Dissolved (Filter)~~	~~HNO_3~~	~~1-1 liter plastic~~	
~~Alkalinity (310.1) Anions (300.0)~~	~~None~~	~~1-250 ml plastic~~	
~~Sulfide (376.1) Dissolved (Filter)~~	~~NaOH~~	~~1-1 liter plastic~~	
~~TOC (415.1)~~	~~HCl~~	~~1-125 ml glass amber~~	
~~Methane Ethane Ethene~~ (RSKSOP 147/175)	~~HCl~~	~~3-40ml glass VOA~~	

OBSERVATIONS / NOTES

One Casing (Saturated Screen) Volume =
22 x 0.0408 x 9.38 = 1.53 gallons x 2 = 3.06 gallons
(minimum Purge Volume)
Pump Intake = ~9.0'

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:
MS/MSD
Duplicate ID No.:

Signature(s): James Knight

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. ~~312~~ Site ~~58~~ 824A 57 (T2)

PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF. 824A. 10S

DATE: 09/27/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1358	5.52								
1359	5.59								
1400	5.61	600	4.81	0.116	2.6	4.98	28.7	-101	
1405	5.64	600	4.69	0.104	9.7	2.29	28.3	-120	
1410	5.62	500	4.68	0.096	2.9	1.45	28.3	-122	
1415	5.62	500	4.69	0.094	3.2	1.02	28.3	-124	
1420	5.62	500	4.68	0.089	0.1	0.93	28.3	-125	
1425	COLLECT	SAMPLE							

SIGNATURE(S): [illegible]

824-11S

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B.~~312~~ SITE ~~58~~ 57 (TR) 824A
Project No.: N 0039 CTO 0078

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

Sample ID No.: CRF 824A-GW-11S-02
Sample Location: BLD 824
Sampled By: DS
C.O.C. No.: CF57-092801
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	~~Other~~ ORP
Date: 9/27/01 Time: 1440								
Method: Low Flow Peristaltic	CLEAR	4.93	.061	27.67	0	5.13	—	-90

PURGE DATA

Date: 9/27/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 23								
Well Casing Diameter: 2"								
Well Casing Material: PVC		SEE	LOW	FLOW	PURGE	DATA	SHEET	
Total Well Depth (TD): 15.10								
Static Water Level (WL): 6.05								
One Casing Volume (gal/L): 1.5								
Start Purge (hrs): 1355								
End Purge (hrs): 1435								
Total Purge Time (min): 40								
Total Vol. Purged (gal/L): 5.39								

11.34L

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	DS
PAHs (8310)	None	2-1 liter glass ambers	DS
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	DS
Lead (6010B) *Dissolved (Filter)	HNO_3	1-1 litter plastic	
Alkalinity (310.1) Anions (300.0)	None	1-250 ml plastic	
Sulfide (376.1) * Dissolved (Filter)	NaOH	1-1 liter plastic	
TOC (415.1)	HCl	1-125 ml glass amber	
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

One Casing (Saturated Screen) Volume =
$2^2 \times 0.0408 \times 9.05 = 1.48$ gallons $\times 2 = 2.95$ Gallons
(minimum Purge Volume)
Pump Intake @ ~10.0'

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:
MS/MSD
Duplicate ID No.:

Signature(s):

824A - 11s

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. ~~312~~ Site ~~58~~ 57 824A (FL)
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-824AGW-11S-02
DATE: 09/27/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1355	6.05								BEGIN PURGE
1405	6.15	500	5.03	.067	1.3	6.01	27.58	-79	
1415	6.17	500	4.91	.060	0	3.51	27.51	-87	
1425	6.18	500	4.92	.060	0	4.36	27.54	-90	
1435	6.18	500	4.93	.061	0	5.13	27.67	-90	

SIGNATURE(S): [signature]

PAGE 2 OF 2

12F

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF 824A GW 12F-02
Sample Location: BLD 824A; CEF 824A-1.
Sampled By: DS
C.O.C. No.: 09/25/01-005
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/25/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	~~Other~~ ORP
Time: 1515								
Method: Low Flow Peristaltic	CLEAR	4.37	.057	27.8	24	0.68	—	-75

PURGE DATA

Date: 9/25/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 4								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 39.70								
Static Water Level (WL): 6.58								
One Casing Volume (gal/L): 1.63								
Start Purge (hrs): 1357								
End Purge (hrs): 1510								
Total Purge Time (min): 73								
Total Vol. Purged (gal/L): 16.5+								

Low Flow Purge Data Sheet Page 2 See

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	YES
PAHs (8310)	None	2-1 liter glass ambers	YES
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	YES
Lead (6010B) *Dissolved (Filter)	HNO_3	1-1 litter plastic	NO
Alkalinity (310.1) Anions (300.0)	None	1-250 ml plastic	
Sulfide (376.1) * Dissolved (Filter)	NaOH	1-1 liter plastic	
TOC (415.1)	HCl	1-125 ml glass amber	
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

One Casing (Saturated Screen) Volume
$2^2 \times 0.0408 \times 5 = 0.816$ gallons $\times 2 = 1.63$ gal
(Minimum Purge Volume Required)
Pump Intake @ ~ 36.5'

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:
MS/MSD
Duplicate ID No.:

Signature(s):

12F

1^ I

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF 824A GW 12I-02
DATE: 09/25/01

12I

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1357	6.58	250							BEGIN PURGE
1400	6.64	250	4.39	.063	45	1.39	28.7	-63	
1405	6.64	250	4.36	.062	40	1.23	28.4	-63	
1410	6.65	250	4.35	.061	40	.97	28.3	-65	
1415	6.64	250	4.35	.060	45	1.21	28.4	-61	
1420	6.64	250	4.35	.059	45	1.61	28.2	-64	
1430	6.65	250	4.36	.059	45	1.08	28.2	-65	
1440	6.65	250	4.37	.059	40	0.82	28.3	-69	
1450	6.65	200	4.39	.058	39	0.78	28.9	-70	
1500	6.63	200	4.37	.058	30	0.74	27.6	-73	
1510	6.64	200	4.37	.057	24	0.68	27.8	-75	END

10

16

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF.824A.GW.13D.01
Sample Location: NAS CF
Sampled By: L. KNIGHT
C.O.C. No.: 09/25/01-005
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/25/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 1450								
Method: Low Flow Peristaltic	Clear	7.07	0.459	26.81	12	2.13	0.0	-28

PURGE DATA

Date: 9/25/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 12.9								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 87								
Static Water Level (WL): 6.29								
One Casing Volume (gal/L): 0.816								
Start Purge (hrs): 1346								
End Purge (hrs): 1450								
Total Purge Time (min): 64								
Total Vol. Purged (gal/L): 17.92								

See Low Flow Purge Data Sheet (Page 2) OR 4.73 Gallons

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	✓
PAHs (8310)	None	2-1 liter glass ambers	✓
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	✓
Lead (6010B) *Dissolved (Filter)	HNO_3	1-1 litter plastic	NO
Alkalinity (310.1) Anions (300.0)	None	1-250 ml plastic	
Sulfide (376.1) * Dissolved (Filter)	NaOH	1-1 liter plastic	
TOC (415.1)	HCl	1-125 ml glass amber	
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

Casing Volume = (Saturated Screen Volume)
$2^2 \times 0.0408 \times 5 = 0.816$ Gallons $\times 2 = 1.63$ gallons
Minimum Purge Volume (2-Saturated Screens)
Pump Intake - 2'-2.5' off the bottom

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Joyce Knight

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-824A-13D
DATE: 09/25/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1346	6.29								
1347	6.82								
1348	6.87								
1349	6.85								
1350	6.85	280	7.33	0.464	60	3.92	27.24	-96	
1355	6.82	280	7.08	0.462	56	2.43	27.06	-91	
1400	6.82	280	7.04	0.461	27	2.30	26.98	-65	
1405	6.82	280	7.03	0.460	27	2.21	26.85	-57	
1410	6.82	280	7.04	0.460	29	2.19	26.76	-50	
1415	6.82	280	7.04	0.460	35	2.17	26.70	-45	
1420	6.82	280	7.04	0.459	31	2.17	26.59	-38	
1425	6.82	280	7.05	0.460	28	2.13	26.53	-37	
1430	6.82	280	7.05	0.459	26	2.12	26.42	-36	
1435	6.82	280	7.05	0.459	24	2.10	26.40	-34	
1440	6.82	280	7.06	0.458	18	2.10	26.73	-34	
1445	6.82	280	7.07	0.459	12	2.13	26.81	-28	
1450	COLLECT	SAMPLE							

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEP-824A-GW-145-01
Sample Location: NOS CF
Sampled By: L. KNIGHT
C.O.C. No.: 10/02/01-001
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 10/1/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 1555								
Method: Low Flow Peristaltic	CLEAR	5.34	0.143	29.13	14	8.59		-173

PURGE DATA

Date: 10/1/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 16.7								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 13.7								
Static Water Level (WL): 7.3								
One Casing Volume(gal/L):								
Start Purge (hrs): 1422								
End Purge (hrs): 1552								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): ~18L								

See Page 02 Purge Low Flow Data Sheet

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	~~SRK~~
PAHs (8310)	None	2-1 liter glass ambers	~~SRK~~
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	~~SRK~~
~~Lead~~ (6010B) *Dissolved Iron (Filter)	HNO_3	500ml ~~1-1 liter~~ plastic Not Collected	~~SRK~~ TD
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250 ml~~ plastic	~~SRK~~ TD
Sulfide (376.1) * Dissolved (Filter)	NaOH	500ml ~~1-1 liter~~ plastic	~~SRK~~ TD
~~TOC (415.1)~~	HCl	1-125 ml glass amber	—
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	~~SRK~~ TD

OBSERVATIONS / NOTES

One Saturated Screen Volume
$2^2 \times 0.0408 \times 6.4 = 1.04 \times 2$ Saturated Screens
= 2.08 gallons
Pump Intake = 9-10'

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Lonnie Knight

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-824A-14S
DATE: 10 ~~09~~/1/01

Time (Hrs.)	Water Level (ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1422	7.30								
1423	7.50								
1424	7.56								
1425	7.60	200	5.45	0.146	50	4.46	29.94	75	
1430	7.65	200	5.35	0.144	180	4.70	29.63	5	
1440	7.67	200	5.33	0.141	150	5.32	29.37	-105	
1450	7.64	200	5.33	0.142	100	6.59	29.31	-129	
1500	7.65	200	5.36	0.145	60	7.40	29.17	-140	
1510	7.69	200	5.34	0.146	40	7.55	29.30	-145	
1520	7.71	200	5.34	0.144	25	8.01	29.16	-158	
1530	7.68	200	5.35	0.142	20	8.18	29.20	-170	
1540	7.71	200	5.35	0.143	17	8.29	29.10	-168	
1550	7.70	200	5.34	0.143	14	8.59	29.13	-173	

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-824A-GW-15I-01
Sample Location: NAS CF CEF-824A-15I
Sampled By: L Knight
C.O.C. No.: 10/02/01-001
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Date: 10/1/01								
Time: 1325								
Method: Low Flow Peristaltic	CLEAR	5.72	0.160	26.90	17	3.48		-111

PURGE DATA

Date: 10/1/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 20.2								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 40.5								
Static Water Level (WL): 7.25								
One Casing Volume(gal/L):								
Start Purge (hrs): 1233								
End Purge (hrs): 1320								
Total Purge Time (min): 47								
Total Vol. Purged (gal/L) ~12L								

See Page 2 Low Flow Purge Data Sheet

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	✓
PAHs (8310)	None	2-1 liter glass ambers	✓
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	✓
~~Lead~~ (6010B) *Dissolved IRON (Filter)	HNO_3	500ml ~~1-1 liter~~ plastic Not Collected	TD
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250 ml~~ plastic	TD
Sulfide (376.1) * Dissolved (Filter)	NaOH	500ml ~~1-1 liter~~ plastic	TD
TOC (~~415.1~~)	HCl	1-125 ml glass amber	—
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA ✓	TD

OBSERVATIONS / NOTES

One Casing Volume (One Saturated Screen)
22 x 0.0408 x 5 = 0.816 x 2 Saturated Screens =
1.63 gallons (Minimum Purge)
Pump Intake = 37.5-38.0'

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Louis Kight

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-824A-15T
DATE: 10 09/ 1 /01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1233	7.25								
1235	7.58	275							
1236	7.55	275							
1240	7.55	275	5.90	0.206	160	2.97	27.20	58	
1245	7.56	275	5.85	0.195	130	2.28	27.02	51	
1250	7.57	275	5.80	0.183	75	2.29	26.97	-15	
1255	7.57	275	5.78	0.174	45	2.56	26.87	-59	
1300	7.57	275	5.75	0.166	33	2.85	26.79	-87	
1305	7.57	275	5.72	0.164	28	3.02	26.76	-98	
1310	7.49	200	5.72	0.161	22	3.20	26.75	-105	
1315	7.42	200	5.73	0.160	19	3.37	26.88	-109	
1320	7.41	200	5.72	0.160	17	3.48	26.90	-111	
1325	COLLECT	SAMPLE							

SIGNATURE(S): Louis Knight

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-824A GW-16D-01
Sample Location: BLD 824; CEF-824A-16D
Sampled By: DS
C.O.C. No.: 10/02/01-001
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 10/01/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 1455								
Method: Low Flow Peristaltic	CLEAR	6.99	.0473	27.1	0	2.81	—	-108

PURGE DATA

Date: 10/01/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 22.7								
Well Casing Diameter: 2								
Well Casing Material: PVC								
Total Well Depth (TD): 85.0'								
Static Water Level (WL): 7.12								
One Casing Volume (gal/L): 0.816								
Start Purge (hrs): 1420								
End Purge (hrs): 1455								
Total Purge Time (min): 35								
Total Vol. Purged (gal/L): 8.25								

See Page 2 Low Flow Purge Data Sheet

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	DS
PAHs (8310)	None	2-1 liter glass ambers	DS
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	DS
Lead (6010B) *Dissolved (Filter)	HNO_3	1-1 litter plastic	
Alkalinity (310.1) Anions (300.0)	None	1-250 ml plastic	
Sulfide (376.1) * Dissolved (Filter)	NaOH	1-1 liter plastic	
TOC (415.1)	HCl	1-125 ml glass amber	
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

One Saturated Screen Volume
$2^2 \times 0.0408 \times 5.0 = 0.816 \times 2$ Saturated Screens
$= 1.63$ gallons
Pump Intake ~820'

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF 824A-16D
DATE: 10 09/01/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1420	7.12	275							
1425	7.30	275	6.84	0.454	4021	6.50	27.3	-44	
1435	7.18	275	6.98	0.472	10.66	3.69	27.2	-80	
1440	7.17	275	6.99	0.472	3.92	3.56	27.3	-90	
1445	7.17	275	6.97	0.473	0.50	3.13	27.2	-101	
1450	7.17	275	6.98	0.473	0	2.89	27.1	-101	
1455	7.18	275	6.99	0.473	0	2.81	27.1	-108	

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF 824A-GW-17I-01
Sample Location: ~~CEF 824~~ CEF-824A-17I
Sampled By: DS
C.O.C. No.: 10/02/01-001
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 10/1/01 Time: 1320	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Method: Low Flow Peristaltic	CLEAR	5.55	.186	26.3	1.2	1.19	—	-13

PURGE DATA

Date: 10/1/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 12.2								
Well Casing Diameter: 2"								
Well Casing Material: PVC		SEE	LOW	FLOW	DATA	SHEET,	P. 2	
Total Well Depth (TD): 40.5								
Static Water Level (WL): 7.09								
One Casing Volume(gal/L) 0.816								
Start Purge (hrs): 1250								
End Purge (hrs): 1320								
Total Purge Time (min): 30								
Total Vol. Purged (gal/L): 1.375								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	DS
PAHs (8310)	None	2-1 liter glass ambers	DS
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	DS
~~Lead~~ (6010B) *Dissolved ICCN (Filter)	HNO_3	500ml ~~1-1 liter~~ plastic	
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250 ml~~ plastic	
Sulfide (376.1) * Dissolved (Filter)	NaOH	500ml ~~1-1 liter~~ plastic	
TOC (415.1)	HCl	1-125 ml glass amber	
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	
	DS		

YES

DS

OBSERVATIONS / NOTES

One Casing Volume =
$2^2 \times 0.0408 \times 5.0 = 0.816 \times 2$ Saturated Screens = 1.63 gallons (Minimum Purge Requirement)
Pump Intake 37.5-38.0'

Laboratory
Contact: L. Williams
4405 Vineland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF 824 A-~~GW~~ 17I
DATE: 10 ~~09~~/01 /01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1250	7.09	325							BEGIN PURGE
1255	7.28	~~7.28~~	4.42	.209	15.6	3.35	26.9	87	
1300	7.26	350	5.59	.204	7.5	1.37	26.7	70	
1310	7.28	350	5.60	.191	3.8	0.87	26.6	44	
1315	7.29	350	5.57	.184	2.2	0.87	26.4	9	
1320	7.30	350	5.55	.186	1.2	1.19	26.3	-13	

325
8:50
8:50
8:50
13.75

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-824A-GW-18S-01
Sample Location: CEF-824A-18S; Site 57
Sampled By: Tom Dickson
C.O.C. No.: 10/01/01-002
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/30/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 1000								
Method: Low Flow Peristaltic	Clear	5.63	0.143	27.0	4.4	6.22	0.0	68

PURGE DATA

Date: 9/30/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 9.8								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 13.55								
Static Water Level (WL): 6.79								
One Casing Volume (gal/L): 1.10								
Start Purge (hrs): 0904								
End Purge (hrs): 1000								
Total Purge Time (min): 56								
Total Vol. Purged (gal/L): 3.35	Gallons							

See Attached (Page 2) Low Flow Purge Data Sheet

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	9 TD
PAHs (8310)	None	2-1 liter glass ambers	6 TD
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	6 TD
~~Lead (6010B)~~ *Dissolved (Filter)	HNO_3	1-1 litter plastic	NO
~~Alkalinity (310.1) Anions (300.0)~~	~~None~~	~~1-250 ml plastic~~	
~~Sulfide (376.1)~~ * Dissolved (Filter)	~~NaOH~~	~~1-1 liter plastic~~	
~~TOC (415.1)~~	~~HCl~~	~~1-125 ml glass amber~~	
~~Methane-Ethane-Ethene~~ (RSKSOP 147/175)	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

Casing Volume
22 x 0.0408 x 6.76 = 1.10 gallons x 2 (Saturated Screens) =
2.2 Gallons (minimum Purge Volume)

Intake = 3.0 - 3.5' from bottom of Screen, Mid Water Column

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle If Applicable:

MS/MSD	Duplicate ID No.:
✓	

Signature(s): Thomas M. Dickson

CEF-824-A-MSD 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-824A-GW-195-01
Sample Location: CEF-824A-195
Sampled By: T. ROJAHN
C.O.C. No.: 10/02/01-001
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 10/01/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 1625								
Method: Low Flow Peristaltic	CLEAR	4.99	0.118	27.8	42	0.49	—	+46

PURGE DATA

Date: 10/01/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): —								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 13.90	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 7.90								
One Casing Volume(gal/L): 3.7								
Start Purge (hrs): 1410								
End Purge (hrs): 1620								
Total Purge Time (min): 130								
Total Vol. Purged (gal/L): 14.3								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	✓
PAHs (8310)	None	2-1 liter glass ambers	✓
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	✓
~~Lead~~ (6010B) *Dissolved IRON (Filter)	HNO_3	500ml ~~1-1 liter~~ plastic	NO
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250 ml~~ plastic	↓
Sulfide (376.1) * Dissolved (Filter)	NaOH	500ml ~~1-1 liter~~ plastic	↓
TOC (415.1)	HCl	1-125 ml glass amber	↓
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	↓

OBSERVATIONS / NOTES

13.90 - 7.90 = 6 x .169 = 0.98 gal or 3.7L
MIN. VOL. = 7.4L
PUMP INTAKE 3' OFF BOTTOM OF WELL

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Terry Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-824A-19S
DATE: 10/01/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1410	7.90	—	—	—	—	—	—	—	Start Purge
1420	8.10	150	4.87	0.116	94	1.01	28.5	158	1500 ml Brownish
1430	8.12	150	4.79	0.116	77	0.47	28.9	116	3000 ml "
1440	8.12	150	4.84	0.117	65	0.61	28.8	102	4500 ml Cloudy
1450	8.13	150	4.80	0.121	69	0.67	28.7	87	6000 ml "
1500	8.13	150	4.85	0.121	65	0.54	28.6	73	7500 ml "
1510	8.06	100	4.91	0.116	54	0.88	28.3	64	8500 ml Sl. Cloudy
1520	8.06	100	4.89	0.119	53	0.51	28.2	61	9500 ml " "
1530	8.06	100	4.94	0.117	52	0.58	28.1	56	10500 ml " "
1540	8.02	75	4.94	0.119	52	0.71	27.5	54	11250 ml " "
1550	8.04	75	4.93	0.119	45	0.66	27.5	55	12000 ml V. " "
1600	8.04	75	4.94	0.121	46	0.47	28.0	54	12750 ml V. " "
1610	8.04	75	4.95	0.120	42	0.52	28.0	50	13500 ml CLEAR
1620	8.04	75	4.99	0.118	42	0.49	27.8	46	14250 ml "
> 2 Hr Purge, Turbidity Flat line & min Flow Rate Start Sampling @ 1625									

SIGNATURE(S): [signature]

MIN VOL = 7.4 L

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-824A-185
DATE: 09/30/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)		DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments	
0904	6.79 (Initial)	210									
0909	6.88	225	5.57	0.150	5.4	4.4	8.28	24.3	154	Clear; no odor; no sheen	
0914	6.89	225	5.62	0.146	3.3	4.2	6.04	26.6	133	~~DO Sat. 88%~~ Cumulative Volume	
0920	6.89	240	5.63	0.146	2.4	4.3	5.90	26.8	123	0.27 gallons	
0930	6.89	240	5.62	0.145	1.8	7.2	5.92	27.0	113	0.65	0.92
0945	6.90	215 ~~230~~	5.62	0.144	6.0	6.2	6.08	27.3	99	(Reduce Flowrate 0.63	1.55
1000	6.89	215	5.63	0.143	3.8	4.4	6.22	27.0	68	Sample 0.95	2.50 gallons
											3.35 gallons

Lamotte 2020 Turbidimeter
Horiba U-22

SIGNATURE(S): Thomas M. Dickson

PAGE 2 OF 2

Instruments Used: PhotoVac 2020 (EDJH338)
Horiba U-22 (9292030)
Lamotte 2020 (0916-4298)

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-824A-GW-20s-01
Sample Location: CEF 824A-20s
Sampled By: DS
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 10/2 /01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 1725								
Method: Low Flow Peristaltic	CLEAR	5.32	.100	30.0	1.2	.35	—	-131

PURGE DATA

Date: 10/2/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 11.2								
Well Casing Diameter: 2								
Well Casing Material: PVC		SEE	DATA FLOW, Pg 2					
Total Well Depth (TD): 13.67								
Static Water Level (WL): 6.37								
One Casing Volume (gal/L): 1.17								
Start Purge (hrs): 1645								
End Purge (hrs): 1720								
Total Purge Time (min): 35								
Total Vol. Purged (gal/L): 13.65	or 3.60 gallons							

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	DS
PAHs (8310)	None	2-1 liter glass ambers	DS
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	DS
~~Lead~~ (6010B) *Dissolved Iron (Filter)	HNO_3	500ml ~~1-1 liter~~ plastic	
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250 ml~~ plastic	
Sulfide (376.1) * Dissolved (Filter)	NaOH	500ml ~~1-1 liter~~ plastic	
TOC (415.1)	HCl	1-125 ml glass amber	
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

13.67
6.37
7.3 GAS.
.16
1.17 GAS VOL

1.17 x 3.78 = ~9 l needed

Pumping ~ 10 ft BLS

20
15
35

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-824A-GW-20S-01
DATE: 10/2/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1645	6.37	390							
1655	6.47	390	5.31	.103	12	.61	30.2	-116	
1705	6.48	390	5.31	.100	5.6	.42	30.1	-128	
1710	6.47	390	5.31	.107	2.6	.38	30.0	-131	
1715	6.47	390	5.32	.101	1.8	.36	30.0	-132	
1720	6.47	390	5.32	.100	1.2	.35	30.0	-131	
1725	Sample								

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-825LS-015-04
Sample Location: CEF-825LS-015
Sampled By: T. ROJAHN
C.O.C. No.: CF57-092801
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/28/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 1210								
Method: Low Flow Peristaltic	CLEAR	6.75	0.547	26.1	1.70	0.97	—	-128

PURGE DATA

Date: 9/28/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0.4								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 18.0	SEE	LOW	FLOW	PURGE	DATA	SHEET		
Static Water Level (WL): 7.0								
One Casing Volume(gal/L) 68								
Start Purge (hrs): 1120								
End Purge (hrs): 1206								
Total Purge Time (min): 46								
Total Vol. Purged (gal/L) 13.8								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	✓
PAHs (8310)	None	2-1 liter glass ambers	✓
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	✓
~~Lead~~ (6010B) *Dissolved IRON (Filter)	HNO_3	1-1 litter plastic	
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250 ml~~ plastic	
Sulfide (376.1) * Dissolved (Filter)	NaOH	1-1 liter plastic	
TOC (415.1)	HCl	1-125 ml glass amber	
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

18 - 7 = 11 x .163 = 1.8 gal or 6.8 L
MIN. VOL = 13.6 L
INTAKE OF PUMP ~5.0' OFF bottom

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Tony Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-825LS-15
DATE: 09/28/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1120	7.00	—	—	—	—	—	—	—	Start PURGE
1130	7.11	300	6.74	0.564	3.15	2.98	26.3	-21	3000 ml CLEAR
1140	7.12	300	6.74	0.565	2.85	0.95	26.2	-89	6000 "
1150	7.11	300	6.74	0.557	2.10	0.85	26.2	-109	9000 "
1200	7.11	300	6.74	0.549	1.65	0.90	26.1	-125	12000 "
1206	7.11	300	6.75	0.547	1.70	0.97	26.1	-128	13800 "
1210	—	—	—	—	—	—	—	—	Start SAMPLING

MIN VOL = 13.6

SIGNATURE(S): [signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-293-GW-1-01
Sample Location: *CEF-293-01 (Above Plan Map)
Sampled By: T. Dickson
C.O.C. No.: 10/01/01-002
Type of Sample:
[X] Low Concentration
[ ] High Concentration

*Note: Table A-2 indicates CEF-293-1 vs CEF-293-01

SAMPLING DATA

Date: 9/30/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 1445								
Method: Low Flow Peristaltic	Yellowish Tint	5.73	0.108	25.4	60	6.89	0.0	-82

PURGE DATA

Date: 9/30/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 19.1								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 14.64								
Static Water Level (WL): 5.47								
One Casing Volume(gal/L):								
Start Purge (hrs): 1245								
End Purge (hrs): 1445								
Total Purge Time (min): 120								
Total Vol. Purged (gal/L): 4.04								

See Page 2 Low Flow Purge Data Sheet

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	Yes TD
PAHs (8310)	None	2-1 liter glass ambers	Yes TD
** TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	Yes TD
~~Lead (6010B) *Dissolved~~ ~~Iron~~ ~~(Filter)~~	~~HNO_3~~	~~1-1 liter plastic~~	~~NO~~
~~Alkalinity (310.1) Anions (300.0)~~	~~None~~	~~1-250 ml plastic~~	
~~Sulfide (376.1) * Dissolved (Filter)~~	~~NaOH~~	~~1-1 liter plastic~~	
~~TOC (415.1)~~	~~HCl~~	~~1-125 ml glass amber~~	
~~Methane Ethane Ethene (RSKSOP 147/175)~~	~~HCl~~	~~3-40ml glass VOA~~	

OBSERVATIONS / NOTES

$2^2 \times 0.0408 \times 9.17 = 1.49 (1.50) \times 2$ (Saturated Screens)
$= 3.00$ gallons (Minimum Purge Volume)

Intake Placed 4.0-4.5' Above bottom of Screen

** - During collection bubbles formed indicating possible reaction with preservative

Laboratory Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Thomas M. Dickson

Note: Well Security
- No Locking Cap
- No Bolt down lid (Not Equipped for Bolt down)

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-293-1
DATE: 09/30/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)		DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments		
1245	5.47	160	5 TD							Yellowish Tint, Slight Sulfur odor		
1250	5.70	180	5.62	0.120	36.2	17	8.60	26.1	-103	Cumulative Volume		
1255	5.71	180	5.63	0.121	22.5	16	7.62	26.0	-108		0.23	0.46
1300	5.73	180	5.65	0.122	43.3	18	7.16	26.3	-115	(Clean Cell)	0.23	~~0.46~~ 0.69
1305	—	180	5.65	0.114	53.1	30	7.32	26.0	-106		0.23	0.92
1310	Reduced	Flowrate to	150 mL/min; Cleaned Flow through Cell *								0.23	1.15
1315	5.68	150	5.68	0.116	72.4	38	7.81	25.5	-101		~~0.23~~ ~~1.38~~ TD	
1325	5.68	150	5.70	0.113	81.9	45	7.18	25.3	-96	Reduce Flowrate	0.29	1.75
1330	5.65	110	5.69	0.113	80.1	55	6.97	25.5	-100		0.14	1.89
1345	5.63	110	5.70	0.110	96.4	55	6.80	25.1	-97		0.43	2.32
1400	5.63	110	5.71	0.116	99.2	60	6.99	25.1	-86		0.43	2.75
1415	5.63	110	5.72	0.111	110.0	60	6.70	25.4	-84		0.43	3.18 (min. Purge Volume)
1430	5.62	110	5.74	0.109	109.0	60	6.72	26.1	-79		0.43	3.61
1445	5.62	110	5.73	0.108	108.0	60	6.89	25.4	-82	Sample	0.43	4.04 gallons

SIGNATURE(S): Thomas M. Nuckolls

PAGE 2 OF 2

Instruments Used: Photovac 2020 (ED3H338)
Horiba U-22 (9292030)
LaMotte 2020 (0916-4298)

* Flocculent discharge

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF 293-GW-3-01
Sample Location: BLD 824 - CEF 293-3
Sampled By: DS
C.O.C. No.: 10/03/01-001
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 10/2/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 1530								
Method: Low Flow Peristaltic	CLEAR	5.44	.075	26.6	8.2	120	—	168

PURGE DATA

Date: 10/2/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 4								
Well Casing Diameter: 2								
Well Casing Material: PVC		SEE	DATA	SHEET	Pg 2			
Total Well Depth (TD): 15.20								
Static Water Level (WL): 6.83								
One Casing Volume (gal/L): 1.3								
Start Purge (hrs): 1220								
End Purge (hrs): 1520								
Total Purge Time (min): 180								
Total Vol. Purged (gal/L): 25								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	DS
PAHs (8310)	None	2-1 liter glass ambers	DS
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	DS
~~Lead~~ (6010B) *Dissolved Iron (Filter)	HNO_3	500ml ~~1-1 liter~~ plastic	NO
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250 ml~~ plastic	
Sulfide (376.1) * Dissolved (Filter)	NaOH	500ml ~~1-1 liter~~ plastic	
TOC (415.1)	HCl	1-125 ml glass amber	
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	Y

OBSERVATIONS / NOTES

1520
6.83
8.37 ft of H2O
.16
1.338 1 case vol
2.6 TOTAL 2 vol

Pumping from ~ 11 ft BLS

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-293-3
DATE: 10/02/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1220	6.83	200		—		—			
1225	6.93	200	5.20	.058	20	3.68	26.1	180	BEGIN PURGE
1230	6.94	200	5.20	.059	18	3.16	26.0	185	
1240	6.94	200	5.23	.061	19	2.76	25.9	184	
1250	6.95	200	5.27	.064	16	2.37	25.9	181	
1300	6.94	200	5.32	.067	16	1.95	25.9	177	
1310	6.93	200	5.36	.069	15	1.69	26.0	175	
1320	6.89	100	5.40	.072	13	1.56	26.2	171	
1330	6.88	100	5.40	.072	13	1.49	26.3	171	
1340	6.88	100	5.40	.072	12	1.40	26.3	172	
1350	6.88	100	5.42	.073	12	1.38	26.4	171	
1400	6.88	100	5.42	.073	10	1.33	26.4	171	
1410	6.88	100	5.42	.074	11	1.41	26.5	170	
1420	6.88	100	5.42	.073	11	1.38	26.5	170	
1430	6.87	100	5.42	.074	9	1.33	26.4	169	
1440	6.87	100	5.44	.074	9	1.26	26.5	168	
1450	6.87	100	5.43	.075	9	1.23	26.5	169	
1500	6.87	100	5.44	.075	8	1.23	26.5	169	
1510	6.87	100	5.44	.075	8	1.20	26.5	168	
1520	6.87	100	5.44	.075	8.2	1.20	26.6	168	

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-293-GW-4-A3
Sample Location: CECIL CEF. 293.4
Sampled By: DS
C.O.C. No.: 10/02/01-001
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 10/2/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 0925								
Method: Low Flow Peristaltic	CLEAR	6.31	.299	24.82	0.00	3.55	—	-125

PURGE DATA

Date: 10/2/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): N.2								
Well Casing Diameter: 2		SEE	DATA	SHEET		P. 2		
Well Casing Material: PVC								
Total Well Depth (TD): 11.0								
Static Water Level (WL): 5.96								
One Casing Volume (gal/L): .8								
Start Purge (hrs): 0805								
End Purge (hrs): 0920								
Total Purge Time (min): 75								
Total Vol. Purged (gal/L): 6.75								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	DS
PAHs (8310)	None	2-1 liter glass ambers	DS
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	DS
~~Lead~~ (6010B) *Dissolved Iron (Filter)	HNO_3	500ml ~~1-1 liter~~ plastic	DS
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250 ml~~ plastic	DS
Sulfide (376.1) * Dissolved (Filter)	NaOH	500ml ~~1-1 liter~~ plastic	DS
TOC (415.1)	HCl	4-125 ml glass amber	DS
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	DS

OBSERVATIONS / NOTES

PUMPING FROM ~ 8 ft BLS

11.0
5.96
5.04 ft

5.04 x .16 = .8 Case vol. x2 = 1.63 gallon (Min. Purge Volume)

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:	Signature(s):
TOC ONLY	TOC ONLY — CEF-824A DUP-5	

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF 243 - 4
DATE: 10/02/01

Time (Hrs.)	Water Level (ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0805	5.96	90		BEGIN	PURGE				PUMPING AS SLOW AS PUMP WILL ALLOW
0820	6.81	90	6.20	.290	2.2	6.11	23.26	-14	
0830	6.78	90	6.31	.293	0	3.42	23.89	-81	
0840	6.78	90	6.32	.292	0	3.43	24.43	-101	
0850	6.78	90	6.34	.294	0	3.41	24.91	-95	
0900	6.79	90	6.31	.296	0	3.56	24.77	-116	
0910	6.79	90	6.31	.296	0	3.09	24.90	-117	
0920	6.78	90	6.31	.299	0	3.55	24.82	-125	

SIGNATURE(S): [illegible]

PAGE 2 OF 2

TOC → DUP & MS/MSD

TABLE 7-1

GROUNDWATER ANALYTES DETECTED ABOVE SCREENING CRITERIA
SITE 57 – BUILDING 824A/DAY TANK 1 AREA
REMEDIAL INVESTIGATION REPORT
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Parameter	Frequency Of Detection[1]	Screening Concentration[2]	NAS Cecil Field IBDS[3]	Regulatory Level[4]	FDEP Criterion[5]	Region IX PRG[6]	Risk Ratio[7]	C or N[8]
Volatile Organic Compounds (µg/L)								
Benzene	11 / 41	248	NA	5 MCL	1 P	0.35	709	C
1,1-DCA	7 / 41	97.2	NA	NA	70	810	0.12	N
1,1-DCE	2 / 41	33.8	NA	7 MCL	7 P	0.046	735	C
cis-1,2-DCE	5 / 41	825	NA	70 MCL	70 P	61	13.5	N
Ethylbenzene	11 / 41	148	NA	700 MCL	30 S	1300	0.11	N
Toluene	7 / 41	66	NA	1000 MCL	40 S	720	0.09	N
TCE	5 / 41	43	NA	5 MCL	3 P	1.6	27	C
Xylenes	13 / 41	572	NA	10000 MCL	20 S	1400	0.41	N
Semivolatile Organic Compounds (µg/L)								
1-Methylnaphthalene	15 / 41	438	NA	NA	20	NA	-	N
2-Methylnaphthalene	13 / 41	175	NA	NA	20	NA	-	N
Naphthalene	12 / 41	196	NA	NA	20	6.2	31.6	N

1. Frequency of detection is the number of samples in which the analyte was detected over the total number of samples analyzed.
2. Maximum detected concentration selected for screening criteria.
3. NAS Cecil Field Inorganic Background Data Set.
4. Maximum Contaminant Level (MCL) or Secondary Maximum Contaminant Level (SMCL).
5. FDEP Groundwater Cleanup Target Levels (FAC 62-777 and FAC 62-550) (August 1999).
6. U.S. EPA Region IX Preliminary Remediation Goal (PRG).
7. Ratio of screening concentration and Region IX PRG.
8. Carcinogen (C) or noncarcinogen (N).

NA Not available.
P Primary standard.
S Secondary standard.

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DS005H125
Sampled By: DS
Field Analyst: T. ROJAHN
Field Form Checked as per QA/QC Checklist (Initials):

Sample ID No.: CEF-293-GW-4-A3
Sample Location: CEF-293-4
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

Date: 10-02-01	Color (Visual)	pH (SU)	S.C. (mS/cm)	Turbidity (NTU)	DO (Meter, mg/l)	Temp. (°C)	ORP (Eh) (+/- mv)
Time: 0925							
Method: Peristaltic	CLEAR	6.31	0.299	0.00	3.55	24.82	-125

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment:
CHEMetrics Range ☑ 0 - 1.0 mg/L ☑ 1 - 12 mg/L
Analysis Time: 1215
CHEMetrics: 1.0 mg/L
Notes:

Carbon Dioxide:

Range Used:	CHEMetrics Range		Concentration
☐	10-100 mg/L	(K-1910)	= mg/L
☑	100-1000 mg/L	(K-1920)	= 155 mg/L
☐	250-2500 mg/L	(K-1925)	= mg/L

Analysis Time: 1220
Notes:

Alkalinity:

Equipment: HACH Digital Titrator AL-DT
CHEMetrics (Range: NA mg/L)
Analysis Time: 1252
Filtered: ☐

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	&	x 0.1	= mg/L
☐	40-160 mg/L	25 ml	0.1600 N	0.4	0 & 406	x 0.4	= 162.4 mg/L
☑	100-400 mg/L	100 ml	1.600 N	1.0	0 & 164	x 1.0	= 164 mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	= mg/L
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	= mg/L
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	= mg/L

Parameter:	Hydroxide	Carbonate	Bicarbonate
Relationship:	0	0	164

CHEMetrics: NA mg/L
Notes:

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

TINUS SHEN/SONNELLE FAX:9042810010 Sep 25 2001 9:28 P.01

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DSO05H125
Sampled By: DS
Field Analyst: T. ROJAHN
Field Form Checked as per QA/QC Checklist (initials):

Sample ID No.: CEF- 293 - GW - 4 - A3
Sample Location: CEF- 293 - 4
Duplicate: ☐
Blank: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION

Ferrous Iron (Fe^{2+}):

Equipment: DR-700 DR-8 9 0 IR-18C Color Wheel Other: _____ Analysis Time: 1223
Program/Module: 500nm 33
Concentration: 0.05 mg/L Filtered: ☐
Notes:

Sulfide (S^{2-}):

Equipment: DR-700 DR-8 9 0 HS-C Color Chart HS-WR Color Wheel Analysis Time: 1232
Program/Module: 610nm 93 Other: _____
Concentration: 0.02 mg/L Filtered: ☐
Notes:

Hydrogen Sulfide (H_2S):

Equipment: HS-C Other: _____ Analysis Time: 1211
Concentration: 0.0 mg/L Exceeded 5.0 mg/L range on color chart: ☐
Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☐
Correct measurement units are cited in the SAMPLING DATA block: ☐
Multiplication is correct for each *Multiplier* table: ☐
Final calculated concentration is within the appropriate *Range Used* block: ☐
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐
Title block is initialized by person who performed the QA/QC Checklist: ☐

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: GW-CEF-293-05-01
Sample Location: CEF-293-05
Sampled By: L. KNIGHT
C.O.C. No.: 10/03/01-001
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 10/2/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	~~Salinity~~ %	Other ORP
Time: 1620								
Method: Low Flow Peristaltic	CLEAR	6.33	0.469	25.78	0.0	3.64	—	87

PURGE DATA

Date: 10/2/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0.0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 11.6								
Static Water Level (WL): 5.25								
One Casing Volume(gal/L): 3.8L								
Start Purge (hrs): 1451								
End Purge (hrs): 1611								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): 8L								

SEE PAGE 2

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	YES
PAHs (8310)	None	2-1 liter glass ambers	YES
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	YES
~~Lead~~ (6010B) *Dissolved Iron (Filter)	HNO_3	500ml ~~1-1 liter~~ plastic	NO
Alkalinity ~~(310.1) Anions (300.0)~~	None	1L ~~1-250 ml~~ plastic	
Sulfide ~~(376.1)~~ * Dissolved (Filter)	NaOH	500ml ~~1-1 liter~~ plastic	
~~TOC (415.1)~~	HCl	1-125 ml glass amber	
~~Methane-Ethane-Ethene (RSKSOP 147/175)~~	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

One Saturated Screen Volume =
TD 11.6
SWL 5.25
SWC 6.35

2"x0.0408x6.35 = 1.04 gallons x 2 = 2.08g.
(Minimum Purge Volume)

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Pump Intake = 7.5-8.0'

Circle if Applicable:
MS/MSD
Duplicate ID No.:

Signature(s): James Knight

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-293-5
DATE: ~~09/ /01~~ 10/2/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1451	5.25								
1454	5.51								TUBING SET ~1 below
1455	5.59	150	6.38	0.476	10.48	6.05	26.60	80	MIDSCREEN (~8.5'
1500	5.86	150	6.38	0.476	5.89	5.37	26.44	79	bls)
1505	6.09	100	6.38	0.468	2.15	5.28	26.30	80	ALL PARAMETERS
1510	6.28	100	6.37	0.460	2.35	5.11	26.20	82	STABLE; DRAWDOWN
1520	6.40	80	6.36	0.451	0.0	4.98	26.05	84	BIGGEST PROBLEM
1540	6.57	80	6.43	0.473	0.08	4.30	25.89	82	
1600	6.60	80	6.41	0.471	0.0	3.91	25.82	86	
1610	6.61	80	6.33	0.469	0.0	3.64	25.78	87	
1620	COLLECT SAMPLE								

SIGNATURE(S): [illegible]

PAGE___OF___

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-293-GW-8-01
Sample Location: CEF-293-08
Sampled By: T. ROJAHN
C.O.C. No.: 10/01/01-002
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/30/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 1835								
Method: Low Flow Peristaltic	Yellow Tint	5.63	0.207	24.4	6.3	0.40	—	-157

PURGE DATA

Date: 9/30/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 4.00								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 15.0	SEE	LOW	FLOW	PURGE	DATA	SHEET		
Static Water Level (WL): 7.3								
One Casing Volume(gal/L): 4.8								
Start Purge (hrs): 1645								
End Purge (hrs): 1830								
Total Purge Time (min): 105								
Total Vol. Purged (gal/L): 19.5								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	✓
PAHs (8310)	None	2-1 liter glass ambers	✓
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	✓
~~Lead~~ (6010B) *Dissolved IRON (Filter)	HNO_3	500 ml ~~1-1 liter~~ plastic	NO
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250 ml~~ plastic	↓
Sulfide (376.1) * Dissolved (Filter)	NaOH	500 ml ~~1-1 liter~~ plastic	↓
TOC (415.1)	HCl	1-125 ml glass amber	↓
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	↓

OBSERVATIONS / NOTES

15 - 7.3 = 7.7 X .163 = 1.26 gal or 4.8 L
MIN VOL = 9.6 L
INTAKE ~4.0' OFF BOTTOM
YELLOW TINT

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle If Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Tony Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-293-08
DATE: 09/30/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments Yellow Tint
1645	7.30	—	—	—	—	—	—	—	Start Purge
1655	7.39	300	5.73	0.269	11.7	1.10	25.2	-131	3000ml CLEAR w/
1705	7.39	300	5.68	0.247	14.3	0.59	25.2	-145	6000ml " "
1715	7.40	300	5.64	0.227	12.2	0.54	25.1	-152	9.000ml " "
1725	7.38	200	5.63	0.225	10.3	0.52	25.0	-152	11.000ml " "
1730	7.38	200	5.63	0.228	8.8	0.58	25.0	-153	12.000ml " "
1735	7.38	200	5.63	0.228	8.0	0.56	24.9	-154	13.000ml " "
1740	7.38	200	5.63	0.225	9.7	0.57	24.8	-154	14.000ml " "
1750	7.37	150	5.63	0.218	10.3	0.57	24.8	-154	15,500ml " "
1800	7.36	100	5.62	0.210	9.9	0.55	24.6	-151	16,500ml " "
1810	7.36	100	5.62	0.212	9.5	0.49	24.7	-152	17,500ml " "
1820	7.36	100	5.63	0.210	8.7	0.48	24.5	-155	18.500ml " "
1830	7.36	100	5.63	0.207	7.5	0.40	24.4	-157	19.500ml " "
1835	—	—	—	—	6.3	By Pass Flow		Cell	Start Sampling

SIGNATURE(S): Terry Rogel

MIN VOL = 9.6 L

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

293-GW-10-A3

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-~~16-GW-39I~~-A1
Sample Location: NAS CF
Sampled By: LK
C.O.C. No.: CF57-092801
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/28/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 1305								
Method: Low Flow Peristaltic	Clear	5.58	0.151	26.2	5.7	6.91	—	-115

PURGE DATA

Date: 9/28/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
LK Monitor Reading (ppm): ~~168~~ → 3.6								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 11.2		SEE	LOW	FLOW	DATA	SHEET		
Static Water Level (WL): 6.50								
One Casing Volume (gal/L): 0.77								
Start Purge (hrs): 1225								
End Purge (hrs): 1255								
Total Purge Time (min): 30								
Total Vol. Purged (gal/L): ~15L								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	✓
PAHs (8310)	None	2-1 liter glass ambers	✓
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	✓
~~Lead (6010B) *Dissolved Lead (Filter)~~	HNO_3	1-1 litter plastic	NO
~~Alkalinity (310.1) Anions (300.0)~~	None	1L ~~1-250~~ ml plastic	
~~Sulfide (376.1) * Dissolved (Filter)~~	NaOH	1-1 liter plastic	
~~TOC (415.1)~~	HCl	1-125 ml glass amber	
~~Methane-Ethane-Ethene (RSKSOP 147/175)~~	HCl	3-40ml glass VOA	✓

OBSERVATIONS / NOTES

One Saturated Screen Volume =
TD 11.2
SWL 6.50
SWC 4.7

$2^2 \times 0.0408 \times 4.7 = 0.77$ gallons $\times 2 = 1.53$
(Minimum Purge Volume)

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:	Signature(s): Louis Knight

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-293-GW-10-A3
DATE: 09/28/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1225	6.50								
1226	6.56								
1229	6.58	500							
1230	6.60	500	5.52	0.128	29	10.18	26.4	-65	
1235	6.61	500	5.52	0.140	16	7.97	26.2	-66	
1240	6.62	500	5.55	0.145	11	7.46	26.2	-81	
1245	6.61	500	5.56	0.147	7.9	7.19	26.1	-94	
1250	6.62	500	5.58	0.148	6.5	6.98	26.2	-108	
1255	6.62	500	5.58	0.151	5.7	6.91	26.2	-115	
1255	STOP PURGING								
1305	COLLECT	SAMPLE							

SIGNATURE(S): Louis Knight

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF293-GW-11-A3
Sample Location: CEF 293-11
Sampled By: DS
C.O.C. No.: CF57-092701
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/27/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 0905								
Method: Low Flow Peristaltic	CLEAR	5.83	.232	26.82	0	3.69	—	-155

PURGE DATA

Date: 9/27/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 14.2								
Static Water Level (WL): 6.48	SEE LOW FLOW PURGE DATA SHEET							
D.5 1.3 One Casing Volume(gal/L): 1.3								
Start Purge (hrs): 0815								
End Purge (hrs): 0855								
Total Purge Time (min): 40								
Total Vol. Purged (gal/L): 14								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	DS
PAHs (8310)	None	2-1 liter glass ambers	DS
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	DS
FE Lead (6010B) *Dissolved (Filter)	HNO_3	500ml ~~1-1 liter~~ plastic	DS
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250 ml~~ plastic	DS
Sulfide (376.1) * Dissolved (Filter)	NaOH	500ml ~~1-1 liter~~ plastic	DS
TOC (415.1)	HCl	1-125 ml glass amber	DS
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	DS

OBSERVATIONS / NOTES

TOC-Collected & analyzed in Error. Only to be collected from CEF-293-4 TD

TD 14.20
SWL 6.48
7.72

One Casing Volume =
$2^2 \times 0.0408 \times 7.72 = 1.26$ gallons $\times 2 = 2.52$ gallons (Minimum Purge Volume)
Pump Intake ~ 9.0'

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:	Signature(s):
—	—	

12.25

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-293-GW-11-A3
DATE: 09/27/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0815	6.48	350							BEGIN PURGE
0820	6.74	350	5.81	.338	11.6	3.34	26.0	45	
0825	6.69	350	5.86	.282	8.2	2.43	26.64	-104	
0835	6.68	350	5.85	.254	1.3	2.47	26.78	-134	
0840	6.68	350	5.84	.246	.35	2.66	26.78	-142	
0845	6.69	350	5.83	.240	0	3.12	26.83	-149	
0850	6.70	350	5.83	.232	0	3.69	26.82	-155	
0855	6.70	350	5.83	234	0	3.65	26.82	-157	

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DS005H125
Sampled By: D.S
Field Analyst: T. ROSAHN
Field Form Checked as per QA/QC Checklist (Initials):

Sample ID No.: CEF-293-GW-11-A3
Sample Location: CEF-293-11
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

Date: 9-27-01	Color	pH	S.C.	Turbidity	DO	Temp.	ORP (Eh)
Time: ~~0905~~ 0905	(Visual)	(SU)	(mS/cm)	(NTU)	(Meter, mg/l)	(°C)	(+/- mv)
Method: Peristaltic	CLEAR	5.83	.232	0	3.69	26.82	-155

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment:
CHEMetrics Range ☑ 0 - 1.0 mg/L ☐ 1 - 12 mg/L
Analysis Time: 0854
CHEMetrics: 0.25 mg/L
Notes:

Carbon Dioxide:

Range Used:	CHEMetrics Range		Concentration		
☐	10-100 mg/L	(K-1910)		=	mg/L
☑	100-1000 mg/L	(K-1920)	190	= 190	mg/L
☐	250-2500 mg/L	(K-1925)		=	mg/L

Analysis Time: 1026
Notes:

Alkalinity:

Equipment: HACH Digital Titrator AL-DT
CHEMetrics (Range: NA mg/L)
Analysis Time: 1040
Filtered: ☐

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	&	x 0.1	= mg/L
☑	40-160 mg/L	25 ml	0.1600 N	0.4	0 & 162	x 0.4	= 65 mg/L
☐	100-400 mg/L	100 ml	1.600 N	1.0	0 & 72	x 1.0	= mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	= mg/L
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	= mg/L
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	= mg/L

Parameter:	Hydroxide	Carbonate	Bicarbonate
Relationship:	0	0	65

CHEMetrics: NA mg/L
Notes:
Standard Additions: ☐ Titrant Molarity: ____ Digits Required: 1st.: ____ 2nd.: ____ 3rd.: ____

FINCH SHOCKSDUNLLE Fax:9042810070 Sep 25 2001 9:28 P.02

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DSO05H125
Sampled By: D.S.
Field Analyst: T. ROJAHN
Field Form Checked as per QA/QC Checklist (initials):

Sample ID No.: CEF-293-GW-11-A3
Sample Location: CEF-293-11
Duplicate: ☐
Blank: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION

Ferrous Iron (Fe^{2+}):

Equipment: DR-700 DR-890 IR-18C Color Wheel Other: Analysis Time: 0905
Program/Module: 500nm 33
Concentration: 0.02 mg/L Filtered: ☐
Notes:

Sulfide (S^{2-}):

Equipment: DR-700 DR-890 HS-C Color Chart HS-WR Color Wheel Analysis Time: 0915
Program/Module: 610nm 93 Other:
Concentration: >0.80 mg/L Filtered: ☐
Notes: 0.8 @ Limit

Hydrogen Sulfide (H_2S):

Equipment: HS-C Other: Analysis Time: 0900
Concentration: 2.0 mg/L Exceeded 5.0 mg/L range on color chart: ☐
Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☐
Correct measurement units are cited in the SAMPLING DATA block: ☐
Multiplication is correct for each *Multiplier* table: ☐
Final calculated concentration is within the appropriate *Range Used* block: ☐
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐
Title block is initialized by person who performed the QA/QC Checklist: ☐

TTNUS JACKSONVILLE FAX:9042810070 Sep 25 2001 9:26 P.09

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-293-GW-13-A3
Sample Location: NAS CF (CEF-293-13)
Sampled By: L. KNIGHT
C.O.C. No.: 10/02/01-001
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 10/2/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	~~Salinity~~ %	~~Other~~ ORP
Time: 0915								
Method: Low Flow Peristaltic	CLEAR	5.43	0.192	25.9	12.4	1.71	/	-81

PURGE DATA

Date: 10/02/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0.0								
Well Casing Diameter: 2"		See Page 2						
Well Casing Material: PVC								
Total Well Depth (TD): 14.80								
Static Water Level (WL): 6.20								
One Casing Volume(gal/L): 1.40								
Start Purge (hrs): 0817								
End Purge (hrs): 0915								
Total Purge Time (min): 58								
Total Vol. Purged (gal/L): ~16L								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	✓
PAHs (8310)	None	2-1 liter glass ambers	✓
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	✓
~~Lead~~ (6010B) *Dissolved Iron (Filter)	HNO_3	500ml ~~1-1 liter~~ plastic	✓
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250 ml~~ plastic	✓
Sulfide (376.1) * Dissolved (Filter)	NaOH	500ml ~~1-1 liter~~ plastic	✓
~~TOC (415.1)~~	HCl	1-125 ml glass amber	—
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	✓

OBSERVATIONS / NOTES

DUPLICATE SAMPLES COLLECTED FOR NON-NA PARAMETERS ONLY (I.E., TRPH, PAH, VOC)

One Saturated Screen Volume:
TD 14.80
SWL 6.20
8.60

$2^2 \times 0.0408 \times 8.60 = 1.40$ gallons $\times 2 = 2.8$ gallons (Minimum Purge Volume)

Pump Intake = ~ 10.0 - 10.5'

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.: CEF-824A-DUP4

Signature(s): James Knight

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-293-13
DATE: ~~09/ /01~~ 10/2/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0817	6.20	400							TUBING SET at
0818	6.30	↓							MIDSCREEN (10'bls)
0819	6.31								
0820	6.33	400	5.52	0.237	63.0	9.31	26.0	145	
0825	6.35	400	5.45	0.231	70.2	5.34	26.6	20	
0830	6.30	300	5.48	0.227	61.1	2.23	26.5	-6	
0835	6.30	300	5.41	0.205	54.3	2.07	26.3	-55	
0840	6.27	200	5.42	0.206	47.0	1.88	26.2	-69	
0845	6.27	200	5.42	0.205	36.8	1.84	26.0	-71	
0850	6.27	200	5.42	0.198	30.8	1.70	26.0	-71	
0855	6.27	200	5.41	0.191	26.7	1.54	26.0	-78	
0900	6.26	150	5.42	0.189	22.2	1.63	25.9	-80	
0905	6.26	150	5.42	0.190	17.8	1.40	25.8	-78	
0910	6.27	150	5.42	0.192	14.9	1.53	25.9	-79	
0915	6.26	150	5.43	0.192	12.4	1.71	25.9	-81	
0915	COLLECT SAMPLE								

SIGNATURE(S): James Kryll

PAGE 2 OF 2

DUPLICATE LABELED 'CEF-824A-DUP4' (VOC, TRPH, PAH only)

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DS005H125
Sampled By: LKnight
Field Analyst: T. Rojahn
Field Form Checked as per QA/QC Checklist (Initials):

Sample ID No.: CEF-293-GW-13-A3
Sample Location: CEF-293-13
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

Date: 10-02-01	Color (Visual)	pH (SU)	S.C. (mS/cm)	Turbidity (NTU)	DO (Meter, mg/l)	Temp. (°C)	ORP (Eh) (+/- mv)
Time: 0915							
Method: Peristaltic	CLEAR	5.43	0.192	12.4	1.71	25.9	-81

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment:
CHEMetrics Range ☑ 0 - 1.0 mg/L ☑ 1 - 12 mg/L
Analysis Time: 1040
CHEMetrics: 1.0 mg/L
Notes:

Carbon Dioxide:

Range Used:	CHEMetrics Range		Concentration
☑	10-100 mg/L	(K-1910)	= 19 mg/L
☐	100-1000 mg/L	(K-1920)	= mg/L
☐	250-2500 mg/L	(K-1925)	= mg/L

Analysis Time: 1100
Notes:

Alkalinity:

Equipment: HACH Digital Titrator AL-DT
CHEMetrics (Range: NA mg/L)
Analysis Time: 1111
Filtered: ☐

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	0 & 38	x 0.1	= 3.8 mg/L
☐	40-160 mg/L	25 ml	0.1600 N	0.4	0 & 5	x 0.4	= mg/L
☐	100-400 mg/L	100 ml	1.600 N	1.0	0 & 6	x 1.0	= mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	= mg/L
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	= mg/L
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	= mg/L

Parameter:	Hydroxide	Carbonate	Bicarbonate
Relationship:	0	0	3.8 or <10

CHEMetrics: NA mg/L
Notes: Results under Range of 10-40

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

TTNUS JACKSONVILLE FAX:9042810070 Sep 25 2001 9:28 P.01

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DSO05H125
Sampled By: L Knight
Field Analyst: T. Rojahn
Field Form Checked as per QA/QC Checklist (initials):

Sample ID No.: CEF-293-GW-13-A3
Sample Location: CEF-293-13
Duplicate: ☐
Blank: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION

Ferrous Iron (Fe^{2+}):

Equipment: DR-700 DR-890 DR-18C Color Wheel Other: _____ Analysis Time: 1059
Program/Module: 500nm 33
Concentration: 0.03 mg/L
Filtered: ☐
Notes:

Sulfide (S^{2-}):

Equipment: DR-700 DR-890 HS-C Color Chart HS-WR Color Wheel Analysis Time: 1051
Program/Module: 610nm 93 Other: _____
Concentration: 0.05 mg/L
Filtered: ☐
Notes:

Hydrogen Sulfide (H_2S):

Equipment: HS-C Other: _____ Analysis Time: 1044
Concentration: 0.0 mg/L Exceeded 5.0 mg/L range on color chart: ☐
Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☐
Correct measurement units are cited in the SAMPLING DATA block: ☐
Multiplication is correct for each *Multiplier* table: ☐
Final calculated concentration is within the appropriate *Range Used* block: ☐
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐
Title block is initialized by person who performed the QA/QC Checklist: ☐

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-293-GW-14-A3
Sample Location: CEF-293-14
Sampled By: L. KNIGHT
C.O.C. No.: 10/02/01-001
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 10/2/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 1330								
Method: Low Flow Peristaltic	Clear	5.68	0.097	25.7	6.35	4.50		135

PURGE DATA

Date: 10/2/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0.0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 14.80								
Static Water Level (WL): 6.38								
One Casing Volume(gal/L): ~5.2L								
Start Purge (hrs): 1237								
End Purge (hrs): 1330								
Total Purge Time (min): 53								
Total Vol. Purged (gal/L): 3.53								

SEE PAGE 2

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	~~YES~~
PAHs (8310)	None	2-1 liter glass ambers	~~YES~~
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	~~YES~~
~~Lead (6010B) *Dissolved Iron~~ (Filter)	HNO_3	500ml ~~1-1 liter~~ plastic	NO
~~Alkalinity (310.1) Anions (300.0)~~	None	1L ~~1-250 ml~~ plastic	
~~Sulfide (376.1) * Dissolved~~ (Filter)	NaOH	500ml ~~1-1 liter~~ plastic	
~~TOC (415.1)~~	HCl	1-125 ml glass amber	
~~Methane-Ethane-Ethene (RSKSOP 147/175)~~	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

One Saturated Screen Volume =

TD 14.80
SWL 6.38
SWC 8.42

22 x 0.0408 x 8.42 = 1.37 gallons x 2 = 2.74 gallons (Minimum Purge Volume)

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Pump Intake ~ 10.0'

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): Lewis Knight

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-93-14
DATE: ~~09/ /01~~ 10/2/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1237	6.38								
1238	6.42	320							TUBING SET
1239	6.42	320							ABOUT MIDSCREEN
1240	6.42	320	5.96	0.075	11.3	10.28	25.51	85	(~10' bls)
1245	6.43	320	5.67	0.073	31.0	6.79	25.47	103	
1250	6.43	320	5.59	0.078	33.3	6.28	25.38	118	
1255	6.43	320	5.57	0.083	25.5	5.70	25.32	127	
1300	6.42	200	5.57	0.088	18.7	4.86	25.31	129	
1305	6.40	200	5.59	0.094	15.3	4.81	25.22	132	
1310	6.40	200	5.60	0.095	11.9	4.71	25.19	133	
1315	6.40	200	5.63	0.095	9.46	4.64	25.17	134	
1320	6.40	200	5.64	0.095	9.37	4.60	25.17	135	
1325	6.40	200	5.65	0.096	7.18	4.53	25.16	135	
1330	6.40	200	5.68	0.097	6.35	4.50	25.17	135	
1330	COLLECT	SAMPLE							

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-293-GW-15D-01
Sample Location: CEF-293-15D
Sampled By: T Dickson
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/30/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 1845								
Method: Low Flow Peristaltic	Slightly cloudy	5.01	0.084	23.4	130	1.44	0.0	-137

PURGE DATA

Date: 9/30/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 38.9								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 58.35								
Static Water Level (WL): 6.85								
One Casing Volume(gal/L): 0.816								
Start Purge (hrs): 1643								
End Purge (hrs): 1845								
Total Purge Time (min): 122								
Total Vol. Purged (gal/L): 4.68 gallons								

See Page 2 Low Flow Purge Data Sheet

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	Yes TD
PAHs (8310)	None	2-1 liter glass ambers	Yes TD
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	Yes TD
~~Lead~~ (6010B) *Dissolved IRON (Filter)	HNO_3	1-1 litter plastic	No
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250 ml~~ plastic	
Sulfide (376.1) * Dissolved (Filter)	NaOH	1-1 liter plastic	
TOC (415.1)	HCl	1-125 ml glass amber	
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

Casing Volume
$2^2 \times 0.0408 \times 50.0 = 0.816 \times 2$ Saturated Screens
$= 1.632$ gallons

Pump Intake @ ~ 55.0'

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Thomas M. Dickson

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF 293-15D
DATE: 09/30/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)		DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments	Volume	
1643	6.85	175	Initiate Pumping							Chocolate brown; No odors		
1650	7.21	175	5.21	0.097	999	625	10.15	25.2	-120			
1700	7.22	190	5.15	0.093	999	950	8.07	24.9	-126		0.78	
1710	7.21	190	5.12	0.089	958	650	8.08	24.7	-118			
1720	7.22	190	5.02	0.082	778	330	5.52	24.7	-135		1.00	1.78
1730	7.22	190	5.01	0.082	469	230	3.51	24.5	-138		0.50	2.28
1731	7.15	145	Reduce Flowrate to Reduce Turbidity									
1740	7.14	145	5.01	0.080	387	180	2.08	24.41	-140			
1750	7.14	145	5.01	0.080	353	170	1.47	24.4	-141			
1800	7.14	145	5.00	0.079	325	150	1.11	24.3	-141			
1802	7.11	110	Reduce Flowrate to Reduce Turbidity								1.14	3.43
1810	7.10	110	5.01	0.080	275	130	1.08	24.3	-142			
1820	7.10	110	5.01	0.080	260	140	2.21	24.0	-138			
1830	7.10	110	5.01	0.086	249	130	1.70	23.5	-134		0.81	4.24
1840	7.11	110	5.01	0.084	241	130	1.44	23.4	-137			
1845	Sample										0.43	4.68 gallons
					Horiba U-22	LaMotte 2020						

SIGNATURE(S): Thomas M. Quintero

Instruments Used: Photovac 2020 PID (EDJH338)
Horiba U-22 (9292030)
LaMotte 2020 (0916-4298)

Page___ of ___

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CRF-293-GW-19-A3
Sample Location: CRF 293 - 19
Sampled By: DS
C.O.C. No.: CF57-092701
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/27/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	~~Other~~ ORP
Time: 1155								
Method: Low Flow Peristaltic	CLEAR	5.65	.201	29.09	2.8	9.27	—	-167

PURGE DATA

Date: 9/27/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 14.02		SEE	LOW	FLOW	PURGE	DATA	SHEET	
Static Water Level (WL): 6.60								
One Casing Volume (gal/L): 1.4								
Start Purge (hrs): 1000								
End Purge (hrs): 1145								
Total Purge Time (min): 105								
Total Vol. Purged (gal/L): 14.0								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	DS
PAHs (8310)	None	2-1 liter glass ambers	DS
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	DS
RK ~~Lead~~ (6010B) *Dissolved IRON (Filter)	HNO_3	500ml ~~1-1 liter~~ plastic	DS
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250 ml~~ plastic	DS
Sulfide (376.1) * Dissolved (Filter)	NaOH	500ml ~~1-1 liter~~ plastic	DS
TOC (415.1)	HCl	1-125 ml glass amber	DS
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	DS

OBSERVATIONS / NOTES

TOC - Collected and analyzed in Error. Only to be collected and analyzed for background locations identified in work plan. TD

Laboratory
Contact: L. Williams
4405 Vineland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF 293 GW 19-A3
DATE: 09/27/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1000	6.60	150			12.2				BEGIN PURGE
1010	6.85	150	5.66	.204	10.7	3.85	27.87	-132	
1020	6.89	100	5.64	.203	5.9	4.52	28.43	-138	
1030	6.93	100	5.67	.199	6.4	7.49	28.56	-147	
1040	6.90	100	5.68	.200	5.4	8.22	28.77	-150	1042 STOP PUMP MOVE TO LOWER RPM
1050	6.87	100	5.68	.201	5.2	5.51	28.63	-134	
1100	6.87	100	5.68	.203	4.2	7.78	29.16	-147	
1110	6.86	100	5.69	.203	4.6	8.59	29.14	-155	
1120	6.86	100	5.68	.203	4.4	9.28	29.15	-157	
1130	6.85	100	5.66	.200	4.1	9.40	29.24	-166	
1140	6.85	100	5.65	.200	3.6	9.39	29.06	-166	
1145	6.84	100	5.65	.201	2.8	9.27	29.09	-167	

SIGNATURE(S): [illegible]

PAGE___OF___

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DSO05H125
Sampled By: DS
Field Analyst: T. ROJAHN
Field Form Checked as per QA/QC Checklist (Initials):

Sample ID No.: CEF-293-GW-19-A3
Sample Location: CEF-293-19
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

Date: 9/27/01	Color	pH	S.C.	Turbidity	DO	Temp.	ORP (Eh)
Time: 1155	(Visual)	(SU)	(mS/cm)	(NTU)	(Meter, mg/l)	(°C)	(+/- mv)
Method: Peristaltic	CLEAR	5.65	0.201	2.8	9.22	29.09	-167

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment:
CHEMetrics Range ☑ 0 - 1.0 mg/L ☐ 1 - 12 mg/L
Analysis Time: 1245
CHEMetrics: 0.2 mg/L
Notes:

Carbon Dioxide:

Analysis Time: 1240

Range Used:	CHEMetrics Range		Concentration
☐	10-100 mg/L	(K-1910)	= mg/L
☑	100-1000 mg/L	(K-1920)	= 300 mg/L
☐	250-2500 mg/L	(K-1925)	= mg/L

Notes:

Alkalinity:

Analysis Time: 1303
Equipment: HACH Digital Titrator AL-DT
CHEMetrics (Range: NA mg/L)
Filtered: ☐

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	&	x 0.1	= mg/L
☑	40-160 mg/L	25 ml	0.1600 N	0.4	0 & 166	x 0.4	= 66.4 mg/L
☐	100-400 mg/L	100 ml	1.600 N	1.0	0 & 72	x 1.0	= mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	= mg/L
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	= mg/L
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	= mg/L

Parameter:	Hydroxide	Carbonate	Bicarbonate
Relationship:	0	0	66.4

CHEMetrics: NA mg/L
Notes:

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DSO05H125
Sampled By: DS
Field Analyst: T. Rosahn
Field Form Checked as per QA/QC Checklist (initials):

Sample ID No.: CEF-293-GW-19-43
Sample Location: CEF-293-19
Duplicate: ☐
Blank: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Ferrous Iron (Fe^{2+}):

Equipment: DR-700 DR-8 9 0 33 IR-18C Color Wheel Other: _____ Analysis Time: 1212
Program/Module: 500nm
Concentration: 1.18 mg/L Filtered: ☐
Notes:

Sulfide (S^{2-}):

Equipment: DR-700 DR-8 9 0 93 HS-C Color Chart HS-WR Color Wheel Other: _____ Analysis Time: 1220
Program/Module: 610nm
Concentration: >0.80 mg/L Filtered: ☐
Notes: Above limit of Colorimeter

Hydrogen Sulfide (H_2S):

Equipment: HS-C Other: _____ Analysis Time: 1224
Concentration: 2.0 mg/L Exceeded 5.0 mg/L range on color chart: ☐
Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☐
Correct measurement units are cited in the SAMPLING DATA block: ☐
Multiplication is correct for each *Multiplier* table: ☐
Final calculated concentration is within the appropriate *Range Used* block: ☐
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐
Title block is initialized by person who performed the QA/QC Checklist: ☐

TINUS JACKSONVILLE Fax:9042810076 Sep 25 2001 9:28 P.02

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-293-GW-20-A3
Sample Location: CEF-293-20-
Sampled By: T. DICKSON
C.O.C. No.: 10/01/01-001
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 10/01/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 1045								
Method: Low Flow Peristaltic	Clear	5.11	0.118	26.0	8.9	0.72	0.0	-140

PURGE DATA

Date: 10/01/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 238								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 14.38								
Static Water Level (WL): 6.67								
One Casing Volume (gal/L): 1.26								
Start Purge (hrs): 0820								
End Purge (hrs): 1040								
Total Purge Time (min): 140								
Total Vol. Purged (gal/L): 5.0								

See Page 2 Low Flow Purge Data Sheet

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	Yes TD
PAHs (8310)	None	2-1 liter glass ambers	Yes
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	Yes
~~Lead~~ (6010B) *Dissolved IRON (Filter)	HNO_3	500 ml ~~1-1 liter~~ plastic 1um filter	Yes
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250 ml~~ plastic	Yes
Sulfide (376.1) * Dissolved (Filter)	NaOH	500 ml ~~1-1 liter~~ plastic 1um filter	Yes
TOC (415.1)	HCl	1-125 ml glass amber	NO
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	Yes

OBSERVATIONS / NOTES

One Casing Volume
$2^2 \times 0.0408 \times 7.71 = 1.26$ gallon x 2 Saturated Screens = 2.51 gallons (minimum Purge Volume)
Pump Intake ~ 11.5'

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Thomas M. Dickson

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-293-20
DATE: 10/01/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)		DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments		
0820	6.67	220								Clear		
0825	6.89	220	5.05	0.128	21.4		6.05	23.2	-54		Volume	
0830	7.01	160	5.07	0.126	23.0	12.0	4.82	24.9	-61		0.58	
0835	7.10	160	5.09	0.126	21.9	12.0	4.55	25.0	-78			
0838		125	Reduce	Flowrate	to	Reduce	Turbidity	and Control	drawdown		0.54	1.12
0840	7.11	125	5.08	0.124	22.3	11.0	4.34	24.7	-80			
0845	7.12	125	5.09	0.124	22.6	12.0	4.30	24.4	-106		0.23	1.35
0855	7.13	125	5.09	0.124	22.6	13.0	4.33	24.1	-122		~~0.75~~	
0858		110									0.23	1.58
0910	7.12	110	5.10	0.123	23.1	22.0	4.18	23.8	-134	Clean Cell		
0920	7.12	110	5.09	0.120	40.6	21.0	4.24	24.1	-132		0.64	2.22
0930	7.12	110	5.09	0.120	40.7	20.0	3.94	24.4	-135		0.29	2.51 (Minimum Purge Volume)
0945	7.12	110	5.09	0.121	39.9	17.0	1.36	24.8	-139		0.44	2.95
0955	7.13	110	5.09	0.118	30.1	14.0	1.97	24.8	-130			
1005	7.13	110	5.11	0.118	29.2	13.0	1.38	25.4	-131			
1020	7.13	110	5.11	0.118	25.6	9.7	0.79	25.7	-137			
1030	7.13	110	5.10	0.118	25.0	10.0	0.72	25.7	-140			
1040	7.13	110	5.11	0.118	20.5	8.9	0.72	26.0	-140			
1045	Sample											

SIGNATURE(S): Thomas M. Nelson

Instruments Used: Photovac 2020 PID (EDJH338)
Horiba U-22 (9292030)
1 Matt... Turbidimeter (0916-4298

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DS005H125
Sampled By: TD
Field Analyst: T. ROJAHN
Field Form Checked as per QA/QC Checklist (Initials):

Sample ID No.: CEF-293-GW-20-A3
Sample Location: CEF-293-20
Duplicate: ☑
Blank: ☐

SAMPLING DATA:

Date: 10-01-01	Color	pH	S.C.	Turbidity	DO	Temp.	ORP (Eh)	
Time: 1045	(Visual)	(SU)	(mS/cm)	(NTU)	(Meter, mg/l)	(°C)	(+/- mv)	
Method: Peristaltic	CLEAR	5.11	0.118	8.9	0.72	26.0	-140	

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment:
CHEMetrics Range ☑ 0 - 1.0 mg/L ☑ 1 - 12 mg/L
Analysis Time: 1124 / 1128
CHEMetrics: 1.0 mg/L
Notes:

Carbon Dioxide:

Range Used:	CHEMetrics Range		Concentration
☐	10-100 mg/L	(K-1910)	= mg/L
☑	100-1000 mg/L	(K-1920)	= 225 mg/L
☐	250-2500 mg/L	(K-1925)	= mg/L

Analysis Time: 1138 / 1149
Dup = 240
Notes:

Alkalinity:

Equipment: HACH Digital Titrator AL-DT
CHEMetrics (Range: _____ mg/L)
Analysis Time: 1211
Filtered: ☐ 1215

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☑	10-40 mg/L	100 ml	0.1600 N	0.1	0 & 239	x 0.1	= 23.9 mg/L
☐	40-160 mg/L	25 ml	0.1600 N	0.4	0 & 69	x 0.4	= 28 mg/L
☐	100-400 mg/L	100 ml	1.600 N	1.0	&	x 1.0	= mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	= mg/L
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	= mg/L
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	= mg/L

Parameter:	Hydroxide	Carbonate	Bicarbonate
Relationship:	0	0	23.9

Dup 23.2 ✓

CHEMetrics: _____ mg/L
23.2
Notes:

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

TTNUS JACKSONVILLE Fax:9042810070 Sep 25 2001 9:28 P.03

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DS005H125
Sampled By: T. D
Field Analyst: T. ROJAHN
Field Form Checked as per QA/QC Checklist (initials):

Sample ID No.: CEF- 293-GW-20-A3
Sample Location: CEF- 293 - 20
Duplicate: ☑
Blank: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Ferrous Iron (Fe^{2+}):

Equipment: DR-700 DR-890 IR-18C Color Wheel Other: _____ Analysis Time: 1137 / 1150
Program/Module: 500nm 33
Concentration: 0.46 mg/L Filtered: ☐
Notes: DUP 0.46

Sulfide (S^{2-}):

Equipment: DR-700 DR-890 HS-C Color Chart HS-WR Color Wheel Analysis Time: 1112 / 1126
Program/Module: 610nm 93 Other: _____
Concentration: >0.80 mg/L Filtered: ☐
Notes: DUP >0.80 RANGE ABOVE the limits OF COLORIMETER

Hydrogen Sulfide (H_2S):

Equipment: HS-C Other: _____ Analysis Time: 1114 / 1125
Concentration: >5.0 mg/L Exceeded 5.0 mg/L range on color chart: ☑
Notes: DUP > 5.0

QA/QC Checklist:

All data fields have been completed as necessary: ☐
Correct measurement units are cited in the SAMPLING DATA block: ☐
Multiplication is correct for each *Multiplier* table: ☐
Final calculated concentration is within the appropriate *Range Used* block: ☐
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐
Title block is initialized by person who performed the QA/QC Checklist: ☐

TTNUS JACKSONVILLE Fax:9042810070 Sep 25 2001 9:28 P.02

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-293-GW-21-A3
Sample Location: CEF-293-21
Sampled By: T. ROJAHN
C.O.C. No.: CFST-092801
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/28/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 0910								
Method: Low Flow Peristaltic	CLEAR	5.75	0.224	28.9	0.01	0.84	—	-66

PURGE DATA

Date: 9/28/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0.0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 14.8	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 6.54								
One Casing Volume(gal/L) 5.1								
Start Purge (hrs): 0830								
End Purge (hrs): 0910								
Total Purge Time (min): 40								
Total Vol. Purged (gal/L) 12								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	✓
PAHs (8310)	None	2-1 liter glass ambers	✓
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	✓
~~Lead~~ (6010B) *Dissolved IRON (Filter)	HNO_3	1-1 litter plastic	NO
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250 ml~~ plastic	↓
Sulfide (376.1) * Dissolved (Filter)	NaOH	1-1 liter plastic	↓
TOC (415.1)	HCl	1-125 ml glass amber	↓
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	↓

OBSERVATIONS / NOTES

14.8 - 6.54 = 8.26 x .163 = 1.34 gal or 5.1L
MIN VOL 10.2L
PUMP INTAKE ~4.0' OFF BOTTOM

NO ODOR

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	CEF-824A-DUP 1

Signature(s): Terry Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-293-21
DATE: 09/28/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0830	6.54	—	—	—	—	—	—	—	Start PURGE
0840	6.65	300	5.70	0.224	0.13	1.59	28.5	139	3000ml CLEAR
0850	6.66	300	5.73	0.227	0.07	1.07	28.9	-27	6000 "
0800	6.67	300	5.75	0.226	0.01	0.96	28.9	-61	9000 "
0910	6.67	300	5.75	0.224	0.01	0.84	28.9	-66	12000 "

SIGNATURE(S): Terry Rogers

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-293-GW-22-A3
Sample Location: NASCF
Sampled By: L. KNIGHT
C.O.C. No.: CFST-092701
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/27/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 0915								
Method: Low Flow Peristaltic	CLEAR	5.38	0.96	27.6	7.2	1.63		168

PURGE DATA

Date: 9/27/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0.0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 14.6	SEE	LOW	FLOW	PURGE	DATA	SHEET		
Static Water Level (WL): 5.67								
One Casing Volume (gal/L): 1.46								
Start Purge (hrs): 0816								
End Purge (hrs): 0915								
Total Purge Time (min): 59								
Total Vol. Purged (gal/L): ~18L								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	[illegible]
PAHs (8310)	None	2-1 liter glass ambers	[illegible]
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	[illegible]
~~Lead~~ (6010B) *Dissolved Iron (Filter)	HNO_3	500ml ~~1-1 liter~~ plastic	[illegible]
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250 ml~~ plastic	[illegible]
Sulfide (376.1) * Dissolved (Filter)	NaOH	500ml ~~1-1 liter~~ plastic	[illegible]
TOC (415.1)	HCl	1-125 ml glass amber	[illegible]
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	[illegible]

OBSERVATIONS / NOTES

TOC Collected in Error. Only to be collected @ Background Locations

One Casing (Saturated Screen) Volume = ~~1.46 gals~~ TD

$22 \times 0.0408 \times 8.93 = 1.46$ gallons $\times 2 = 2.91$ gallons (Minimum Purge Volume)

Pump Intake 8.5-9.0'

Laboratory
Contact: L. Williams
4405 Vineland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Louis Knight

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-293-22
DATE: 09/27/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0816	5.67								
0817	5.82								
0818	5.90								
0819	5.95								
0820	5.98	300	5.37	1.10	70	5.58	26.2	191	
0825	6.08	300	5.41	1.06	130	4.91	27.3	182	
0830	6.12	300	5.44	1.04	150	4.92	27.6	177	
0835	6.12	300	5.41	1.03	75	4.84	27.7	176	
0840	6.13	280	5.40	1.02	45	4.74	27.7	176	
0845	6.12	280	5.39	1.00	31	4.55	27.6	176	
0850	6.13	280	5.38	0.99	19	4.38	27.6	175	
0855	6.13	280	5.38	1.26	13	1.42	27.7	174	
0900	6.12	280	5.38	0.98	9.6	1.46	27.7	164	
0905	6.12	280	5.39	0.96	7.5	1.51	27.6	167	
0910	6.12	280	5.38	0.96	7.2	1.63	27.6	168	
0915	COLLECT	SAMPLE							

SIGNATURE(S): Louis Knight

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DSO08H125
Sampled By: L.K.
Field Analyst: T. ROJAHN
Field Form Checked as per QA/QC Checklist (Initials):

Sample ID No.: CEF- 293 - GW - 22 - A3
Sample Location: CEF- 293 - 22
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

Date: 9-27-01 / Time: 0915	Color (Visual)	pH (SU)	S.C. (mS/cm)	Turbidity (NTU)	DO (Meter, mg/l)	Temp. (°C)	ORP (Eh) (+/- mv)	
Method: Peristaltic	CLEAR	5.38	0.96	7.2	1.63	27.6	+168	

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment:
CHEMetrics Range ☑ 0 - 1.0 mg/L ☐ 1 - 12 mg/L
Analysis Time: 1005
CHEMetrics: 0.6 mg/L
Notes:

Carbon Dioxide:

Range Used:	CHEMetrics Range		Concentration	
☐	10-100 mg/L	(K-1910)		= mg/L
☑	100-1000 mg/L	(K-1920)	140	= 140 mg/L
☐	250-2500 mg/L	(K-1925)		= mg/L

Analysis Time: 0942
Notes:

Alkalinity:

Equipment: HACH Digital Titrator AL-DT
CHEMetrics (Range: NA mg/L)
Analysis Time: 1002
Filtered: ☐

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	&	x 0.1	= mg/L
☑	40-160 mg/L	25 ml	0.1600 N	0.4	0 & 112	x 0.4	= 45 mg/L
☐	100-400 mg/L	100 ml	1.600 N	1.0	0 & 42	x 1.0	= mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	= mg/L
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	= mg/L
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	= mg/L

Parameter:	Hydroxide	Carbonate	Bicarbonate
Relationship:	0	0	45

CHEMetrics: NA mg/L
Notes:
Standard Additions: ☐ Titrant Molarity: ____ Digits Required: 1st.: ____ 2nd.: ____ 3rd.: ____

TINUS JACKSONVILLE Fax:9042810070 Sep 25 2001 9:28 P.01

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DSO05H125
Sampled By: LK
Field Analyst: T. ROJAHN
Field Form Checked as per QA/QC Checklist (initials):

Sample ID No.: CEF-293-GW-22-A3
Sample Location: CEF-293-22
Duplicate: ☐
Blank: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Ferrous Iron (Fe^{2+}):

Equipment: DR-700 DR-890 / 33 IR-18C Color Wheel Other: _____ Analysis Time: 0936
Program/Module: 500nm
Concentration: 0.02 mg/L Filtered: ☐
Notes:

Sulfide (S^{2-}):

Equipment: DR-700 DR-890 / 93 HS-C Color Chart HS-WR Color Wheel Other: _____ Analysis Time: 0925
Program/Module: 610nm
Concentration: 0.02 mg/L Filtered: ☐
Notes:

Hydrogen Sulfide (H_2S):

Equipment: HS-C Other: _____ Analysis Time: 0927
Concentration: 0.0 mg/L Exceeded 5.0 mg/L range on color chart: ☐
Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☐
Correct measurement units are cited in the SAMPLING DATA block: ☐
Multiplication is correct for each *Multiplier* table: ☐
Final calculated concentration is within the appropriate *Range Used* block: ☐
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐
Title block is initialized by person who performed the QA/QC Checklist: ☐

TTNUS CHARSONVILLE Fax:9042810070 Sep 25 2001 9:36 P.02

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-16-GW-38S-A1
Sample Location: CEF 16 - 38S
Sampled By: DS
C.O.C. No.: CF57-092801
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 1055 9/28/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 1055								
Method: Low Flow Peristaltic	Clear	5.22	0.091	29.40	0	4.57	—	-28

PURGE DATA

Date: 9/28/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 228								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 16.8		SEE LOW FLOW PURGE DATA SHEET						
Static Water Level (WL): 7.38								
One Casing Volume (gal/L): 1.5								
Start Purge (hrs): 1005								
End Purge (hrs): 1040								
Total Purge Time (min): 35								
Total Vol. Purged (gal/L): 4.6								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	DS
PAHs (8310)	None	2-1 liter glass ambers	DS
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	DS
~~Lead~~ (6010B) *Dissolved IRON (Filter)	HNO_3	1-1 litter plastic	
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250 ml plastic~~ HDPE	6010
Sulfide (376.1) * Dissolved (Filter)	NaOH	1-1 liter plastic	
TOC (415.1)	HCl	1-125 ml glass amber	
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

One Casing (Saturated Screen) Volume =
TD 16.8
SWL 7.38
SWC 9.42
$2^2 \times 0.0408 \times 9.42 = 1.54$ gallons $\times 2 = 3.07$
(Minimum Purge Volume)
Pump Intake ~12.0-12.5'

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:
MS/MSD
Duplicate ID No.: CEF-824A-DUP2

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-16-GW-385-A1
DATE: 09/28/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1005	7.38								BEGIN PURGE
1015	7.49	500	5.24	0.10	1.9	2.56	29.34	67	
1025	7.51	500	5.22	0.092	0.6	3.84	29.41	-18	
1035	7.50	500	5.22	0.091	0	4.48	29.38	-28	
1040	7.50	550	5.22	0.091	0	4.57	29.40	-28	

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-16-GW 398-A1
Sample Location: CEF16
Sampled By: DS
C.O.C. No.: CF57-092801
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	~~Other~~ ORP
Date: 9/28/01								
Time: 1210								
Method: Low Flow Peristaltic	CLEAR	5.18	0.063	27.20	0	2.32	—	-68

PURGE DATA

Date: 1210 9/28/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 168								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 55.3		SEE LOW FLOW PURGE DATA SHEET						
Static Water Level (WL): 7.41								
One Casing Volume(gal/L): .8								
Start Purge (hrs): 1140 ~~20~~								
End Purge (hrs): 1200								
Total Purge Time (min): 20								
Total Vol. Purged (gal/L) 2.6								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	DS
PAHs (8310)	None	2-1 liter glass ambers	DS
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	DS
~~Lead~~ (6010B) *Dissolved IRON (Filter)	HNO_3	1-1 litter plastic	
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250 ml~~ plastic	
Sulfide (376.1) * Dissolved (Filter)	NaOH	1-1 liter plastic	
TOC (415.1)	HCl	1-125 ml glass amber	
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

One Saturated Screen Volume
= 2" x 0.0408 x 5.0' = 0.816 gallons x 2 = 1.63 gallons
(Minimum Purge Volume)

Pump Intake ~ 53.0'

Laboratory
Contact: L. Williams
4405 Vineland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-16-GW-39I-A1
DATE: 09/28/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1140	7.41		5						BEGIN PURGE
1145	7.46	500	5.26	0.067	2.5	3.78	27.43	-76	
1150	7.47	500	5.23	0.066	0.8	2.45	27.21	-77	
1155	7.48	500	5.20	0.065	0	2.21	27.30	-70	
1200	7.47	500	5.18	0.063	0	2.32	27.20	-68	

SIGNATURE(S): RPSL

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-16-GW-40D-A1
Sample Location: NAS CF; CEF-16-40D
Sampled By: L. KNIGHT
C.O.C. No.: CE57-092801
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/28/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 1055								
Method: Low Flow Peristaltic	CLEAR	6.66	0.429	25.9	0.0	2.20		-147

PURGE DATA

Date: 9/28/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 229								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 90.1	SEE LOW FLOW PURGE DATA SHEET							
Static Water Level (WL): 7.09								
One Casing Volume(gal/L): 0.816								
Start Purge (hrs): 1019								
End Purge (hrs): 1055								
Total Purge Time (min): 36								
Total Vol. Purged (gal/L): ~18L								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	~~YES~~
PAHs (8310)	None	2-1 liter glass ambers	~~YES~~
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	~~YES~~
~~Lead (6010B) *Dissolved Iron (Filter)~~	HNO_3	1-1 litter plastic	NO
~~Alkalinity (310.1) Anions (300.0)~~	None	1L ~~1 250 ml~~ plastic	
~~Sulfide (376.1) * Dissolved (Filter)~~	NaOH	1-1 liter plastic	
~~TOC (415.1)~~	HCl	1-125 ml glass amber	
~~Methane-Ethane-Ethene (RSKSOP 147/175)~~	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

One Saturated Screen Volume =
$2^2 \times 0.0408 \times 5.0 = 0.816$ gallons $\times 2 = 1.63$ gallons
(minimum Purge Volume)

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Pump Intake ~ 88'.0

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Louis Knight

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-16-40D
DATE: 09/ /01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1019	7.09	375							
1020	7.13	375							
1022	7.13	375							
1025	7.14	500	6.62	0.427	0.05	7.04	25.9	-108	
1030	7.15	500	6.64	0.428	0.15	5.73	26.0	-123	
1035	7.15	500	6.66	0.429	0.0	5.20	26.0	-132	
1040	7.18	500	6.66	0.429	0.0	4.91	26.0	-138	
1045	7.18	500	6.66	0.429	0.15	4.60	25.9	-141	
1050	7.18	500	6.67	0.429	0.0	2.22	25.9	-148	
1055	7.18	500	6.66	0.429	0.0	2.20	25.9	-147	
1055	COLLECT	SAMPLE							

SIGNATURE(S): Louis Kyfl

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039DS005H105 CTO 0078

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

Sample ID No.: CEF-824A-GW-013A-06
Sample Location: CEF-824A-013A
Sampled By: L. MIDDLETON
C.O.C. No.: 824A-121401A
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 12/14/01 Time: 1330	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	~~Salinity~~ ORP	Other
Method: Low Flow Peristaltic	CLEAR	5.06	0.096	26.1	3.8	0	-16	

PURGE DATA

Date: 12/14/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0.9								
Well Casing Diameter: 2"								
Well Casing Material: PVC			SEE DATA SHEETS					
Total Well Depth (TD): 14.16								
Static Water Level (WL): 9.05								
One Casing Volume(gal/L): 3.1								
Start Purge (hrs): 1245								
End Purge (hrs): 1320								
Total Purge Time (min): 35								
Total Vol. Purged (gal/L): 10.5								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
TCL VOCs (8260B)	HCl	3 ~~2~~ 40ml glass VOA	X
PAHs (8310)	None	2 ~~1~~ -1 liter glass ambers	X
TRPH (FL PRO)	H_2SO_4	2 ~~1~~ -1 liter glass ambers	X
		(DS for MS/3)	

OBSERVATIONS / NOTES

800-471-6451

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD

Duplicate ID No.: None

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57

PROJECT NUMBER: N0039DS005H105 CTO 0078

WELL ID.: CEF-824A-01SA ~~CEF-824A-01~~ rum

DATE: 12/14/01

	Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
	1245	9.05	300	—	—	—	—	—	—	
3	1255	9.15	300	4.65	0.092	204	1.77	26.0	27	TAN
4.5	1300	9.13	300	4.72	0.092	194	1.66	26.1	22	
6	1305	9.13	300	4.87	0.096	52	0.37	26.0	8	
7.5	1310	9.13	300	5.00	0.096	20	0	26.2	-3	CLEAR
9	1315	9.13	300	5.04	0.096	8.8	0	26.1	-9	
10.5	1320	9.13	300	5.06	0.096	3.8	0	26.1	-16	
	END PURGE									

SIGNATURE(S): [signature]

PAGE 2 OF 2

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039DS005H105 CTO 0078

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

Sample ID No.: CEF-824A-7S-03 GW
Sample Location: CEF-824A-7S
Sampled By: M. O'Neill
C.O.C. No.: 824A-121401A
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 12/14/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	~~Salinity~~ ORP	Other
Time: 1309								
Method: Low Flow Peristaltic	CLR	4.88	0.052	26.4	2.7	0.81	4	

PURGE DATA

Date: 12/14/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0.0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 14.91								
Static Water Level (WL): 9.11								
One Casing Volume(gal/L): 1.0/3.7								
Start Purge (hrs): 1212								
End Purge (hrs): 1307								
Total Purge Time (min): 55								
Total Vol. Purged (gal/L): 18.9 L								

See Low Flow Sheet

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
TCL VOCs (8260B)	HCl	3 ~~2~~-40ml glass VOA	MO
PAHs (8310)	None	2 ~~1~~-1 liter glass ambers	MO
TRPH (FL PRO)	H_2SO_4	2 ~~1~~-1 liter glass ambers	MO

OBSERVATIONS / NOTES

14.91 − 9.11 = 5.80

^{2}3.7 × 3 = 11.1

^{3}3.7 × 5 = 18.5

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD

Duplicate ID No.: None

Signature(s): M. O'Neill

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

2350 × 5 = 1,750

4350 × 8 = 2,800

PROJECT SITE NAME: B. 824A Site 57

PROJECT NUMBER: N0039DS005H105 CTO 0078

WELL ID.: CEF-824A-75

DATE: 12/14/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	(L) Volume	Comments
1212	9.11	350		1213	9.22		1215	9.22		org./tan
1220	9.21	350	5.10	0.057	839.0	7.14	26.6	20	2.8	empty cup clear orgish brown
1225	9.21	350	5.04	0.052	315.0	3.05	26.4	20	4.6	empty cup clear tan
1230	9.21	350	4.98	0.050	130.0	2.50	26.4	20	6.4	
1235	9.21	350	4.94	0.051	41.6	2.00	26.4	18	8.2	11.1/18.5
1240	9.21	350	4.93	0.051	24.9	1.43	26.4	16	10.0	
1245		350							11.8	
1250	9.21	350	4.92	0.051	4.8	2.87	26.4	13	13.6	clr
1255 ~~1300~~	9.21	350	4.91	0.052	10.0	1.87	26.4	10	~~17.1~~	
1300	9.21	350	4.89	0.052	5.3	1.20	26.4	8	~~18.9~~ 17.1	
1305	9.21	350	4.88	0.052	2.7	0.81	26.4	4	18.9	
1307	end purge									
1309	sample									

SIGNATURE(S): [signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039DS005H105 CTO 0078

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

Sample ID No.: CEF-824A-GW-115-Q
Sample Location: CEF-824A-115
Sampled By: M. O'Neill
C.O.C. No.: ~~824A-121401~~ C
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	~~Salinity~~ ORP	Other
Date: 12-14-01 Time: 1455								
Method: Low Flow Peristaltic	Clr	5.03	0.050	24.5	0.5	1.09	-3	

PURGE DATA

Date: 12-14-01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm):								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 15.21								
Static Water Level (WL): 7.92								
One Casing Volume(gal/L): 1.1/4.4								
Start Purge (hrs): 1417								
End Purge (hrs): 1454								
Total Purge Time (min): 37								
Total Vol. Purged (gal/L): 14.8								

See Low Flow Data Sheet

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
TCL VOCs (8260B)	HCl	3 ~~2~~-40ml glass VOA	no
PAHs (8310)	None	2 ~~1~~-1 liter glass ambers	no
TRPH (FL PRO)	H_2SO_4	2 ~~1~~-1 liter glass ambers	no
		no	

OBSERVATIONS / NOTES

15.21 − 7.92 = 7.29

4.4 × 3 = 13.2

4.4 × 5 = 22.0

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD

Duplicate ID No.: None

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039DS005H105 CTO 0078

WELL ID.: CEF-824A-GW-MS-03
DATE: 12/14/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	(L) Volume	Comments
1417	7.92	400	1418	7.99	~~7.99~~	1.20	8.00	142	8.00	
1427	~~7.92~~ 8.00	400	5.07	0.050	2.0	1.91	24.5	7	4	
1432	~~7.92~~ 8.00	400	5.06	0.050	1.0	3.17	24.5	4	6	
1437	8.00	400	5.06	0.050	0.6	1.94	24.5	2	8	
1442	8.00	400	5.05	0.050	0.4	1.42	24.5	0	10	
1447	8.00	400	5.04	0.050	0.4	1.16	24.5	-2	12	
1452	8.00	400	5.03	0.050	0.5	1.09	24.5	-3	14	
1454	end purge									
1455	sample									

400 × 5 = 2000

13.2/22

SIGNATURE(S): [signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039DS005H105 CTO 0078

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

Sample ID No.: CEF-824A-GW-21 I-01
Sample Location: CEF-824A-21I
Sampled By: Monbell / L. Middleton
C.O.C. No.: 824A-121701-A
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 12/17/01 Time: 1504	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	~~Salinity~~ ORP	Other
Method: Low Flow Peristaltic	GBrwn	5.07	0.086	25.3	650	0	-65	

PURGE DATA

Date: 12/17/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm):								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 39.71								
Static Water Level (WL): 8.13								
One Casing Volume(gal/L): 0.31	5' SCREEN							
Start Purge (hrs): 1405								
End Purge (hrs): 1502								
Total Purge Time (min): 57								
Total Vol. Purged (gal/L): 1.65								

SEE LOW FLOW DATA SHEET

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
TCL VOCs (8260B)	HCl	2-40ml glass VOA	MO/LM
PAHs (8310)	None	1-1 liter glass ambers	MO/LM
TRPH (FL PRO)	H_2SO_4	1-1 liter glass ambers	MO/LM

OBSERVATIONS / NOTES

3:1
+5
16.5

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:
MS/MSD
Duplicate ID No.:

Signature(s):

CEF-824A-MD01-GW-01

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039DS005H105 CTO 0078

WELL ID.: CEF-824A-21 I
DATE: 12/17/01

	Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
	1405	8.13	300	—	—	—	—	—	—	
3	1415	8.17	300	5.18	0.140	742	0.53	25.5	-27	~~Clear~~ LtBrown
4.5	1420	8.17	300	5.21	0.132	760	708	25.3	-37	
6	1425	8.17	300	5.10	0.127	758	1.70	25.4	-47	
7.5	1430	8.15	300	5.09	0.107	813	0.37	25.42	-57	lot of air bubbles / clear tan /
9	1435	8.15	300	5.08	0.104	780	0.24	25.42	-58	turbity could be high due to the
10.5	1440	8.15	300	5.09	0.096	777	0.13	25.54	-60	amount of air bubbles/
12	1445	8.15	300	5.09	0.099	743	0.06	25.55	-60	using flow through cell
13.5	1450	8.15	300	5.08	0.094	721	0.04	25.28	-62	
15	1455	8.15	300	5.08	0.091	685	0.00	25.35	-64	
16.5	1500	8.15	300	5.07	0.086	650	0	25.3	-65	
	1502	end purge								
	1504	sample								

SIGNATURE(S): [signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0039DS005H105 CTO 0078

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

Sample ID No.: CEF-824A-GW-22S-01
Sample Location: CEF-824A-22S
Sampled By: DS
C.O.C. No.: 824A 121401B
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 12-14-01 / Time: 1310	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Method: Low Flow Peristaltic	CL	4.73	0.131	26.56	3.2	0.30	/	68

PURGE DATA

Date: 12-1401	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0.7								
Well Casing Diameter: 2								
Well Casing Material: PVC			SEE DATA SHEET					
Total Well Depth (TD): 13.20								
Static Water Level (WL): 8.88								
One Casing Volume(gal/L): ~3.0								
Start Purge (hrs): 1205								
End Purge (hrs): 1305								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 18								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
TCL VOCs (8260B)	HCl	3 ~~2~~-40ml glass VOA	DS
PAHs (8310)	None	2 ~~1~~-1 liter glass ambers	DS
TRPH (FL PRO)	H_2SO_4	2 ~~1~~-1 liter glass ambers	DS
		DS for ALL(3)	

OBSERVATIONS / NOTES

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.: CEF-824A-0401-GW-01

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039DS005H105 CTO 0078

WELL ID.: CEF-824A-GW-225-01
DATE: 12-14-01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1205	8.88	300							
1215	9.04	300	4.73	0.129	25.6	1.16	26.78	135	
1225	9.05	300	4.75	0.131	7.6	0.69	26.77	109	
1235	9.04	300	4.75	0.133	4.8	0.56	22.71	96	
1245	9.03	300	4.76	0.133	4.4	0.40	22.62	84	
1255	9.03	300	4.72	0.131	4.1	0.35	26.56	74	
1305	9.03	300	4.73	0.131	3.2	0.30	26.56	68	
1310	SAMPLED								

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. 824A Site 57
Project No.: N 0089DS005H105 CTO 0078

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

Sample ID No.: CEF-293-GW-11-A4
Sample Location: CEF-293-11
Sampled By: DS
C.O.C. No.: 824A 121401C
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 12/14/01 Time: 1545	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	~~Salinity~~ ~~%~~	Other ORP
Method: Low Flow Peristaltic	CL	5.06	0.085	25.16	0	0.13		-43

PURGE DATA

Date: 12/14/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0.0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 14.30			SEE DATA SHEETS					
Static Water Level (WL): 8.36								
One Casing Volume(gal/L): 3.7								
Start Purge (hrs): 1440								
End Purge (hrs): ~~1300~~ 1505	1540							
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 12								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
TCL VOCs (8260B)	HCl	3 ~~2~~-40ml glass VOA	DS
PAHs (8310)	None	2 ~~1~~-1 liter glass ambers	DS
TRPH (FL PRO)	H_2SO_4	2 ~~1~~-1 liter glass ambers	DS
		DS for MW(3)	

OBSERVATIONS / NOTES

3 / 11.1 5 / 18.5

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 824A Site 57
PROJECT NUMBER: N0039DS005H105 CTO 0078

WELL ID.: CEF-29D-GW-11-A4
DATE: 12-14-09

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1440	~~200~~ 8.36	200	5.24	.110	DS	DS	DS	DS	
1450	~~DS 200~~ 8.52	~~5.09~~ 200	~~0.46~~	~~.097~~	~~4.8~~	~~103~~	~~25.19~~	~~22~~	
~~1300~~	8.52	~~200~~	~~5.09~~	~~0.097~~	~~4.8~~	~~137~~	~~25.19~~	~~-9~~	
1440	~~200~~ 8.36	200							
1450	8.52	200	5.24	.110	4.7	103	25.19	22	
1300	8.52	200	5.09	.097	4.8	137	25.19	-9	
1310	8.52	200	5.11	.095	3.5	0.89	25.19	-19	
1320	8.50	200	5.08	.091	0	0.28	25.16	-30	
1330	8.50	200	5.06	.087	0	0.19	25.15	-38	
1540	8.51	200	5.06	.085	0	0.13	25.16	-43	
1545	SAMPLE								

SIGNATURE(S): [signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B.312 Site 58
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-312-GW-01-02
Sample Location: CEF-312-01
Sampled By: Tom Dickson
C.O.C. No.: 09/19/01-001
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/19/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 1050								
Method: Low Flow Peristaltic	Clear	5.90	0.305	27.4	0.0	3.96	0.0	-141

PURGE DATA

Date: 9/19/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0.0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 14.68								
Static Water Level (WL): 3.42								
One Casing Volume(gal/L): 1.84								
Start Purge (hrs): 0904								
End Purge (hrs): 1050								
Total Purge Time (min): 106								
Total Vol. Purged (gal/L): 5.51								

See Attached Low Flow Purge Data Sheet

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	✓
PAHs (8310)	None	2-1 liter glass ambers	✓
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	✓
Lead (6010B) *Dissolved (Filter)	HNO_3	1-1 litter plastic	
Alkalinity (310.1) Anions (300.0)	None	1-250 ml plastic	
Sulfide (376.1) * Dissolved (Filter)	NaOH	1-1 liter plastic	
TOC (415.1)	HCl	1-125 ml glass amber	
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

Casing Volume = $2^2 \times 0.0408 \times 11.26 = 1.84$ Gallons
Total Purge Minimum = 5.51 gallons
Maximum = 9.2 gallons

Pump Intake ~ 9.0'

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:
MS/MSD
Duplicate ID No.:

Signature(s): Thomas M. Dickson

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B.312 Site 58
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-312-01
DATE: 09/19/01

Total Depth 14.68 SWL 3.42 SWC 11.26

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)		DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments	Purge Amt.	Total
0904	3.44	280	5.58	0.223	5.0	5.5	6.42	26.8	-112	Sal 0.0		
0912	3.53	280	5.69	0.231	8.5	7.4	4.11	27.1	-127			
0918	3.49	180	5.78	0.251	33.7	21	3.64	27.0	-141	Adjust Flowrate to 160	3920	
0923	3.49	180	5.78	0.257	31.2	21	3.63	27.1	-138			
0933	3.49	180	5.81	0.270	18.6	8.4	3.97	27.2	-141		2700	6650
0943	3.49	180	5.84	0.275	10.8	5.9	4.61	27.2	-150		1800	8450
0955	3.49	185	5.86	0.287	5.1	1.4	4.54	27.3	-136		2220	10670
1010	3.50	190	5.87	0.292	3.9	0.0	4.53	27.3	-149		2850	13520
1030	3.51	190	5.89	0.300	2.5	0.0	4.42	27.3	-153		3800	17320
1045	3.51	190	5.89	0.303	2.1	0.0	4.03	27.4	-135		2850	20170
1050	3.51	190	5.90	0.305	2.3	0.0	3.96	27.4	-141	Sample	950	21120

SIGNATURE(S): Thomas M. Dickson

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. ~~824A~~ 312 Site 53 (TX)
Project No.: N 0039 CTO 0078

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

Sample ID No.: ~~CEF-B312-GW-01~~ CEF-B312-GW-01S.03
Sample Location: ~~CEFB312-1S~~ CEFB312-1S
Sampled By: ER
C.O.C. No.: CF~~312~~-092601 53
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/26/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	~~Salinity~~ ORP mV	Other
Time: 1005								
Method: Low Flow Peristaltic	clear	6-10	0.451	26.1	2.1	11.62	-143	Strong odor

PURGE DATA

Date: 9/26/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 271								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 13.61								
Static Water Level (WL): 4.32 = 9.29								
One Casing Volume(gal/L): 1.5/5.6								
Start Purge (hrs): 0901								
End Purge (hrs): 1001								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 20								

Page 2 Low Flow Purge Data Sheet

SEE

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	✓
PAHs (8310)	None	2-1 liter glass ambers	✓
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	✓
~~Lead~~ (6010B) *Dissolved IRON (Filter)	HNO_3	500ml ~~1-1 liter~~ plastic	✓
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250 ml~~ plastic	✓
Sulfide (376.1) * Dissolved (Filter)	NaOH	500ml 1-1 liter plastic	✓
TOC (415.1)	HCl	~~1-125 ml glass amber~~	~~✓~~
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	✓

STE Not Collected TD

OBSERVATIONS / NOTES

Ow Casing Volume 13.61 - 4.32 = 9.29'
22 x 0.0408 x 9.29 = 1.52 gallons x 2 = 3.03
(Minimum Purge Volume)

Pump Intake ~ 9.0'

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Note: TOC collected above was not to be sample/collected only background walk

TC

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Elena Rodriguez

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. ~~824A~~ 312 Site 53 (TA)
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF - B 312 - 01 S
DATE: 09/26/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Stabilized Vol. (L)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0901	4.32	450								
0906	4.64	350	2.25	5.88	0.591	41.4	5.07	26.1	-162	strong odor/black w/sheen
0911	4.84	350	4	6.15	0.535	18.2	4.71	26.0	-156	slow pump clear tan
0916	4.89	350	5.75	6.10	0.521	10.7	2.77	26.2	-164	
0921	4.91	350	7.5	6.10	0.503	14.8	4.18	26.3	-163	
0926	4.93	350	9.25	6.10	0.488	18.1	6.94	26.3	-161	clear pale yellow
0931	4.93	350	11	6.09	0.473	15.0	9.75	26.2	-158	slow pump
0936	4.88	300	12.5	6.08	0.460	24.3	10.90	26.2	-157	switch to flowcell
0941	4.86	300	14	6.10	0.436	2.5	5.77	26.0	-128	clear
0946	4.86	300	15.5	6.09	0.438	3.0	7.42	26.1	-134	
0951	4.87	300	17	6.10	0.439	1.2	9.81	26.1	-143	
0956	4.86	300	18.5	6.10	0.442	1.6	11.06	26.2	-143	
1001	4.87	300	20	6.10	0.451	0.9	11.62	26.1	-143	Lamotte Turbidity 2.1 NTU
	end purge									
1005	begin sampling									

SIGNATURE(S): Elenor Rodriguez

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DS005H125
Sampled By: ER
Field Analyst: TK & ER
Field Form Checked as per QA/QC Checklist (initials):

Sample ID No.: CEF- B312-GW-015-03
Sample Location: CEF- B312-GW-015
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

Date: 9/26/01	Color	pH	S.C.	Turbidity	DO	Temp.	ORP (Eh)	
Time: 1005	(Visual)	(SU)	(mS/cm)	(NTU)	(Meter, mg/l)	(°C)	(+/- mv)	
Method: Peristaltic	CLEAR	6.10	0.451	2.1	11.62	26.1	-143	

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment:
CHEMetrics Range ☑ 0 - 1.0 mg/L ☐ 1 - 12 mg/L
Analysis Time: 1120
CHEMetrics: 0.1 mg/L
Notes:

Carbon Dioxide:

Range Used:	CHEMetrics Range		Concentration	
☑	10-100 mg/L	(K-1910)		= <10 mg/L
☐	100-1000 mg/L	(K-1920)		= mg/L
☐	250-2500 mg/L	(K-1925)		= mg/L

Analysis Time: 1136
Notes: Pink went away before it could reach 10

Alkalinity:

Equipment: HACH Digital Titrator AL-DT
CHEMetrics (Range: NA mg/L)
Analysis Time: 1200
Filtered: ☐

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	&	x 0.1	= mg/L
☐	40-160 mg/L	25 ml	0.1600 N	0.4	&	x 0.4	= mg/L
☐	100-400 mg/L	100 ml	1.600 N	1.0	0 & 233	x 1.0	= ~~233~~ mg/L
☑	200-800 mg/L	50 ml	1.600 N	2.0	0 & 111	111 x 2.0	= 222 mg/L
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	= mg/L
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	0 & 26	26 x 10.0	= ~~260~~ mg/L

Parameter:	Hydroxide	Carbonate	Bicarbonate
Relationship:	0	0	222

CHEMetrics: NA mg/L
Notes:

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DSO05H125
Sampled By: ER
Field Analyst: TR EER
Field Form Checked as per QA/QC Checklist (initials):

Sample ID No.: CEF-B312-GW-015-03
Sample Location: CEF-B312-GW-015
Duplicate: ☐
Blank: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION

Ferrous Iron (Fe^{2+}):

Equipment: DR-700 DR-890 IR-18C Color Wheel Other: 7.0 Analysis Time: 1120
Program/Module: 500nm 33
Concentration: >3.3 mg/L Filtered: ☐
Notes:

Sulfide (S^{2-}):

Equipment: DR-700 DR-890 HS-C Color Chart HS-WR Color Wheel Analysis Time: 1130
Program/Module: 610nm 93 Other:
Concentration: 0.48 mg/L Filtered: ☐
Notes:

Hydrogen Sulfide (H_2S):

Equipment: HS-C Other: Analysis Time: 1125
Concentration: 1.0 mg/L Exceeded 5.0 mg/L range on color chart: ☐
Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☐
Correct measurement units are cited in the SAMPLING DATA block: ☐
Multiplication is correct for each *Multiplier* table: ☐
Final calculated concentration is within the appropriate *Range Used* block: ☐
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐
Title block is initialized by person who performed the QA/QC Checklist: ☐

TTNUS JACKSONVILLE Fax:9042410070 Sep 25 2001 9:36 P.09

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B.312 Site 58
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-B312-GW-01-02
Sample Location: CEF-B312-01I
Sampled By: Tom Dickson
C.O.C. No.: 09/19/01-001
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Date: 9/19/01								
Time: 1300								
Method: Low Flow Peristaltic	Clear	8.57	0.275	25.0	0.0	3.93	0.0	-59

PURGE DATA

Date: 9/19/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0.0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 33.65								
Static Water Level (WL): 3.60								
One Casing Volume (gal.): 4.9								
Start Purge (hrs): 1021								
End Purge (hrs): 1300								
Total Purge Time (min): 159								
Total Vol. Purged (gal.): 15.83								

See Attached Low Flow Purge Data Sheet

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	✓
PAHs (8310)	None	2-1 liter glass ambers	✓
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	✓
Lead (6010B) *Dissolved (Filter)	HNO_3	1-1 litter plastic	
Alkalinity (310.1) Anions (300.0)	None	1-250 ml plastic	
Sulfide (376.1) * Dissolved (Filter)	NaOH	1-1 liter plastic	
TOC (415.1)	HCl	1-125 ml glass amber	
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

Casing Volume = $2^2 \times 0.0408 \times 30.05 = 4.9$ gallons
Minimum Purge Volume = $4.9 \times 3 = 14.7$
Maximum Purge Volume = $4.9 \times 5 = 24.5$

Pump Intake ~ 30.0'

Laboratory
Contact: L. Williams
4405 Vineland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle If Applicable:
MS/MSD
Duplicate ID No.:

Signature(s): Thomas M. Dickson

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B.312 Site 58
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-B312-01I
DATE: 09/19/01

Total Depth 33.65 SWL 3.60 SWC 30.05

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)		DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments	Purge Vol.	Total Purge
1021	4.13	365	11.16	0.767	31.3	-	1.49	25.6	-147	SAT 0.0		
1035	4.16	380	10.76	0.518	8.4	9.1	1.24	25.5	-128		5320	
1100	4.11	360	9.81	0.332	4.4	0.0	1.47	25.3	-71		19800	25120
1130	4.15	360	9.49	0.306	3.2	0.0	1.52	25.0	-51		11400	36520*
1200	4.08	380	8.58	0.281	4.0	0.0	4.94	25.1	-66		5850	42370
1215	4.13	390	8.56	0.276	3.4	0.0	4.02	25.0	-63		5850	48220
1230	4.15	390	8.56	0.275	3.3	0.0	3.90	25.0	-59		5850	54070
1245	4.15	390	8.57	0.272	2.9	0.0	3.95	26.0	-56		5850	59920
1300	4.15	390	8.57	0.275	2.7	0.0	3.93	25.0	-59			

SIGNATURE(S): [signature]

Minimum Purge Volume = 55.566 Liters

PAGE___OF___

* Changed out Horiba U-22 (Battery Fault Message)

Instruments Used
Horiba U-22 (T0052009) LAMOTTE 2020 Turbidimeter (1757-1800)
Horiba 22 (9292030) PhotoVac PID 2020 (EDFK241)

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B.312 SITE 58
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-B312-GW-02S-02
Sample Location: CEF-B312-02S
Sampled By: TD
C.O.C. No.: 10/02/01-001
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 10/02/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 0850								
Method: Low Flow Peristaltic	Clear	5.54	0.168	27.0	0.00	2.37	0.0	-141

PURGE DATA

Date: 10/02/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 75.8								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 14.30								
Static Water Level (WL): 4.72								
One Casing Volume (gal/L): 1.56								
Start Purge (hrs): 0807								
End Purge (hrs): 0850								
Total Purge Time (min): 43								
Total Vol. Purged (gal/L): 4.0								

See Page 2 Low Flow Purge Data Sheet

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	TD
PAHs (8310)	None	2-1 liter glass ambers	TD
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	TD
~~Lead~~ (6010B) *Dissolved Iron (Filter)	HNO_3	500 ml ~~1-1 liter~~ plastic 1um Filter	TD
Alkalinity (310.1) Anions (300.0)	None	1 Liter ~~1-250 ml~~ plastic	TD
Sulfide (376.1) * Dissolved (Filter)	NaOH	500 ml ~~1-1 liter~~ plastic 1um Filter	TD
TOC (415.1)	HCl	1-125 ml glass amber	—
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	TD

OBSERVATIONS / NOTES

Total Depth 14.30'
Static Water Level - 4.72'
Standing Water Column 9.58'
One Casing (Saturated Screen) Volume
$2^2 \times 0.0408 \times 9.58 = 1.56$ gallon $\times 2 = 3.12$

Pump Intake 9.5-10'

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle If Applicable:
MS/MSD
Duplicate ID No.:

Signature(s): Thomas M. Jackson

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 312 Site 58
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-B312-02S
DATE: 10/02/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)		DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments		
0807	4.72	350								Clear; Chemical odor		
0812	4.80	350	5.54	0.221	8.7	6.2	5.46	24.7	-126		Volume	
0820	4.81	350	5.64	0.199	31.9	19	2.00	26.9	-144			
0825	4.81	350	5.62	0.186	25.4	14	2.21	26.9	-142			
0830	4.81	350	5.57	0.170	19.2	8.7	2.43	26.9	-140			
0840	4.81	350	5.56	0.169	6.5	2.0	2.36	26.9	-142			
0845	4.81	350	5.54	0.168	4.4	0.00	2.37	27.0	-141			4.00 gallons
0850	Sample											

SIGNATURE(S): Thomas M. Duckett

Instruments Used:
Photovac 2020 PID (EDJH338)
Horiba U-22 Water Quality Monitor (292030)
LaMotte Turbidimeter 2020 (0916 #298)

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DSO05H125
Sampled By: TD
Field Analyst: T. Rusano
Field Form Checked as per QA/QC Checklist (Initials):

Sample ID No.: CEF- B312-GW-025-02
Sample Location: CEF- B312-025
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

Date: 10-02-01	Color (Visual)	pH (SU)	S.C. (mS/cm)	Turbidity (NTU)	DO (Meter, mg/l)	Temp. (°C)	ORP (Eh) (+/- mv)	
Time: 0850								
Method: Peristaltic	CLEAR	5.54	0.168	0.00	2.37	27.0	-141	

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment:
CHEMetrics Range ☑ 0 - 1.0 mg/L ☐ 1 - 12 mg/L
Analysis Time: 0928 0930
CHEMetrics: 0.07 mg/L DUP 0.2
Notes:

Carbon Dioxide:

Range Used:	CHEMetrics Range		Concentration	
☐	10-100 mg/L	(K-1910)		= mg/L
☑	100-1000 mg/L	(K-1920)		= 140 mg/L
☐	250-2500 mg/L	(K-1925)		= mg/L

Analysis Time: 0951 0958
DUP = 160 mg/L
Notes:

Alkalinity:

Equipment: HACH Digital Titrator AL-DT CHEMetrics (Range: NA mg/L)
Analysis Time: 1025
Filtered: ☐ 1018

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	0 & 375	x 0.1	= 37.5 mg/L
☑	40-160 mg/L	25 ml	0.1600 N	0.4	0 & 113 & 116	x 0.4	= 45.2 mg/L
☐	100-400 mg/L	100 ml	1.600 N	1.0	0 & 89	x 1.0	= mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	= mg/L
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	= mg/L
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	= mg/L

Parameter:	Hydroxide	Carbonate	Bicarbonate
Relationship:	0	0	45.2

CHEMetrics: NA mg/L
Notes: DUP = 46.4

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DSO05H125
Sampled By: TD
Field Analyst: T. ROJAHN
Field Form Checked as per QA/QC Checklist (initials):

Sample ID No.: CEF-B312-GW-025-02
Sample Location: CEF-B312-025
Duplicate: ☐
Blank: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Ferrous Iron (Fe^{2+}):

Equipment: ~~DR-700~~ DR-890 IR-18C Color Wheel Other: _____ Analysis Time: 0916 / 0943
Program/Module: ~~600nm~~ 33
Concentration: 5.8 mg/L DUP = 5.6 Filtered: ☐
Notes: DR-890 Results >3.30 mg/L

Sulfide (S^{2-}):

Equipment: DR-700 DR-890 HS-C Color Chart HS-WR Color Wheel Analysis Time: 0952 / 0959
Program/Module: 610nm 93 Other: _____
Concentration: 0.16 mg/L Dup. 0.13 Filtered: ☐
Notes:

Hydrogen Sulfide (H_2S):

Equipment: HS-C Other: _____ Analysis Time: 0913 / 0924
Concentration: 0.7 mg/L Exceeded 5.0 mg/L range on color chart: ☐
Notes: Dup = 1.0

QA/QC Checklist:

All data fields have been completed as necessary: ☐
Correct measurement units are cited in the SAMPLING DATA block: ☐
Multiplication is correct for each *Multiplier* table: ☐
Final calculated concentration is within the appropriate *Range Used* block: ☐
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐
Title block is initialized by person who performed the QA/QC Checklist: ☐

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B-~~824A~~ 312 Site ~~58~~ 58
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-B312-GW-3~~5~~ -08
Sample Location: CEF-B312-GW-3
Sampled By: Elena Rodriguez
C.O.C. No.: CF ~~312~~ 58-092601
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/26/01	Color	pH	S.C.	Temp.	Turbidity	DO	~~Salinity~~ ORP	Other
Time: 1340	Visual	Standard	mS/cm	°C	NTU	mg/l	~~ppt~~ mV	
Method: Low Flow Peristaltic	clear	6.72	0.613	30.2	0.85	2.90	-156	—

PURGE DATA

Date: 9/26/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 15.1								
Well Casing Diameter: 2"		See attached low flow purge sheet						
Well Casing Material: PVC								
Total Well Depth (TD): 14.11								
Static Water Level (WL): 4.64=9.5								
One Casing Volume(gal/L): 1.5/6.0								
Start Purge (hrs): 1248								
End Purge (hrs): 1339								
Total Purge Time (min): 51								
Total Vol. Purged (gal/L): 20								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	YES
PAHs (8310)	None	2-1 liter glass ambers	
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	
~~Lead~~ (6010B) *Dissolved IRON (Filter)	HNO_3	500ml 1-~~1 liter~~ plastic	
Alkalinity (310.1) Anions (300.0)	None	1L 1-~~250 ml~~ 1L plastic	
Sulfide (376.1) * Dissolved (Filter)	NaOH	500ml 1-~~1 liter~~ plastic	
TOC (415.1)	HCl	1-125 ml glass amber ~~Not Collected~~ TD	
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

One Casing Volume = 14.11 - 4.64 = 9.47
$2^2 \times 0.0408 \times 9.47 = 1.54$ gal $\times 2 = 3.09$ gallons
(Minimum Purge Volume)
Pump Intake ~ 9.5-10.0'

TOC Collected however, was only to be collected on background wells TD

Laboratory ACCUTEST
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:
MS/MSD
Duplicate ID No.: CEF-B312-GW-MS/MSD

Signature(s): Elena Rodriguez

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. ~~824A~~ 312 Site 58
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-B312-3S
DATE: 09/26/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Cum.	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1249	4.64	400								
1254	4.96	400	2	6.73	0.605	24.2	2.40	30.8	-135	clear
1259	4.97	400	4	6.78	0.617	20.7	3.29	29.9	-133	
1304	4.96	400	6	6.76	0.615	17.9	2.45	30.4	-144	
1309	4.98	400	8	6.75	0.615	14.3	2.17	30.5	-152	
1314	4.98	400	10	6.75	0.614	8.0	2.19	30.5	-157	
1319	4.98	400	12	6.75	0.614	2.3	2.35	30.4	-159	
1324	4.98	400	14	6.74	0.614	2.6	2.44	30.4	-160	
1329	4.98	400	16	6.74	0.614	0.9	2.61	30.4	-162	Lamotte 0.75 NTU
1334	4.98	400	18	6.72	0.614	0.3	2.77	30.3	-159	
1339	4.98	400	20	6.72	0.613	0.0	2.90	30.2	-156	Lamotte 0.85 NTU
end purge										
1340	begin sampling.									

SIGNATURE(S): Elena Rodriguez

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DS005H125
Sampled By: Elena Rodriguez
Field Analyst: Elena Rodriguez
Field Form Checked as per QA/QC Checklist (Initials):

Sample ID No.: CEF- B312-GW-35-03
Sample Location: CEF- B312-MW 35
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

	Color (Visual)	pH (SU)	S.C. (mS/cm)	Turbidity (NTU)	DO (Meter, mg/l)	Temp. (°C)	ORP (Eh) (+/- mv)
Date: 9-26-01							
Time: 1340							
Method: Peristaltic	clear	6.72	0.613	0.85	2.90	30.2	-156

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment:
CHEMetrics Range ☒ 0 - 1.0 mg/L ☐ 1 - 12 mg/L
Analysis Time: 13:54
CHEMetrics: 0.4 mg/L
Notes:

Carbon Dioxide:

Range Used:	CHEMetrics Range		Concentration
☐	10-100 mg/L	(K-1910)	= mg/L
☒	100-1000 mg/L	(K-1920)	= 110 mg/L
☐	250-2500 mg/L	(K-1925)	= mg/L

Analysis Time: 1531
Notes:

Alkalinity:

Equipment: HACH Digital Titrator AL-DT
CHEMetrics (Range: NA mg/L)
Analysis Time: 1529
Filtered: ☐

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	&	x 0.1	= mg/L
☐	40-160 mg/L	25 ml	0.1600 N	0.4	60 & 60	x 0.4	= ~~240~~ mg/L
☐	100-400 mg/L	100 ml	1.600 N	1.0	6 &	x 1.0	= mg/L
☒	200-800 mg/L	50 ml	1.600 N	2.0	0 & 207	x 2.0	= 414 mg/L
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	= mg/L
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	= mg/L

Parameter:	Hydroxide	Carbonate	Bicarbonate
Relationship:	0	0	414

CHEMetrics: NA mg/L
Notes:
Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

TINUS CHOKSUNULLE FAX:9042810070 Sep 25 2001 9:28 P.01

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DSO05H125
Sampled By: Elena Rodriguez
Field Analyst: Elena Rodriguez
Field Form Checked as per QA/QC Checklist (initials):

Sample ID No.: CEF-B312-GW-35-01
Sample Location: CEF-B312MW-3S
Duplicate: ☐
Blank: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Ferrous Iron (Fe^{2+}):

Equipment: DR-700 DR-890 / 33 IR-18C Color Wheel Other: _____ Analysis Time: 1542
Program/Module: 500nm
Concentration: _____ mg/L Filtered: ☐
Notes: 23.30

Sulfide (S^{2-}):

Equipment: DR-700 DR-890 / 93 HS-C Color Chart HS-WR Color Wheel Other: _____ Analysis Time: 1534
Program/Module: 610nm
Concentration: 0.13 mg/L Filtered: ☐
Notes:

Hydrogen Sulfide (H_2S):

Equipment: HS-C Other: _____ Analysis Time: 1440
Concentration: 0.5 mg/L Exceeded 5.0 mg/L range on color chart: ☐
Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☐
Correct measurement units are cited in the SAMPLING DATA block: ☐
Multiplication is correct for each *Multiplier* table: ☐
Final calculated concentration is within the appropriate *Range Used* block: ☐
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐
Title block is initialized by person who performed the QA/QC Checklist: ☐

TTNUS JACKSONVILLE FAX:8042810071 Sep 25 2001 9:26 P.02

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B.312 SITE 58
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-B312-GW-045-02
Sample Location: CEF-B312-GW-045
Sampled By: T. ROSAHN
C.O.C. No.: 09/25/01-004
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/25/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	~~Salinity~~ ORP %	Other
Time: 1440								
Method: Low Flow Peristaltic	CLEAR	4.84	0.077	28.8	0.7	0.02	+ 57	NONE

PURGE DATA

Date: 9/25/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 624								
Well Casing Diameter: 2"								
Well Casing Material: PVC		SEE	LOW FLOW	PURGE	DATA	SHEET		
Total Well Depth (TD): 14.2								
Static Water Level (WL): 4.52								
One Casing Volume(gal/L): 6L								
Start Purge (hrs): 1345								
End Purge (hrs): 1435								
Total Purge Time (min): 50								
Total Vol. Purged (gal/L) 12.5								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	✓
PAHs (8310)	None	2-1 liter glass ambers	✓
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	✓
Lead (6010B) *Dissolved (Filter)	HNO_3	1-1 litter plastic	NO
Alkalinity (310.1) Anions (300.0)	None	1-250 ml plastic	
Sulfide (376.1) * Dissolved (Filter)	NaOH	1-1 liter plastic	
TOC (415.1)	HCl	1-125 ml glass amber	
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

14.2 - 4.52 = 9.68 x .163 = 1.58 gal or 6L
MIN VOL = 12L
Pump Intake ~4.8' off Bottom

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle If Applicable:
MS/MSD
Duplicate ID No.:

Signature(s): Troy Rosahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 312 Site 58
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-B312-GW-045
DATE: 09/25/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1345	4.52	—	—	—	—	—	—	—	Start PURGE
1355	4.59	250	4.79	0.081	8.5	0.17	29.0	99	2500mL CLEAR
1405	4.57	250	4.80	0.079	14.8	0.00	28.8	86	5000mL "
1415	4.56	250	4.85	0.080	5.2	0.00	28.8	67	7500 "
1425	4.56	250	4.82	0.080	1.6	0.00	28.8	63	10000 "
1435	4.56	250	4.84	0.077	0.7	0.02	28.8	57	12500 "
1440									Start SAMPLING

SIGNATURE(S): [signature]

MIN VOL = 12 L

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B. ~~824A~~ 312 Site ~~57~~ 58 (TC)
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-B312-GW-05S-02
Sample Location: BLD 312 CEF-B312-05S
Sampled By: D.S.
C.O.C. No.: CE58-092601
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/26 /01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 0955								
Method: Low Flow Peristaltic	CLEAR	4.97	.094	27.2	3.2	.55	—	-51

PURGE DATA

Date: 9/26 /01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 1535								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 14.2								
Static Water Level (WL): 4.17								
One Casing Volume (gal/L): 1.63								
Start Purge (hrs): 0855								
End Purge (hrs): 0940								
Total Purge Time (min): 45								
Total Vol. Purged (gal/L): 4.22 Gallons								

See Page 2 Low Flow Purge Data Sheet

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	DS
PAHs (8310)	None	2-1 liter glass ambers	DS
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	DS
FE Lead (6010B) *Dissolved (Filter)	HNO_3	500ml ~~1-1 liter~~ plastic	DS
Alkalinity (310.1) Anions (300.0)	None	1L ~~1-250 ml~~ plastic	DS
Sulfide (376.1) * Dissolved (Filter)	NaOH	500ml ~~1-1 liter~~ plastic	DS
TOC (415.1)	HCl	1-125 ml glass amber	DS
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	8-40ml glass VOA	DS

OBSERVATIONS / NOTES

One Casing Volume =
$2'' \times 0.0408 \times 10.03 = 1.63 \times 2 = 3.2$ gallons

Pump Intake ~ 9.5-10'

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle If Applicable:

MS/MSD	Duplicate ID No.: CEF-B312-DUP2

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. ~~824A~~ 312 Site 53

PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-B312-GW-05S-02

DATE: 09/26/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0855	4.17	400							BEGIN PURGE
0900	4.24	400	4.71	.099	1.2	1.95	27.3	-22	
0910	4.25	400	4.90	.098	23	.61	27.8	-45	
0920	4.26	400	4.93	.088	10	.46	28.1	-46	
0930	4.21	200	4.97	.090	5.0	.52	27.1	-48	3.69
0935	4.21	200	4.97	.090	2.6	.54	27.1	-51	
0940	4.21	200	4.97	.094	3.2	.55	27.2	-51	END PURGE

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DS005H125
Sampled By: D.S.
Field Analyst: T.R.
Field Form Checked as per QA/QC Checklist (Initials):

Sample ID No.: CEF-B312-GW-055-2
Sample Location: CEF-B312-GW-055
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

Date: 9-26-01	Color	pH	S.C.	Turbidity	DO	Temp.	ORP (Eh)
Time: 0955	(Visual)	(SU)	(mS/cm)	(NTU)	(Meter, mg/l)	(°C)	(+/- mv)
Method: Peristaltic	CLEAR	4.92	.094	3.2	0.55	27.2	+61

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment:
CHEMetrics Range ☑ 0 - 1.0 mg/L ☐ 1 - 12 mg/L
Analysis Time: 0957
CHEMetrics: 0.07 mg/L
Notes:

Carbon Dioxide:

Range Used:	CHEMetrics Range		Concentration		
☑	10-100 mg/L	(K-1910)	70	= 70	mg/L
☐	100-1000 mg/L	(K-1920)		=	mg/L
☐	250-2500 mg/L	(K-1925)		=	mg/L

Analysis Time: 0959
Notes:

Alkalinity:

Equipment: HACH Digital Titrator AL-DT
CHEMetrics (Range: NA mg/L)
Analysis Time: 1022
Filtered: ☐

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☑	10-40 mg/L	100 ml	0.1600 N	0.1	0 & 35	x 0.1	= 3.5 mg/L
☑	40-160 mg/L	25 ml	0.1600 N	0.4	0 & 9	x 0.4	= 3.6 mg/L
☐	100-400 mg/L	100 ml	1.600 N	1.0	&	x 1.0	= mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	= mg/L
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	= mg/L
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	= mg/L

Parameter:	Hydroxide	Carbonate	Bicarbonate
Relationship:	0	0	3.5

CHEMetrics: NA mg/L
Notes:

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

TINUS CHOKSUNALLE Fax:904/281-0070 Sep 25 2001 9:28 P.01

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DS005H125
Sampled By: DS
Field Analyst: TR
Field Form Checked as per QA/QC Checklist (initials):

Sample ID No.: CEF-B312-GW-055-2
Sample Location: CEF-B312-GW-055
Duplicate: ☐
Blank: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Ferrous Iron (Fe^{2+}):

Equipment: DR-700 DR-890 IR-18C Color Wheel Other: 4.3 Analysis Time: 10:57
Program/Module: ~~500nm~~ 890 33
Concentration: Above Limit 3.3 mg/L Filtered: ☐
Notes:

Sulfide (S^{2-}):

Equipment: DR-700 DR-890 HS-C Color Chart HS-WR Color Wheel Analysis Time: 1036
Program/Module: 610nm 93 Other:
Concentration: 0.19 mg/L Filtered: ☐
Notes:

Hydrogen Sulfide (H_2S):

Equipment: HS-C Other: Analysis Time: 1038
Concentration: 0.5 mg/L Exceeded 5.0 mg/L range on color chart: ☐
Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☐
Correct measurement units are cited in the SAMPLING DATA block: ☐
Multiplication is correct for each *Multiplier* table: ☐
Final calculated concentration is within the appropriate *Range Used* block: ☐
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐
Title block is initialized by person who performed the QA/QC Checklist: ☐

TTNUS CHUCKSONVILLE Fax:9042810070 Sep 25 2001 9:28 P.02

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B.312 Site 58
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-B312-GW-06S-02
Sample Location: CEF-B312-06S
Sampled By: Tom Dickson
C.O.C. No.: 09/19/01-001
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/18/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 1450								
Method: Low Flow Peristaltic	Clear	6.12	0.491	29.0	0.26	1.02	0.0	-172

PURGE DATA

Date: 9/18/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0.0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 13.98								
Static Water Level (WL): 4.45								
One Casing Volume (gal/L): 1.55								
Start Purge (hrs): 1336								
End Purge (hrs): 1450								
Total Purge Time (min): 74								
Total Vol. Purged (gal/L): 10								

See Low Flow Purge Data Sheet

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	✓
PAHs (8310)	None	2-1 liter glass ambers	✓
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	✓
Lead (6010B) *Dissolved (Filter)	HNO_3	1-1 litter plastic	
Alkalinity (310.1) Anions (300.0)	None	1-250 ml plastic	
Sulfide (376.1) * Dissolved (Filter)	NaOH	1-1 liter plastic	
TOC (415.1)	HCl	1-125 ml glass amber	
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

Casing Volume = $2^2 \times 0.0408 \times 9.53 = 1.55$ gallons
$1.55 \times 2 = 3.10$ gallons (Minimum Purge Volume)
Pump Intake - 8.5-9.0'

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:
MS/MSD
Duplicate ID No.:

Signature(s): Thomas M. Dickson

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 312 Site 58
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-B312-06S
DATE: 09/18/01
SWL: 4.45 Total depth 13.98

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)		DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1336	Start Purge; Sweep Screen & Water Column									
1340	4.57	400	6.38	0.754	13.5		1.57	29.2	-157	Clear; No odor; 0.0ppm
1348	4.59	480	6.28	0.609	1.5	–	0.61	29.1	-162	Reduce Flow Rate
1353	4.53	500	6.22	0.548	26.7	–	0.48	29.3	-169	
1407	— 5 — Gallons collected; Cleaned Flow Cell									
1410	4.53	420	6.21	0.539	0.9	0.8	2.04	29.4	-159	
1420	4.53	460	6.20	0.525	–	0.78	0.50	29.4	-176	
1445	4.53	420	6.13	0.511	11.9	0.61	1.82	29.1	-171	
1450	4.53	400	6.12	0.491	12.3	0.26	1.02	29.0	-172	
	10 Gallons									
					Horiba U-22	LaMotte 2020 Turbidimeter				

Instruments:
PID: ED FK 241
Horiba U-22: 9292030
LaMotte 2020: 1757-1800

SIGNATURE(S): Thomas M. Nichols

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B.312 Site 58
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-B312-GW-07S-03
Sample Location: CEF-B312-07S
Sampled By: Dave Siefken
C.O.C. No.: 09/19/01-001
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/18/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 1445								
Method: Low Flow Peristaltic	Clear	6.11	0.565	29.3	1.0	5.23	0.0	-118

PURGE DATA

Date: 9/18/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0.0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 13.88								
Static Water Level (WL): 4.66								
One Casing Volume (gal/L): 1.51								
Start Purge (hrs): 1316								
End Purge (hrs): 1445								
Total Purge Time (min): 89								
Total Vol. Purged (gal/L): 7.0								

See Attached Low Flow Purge Data Sheet

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	✓
PAHs (8310)	None	2-1 liter glass ambers	✓
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	✓
Lead (6010B) *Dissolved (Filter)	HNO_3	1-1 litter plastic	NO
Alkalinity (310.1) Anions (300.0)	None	1-250 ml plastic	↓
Sulfide (376.1) * Dissolved (Filter)	NaOH	1-1 liter plastic	↓
TOC (415.1)	HCl	1-125 ml glass amber	↓
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	↓

OBSERVATIONS / NOTES

Casing Volume
$2^2 \times 0.0408 \times 9.28 = 1.51$ gallons $\times 2 =$ 3.02 Gallons

Pump Intake - 8.5-9.0'

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle If Applicable:
MS/MSD
Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B.312 Site 58
PROJECT NUMBER: N0039 CTO 0078
WELL ID.: CEF-B312-07S
DATE: 09/18/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)		DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1318	Sump Screen									
1319	4.70	300	6.14	0.826	15.7		5.81	29.8	-137	yellowish tint; no odor; no PID readings
1330	4.78	290	6.19	0.695	16.1		4.01	29.7	-138	
1342	4.78	290	6.17	0.649	3.3	1.7	5.56	29.7	-133	
1358	4.78	280	6.15	0.618	2.3	1.3	5.80	29.6	-126	
1415	4.78	290	6.14	0.600	1.6	1.3	5.50	29.9	-123	
1425	4.78	300	6.12	0.591	0.8	1.1	5.52	29.7	-120	
1445	4.77	300	6.11	0.565	0.4	1.0	5.23	29.3	-118	

Horiba U-22

LaMotte 2020 Turbidimeter

SIGNATURE(S): [illegible]

PAGE___OF___

Instruments: PID - EDFK241
Horiba U-22 - T0052000
LaMotte 2020 - 0840-1292

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B.312 SITE 58
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-B312-GW-08S-03
Sample Location: CEF 8312 08S
Sampled By: T. ROJAHN
C.O.C. No.: 09/25/01-004
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/25/01 9/ /01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	~~Salinity~~ ORP	Other
Time: 0925								
Method: Low Flow Peristaltic	CLEAR	6.45	0.386	25.4	0.01	0.00	-106	ODOR

PURGE DATA

Date: 9/25/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0.0								
Well Casing Diameter: 2"								
Well Casing Material: PVC			SEE	LOW	FLOW			
Total Well Depth (TD): 13.9			PURGE	DATA				
Static Water Level (WL): 5.08				SHEET				
One Casing Volume(gal/L): 5.4								
Start Purge (hrs): 0835								
End Purge (hrs): 0925								
Total Purge Time (min): 50								
Total Vol. Purged (gal/L) 11								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	✓
PAHs (8310)	None	2-1 liter glass ambers	✓
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	✓
Lead (6010B) *Dissolved (Filter)	HNO_3	1-1 litter plastic	
Alkalinity (310.1) Anions (300.0)	None	1-250 ml plastic	
Sulfide (376.1) * Dissolved (Filter)	NaOH	1-1 liter plastic	
TOC (415.1)	HCl	1-125 ml glass amber	
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

13.9 - 5.08 = 8.82 x .163 = 1.44 GAL or 5.44 L
MIN VOL = 11L
INTAKE ~4.4' OFF bottom
CHEMICAL ODOR

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	CEF-B312-DUP1

Signature(s): Tony Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 312 Site 58
PROJECT NUMBER: N0039 CTO 0078
WELL ID.: CEF-B312-GW-08S
DATE: 09/25/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments CHEMICAL ODOR
0835	5.08	—	—	—	—	—	—	—	START PURGE
0845	5.16	250	6.33	0.404	11.9	0.40	25.5	-71	2500 ML CLEAR
0855	5.17	250	6.36	0.386	4.4	0.00	25.5	-91	5000 CLEAR
0905 ~~0955~~ (TS)	5.15	200	6.37	0.383	1.9	0.00	25.4	-98	7000 CLEAR
0905	5.14	200	6.42	0.385	0.04	0.00	25.4	-102	9000 CLEAR
0925	5.15	200	6.45	0.386	0.01	0.00	25.4	-106	11000 CLEAR

MIN VOL = 11L

SIGNATURE(S): Terry Rogahn

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B.312 SITE 58
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-B312-GW-095-01
Sample Location: CEF-B312-095
Sampled By: Tom Dickson
C.O.C. No.: 09/25/01-004
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other
Date: 9/25/01								ORP
Time: 1155								
Method: Low Flow Peristaltic	Clear	6.42	0.393	28.2	0.00	6.05	0.0	

PURGE DATA

	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Date: 9/25/01								
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 7.9								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 14.35								
Static Water Level (WL): 7.45								
One Casing Volume (gal/L): 1.12								
Start Purge (hrs): 1101								
End Purge (hrs): 1155								
Total Purge Time (min): 54								
Total Vol. Purged (gal/L): 2.85 gallons or 10.8 Liters								

See Attached Low Flow Purge Data Sheet

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	✓
PAHs (8310)	None	2-1 liter glass ambers	✓
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	✓
Lead (6010B) *Dissolved (Filter)	HNO_3	1-1 litter plastic	No
Alkalinity (310.1) Anions (300.0)	None	1-250 ml plastic	✓
Sulfide (376.1) * Dissolved (Filter)	NaOH	1-1 liter plastic	✓
TOC (415.1)	HCl	1-125 ml glass amber	✓
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	✓

OBSERVATIONS / NOTES

Casing Volume = $2^2 \times 0.0408 \times 6.9' = 1.12$
1.12×2 (2.25 Gallons) Minimum Purge Volume Requirement

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Pump Intake 8.5-9.0'

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Thomas M. Dickson

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 312 Site 58
PROJECT NUMBER: N0039 CTO 0078
WELL ID.: CEF-B312-09S
DATE: 09/25/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)		DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1101	Start 0745	200								
1105	7.62	↓	6.35	0.351	1.1	1.5	8.99	27.8	140	
1110	7.66	↓	6.34	0.347	1.4	0.45	8.20	28.1	135	
1120	7.68	250	6.33	0.349	-0.4	0.40	7.25	28.4	125	Reduce Flowrate 180 - 200
1130	7.67	200	6.39	0.368	-3.4	0.00	6.38	28.5	114	
1140	7.67	200	6.44	0.384	-4.2	0.00	6.10	28.5	107	
1150	7.67	200	6.43	0.392	-4.3	0.00	6.01	28.5	103	
1155	7.67	200	6.42	0.393	-4.2	0.00	6.05	28.2	101	Sample

SIGNATURE(S): Thomas M. Dickson

105

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B.312 SITE 58
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-B312-0105-01
Sample Location: BLD. 312
Sampled By: D.S.
C.O.C. No.: 09/25/01-007
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/25/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	~~Other~~ ORP
Time: 1100								
Method: Low Flow Peristaltic	CLEAR	5.68	.153	27.5	0	5.07	—	126

PURGE DATA

Date: 9/25/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 3.2								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 14.30								
Static Water Level (WL): 5.03								
One Casing Volume(gal/L): 1.6								
Start Purge (hrs): 1015								
End Purge (hrs): 1045								
Total Purge Time (min): 30								
Total Vol. Purged (gal/L): 3.9								

Low Flow Purge Data Sheet

See Page 2

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	YES
PAHs (8310)	None	2-1 liter glass ambers	YES
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	YES
Lead (6010B) *Dissolved (Filter)	HNO_3	1-1 litter plastic	
Alkalinity (310.1) Anions (300.0)	None	1-250 ml plastic	
Sulfide (376.1) * Dissolved (Filter)	NaOH	1-1 liter plastic	
TOC (415.1)	HCl	1-125 ml glass amber	
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

One Casing Volume = $2^2 \times 0.0408 \times 9.27 = 1.51$ gallons
$1.51 \times 2 = 3.02$ gallons (Minimum Purge Volume)
Pump Intake 8.5-9.0'

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

105

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 312 Site 58
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF - B312 - 105-01
DATE: 09/25/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1015	5.03	500	—		—		—		BEGIN PURGE
1020	5.13	500	5.57	.164	2.1	2.14	27.9	115	
1030	5.14	500	5.62	.158	0.1	5.35	27.6	124	
1040	5.13	500	5.65	.155	0	2.33	27.5	125	
1045	5.13	500	5.68	.153	0	5.07	27.5	126	

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B.312 SITE 58
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-B312-GW-11S-01
Sample Location: NAS CF CEF-B312-11S
Sampled By: L. Knight
C.O.C. No.: 09/25/01-004
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/25/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other
Time: 0920								
Method: Low Flow Peristaltic	CLEAR	5.80	0.283	29.20	2.7	7.63		

PURGE DATA

Date: 9/25/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 2.2								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 14.50								
Static Water Level (WL): 5.77								
One Casing Volume(gal/L):								
Start Purge (hrs): 0848								
End Purge (hrs): 0925								
Total Purge Time (min): 27								
Total Vol. Purged (gal/L): ~18L								

See Page 2 Low Flow Purge Data Sheet

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	✓
PAHs (8310)	None	2-1 liter glass ambers	✓
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	✓
Lead (6010B) *Dissolved (Filter)	HNO_3	1-1 litter plastic	
Alkalinity (310.1) Anions (300.0)	None	1-250 ml plastic	
Sulfide (376.1) * Dissolved (Filter)	NaOH	1-1 liter plastic	
TOC (415.1)	HCl	1-125 ml glass amber	
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

Casing Volume =
22 x 0.0408 x 8.73 = 1.43 gallons x 2 = 2.85 gallons
(Minimum Purge Volume)

Pump Intake ~ 9.0'

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Jacob Knight

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 312 Site 58
PROJECT NUMBER: N0039 CTO 0078
WELL ID.: CEF. B312. 118
DATE: 09/ /01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0848	5.78	–	–	–	–	–	–	–	
0852	5.93	–	–	–	–	–	–	–	
0853	5.98	–	–	–	–	–	–	–	
0854	6.02	700							
0855	6.02	700	6.03	0.439	3.9	3.24	29.13	-125	
0900	6.00	700	5.96	0.356	3.9	2.79	29.24	-145	
0905	6.02	700	5.88	0.313	3.3	4.71	29.24	-155	
0910	6.02	700	5.83	0.291	3.3	5.90	29.21	-160	
0915	6.02	700	5.80	0.283	2.7	7.63	29.20	-162	
0920	COLLECT	SAMPLE							

SIGNATURE(S): Louis Knight

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B.312 SITE 58
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-B312-GW-125-01
Sample Location: CEF B312 GW 125
Sampled By: T. ROJAHN
C.O.C. No.: 09/25/01-004
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/25/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity ORP	Other
Time: 1130								
Method: Low Flow Peristaltic	CLEAR	4.67	0.080	25.6	2.3	0.00	+ 110	NONE

PURGE DATA

Date: 9/25/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 24.1								
Well Casing Diameter: 2"								
Well Casing Material: PVC		SEE LOW FLOW PURGE DATA SHEET						
Total Well Depth (TD): 13.8								
Static Water Level (WL): 5.74								
One Casing Volume(gal/L): 5								
Start Purge (hrs): 1048								
End Purge (hrs): 1128								
Total Purge Time (min): 40								
Total Vol. Purged (gal/L): 10								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	✓
PAHs (8310)	None	2-1 liter glass ambers	✓
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	✓
Lead (6010B) *Dissolved (Filter)	HNO_3	1-1 litter plastic	NO
Alkalinity (310.1) Anions (300.0)	None	1-250 ml plastic	
Sulfide (376.1) * Dissolved (Filter)	NaOH	1-1 liter plastic	
TOC (415.1)	HCl	1-125 ml glass amber	
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

13.8 - 5.74 = 8.06 x .163 = 1.3 gal or 5L
10L = MIN VOL.
PUMP INTAKE ~ 4.0' OFF WELL BOTTOM

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Terry Rojahn

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 312 Site 58
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-B312-GW-12S
DATE: 09/25/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1048	5.74	—	—	—	—	—	—	—	START PURGE
1058	5.79	250	5.05	0.091	35	0.37	25.6	136	2500 ML CLEAR
1108	5.79	250	4.70	0.080	9.1	0.00	25.6	131	5000 ML CLEAR
1118	5.78	250	4.68	0.077	3.6	0.00	25.7	118	7500 ML CLEAR
1128	5.78	250	4.67	0.080	2.3	0.00	25.6	110	10000 ML CLEAR
1130	—	—	—	—	—	—	—	—	START SAMPLING

MIN VOL = 10L

SIGNATURE(S): Terry Rigal

135

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B.312 SITE 58
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-B312 GW-135-01
Sample Location: BLD312; CEF-B312-135
Sampled By: D.S
C.O.C. No.: 09/25/01-004
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other
Date: 9/25/01								
Time: 0910								
Method: Low Flow Peristaltic	CLEAR	5.08	.087	28.6	0	.54		

PURGE DATA

Date: 9/25/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								-3
Monitor Reading (ppm): 0								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 14.35								
Static Water Level (WL): 5.22								
One Casing Volume (gal/L): 1.6								
Start Purge (hrs): 0831								
End Purge (hrs): 0905								
Total Purge Time (min): 34								
Total Vol. Purged (gal/L): 4.49								

See Page 2 Low Flow Purge Data Sheet

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	YES
PAHs (8310)	None	2-1 liter glass ambers	YES
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	YES
Lead (6010B) *Dissolved (Filter)	HNO_3	1-1 litter plastic	
Alkalinity (310.1) Anions (300.0)	None	1-250 ml plastic	
Sulfide (376.1) * Dissolved (Filter)	NaOH	1-1 liter plastic	
TOC (415.1)	HCl	1-125 ml glass amber	
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	

OBSERVATIONS / NOTES

One Casing (Saturated Screen) Volume
$2^2 \times 0.8408 \times 9.13' = 1.49$ gallons $\times 2 =$
2.97 gallons (Minimum Purge Volume)
Pump Intake - 8.5-9.0'

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:
MS/MSD
Duplicate ID No.:

Signature(s):

135

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 312 Site 58
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-B 312 - 0135
DATE: 09/25 /01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0831	5.22	500	4.99	.087	5	1.03	28.8	34	BEGIN PURGE
0840	5.30	500	5.02	.096	0	.75	28.7	29	
0850	5.32	500	5.04	.098	0	.73	28.8	17	
0900	5.32	500	5.06	.096	0	.69	28.7	4	
0905	5.33	500	5.08	.087	0	.54	28.6	-3	

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B.312 SITE 58
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-B312-GW-148-01
Sample Location: NAS CF
Sampled By: L. KNIGHT
C.O.C. No.: 09/25/01-004
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 9/25/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Time: 1100								
Method: Low Flow Peristaltic	CLEAR	5.89	0.156	26.25	0	2.29	0.0	

PURGE DATA

Date: 9/25/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 1.3								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 13.90								
Static Water Level (WL): 5.31								
One Casing Volume (gal/L): 1.40								
Start Purge (hrs): 1021								
End Purge (hrs): 1055								
Total Purge Time (min): 34								
Total Vol. Purged (gal/L): 17L								

See Low Flow Purge Data Sheet (Page 2)

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	✓
PAHs (8310)	None	2-1 liter glass ambers	✓
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	✓
~~Lead (6010B) *Dissolved (Filter)~~	~~HNO_3~~	~~1-1 liter plastic~~	
~~Alkalinity (310.1) Anions (300.0)~~	~~None~~	~~1-250 ml plastic~~	
~~Sulfide (376.1) * Dissolved (Filter)~~	~~NaOH~~	~~1-1 liter plastic~~	
~~TOC (415.1)~~	~~HCl~~	~~1-125 ml glass amber~~	
~~Methane Ethane Ethene (RSKSOP 147/175)~~	~~HCl~~	~~3-40ml glass VOA~~	

OBSERVATIONS / NOTES

Casing Volume
$2^2 \times 0.0408 \times 8.59 = 1.40$ gallons
$\times 2 = 2.80$ gallons
Minimum Purge Volume

Pump Intake 8.0-8.5'

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Louis Knight

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 312 Site 58
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF. B312-14S
DATE: 09/25/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1021	5.31	–	–	–	–	–	–	–	
1022	5.40	500							
1023	5.42	500							
1024	5.42	500							
1025	5.42	500	6.41	0.270	21	3.23	26.59	42	
1030	5.42	500	6.30	0.247	17	3.09	26.41	11	
1035	5.42	500	6.09	0.229	4.5	2.65	26.29	-5	
1040	5.42	500	6.01	0.208	1.5	2.46	26.27	-2	
1045	5.42	500	5.98	0.180	0.3	2.38	26.23	-2	
1050	5.42	500	5.92	0.168	0.0	2.31	26.21	-1	
1055	5.42	500	5.89	0.156	0.0	2.29	26.25	1	
1100	COLLECT	SAMPLE							

SIGNATURE(S): Lucas Knight

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B.312 SITE 58
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-B312-GW-15I-01
Sample Location: CEF-B312-15I; Site 58
Sampled By: T. Dickson
C.O.C. No.: 09/25/01-004
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other ORP
Date: 9/25/01								
Time: 0945								
Method: Low Flow Peristaltic	Clear	6.03	0.224	24.0	3.3	4.32	0.0	103

PURGE DATA

Date: 9/25/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 5.3								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 40.30								
Static Water Level (WL): 5.03								
One Casing Volume(gal/L):								
Start Purge (hrs): 0850								
End Purge (hrs): 0945								
Total Purge Time (min): 65								
Total Vol. Purged (gal/L): 4.29 gallons or 16.25 L								

See Attached Low Flow Purge Data Sheet

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	✓
PAHs (8310)	None	2-1 liter glass ambers	✓
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	✓
Lead (6010B) *Dissolved (Filter)	HNO_3	1-1 litter plastic	No
Alkalinity (310.1) Anions (300.0)	None	1-250 ml plastic	↓
Sulfide (376.1) * Dissolved (Filter)	NaOH	1-1 liter plastic	↓
TOC (415.1)	HCl	1-125 ml glass amber	↓
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	↓

OBSERVATIONS / NOTES

One Saturated Screen Volume
22 x 0.0408 x 5 (screen Length) = 0.816 x 2 =
1.63 gallons (Minimum Purge Volume)

Pump Intake ~ 37.0'

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Thomas M. Dickson

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 312 Site 58
PROJECT NUMBER: N0039 CTO 0078
WELL ID.: CEF-B312-15I
DATE: 09/25/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)		DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0850	5.03	250	5.94	0.313	37.0		8.42	23.4	157	No odor; Slightly Cloudy.
0855	5.19		6.16	0.312	39.2		6.16	23.9	145	No visible sheen
0900	5.21		6.22	0.299	42.6	29	5.50	23.9	141	
0905	5.21		6.19	0.278	29.3	24	5.12	24.0	136	
0915	5.21		6.15	0.253	18.2	14	4.79	24.0	127	
0925	5.21		6.12	0.246	9.8	8.7	4.59	24.0	116	
0930	5.21		6.11	0.238	7.1	6.3	4.47	24.0	112	
0935	5.21		6.09	0.231	4.9	5.1	4.38	24.0	105	
0940	5.21		6.08	0.227	2.9	4.3	4.34	24.0	103	
0945	5.21		6.08	0.224	2.9	3.3	4.32	24.0	103	Sample

SIGNATURE(S): Thomas M. Jackson

PAGE 2 OF 2

Purge Volume = $2^2 \times 0.0408 \times 5 = 0.816 \times 2 = 1.63$ gallons Minimum Purge Volume

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS CECIL FIELD B312 Site 58 (12)
Project No.: 0039

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

Sample ID No.: CEF-B312LS-GW-015a-03
Sample Location: BLD 312
Sampled By: DS
C.O.C. No.: CF58-092601
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Sal. %	~~Other~~ ORP ~~NA~~
Date: 9/26/01								
Time: 1340								
Method: Peristaltic pump	CLEAR	6.68	.236	27.0	0	3.64	—	66

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 9/26/01								
Method: Peristaltic pump								
Monitor Reading (ppm): 6.4								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): ~15.80								
Static Water Level (WL): 5.73			(SEE LOW FLOW PURGE DATA SHEET)					
One Screeen Volume (gal/L): 1.6								
Start Purge (hrs): 1250								
End Purge (hrs): 1325								
Total Purge Time (min): 35								
Total Vol. Purged (gal/L): 13.5 L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC	4°C & HCl	(2) 40-ml vial	yes
TRPH	4°C & H_2SO_4	(2) 1 L Glass amber glass	yes
~~TCL SVOC~~ PAH	4°C	(2) 1 L Glass amber glass	YES
TCL Pesticides and PCBs	4°C	(2) 1 L Glass amber glass	
Total TAL Metals	4°C & HNO_3	1 L HDPE plastic container	
Dissolved TAL Metals (See Notes)	4°C & HNO_3	1 L HDPE plastic container	
Cyanide	4°C & NaOH	1 L HDPE plastic container	
Hardness	4°C & HNO_3	500-ml HDPE plastic container	
TOC	4°C & HCl	8oz Glass amber jar	YES

OBSERVATIONS / NOTES:

Filtered TAL Metals Sample ID No.: CEF- -GF-
Screen Length

One Casing Volume = 15.80 - 5.73 = 10.07
2" x 0.0408 x 10.07 = 1.64 gallons x 2 = 3.29 gallons (Minimum Purge Volume)
Pump Intake @ ~10.0'

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

3.2

PROJECT SITE NAME: B. ~~824A~~ 312 Site 53 (FR)
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF B 312LS GW-015a-03
DATE: 09/26/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1250	~~5.58~~ 5.43	300						→	BEGIN PURGE
1255	5.62	300	5.56	.245	4.1	4.09	27.1	38	
1300	5.65	300	6.67	.241	3.3	4.16	27.1	43	
1310	5.66	300	6.73	.239	2.6	4.66	27.0	54	
1320	5.66	300	6.71	.237	0.85	4.38	27.0	64	
1325	5.66	300	6.68	.236	0.0	3.64	27.0	66	

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DS005H125
Sampled By: D. S
Field Analyst: D. S
Field Form Checked as per QA/QC Checklist (Initials):

Sample ID No.: CEF- B312LS-GW-01Sa-03
Sample Location: CEF- DLD 312
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

	Color (Visual)	pH (SU)	S.C. (mS/cm)	Turbidity (NTU)	DO (Meter, mg/l)	Temp. (°C)	ORP (Eh) (+/- mv)	
Date: 9/26/01								
Time: 1340								
Method: Peristaltic	CLEAR	6.68	.236	0	3.64	27.0	66	

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment:
CHEMetrics Range ☐ 0 - 1.0 mg/L ☑ 1 - 12 mg/L
Analysis Time: 1420
CHEMetrics: mg/L 2.0
Notes:

Carbon Dioxide:

Analysis Time: 1455 ~~112~~

Range Used:	CHEMetrics Range		Concentration	
☐	10-100 mg/L	(K-1910)		= mg/L
☑	100-1000 mg/L	(K-1920)	112	= 112 mg/L
☐	250-2500 mg/L	(K-1925)		= mg/L

Notes:

Alkalinity:

Equipment: HACH Digital Titrator AL-DT
CHEMetrics (Range: NA mg/L)
Analysis Time: 1437
Filtered: ☐

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	&	x 0.1	= mg/L
☐	40-160 mg/L	25 ml	0.1600 N	0.4	&	x 0.4	= mg/L
☑	100-400 mg/L	100 ml	1.600 N	1.0	~~120~~ & 112	x 1.0	= 112 mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	= mg/L
☐	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	= mg/L
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	= mg/L

Parameter:	Hydroxide	Carbonate	Bicarbonate
Relationship:	0	0	112

CHEMetrics: NA mg/L
Notes:

Standard Additions: ☐ Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: Cecil Field Sites 57 & 58
Project No.: N0039.DSO05H125
Sampled By: DS
Field Analyst: DS
Field Form Checked as per QA/QC Checklist (initials):

Sample ID No.: CEF- B3125-GW-01Sa-03
Sample Location: CEF- DLD 302
Duplicate: ☐
Blank: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION

Ferrous Iron (Fe^{2+}):

Equipment: DR-700 (DR-890) IR-18C Color Wheel Other: _____ Analysis Time: 1405
Program/Module: 500nm 33
Concentration: 0.01 mg/L Filtered: ☐
Notes:

Sulfide (S^{2-}):

Equipment: DR-700 (DR-890) HS-C Color Chart HS-WR Color Wheel Analysis Time: 1423
Program/Module: 610nm 93 Other: _____
Concentration: 0.00 mg/L Filtered: ☐
Notes:

Hydrogen Sulfide (H_2S):

Equipment: (HS-C) Other: _____ Analysis Time: 14:12
Concentration: 0.0 mg/L Exceeded 5.0 mg/L range on color chart: ☐
Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☐
Correct measurement units are cited in the SAMPLING DATA block: ☐
Multiplication is correct for each *Multiplier* table: ☐
Final calculated concentration is within the appropriate *Range Used* block: ☐
QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐
Title block is initialized by person who performed the QA/QC Checklist: ☐

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: B.312 SITE 58
Project No.: N 0039 CTO 0078

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

Sample ID No.: CEF-312LS-GW-01S2-03
Sample Location: CEF-312LS-01S2, Bldg 312
Sampled By: TD
C.O.C. No.: 10/02/01-002
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 10/02/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Salinity %	Other
Time: 1300								
Method: Low Flow Peristaltic	Clear	6.29	0.220	27.3	0.00	4.63	0.0	38

PURGE DATA

Date: 10/02/01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0.7								
Well Casing Diameter: 2"								
Well Casing Material: PVC								
Total Well Depth (TD): 15.87								
Static Water Level (WL): 6.15								
One Casing Volume (gal/L): 1.58								
Start Purge (hrs): 1216								
End Purge (hrs): 1300								
Total Purge Time (min): 44								
Total Vol. Purged (gal/L): 3.9								

See Page 2 Low Flow Purge Data Sheet

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOCs (8260B)	HCl	3-40ml glass VOA	No
PAHs (8310)	None	2-1 liter glass ambers	No
TRPH (FL PRO)	H_2SO_4	2-1 liter glass ambers	No
~~Lead~~ (6010B) *Dissolved IRON (Filter)	HNO_3	(1) 500 ml ~~1-1 liter plastic~~ TD	Yes TD
Alkalinity (310.1) Anions (300.0)	None	(1) 1-Liter 1-250 ml plastic	Yes TD
Sulfide (376.1) * Dissolved (Filter)	NaOH	(1) 500 ml ~~1-1 liter plastic~~ TD	Yes TD
TOC (415.1)	HCl	1-125 ml glass amber	No
Methane-Ethane-Ethene (RSKSOP 147/175)	HCl	3-40ml glass VOA	Yes TD

OBSERVATIONS / NOTES

Total Depth 15.87
Static Water Level 6.15
Standing Water 9.72

One Casing Volume
$2^2 \times 0.0408 \times 9.72 = 1.58$ gallons
$1.58 \times 2 = 3.17$ gallons
(minimum Purge Volume)

Laboratory
Contact: L. Williams
4405 Vileland Road #C15
Orlando, FL 32811
Phone: (407) 425-6700

1/0 Bolts on Cover. Pump Intake @ 10-11'

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Thomas M. Quebion

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 312 Site 58
PROJECT NUMBER: N0039 CTO 0078

WELL ID.: CEF-312LS-01S2
DATE: 10/02/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)		DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments		
1216	6.15	350								Clear, No odor		
1220	6.28	350	6.29	0.216	1.0	0.00	6.24	27.3	74		Volume	
1225	6.31	350	6.32	0.218	2.6	0.00	5.34	29.4	66			
1230	6.31	330	6.31	0.217	1.6	0.00	5.09	27.4	61		1.29	
1240	6.31	330	6.30	0.219	1.3	0.00	4.80	27.3	48			
1250	6.31	330	6.30	0.220	1.6	0.00	4.66	27.3	36		1.74	3.03
1255	6.30	330	6.29	0.220	1.1	0.00	4.63	27.3	38		~~0.87~~	
1300	Sample										0.87	3.90 gallons

SIGNATURE(S): Thomas M. Jackson

PAGE 2 OF 2

Instruments Used:
Photovac 2020 PID (EDJH338)
Horiba U-22 Water Quality Monitor (9292030)

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: BLD 312
Project No.: ~~N3996~~ N00390500SH105

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

Sample ID No.: CEF-312-GW-BS-3Q
Sample Location: CEF-312-BS
Sampled By: M.O.
C.O.C. No.: 312-121219
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 12-12-01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	~~Salinity~~ ORP ~~%~~	Other
Time: 1650								
Method: Low Flow Peristaltic	CL	6.85	0.251	23.97	0.9	0.0	-141	

PURGE DATA

Date: 12-12-01	Time	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	ORP
Method: Low Flow Peristaltic								
Monitor Reading (ppm): 0.4								
Well Casing Diameter:								
Well Casing Material: 2								
Total Well Depth (TD): 14.03								
Static Water Level (WL): 7.61								
One Casing Volume(gal/L): 1.05/4.0								
Start Purge (hrs): 1607								
End Purge (hrs): 1649								
Total Purge Time (min): 42								
Total Vol. Purged (gal/L): 13.03 L								

See Low Flow Purge Data Sheet

31
14.03
-7.61
6.42

3=12
5=20

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
8260 D	HCL	3 40 ml	M.O

OBSERVATIONS / NOTES

3.250 / 10 = 325

16 / 25 = 32 × 5.5

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: B. 312
PROJECT NUMBER: ~~N3996360650145~~ N0039D50054105

WELL ID.: CEF-312-85-3a
DATE: 12/12/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments volume
1607	7.61	325	1609	7.66					clear
1612	7.61	325	6.88	0.248	64.7	0.20	24.04	-126	1.63
1617	7.61	325	6.88	0.242	26.5	0.81	24.07	-131	3.26
1622	7.63	325	6.87	0.242	12.6	0.03	24.10	-138	4.89
1632	7.64	325	6.86	0.247	4.8	0.14	24.01	-141	8.14
1637	7.64	325	6.86	0.248	4.2	0.0	24.00	-141	9.77
1642	7.65	325	6.85	0.251	2.1	0.06	23.98	-140	11.40
1647	7.65	325	6.85	0.251	0.9	0.00	23.97	-141	13.03
1649	end purge								
1650	sample								

SIGNATURE(S):

A.2 Site 57 Surface Water Sample Log Sheet

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: RI @ OU9, Site 57 (824A)
Project No.: N0039.DS005H105

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: OUTFALL #4
[] QA Sample Type:

Sample ID No.: CEF-824A-SW01
Sample Location: PSC 39 Outfall No. 4
Sampled By: M.O Neill/L.Middleton
C.O.C. No.: 824A-121701-A

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

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	~~Salinity~~	Other
	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	ORP	NA
Date: 12/17/01								
Time: 1600								
Depth: ~~0~~ Top 0.8	SHEEN	5.57	0.103	23.6	0.1	7.08	87	—
Method: SOLINST	BROWN							

SAMPLE COLLECTION INFORMATION:

Analysis		Preservative	Container Requirements	Collected
TCL VOCs	SW846 8260B	HCL	3-40 ml vials	X
Selected PAHs	SW846 8310	None	2-1liter glass amber	X
TRPH	FL-PRO	H2SO4	2-1liter glass amber	X

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

~~Duplicate ID No.:~~

Signature(s):

A.3 Site 58 Sediment Sample Log Sheets

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NAS CECIL, SITE 58, BLD 312
Project No.: 0039

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

Sample ID No.: CEF B312-SD-001
Sample Location: BLD 312
Sampled By: D. S
C.O.C. No.: 09/19/01-001

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 9-19-01 Time: 0900 Method: SPATULA (S.S.) Monitor Reading (ppm): 0.0	0-3 inches	TAN & BROWN	SAND, FINE TO MEDIUM MOIST

COMPOSITE SAMPLE DATA:

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

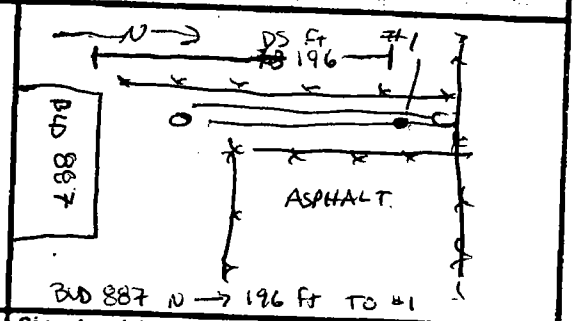
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOLATILES	3 ENCORE	3	
PAH	1 4 oz	1	
FL PRO - TRPH	1 4 oz	1	
	1 4 oz	1	Extra Volume

OBSERVATIONS / NOTES:

1 EXTRA SAMPLE OF SOIL, 4 oz JAR WAS COLLECTED

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:
	CEF B312 SD-DUP-1

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NAS CECIL, SITE 58, BLD 312
Project No.: 00039

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

Sample ID No.: CEF B312-SD-002
Sample Location: BLD 312
Sampled By: D.S.
C.O.C. No.: 09/19/01-001

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 9/19/01 Time: 0945 Method: S.S. Spatula Monitor Reading (ppm): 0.0	0-3 in.	TAN & BROWN	SAND FINE TO MEDIUM MOIST

COMPOSITE SAMPLE DATA:

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

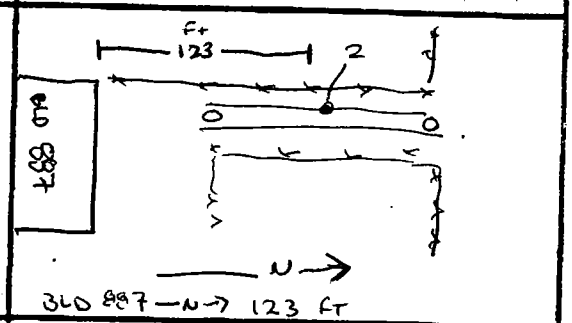
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOLATILES	3 ENCORE	3	
PAH	1 4 oz	1	
FL PRO - TRPH	1 4 oz	1	
	1 4 oz	1	Extra Volume

OBSERVATIONS / NOTES:

1 EXTRA SAMPLE OF SOIL, 4 oz JAR WAS COLLECTED

MAP:



Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NAS CECIL, SITE 58, BLD 312
Project No.: 0039

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

Sample ID No.: CEF B312-SD-003
Sample Location: BLD 312
Sampled By: D.S
C.O.C. No.: 09/19/01-001

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 9/19/01	~~Reddish Brown~~ 0-3 in	Reddish Brown	SAND FINE TO MEDIUM w/ SOME CLAY MOIST
Time: 1020			
Method: S.S. Spoonula			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

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

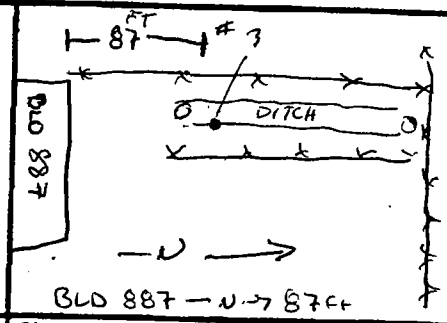
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOLATILES	(3) ENCORE	3	
PAH	(1) 4oz	1	
FL-PRO - TRPH	(1) 4 oz	1	
	(1) 4oz	1	Extra Volume

OBSERVATIONS / NOTES:

1 EXTRA SOIL JAR WAS COLLECTED

MAP:



Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

A.4 Chain of Custody Records

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 09/25/01-005 ~~CF-57~~ TD | PAGE ___ OF ___

PROJECT NO: N0039	SITE NAME: Site 57 B.824A	PROJECT MANAGER AND PHONE NUMBER: Belinda Miller 412-921-7090	LABORATORY NAME AND CONTACT: Accutest L. Williams
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER AND PHONE NUMBER: Tom Dickson 412-921-8457	ADDRESS: 4405 Vineland Rd #C-15
		CARRIER/WAYBILL NUMBER	CITY, STATE: Orlando FL 32811

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

DATE YEAR 2001	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	VOCs (8260B)	PAHs (8310)	TKPH (FL PRO) (6010B) * Dissolved Iron	Alkalinity (310.1) Anions (300.0) * Dissolved sulfide (376.1)	TOC (415.1) Methane/Ethane/Ethene (RSKSOP 147/175)	COMMENTS
		CONTAINER TYPE PLASTIC (P) or GLASS (G)				G	G	G	P	P	G
		PRESERVATIVE USED				HCl	/	H_2SO_4	HNO_3 /	NaOH	HCl / HCl
09/25	1450	CEF-824A-GW-13D-01	Aqueous	G	7	3	2	2			Cool to 4°C
	1515	CEF-824A-GW-12I-02			7	3	2	2			
	1515	CEF-824A-GW-05S-03			7	3	2	2			Work Release
	1700	CEF-824A-GW-06I-02			7	3	2	2			# CF-27
	1705	CEF-824A-GW-01Sa-05			7	3	2	2			
											Anions: NO_3, NO_2, SO_4, PO_4, Cl^-
											* Dissolved = Field Filtered

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Thomas M. Dickson	09/25/01	1900	1. RECEIVED BY FEDEX		
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS N0039 D5005H105

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

FORM NO. TtNUS-001 3/99

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER CF57-092701 | PAGE 1 OF 1

PROJECT NO: N0039	SITE NAME: Site 57 B.824A	PROJECT MANAGER AND PHONE NUMBER: Rolinda Miller 412-921-7090	LABORATORY NAME AND CONTACT: Accutest - L. Williams
SAMPLERS (SIGNATURE): [signature]		FIELD OPERATIONS LEADER AND PHONE NUMBER: Tom Dickson 412-921-8457	ADDRESS: 4405 Vineland Rd #C-15
		CARRIER/WAYBILL NUMBER: Accutest Pick up	CITY, STATE: Orlando, FL 32811

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

DATE YEAR 2001	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	VOCs (8260B)	PAHs (8310)	TRP H (FLPRO)	* Dissolved Iron (6010B)	Alkalinity (310.1)	Ammonia (350.2)	* Dissolved Sulfide (376.1)	TOC (415.1) Methane, Ethane, Ethene (RSK-SOP 147/175)	COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)						G	G	G	P	P	P	G	G	
PRESERVATIVE USED						HCl	/	H_2SO_4	HNO_3	/	NaOH	HCl	HCl	
9/27	0905	CEF-293-GW-11-A3	GW	G	14	3	2	2	1	1	1	1	3	Cool to 4°C
9/27	0915	CEF-293-GW-22-A3	GW	G	14	3	2	2	1	1	1	1	3	
9/27	1105	CEF-824A-GW-09$-02	GW	G	14	3	2	2	1	1	1	1	3	Work Release
9/27	1155	CEF-293-GW-19-A3	GW	G	14	3	2	2	1	1	1	1	3	#CF-27
														Anions: NO_3, NO_2, SO_4, PO_4, Cl^-
														* Dissolved = Field Filtered

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY [signature]	9/27/01	1440	1. RECEIVED BY - Rachel Hil	092701	1435
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS N0039 US005H105

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

3/99
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER CF 57-092801 PAGE 1 OF 1

PROJECT NO:	SITE NAME:	PROJECT MANAGER AND PHONE NUMBER	LABORATORY NAME AND CONTACT:
N00039	SITE 57 - B.824A	Rolinda Miller 412-921-7090	Accutest L. Williams
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER AND PHONE NUMBER	ADDRESS
		Tom Dickson 412-921-8457	4405 Vineland Rd #C-15
		CARRIER/WAYBILL NUMBER 828074027562, 573, 584 & 595	CITY, STATE
			Orlando, FL 32811

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

DATE YEAR 2001	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	VOCs (8260B)	PAHs (8310)	TRPH (FL PRO)	* Dissolved Iron (6010B)	Alkalinity (310.1)	Anions (300.0)	* Dissolved Sulfide (376.1)	TOC (415.1)	Methanol, Ethanol, Hexane & Hexane (5030/1613)	COMMENTS
					CONTAINER TYPE PLASTIC (P) or GLASS (G)	G	G	G	P	P	P	G	G		
					PRESERVATIVE USED	HCl	—	H_2SO_4	HNO_3	—	NaOH	HCl	HCl		
9/27	1425	CEF-824A-GW-10$-02	GW	G	7	3	2	2	—	—	—	—	—		Cool to 4°C
9/27	1440	CEF-824A-GW-11$-02	GW	G	7	3	2	2	—	—	—	—	—		
9/28	0905	CEF-824A-GW-02$-03	GW	G	7	3	2	2	—	—	—	—	—		Work Release
9/28	0910	CEF-293-GW-21-A3	GW	G	7	3	2	2	—	—	—	—	—		#CF-27
9/28	0910	CEF-824A-GW-03$-03	GW	G	7	3	2	2	—	—	—	—	—		
9/28	1055	CEF-16-GW-38$-A1	GW	G	7	3	2	2	—	—	—	—	—		Anions: NO_3,
9/28	1055	CEF-16-GW-40D-A1	GW	G	7	3	2	2	—	—	—	—	—		NO_2, SO_4, PO_4,
9/28	1210	CEF-16-GW-39I-A1	GW	G	7	3	2	2	—	—	—	—	—		Cl^-
9/28	1210	CEF-825LS-01$-04	GW	G	7	3	2	2	—	—	—	—	—		
9/28	1305	CEF-293-GW-10-A3	GW	G	7	3	2	2	—	—	—	—	—		* Dissolved =
9/28	0000	CEF-824A-DUP1	GW	G	7	3	2	2	—	—	—	—	—		field filtered
9/28	0000	CEF-824A-DUP2	GW	G	7	3	2	2	—	—	—	—	—		

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	9/28/01	1445	1. RECEIVED BY FEDERAL EXPRESS	9/28/01	1445
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS N00039 DS005 H105

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

3/99
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 10/01/01-002 | PAGE ____ OF ____

PROJECT NO:	SITE NAME:	PROJECT MANAGER AND PHONE NUMBER	LABORATORY NAME AND CONTACT:
N0039	Site 57 B.824A	Rahinda M. Miller 410.921-7090	Accutest L. Williams
SAMPLERS (SIGNATURE) Thomas M. Hudson		FIELD OPERATIONS LEADER AND PHONE NUMBER: Tom Dickson 412-621-8457	ADDRESS: 4405 Vineland RD #C-15
		CARRIER/WAYBILL NUMBER	CITY, STATE: Orlando FL 32811

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

DATE YEAR 2001	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	VOC (40mL Vials)	RFHs (1-Liter Ambers)	TRPH (1-Liter Ambers)	* Dissolved Iron	Alkalinity	* Dissolved Sulfide	TOC	Methanol, Ethanol, Ethane (RSK SOP 147/175)	COMMENTS
		CONTAINER TYPE PLASTIC (P) or GLASS (G)				G	G	G	P	P	P	G	G	
		PRESERVATIVE USED				HCl	/	H_2SO_4	HNO_3	/	NaOH	HCl	HCl	
		TYPE OF ANALYSIS				(8260B)	(8310)	(418.1)	(310.1)	(9060)	(376.1)	(415.1)		
09/30	0955	CEF-824A-GW-08S-02	Aquous	G	7	3	2	2						Cool to 4°C
	1000	CEF-824A-GW-18S-01			7	3	2	2						
	1000	CEF-824A-MSD1			14	6	4	4						Work Release
	1425	CEF-824A-GW-01S-02			7	3	2	2						#CF-27
	1445	CEF-~~824~~ 293-GW-1-01			7	3	2	2						
	1835	CEF-293-GW-8-01			7	3	2	2						Anions: NO_3,
	1845	CEF-293-GW-15D-01			7	3	2	2						NO_2, SO_4, PO_4,
														Cl^-
														*Dissolved =
														Field Filtered

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Thomas M. Hudson	10/01/01	1600	1. RECEIVED BY	10/1/01	1620
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS N0039 D5005 H105

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

FORM NO. TtNUS-001 3/99

TETRA TECH NUS, INC.

CHAIN OF CUSTODY | NUMBER 10/01/01-001 ~~CF 57~~ | PAGE ___ OF ___

PROJECT NO:	SITE NAME:	PROJECT MANAGER AND PHONE NUMBER	LABORATORY NAME AND CONTACT:
N0039	Site 57 B.824A	Rolinda M. Miller 412-921-7090	Accutest L. Williams
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER AND PHONE NUMBER	ADDRESS
Thomas M. Dickson Also for Dave Siefken, Louis Knight		Tom Dickson 412-921-8457	4405 Vineland Rd # C-15
		CARRIER/WAYBILL NUMBER	CITY, STATE
			Orlando FL 32811

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

DATE YEAR 2001	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	VOCs (40mL Vials) (8260B)	RAHs (1 liter Amber) (8310)	TRPH (1-1 liter Amber) (FL PRO)	* Dissolved Iron (6010B) (500mL Plastic)	Alkalinity (310.1)	Anions: 300.0 (1-liter Plastic)	* Dissolved Silica (370.1) (500mL Plastic)	TOC (415.1)	Methane, Ethane, Ethene (RSK-SOP 147/175) (40mL Vials)	COMMENTS
					CONTAINER TYPE PLASTIC (P) or GLASS (G)	G	G	G	P	P	P		G	G	
					PRESERVATIVE USED	HCl	1	H_2SO_4	HNO_3				H_2SO_4	HCl	HCl
10/01	0915	CEF-824A-GW-07S-02	Aqueous	G	13	3	2	2	1	1	1		3		Cool to 4°C
	0915	CEF-824A-MSD2			26	6	4	4	~~1~~ 2	~~2~~ 2	~~1~~ 2		6		
	0916	CEF-824A-GW-04S-03			13	3	2	2	1	1	1		3		Work Release
	1045	CEF-~~824A-GW~~ 293-GW-20-A3			13	3	2	2	1	1	1		3		#CF-27
															Anions: NO_3, NO_2, SO_4, PO_4, Cl^-
															*Dissolved = Field Filtered
10/01	0000	CEF-824A-DUP3	Aqueous	G	13	3	2	2	1	1	1		3		

1. RELINQUISHED BY	DATE	TIME	1. RECEIVED BY	DATE	TIME
Thomas M. Dickson	10/01/01	1600	Janet [illegible]	10/1/01	1620
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS N0039 DS005 H105

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

3/99
FORM NO. TtNUS-001

TERRA TECH NUS, INC. CHAIN OF CUSTODY NUMBER CF 57-10/02/01-001 PAGE 1 OF 1

PROJECT NO:	SITE NAME:	PROJECT MANAGER AND PHONE NUMBER	LABORATORY NAME AND CONTACT:
N0039	SITE 57 B.824 A	Rolinda Miller 412-921-7090	Accutest L. Williams
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER AND PHONE NUMBER	ADDRESS
Thomas M. Dickson for Louis Knight Terry Royston Dave Siefken		Tom Dickson 412-921-8457	4405 Vineland Rd #C-15
		CARRIER/WAYBILL NUMBER Accutest Courier	CITY, STATE Orlando, FL 32811

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

DATE YEAR 2001	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	VOCs (40mL Vials)	MGHs (1-Liter Amber)	TRPH (1-Liter Amber)	* Dissolved Iron (600mL)	Alkalinity (500mL)	* Dissolved Solids (500mL)	TOC (125mL)	Methane, Ethane, Ethene (125mL)	COMMENTS
					CONTAINER TYPE PLASTIC (P) or GLASS (G)	G	G	G	P	P	P	G	G	
					PRESERVATIVE USED	HCl	/	H_2SO_4	HNO_3	/	NaOH	HCl	HCl	
10/01	1320	CEF-824A-GW-17I-01	Aqueous	G	7	3	2	2						Cool to 4°C
	1325	CEF-824A-GW-15I-01			7	3	2	2						
	1455	CEF-824A-GW-16D-01			7	3	2	2						Work Release
	1555	CEF-824A-GW-14S-01			7	3	2	2						#CF-27
	1625	CEF-824A-GW-19S-01			7	3	2	2	+ID					
10/02	0915	CEF-293-GW-13-A3			13	3	2	2	1	1	1		3	Anions: NO_3,
	0925	CEF-293-GW-4-A3			~~14~~ 16 ID	3	2	2	1	1	1	~~1~~ 3 ID	3	NO_2, SO_4, PO_4,
	1330	CEF-293-GW-14-A3			7	3	2	2						Cl^-
														*Dissolved =
10/02	0000	CEF-824A-DUP4	Aqueous	G	7	3	2	2						Field Filtered
10/02	0000	CEF-824A-DUP5			1							1		
10/02	1405	CEF-57/58-IDW-GW-002			7	3	2	2						~~7-Day TAT~~

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Thomas M. Dickson	10/02/01	1600	1. RECEIVED BY	10/2/01	1500
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS N0039 D5005H105

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

3/99
FORM NO. TtNUS-001

TETRA TECH NUS, INC.

CHAIN OF CUSTODY

NUMBER CF57-10/03/01-001

PAGE ___ OF ___

PROJECT NO: N0039	SITE NAME: Site 57 & 824A
PROJECT MANAGER AND PHONE NUMBER	Melinda Miller 412-921-7090
LABORATORY NAME AND CONTACT:	Accutest L. Williams
SAMPLERS (SIGNATURE)	Thomas M. Dickson
FIELD OPERATIONS LEADER AND PHONE NUMBER	TOM Dickson 412-921-8457
ADDRESS	4405 Vineland RD #C-15
CARRIER/WAYBILL NUMBER	
CITY, STATE	Orlando FL 32811

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

DATE YEAR 2001	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	VOCs (8260B)	PAHs (8310)	TRPH (EL PRO) * Dissolved Fe (6010B)	Alkalinity (310.1)	Anions (300.0) * Dissolved Sulfide (376.1)	TOC (415.1)	Methane/Ethane/Ethene (RSKSOP 147/175)	COMMENTS
		CONTAINER TYPE PLASTIC (P) or GLASS (G)				G	G	G	P	P	P	G	G
		PRESERVATIVE USED				HCl	/	H_2SO_4	HNO_3	/	NaOH	HCl	HCl
10/02	1530	CEF-293-GW-3-01	Aqueous	G	7	3	2	2					Cool to 4°C
↓	1620	CEF-293-GW-5-01			7	3	2	2					
↓	1725	CEF-824A-GW-208-01			7	3	2	2					Work Release
													#CF-27
** 10/03	1530	CEF-824-IDW-TW-003	Aqueous	G	7	3	2	2	← 7 day TAT				** Potential High Concentration
													Anions: NO_3,
** 10/03	1530	CEF 824-IDW-SBTW01	Soil	G	5	3 Encores	1 (8oz)	1 (8oz)	← 7 day TAT				NO_2, SO_4, PO_4,
													Cl^-
													* Dissolved =
													Field Filtered

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Thomas M. Dickson	10/03/01	1800	1. RECEIVED BY		
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS N0039 DS005 H105

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

FORM NO. TtNUS-001 3/99

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 824A 121701-A | PAGE 1 OF 1

PROJECT NO:	SITE NAME:	PROJECT MANAGER AND PHONE NUMBER	LABORATORY NAME AND CONTACT:
N0039 1F00F4105	B824A / SITE 37	Mark Ferranuza 412-921-8916	Accutest L. W. Williams
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER AND PHONE NUMBER	ADDRESS
		Merv Dale 904-281-0100	9405 Vineland Rd Suite 5
		CARRIER/WAYBILL NUMBER	CITY, STATE
		FEDEX 8311 6672 8012	ORLANDO, FL 32811

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

DATE YEAR 2001	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: TCL VOC	TAL MET 6020	TRPH 8310	FL PRO					COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)						G	G	G						
PRESERVATIVE USED						HCL	NONE	H_2SO_4						
12/7	1504	CEF-824A-GW-21I-01	GW	G	7	3	2	2						Cool to 4°C
12/7	1600	CEF-824A-SW01	SW	G	7	3	2	2						
12/7	1504	CEF-824A-MD01-GW-01	GW	G	7	3	2	2						Work Release
														CE-38

1. RELINQUISHED BY	DATE	TIME	1. RECEIVED BY	DATE	TIME
	12/7/01	1700			
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

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

3/99
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 824A-121401B | PAGE 1 OF 1

PROJECT NO:	SITE NAME:	PROJECT MANAGER AND PHONE NUMBER	LABORATORY NAME AND CONTACT:
N003 9D5005H105	B-824A/SITE 57	MARK SPERANZA 412 921-8916	ACCUTEST L. WILLIAMS
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER AND PHONE NUMBER	ADDRESS
		MERV DALE 904 281 0400	4405 VINELAND RD C-15
		CARRIER/WAYBILL NUMBER	CITY, STATE
		FEDEX 8311 6072 8067	ORLANDO, FL

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

CONTAINER TYPE PLASTIC (P) or GLASS (G): G G G

PRESERVATIVE USED: HCl, None, H_2SO_4

DATE YEAR 2001	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	TCL VOC	SW846 8260B	SW846 8310 PAH	TPH FL-PRO					COMMENTS
12/14	1310	CEF-824A-GW-225-01	GW	G	7	3	2	2						COOL TO 4°C
12/14	0000	CEF-824A-DU01-GW-01	GW	G	7	3	2	2						
														WORK RELEASE
														CF-28

1. RELINQUISHED BY	DATE	TIME	1. RECEIVED BY	DATE	TIME
	12/14/01	1700			
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

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

3/99
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 824A - 121401A | PAGE 1 OF 1

PROJECT NO:	SITE NAME:	PROJECT MANAGER AND PHONE NUMBER	LABORATORY NAME AND CONTACT:
N0039 D5005 4105	824A/SITE 57	MARK SPERANZA 412 921-8916	ACCUTEST L. WILLIAMS
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER AND PHONE NUMBER	ADDRESS
		METZ DALE 904 281-0400	4405 VINELAND RD C-15
		CARRIER/WAYBILL NUMBER	CITY, STATE
		FEDEX 8311 6072 8056	ORLANDO FL

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

DATE YEAR 2001	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: TCL VOC	SW 8146 8260B PAH	SW 8146 8310 TRPH	FL PRO					COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)						G	G	G						
PRESERVATIVE USED						HCl	NONE	HCl						
12/14	1330	CEF-824A-GW-01SA-06	GW	G	7	3	2	2						Cool to 4°C
12/14	1309	CEF-824A-GW-175-03	GW	G	7	3	2	2						
														Work Release CF-28

1. RELINQUISHED BY	DATE	TIME	1. RECEIVED BY	DATE	TIME
	12/14/01	1700			
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

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

3/99
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 824 A - 121401 | PAGE 1 OF 1

PROJECT NO: N0039[redacted]005H105	SITE NAME: 0406 824A / Site 57	PROJECT MANAGER AND PHONE NUMBER: MARK SPERANZA - 412/921-8916	LABORATORY NAME AND CONTACT: ACCUTEST - L. Williams
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER AND PHONE NUMBER: MERVIN DALE - 904/281-0400	ADDRESS: 4405 Vineland Rd - C-15
		CARRIER/WAYBILL NUMBER: Fed Ex 831160728089	CITY, STATE: Orlando, FL 32811

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

CONTAINER TYPE PLASTIC (P) or GLASS (G): 6 6 6
PRESERVATIVE USED: HCL — H_2SO_4

DATE YEAR 2001	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	TCL VOC SW 8260 B	PAH SW846 8310	TRPH - FL PRO						COMMENTS
12/14	1455	CEF-824A-GW-115-03	GW	G	7	3	2	2						Cool to 4°C
12/14	1545	CEF-[redacted]93-GW-11-A4	GW	G	7	3	2	2						
														Work Release #
														CF-28

1. RELINQUISHED BY	DATE 12/14/01	TIME 1700	1. RECEIVED BY	DATE	TIME
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

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

3/99
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 09/19/01-001 | PAGE 1 of 1

PROJECT NO: CTO 0078 / N0039
SITE NAME: NAS Cecil Field
PROJECT MANAGER AND PHONE NUMBER: Mr. Mark Speranza (412) 921-8916
LABORATORY NAME AND CONTACT: Accutest: Ms. Linda Williams
SAMPLERS (SIGNATURE): Thomas M. Dickson
FIELD OPERATIONS LEADER AND PHONE NUMBER: Tom Dickson (412) 716-9609 (Cell Phone)
ADDRESS: 4405 Vineland Road, Suite C-15
CARRIER/WAYBILL NUMBER: Courier Service 8219 5407 2026
CITY, STATE: Orlando, Florida 32811

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

DATE YEAR 2001	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	TCL Volatiles (40ml Vials)	PAHs (1-Liter Amber)	TRPH (FL-PRO) (1 Liter Amber)	TCL Volatiles 4oz Glass Jar	TCL Volatiles (Encore Samplers)	PAH (4oz Glass Jar)	TRPH (FL-PRO) (4oz Glass Jar)	Extra Soil (4oz Glass Jar)	COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)						G	G	G	G	P	G	G	G	
PRESERVATIVE USED						4°C/HCL	4°C	4°C/H2SO4	4°C	4°C	4°C	4°C	4°C	
09/18	1445	CEF-B312-GW-01S-03	GW	G	7	3	2	2						
09/18	1450	CEF-B312-GW-06S-02	↓	↓	7	3	2	2						
09/19	1050	CEF-312-GW-01-02	↓	↓	7	3	2	2						
09/19	1300	CEF-B312-GW-01I-02	↓	↓	7	3	2	2						
09/19	0900	CEF-B312-SD-001	Sediments	G	6					3	1	1	1	Extra Soil. Encore Samplers may have been lab out, if so Run these for TCL Volatiles
↓	0945	CEF-B312-SD-002*	↓	↓	12					6	2	2	2	
↓	1020	CEF-B312-SD-003	↓	↓	6					3	1	1	1	
↓	0000	CEF-B312-SD-DUP-1	↓	↓	6					3	1	1	1	
09/19	1100	CEF-57/58-IDW-SB-001	Soil	G	4				1		1	1	1	7 day Turn Aro

* MS/MSD - double Volume

1. RELINQUISHED BY: Thomas M. Dickson	DATE 09/19/01	TIME 1600	1. RECEIVED BY	DATE	TIME
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

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

3/99
FORM NO. TtNUS-001

TETRA TECH NUS, INC.

CHAIN OF CUSTODY

NUMBER ~~CF58~~ 09/25/01-004

PAGE ____ OF ____

PROJECT NO:	SITE NAME:	PROJECT MANAGER AND PHONE NUMBER	LABORATORY NAME AND CONTACT:
N0039	Site 58 B312	Rolinda Miller 412-921-7090	Accutest L. Williams
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER AND PHONE NUMBER	ADDRESS
Thomas M. Dickson		Tom Dickson 412-921-8457	7405 Vineland Rd #C15
		CARRIER/WAYBILL NUMBER	CITY, STATE
			Orlando, FL 32811

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

DATE YEAR 2001	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	VOCs (8260B)	SVOCs (8270B)	TRPH (CFL PRO) * Dissolved Iron	TOC (9060) Alkalinity (310.1) Anions	* Dissolved Sulfide (376.1)	TOC (415.1) Methanol, Ethanol, Ethanol	(RSK SOP 147/175)	COMMENTS
		CONTAINER TYPE PLASTIC (P) or GLASS (G)				G	G	G	P	P	P	G	G
		PRESERVATIVE USED				HCl	/	NO H_2SO_4	HNO_3	/	NaOH	HCl	HCl
09/25	0910	CEF-B312-GW-11S-01	Aqueous	G	7	3	2	2					cool to 4°C
	0920	CEF-B312-GW-13S-01			7	3	2	2					
	0925	CEF-B312-GW-08S-03			7	3	2	2					Work Release
	0945	CEF-B312-GW-15I-01			7	3	2	2					#CF-27
	1100	CEF-B312-GW-10S-01			7	3	2	2					
	1100	CEF-B312-GW-14S-01			7	3	2	2					Anions: NO_3,
	1130	CEF-B312-GW-12S-01			7	3	2	2					NO_2, SO_4, Cl,
	1155	CEF-B312-GW-09S-01			7	3	2	2					PO_4
	1440	CEF-B312-GW-04S-02			7	3	2	2					
													* Field Filtered
09/25	0000	CEF-B312-DUP01	Aqueous	G	7	3	2	2					

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Thomas M. Dickson	09/25/01	1900	1. RECEIVED BY FEDEX		
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS N0039 DS 005H105

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

3/99
FORM NO. TtNUS-001

TETRA TECH NUS, INC.

CHAIN OF CUSTODY | NUMBER CF58-092601 | PAGE 1 OF 1

PROJECT NO: N0039	SITE NAME: Site 58 B.312
PROJECT MANAGER AND PHONE NUMBER	Rolinda Miller 412-921-7010
FIELD OPERATIONS LEADER AND PHONE NUMBER	Tom Dickson 412-921-8457
CARRIER/WAYBILL NUMBER	
LABORATORY NAME AND CONTACT:	Accutest L. Williams
ADDRESS	4406 Vineland Rd #C15
CITY, STATE	Orlando FL 32811
SAMPLERS (SIGNATURE)	Glenn Rodriguez

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

DATE YEAR 2001	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	VOCs (8260B)	SVOCs (8310)	TRPH (FL-PRO)	* Dissolved Iron (6010B)	Alkalinity (310.1)	* Dissolved Anions (300.0)	TOC (415.1)	Methane/Ethane/Ethene (RSKSOP 147/175)	COMMENTS
		CONTAINER TYPE PLASTIC (P) or GLASS (G)				G	G	G	P	P	P	G	G	
		PRESERVATIVE USED				HCl	/	H2SO4	HNO3	/	NaOH	HCl	HCl	
9/26	0955	CEF-B312-GW-05$-02	GW	G	12	**2	2	2	1	1	1	1	**2	cool to 4°C
9/26	1005	CEF-B312-GW-01$-03	GW	G	14	3	2	2	1	1	1	1	3	
9/26	1340	CEF-B312-LS-GW-01$a-03	GW	G	8	3	2	2	—	—	—	1	—	Work Release
9/26	1340	CEF-B312-GW-03$-02	GW	G	14	3	2	2	1	1	1	1	3	# LF-27
9/26	1340	CEF-B312-MSMSD	GW	G	28	6	4	4	2	2	2	2	6	→ SAME AS CEF-B312-GW-03S-02
9/26	0000	CEF-B312-DUP2	GW	G	12	**2	2	2	1	1	1	1	**2	Anions: NO3, NO2, SO4, Cl, PO4
														* Field Filtered
														** MIN. VOL.

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY [signature]	9/26/01	1608	1. RECEIVED BY [signature]	9/26/01	1608
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS N0039DS605H105 Accutest picked up 3 coolers @ 1608

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

FORM NO. TtNUS-001 3/99

TETRA TECH NUS, INC.

CHAIN OF CUSTODY NUMBER CF58-10/02/01-002 PAGE 1 OF 1

PROJECT NO: N0039	SITE NAME: Site 58 B,312
PROJECT MANAGER AND PHONE NUMBER	Rolinda Miller 412-921-7090
FIELD OPERATIONS LEADER AND PHONE NUMBER	TOM Dickson 412-921-8457
CARRIER/WAYBILL NUMBER	Accutest Courier
LABORATORY NAME AND CONTACT:	Accutest L. Williams
ADDRESS	4405 Vineland Rd #C15
CITY, STATE	Orlando FL 32811
SAMPLERS (SIGNATURE)	Thomas M. Dickson

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

DATE YEAR 2001	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	VOCs (40mL Vial)	PAHs (1-Liter Amber)	TRPH (1-Liter Amber)	* Dissolved Iron (600mL)	Alkalinity (600mL)	Anions (600mL)	* Dissolved Sulfide (1-liter)	TOC (40mL)	Methane, Ethane, Ethene (40mL Vial)	COMMENTS
		CONTAINER TYPE PLASTIC (P) or GLASS (G)				G	G	G	P	P	P	G	G		
		PRESERVATIVE USED				HCl	—	H_2SO_4	HNO_3	—	—	NaOH	HCl	HCl	
10/02	0850	CEF-B312-GW-028-02	Aqueous	G	13	3	2	2	1	1	1		3		cool to 4°C
↓	1300	CEF-312LS-GW-01S2-03	↓	↓	6				1	1	1		3		
															Work Release #CF-27
															Anions: NO_3, NO_2, SO_4, Cl, PO_4
															* Field Filtered

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY Thomas M. Dickson	10/02/01	1600	1. RECEIVED BY	10/2/01	1300
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS N0039DS005H105

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

3/99
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 312-1212a | PAGE 1 OF 1

PROJECT NO:	SITE NAME:	PROJECT MANAGER AND PHONE NUMBER	LABORATORY NAME AND CONTACT:
N0039205SH015	BLD 312	MARK Sperazza A 412 921 8916	ACCUTEST C. Williams
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER AND PHONE NUMBER: MERV DALE 904/251-0400	ADDRESS: 4405 Vineland Rd C-15
		CARRIER/WAYBILL NUMBER: Fed Ex 8311 6072 8159	CITY, STATE: ORLANDO, FL 32811

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

CONTAINER TYPE PLASTIC (P) or GLASS (G): G

PRESERVATIVE USED: HCL

DATE YEAR 2001	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: VOC SW846 8260B								COMMENTS
12/12	1650	CEF-312-GW-~~03~~ 03a ~~03~~ MO	GW	G	3	3								Cool to 4°C
														Work Release
														MSN MI DALE

1. RELINQUISHED BY	DATE	TIME	1. RECEIVED BY	DATE	TIME
	12-12	1700			
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

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

3/99
FORM NO. TtNUS-001

A.5 Survey Data

LOCATION	NORTHING	EASTING	GROUND SURFACE	TOP OF CASING
CEF-016-38S	2143925.40	378502.48	76.90	76.70
CEF-016-39I	2143925.57	378509.26	76.90	76.69
CEF-016-40D	2143925.33	378516.80	77.00	76.65
CEF-293-01	2143926.67	377592.05	76.30	76.29
CEF-293-02	2143942.58	377780.26	77.70	77.64
CEF-293-03	2144233.80	377802.06	77.10	76.91
CEF-293-04	2144030.03	377517.94	75.90	75.72
CEF-293-05	2144162.08	377592.31	77.10	76.82
CEF-293-06	2144283.53	377683.67	77.60	77.32
CEF-293-07	2144007.82	377603.69	79.20	78.42
CEF-293-08	2144087.65	377674.46	78.20	78.12
CEF-293-09	2144028.34	377763.63	78.20	78.00
CEF-293-10	2144164.07	377904.12	75.40	75.25
CEF-293-11	2144017.98	377952.57	75.48	75.27
CEF-293-12	2143849.49	377687.06	77.10	77.13
CEF-293-13	2143858.80	377956.95	74.61	74.48
CEF-293-14	2143859.99	377789.64	75.50	75.08
CEF-293-15D	2143974.15	377787.55	77.90	77.60
CEF-293-16	2143424.43	378819.02	73.90	73.53
CEF-293-17D	2143860.46	378060.53	76.50	75.99
CEF-293-18	2143709.89	378770.75	73.30	72.93
CEF-293-19	2143996.77	378099.94	NA	75.08
CEF-293-20	2143784.18	378240.33	NA	74.37
CEF-293-21	2143732.89	378101.50	NA	74.45
CEF-293-22	2143945.15	377983.40	NA	74.42
CEF-312-01	2142841.22	377619.99	NA	71.88
CEF-312-02	2142968.79	377507.72	76.18	76.30
CEF-312LS-01S	2142988.07	377548.84	74.70	74.32
CEF-312LS-02	2142966.67	377516.83	74.80	74.77
CEF-312LS-1I	2142974.12	377493.97	74.90	74.66
CEF-312LS-1S	2142993.01	377556.88	NA	NA
CEF-312LS-1Sa	2142974.30	377435.98	75.50	75.25
CEF-824A-01S	2143621.86	377865.80	NA	NA
CEF-824A-01Sa	2143556.49	378147.07	NA	74.88
CEF-824A-02S	2143609.40	378087.49	NA	74.36
CEF-824A-03S	2143445.37	378262.36	NA	73.75
CEF-824A-04S	2143612.13	378203.09	NA	74.60
CEF-824A-05S	2143501.60	378089.51	NA	74.15
CEF-824A-06I	2143553.12	378152.50	NA	75.00
CEF-824A-07S	2143477.85	378195.49	NA	74.48
CEF-824A-08S	2143592.21	378445.86	NA	74.39
CEF-824A-09S	2144070.96	378222.37	NA	74.93
CEF-824A-10S	2144057.95	378041.81	NA	74.12
CEF-824A-11S	2144072.95	377906.27	NA	74.95
CEF-824A-12I	2143973.31	378118.04	NA	75.11
CEF-824A-13D	2143968.29	378116.86	75.40	75.20
CEF-824A-14S	2143936.01	378164.16	75.50	75.24
CEF-824A-15I	2143932.95	378170.79	75.50	75.14
CEF-824A-16D	2143925.63	378170.31	75.50	75.28
CEF-824A-17I	2143609.26	378202.27	74.70	74.38
CEF-824A-18S	2143572.36	378664.23	72.60	72.56
CEF-824A-19S	2143416.79	378568.62	74.30	74.00

LOCATION	NORTHING	EASTING	GROUND SURFACE	TOP OF CASING
CEF-824A-20S	2143353.58	378347.72	73.30	73.00
CEF-824A-21I	2144023.00	377951.78	75.20	75.03
CEF-824A-22S	2143401.28	378193.65	NA	74.36
CEF-825LS-1S	2144150.10	378020.90	75.70	75.56
CEF-B312-01I	2142836.01	377619.99	NA	72.08
CEF-B312-01S	2142828.30	377593.58	73.40	73.22
CEF-B312-02S	2142858.46	377667.02	NA	71.79
CEF-B312-03S	2142769.78	377668.82	76.35	76.10
CEF-B312-04S	2142889.01	377614.25	NA	72.45
CEF-B312-05S	2142858.78	377719.38	NA	71.51
CEF-B312-06S	2142738.75	377700.05	NA	72.44
CEF-B312-07S	2142719.88	377658.95	NA	72.75
CEF-B312-08S	2142814.28	377545.85	77.25	76.96
CEF-B312-09S	2142807.75	377488.14	76.97	76.77
CEF-B312-10S	2142760.15	377575.36	74.15	73.93
CEF-B312-11S	2142708.86	377758.86	73.80	73.61
CEF-B312-12S	2142662.88	377802.19	73.27	72.92
CEF-B312-13S	2142820.99	377792.95	73.52	73.34
CEF-B312-14S	2142867.18	377500.67	74.80	74.64
CEF-B312-15I	2142822.35	377545.69	74.50	74.15

APPENDIX B

BORING AND WELL RECORDS

B.1 Boring Logs

- Site 57
- Site 58

B.2 Monitoring Well Construction Sheets

- Site 57
- Site 58

B.3 Well Conformance Reports

- Site 57
- Site 58

B.1 Boring Logs

BORING LOG

PROJECT NAME: SAR - B.824A
PROJECT NUMBER: N0039
DRILLING COMPANY: GPI
DRILLING RIG: Diedrich D-120
BORING NUMBER: 003
DATE: 06/29/00
GEOLOGIST: M. DAVE
DRILLER: N. SMARRITTO

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0-1						concrete						
	1-4					BRN	fine silty sand	SM	dry				
	4-6					BRN	fine silty sand	SM	dry				
	6-9					Red BRN	fine silty sand	SM	dry				
	9-17.5					brn	fine silty sand	SM	wet @ 9'				
							EOB @ 17.5'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks:

Drilling Area Background (ppm): —

Converted to Well: Yes X No

Well I.D. #: CKF-824A-9.5

BORING LOG

PROJECT NAME: SAR - B.824A
PROJECT NUMBER: N0039
DRILLING COMPANY: GPI
DRILLING RIG: Diedrich D-120

BORING NUMBER: 004
DATE: 06/29/00
GEOLOGIST: M. Dark
DRILLER: N. Smalritto

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0-1						concrete						
	1-2					BRN	fine silty sand	SM	w/pebbles, dry				
	2-2.5					GRAY	fine silty sand	SM	w/pebbles, dry				
	2.5-3					GRAY	fine silty sand	SM	~~w/ tree roots~~ MD, dry				
	3-4					BRN	fine silty sand	SM	w/ tree roots, dry				
	4-9					BRN	fine silty sand	SM	wet at 8 to 9'				
	9-17.5					BRN	fine silty sand	SM	wet				
							EOB @ 17.5'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm): —

Remarks:

Converted to Well: Yes X No ____ Well I.D. #: CEF-824A-3S

BORING LOG

PROJECT NAME: SAR - B. 824A
PROJECT NUMBER: 0486
DRILLING COMPANY: Groundwater protection
DRILLING RIG: Diedrich D-120

BORING NUMBER: 001
DATE: 6/29/00
GEOLOGIST: A. Pale
DRILLER: Nick

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0-1						concrete						
	1-3					DK. BRN	silty sand, fine grain	SM	dry				
	3-4					LT. BRN	silty sand, fine grain	SM	dry				
	4-15					Med. BRN	silty sand, fine grain	SM	damp ▽@6-7'				
							EOB @ 15 feet.						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm): —

Remarks:

Converted to Well: Yes ✓ No ____ Well I.D. #: C.F.F. 824A-45

BORING LOG

PROJECT NAME: SAR - B. 824A
PROJECT NUMBER: 6486
DRILLING COMPANY: Groundwater Protection
DRILLING RIG: D120

BORING NUMBER: 002
DATE: 6/29/00
GEOLOGIST: M. Rule
DRILLER: Nick

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0-1						concrete						
	1-2					GRY	silty sand, fine grain	SM	dry				
	2-4					LT BRN	silty sand, fine grain	SM	dry				
	4-8					LT BRN	silty sand, fine grain	SM	damp				
	8-17.5					LT BRN	silty sand, fine grain	SM	wet @ 8'				
							EOB @ 17.5 ft.						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm): —

Remarks:

Converted to Well: Yes ✓ No ____ Well I.D. #: C.E.F. 824A-55

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NAS CECIL FIELD
PROJECT NUMBER: 0039 DS0 05PS20
DRILLING COMPANY: Partridge Drilling Company
DRILLING RIG: DRILLMASTER 400, Truck #93

BORING NUMBER: 001
DATE: 09/11/00
GEOLOGIST: Mervin Dale
DRILLER: Allan Kelly

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sample Bag	Borehole	Drill Rig
N/A		N/A	N/A										
	0-1						Concrete		12-IN hole, precored.				
	1-2					GRAY	SILTY FINE SAND	SM	DAMP	0			
	2-3					BROWN-GRAY	SILTY FINE SAND	SM	DAMP	0			
	3-4					WHIT	SL. SILTY FINE SAND	SP	DAMP-ORG. STAINS	0			
	5-9					RED BROWN	SILTY FINE SAND	SM	DAMP. ~9' ▼				
	9-12						SAME AS 5 TO 9 FT. INTERVAL						
	12-40					GRAY-BRN	SILTY FINE SAND	SM	SOUPY @ 22' BLS.				
							EOB ~ 40 FT. BLS.						
							M. Dale						
							note: overdrilled about 0.5 feet per M. Dale						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: HAND Augeh @ 1 to 4 FT BLS.
Hollow Stem Auger - read cuttings coming up flights from 4 feet to death.

65

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NAS CECIL FIELD
PROJECT NUMBER: 0039 DS0 05PS20
DRILLING COMPANY: Partridge Drilling Company
DRILLING RIG: FOREMOST MOBILE B3500

BORING NUMBER: 002
DATE: 09/12/90
GEOLOGIST: Mervin Dale
DRILLER: Mike Nicholson

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sample Dup. 002	Background	Drill Bit
	0-1						concrete	—	12 in. diam. core by Contract				
	1-1.5					GRAY	SILTY FINE SAND	SM	damp, limerock				0
	1.5-3					DARK GRAY	FINE SAND	SP	damp, tree roots				
	3-4					LT. BRN	FINE SAND	SP	damp, tree roots				0
	4-5						same						
	5-10					Red brn	fine sand	SP	damp, wet @ 8'				0
	10-15					lt. red brn	FINE SAND	SP	saturated				
							EOB @ 15'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 0

75

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: B.824A, PH IV
PROJECT NUMBER: N0039.D50.05E.145
DRILLING COMPANY: GPI
DRILLING RIG: Diedrich D-50 Turbo

BORING NUMBER: 3
DATE: 1-15-01
GEOLOGIST: M.O'Neill
DRILLER: N. Smarrido

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0-1'						concrete						
	1-2'						fill material						
	2-3'					gry	silty sand	SM					
	3-4'					red brwn	silty sand	SM					
	5'					mod brwn	silty sand	SM					
	10'					lgt brwn	silty sand	SM	8-10' Hit water			8.9	8.7
	15'					lgt brwn	silty sand	SM	≈12' sat. soil			8.4	8.5
					end of boring at 16'								

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 8.5

Remarks:

Converted to Well: Yes X No _____ Well I.D. #: CEF-824A-085

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: B.824A, PH IV
PROJECT NUMBER: N0039.D50.05E.145
DRILLING COMPANY: GPI
DRILLING RIG: Diedrich D-50 Turbo

BORING NUMBER: 2
DATE: 1-15-01
GEOLOGIST: M.O'Neill
DRILLER: N. Smarrido

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
MDP-G-	0-1'						concrete						
	1-2'					gry blk	fill material						
	2-4					dark gry	silty sand	SM				11	8.5
	4-6					dark gry	silty sand	SM					
MDP-G-	6-8					mod brun	silty sand	SM	moist				
	8-10'					Red brun	silty sand	SM	Hit water				
	10-12'					same as above		SM	Sat. soil			16.9	8.4
	12-14'					same as above		SM					
	15'					same as above		SM					
					end of boring at 16'								

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 8.4

Remarks:

Converted to Well: Yes X No _____ Well I.D. #: CEF-824A-095

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NAS Cecil Field
PROJECT NUMBER: 0039
DRILLING COMPANY: GPI
DRILLING RIG: DT6600

BORING NUMBER: 002
DATE: 1-18-01
GEOLOGIST: Michele O'Neill
DRILLER: Jeff Ziegler

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						concrete						
	1			MDS	lt brown	lt brown gry	silty sand						
	1.5					dark brn	same as above					8.2	8.3
	2					med brn	same as above					7.9	7.9
	3					red brn	same as above		roots				
	6					red brn	same as above		moist				
	7						same as above		≈hit water				
	10						same as above		completely sat. chemical smell				
	15						same as above						
							TD = 16'						
							soil drum 824A-30 (36 Gal)						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 8.3

Remarks:

Converted to Well: Yes X No ____ Well I.D. #: CEF-824-A-105

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: B.824A, PH IV
PROJECT NUMBER: N0039.D50.05E.145
DRILLING COMPANY: GPI
DRILLING RIG: Diedrich D-50 Turbo

BORING NUMBER: 3
DATE: 1-15-01
GEOLOGIST: M.O'Neill
DRILLER: N. Smarrido

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0-4"						Ashphalt						
	4-5"						limerock						
	5"-4'					dark brown	silty fine sand					84	78
	5'					dark brown gray	Silty fine sand						
	7'					red brown	Silty sand						
	8'					lgt red brown	silty sand						
	10'					lgt brown	silty sand		Hit water				
	13'						same as above		completely sat.				
	15'						same as above					8	8

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 7.8

Remarks:

Converted to Well: Yes X No _____ Well I.D. #: CEF-824A-115

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: B.824A, PH IV
PROJECT NUMBER: N0039.D50.05E.145
DRILLING COMPANY: GPI
DRILLING RIG: Diedrich D-50 Turbo

BORING NUMBER: 1
DATE: 1-15-01
GEOLOGIST: M.O'Neill
DRILLER: N. Smarrido

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft. -) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
	0-1'					~~brn~~ MDD	silty concrete		FID readings				
	1-2'					gry brn	silty sand	SM	0.00 ppm			0	0
	2-3'					dark gry	silty sand	SM					
	3-4'					light gry	silty sand	SM	115 ppm			115	0
	4-5'					gry	silty sand	SM	0.00 ppm			0	0
	10'					gry brn	silty sand	SM	hit H2O between 8-10'				
	15'					light brn	silty sand	SM	slightly sat.				
	20'					med brn	silty sand	SM	sat. strong odor				
	25'						same as above	SM					
	30'						same as above	SM					
	35'						same as above	SM				110	0
	40'						same as above	SM					
					end of boring at 41'								

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks:

Converted to Well: Yes X No

Well I.D. #: CEF-824A-12I

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Bldg 824A
PROJECT NUMBER: N0039
DRILLING COMPANY: TRANSAMERICAN
DRILLING RIG: GEOPROBE (ADVANCE GG DT)

BORING NUMBER: CEF-824A-22S
DATE: 12-7-01
GEOLOGIST: L. KNIGHT
DRILLER: D. HEARNE

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
							CONCRETE (TARMAC)						
				1.0			FILL: SAND w/						
							rock fragments & wood						
				3.0									
							SAND: f/vf;						
							yellow-brown &						
							med. brown						
				13									
							EOB = 13.5						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks:

Drilling Area Background (ppm): 4.4

Converted to Well: Yes ✓ No

Well I.D. #: CEF-824A-22S

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Site 57-Bldg 824A
BORING NUMBER: CEF. 824A-21I
PROJECT NUMBER: N0039
DATE: 12·6·01
DRILLING COMPANY: TRANSAMERICAN
GEOLOGIST: L. KNIGHT
DRILLING RIG: DIEDRICH D-120
DRILLER: D. BOHN

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
				0.1			ASPHALT						
				0.4			ROAD BASE						
							SAND; f; med. brown, lt yellow.						
							brown						
				25			SILTY SAND: f\vf; brown						
							40' = EOB						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 10.6

Remarks:

Converted to Well: Yes ✓ No _____ Well I.D. #: CEF. 824A. 21I

B.2 Monitoring Well Construction Sheets

Tetra Tech NUS, Inc.

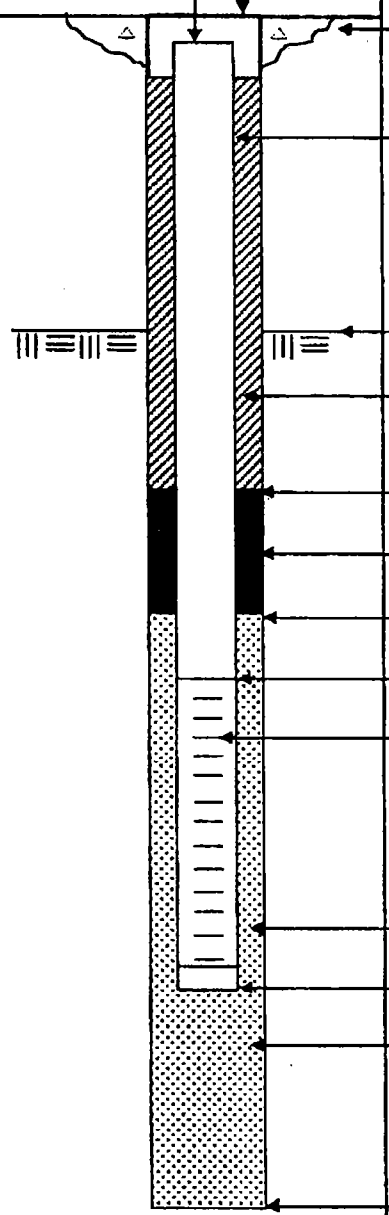
WELL No.: CEF-824A-2S

MONITORING WELL SHEET

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	GPI	BORING No.:	003
PROJECT No.:	0039	DRILLER:	Nick Smarrito	DATE COMPLETED:	6/29/00
SITE:	SAR, B.824A	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	M. Dance	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / Depth of Top of Riser:	1~2 IN.
Elevation / Height of Top of Surface Casing:	1 0 IN.
I.D. of Surface Casing:	8 IN.
Type of Surface Casing:	Steel boltdown manhole
Type of Surface Seal:	concrete
I.D. of Riser:	2 IN.
Type of Riser:	PVC, Sch. 40
Borehole Diameter:	8 IN.
Elevation / Depth Top of Rock:	N/A
Type of Backfill:	Portland Cement Type I
Elevation / Depth of Seal:	12 FT.
Type of Seal:	30/65 Sand
Elevation / Depth of Top of Filter Pack:	14 FT.
Elevation / Depth of Top of Screen:	16.8 FT.
Type of Screen:	PVC, Sch. 40
Slot Size x Length:	0.010 IN. X 10 FT.
I.D. of Screen:	2 IN.
Type of Filter Pack:	20/30 Sand
Elevation / Depth of Bottom of Screen:	MD 16.8 / ~~17.4~~ FT.
Elevation / Depth of Bottom of Filter Pack:	17.4 FT.
Type of Backfill Below Well:	MD ~~30/65 80/30~~ Sand
Elevation / Total Depth of Borehole:	17.5 FT.

Tetra Tech NUS, Inc.

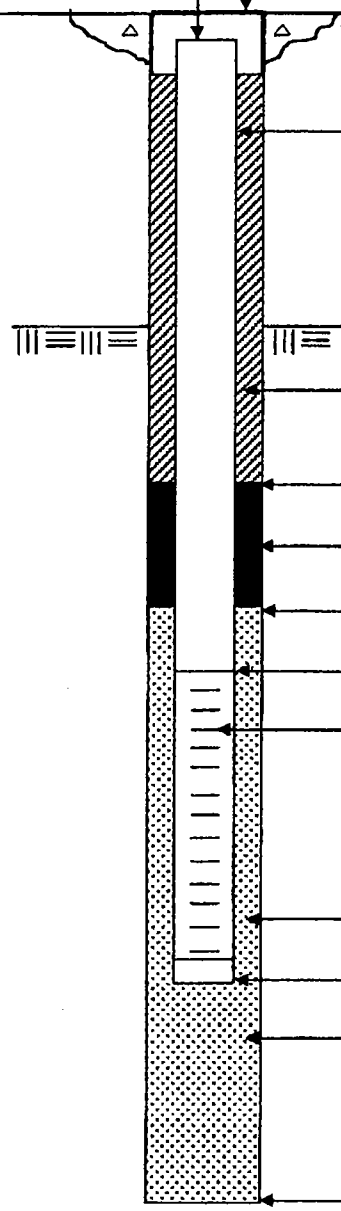
WELL No.: CEF-824A-3S

MONITORING WELL SHEET

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	GPI	BORING No.:	004
PROJECT No.:	0039	DRILLER:	N. SMARRITO	DATE COMPLETED:	06/29/00
SITE:	SAR 3.824A	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	M. DAVE	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / Depth of Top of Riser: 1 ~ 2 IN.

Elevation / Height of Top of Surface Casing: 1 0 IN.

I.D. of Surface Casing: 8 IN.

Type of Surface Casing: Steel bolted down manhole

Type of Surface Seal: concrete

I.D. of Riser: 2 IN.

Type of Riser: PVC, Sch. 40

Borehole Diameter: 8 IN.

Elevation / Depth Top of Rock: N/A

Type of Backfill: Portland Cement Type I

Elevation / Depth of Seal: 12.5 FT.

Type of Seal: 30/65 Sand

Elevation / Depth of Top of Filter Pack: 14 FT.

Elevation / Depth of Top of Screen: 16.5 FT.

Type of Screen: PVC, Sch. 40

Slot Size x Length: 0.010 IN. X 10 FT.

I.D. of Screen: 2 IN.

Type of Filter Pack: 20/30 Sand

Elevation / Depth of Bottom of Screen: 16.5 FT.

Elevation / Depth of Bottom of Filter Pack: 17.5 FT.

Type of Backfill Below Well: 20/30 Sand

Elevation / Total Depth of Borehole: 17.5 FT.

Tetra Tech NUS, Inc.

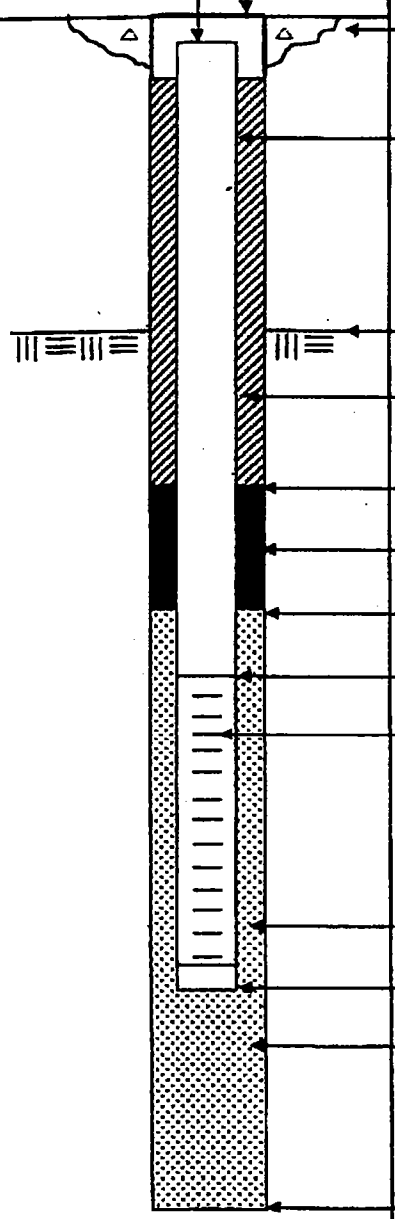
WELL No.: CEF-824A-45

MONITORING WELL SHEET

PROJECT:	NAS CECIL FIELD SAR Bl. 824A	DRILLING Co.:	Groundwater Prof.	BORING No.:	001
PROJECT No.:	~~0039~~ 0486	DRILLER:	Nick	DATE COMPLETED:	6/29/00
SITE:	Cecil Field	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	M. Dale	DEV. METHOD:		EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / Depth of Top of Riser: 1

Elevation / Height of Top of Surface Casing: 10 inches

I.D. of Surface Casing: 8 inch

Type of Surface Casing: bolt down steel manhole

Type of Surface Seal: Concrete

I.D. of Riser: 2 inch

Type of Riser: schedule 40 PVC

Borehole Diameter: 4 inch

Elevation / Depth Top of Rock: 1 NA

Type of Backfill: Portland type one cement

Elevation / Depth of Seal: 12 feet

Type of Seal: 30/65 fine sand

Elevation / Depth of Top of Filter Pack: 1 45 feet

Elevation / Depth of Top of Screen: 1 5 feet

Type of Screen: Schedule 40 PVC

Slot Size x Length: 0.010 inch x 10 feet

I.D. of Screen: 2 inch

Type of Filter Pack: 20/30 sand

Elevation / Depth of Bottom of Screen: 1 15 feet

Elevation / Depth of Bottom of Filter Pack: 1 15 feet

Type of Backfill Below Well: 20/30 Sand

Elevation / Total Depth of Borehole: 1 15 feet

Tetra Tech NUS, Inc.

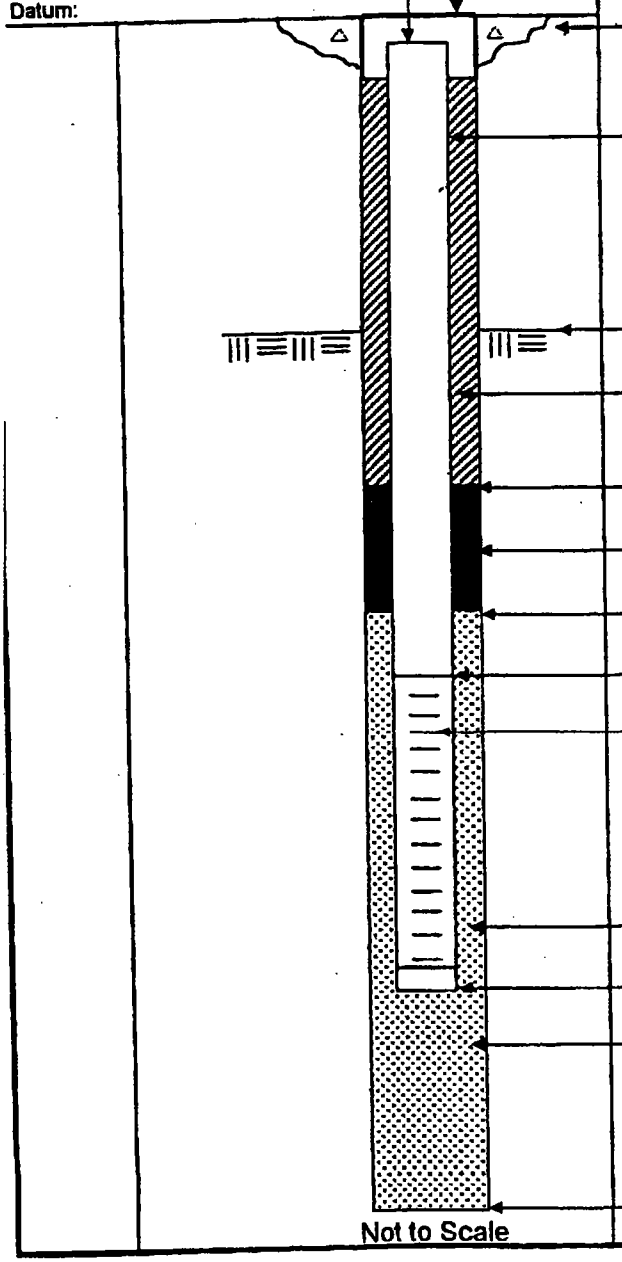
WELL No.: CEF-824A-55

MONITORING WELL SHEET

PROJECT:	NAS ~~CECIL~~ FIELD SAR-824A	DRILLING Co.:	Groundwater Tech.	BORING No.:	002
PROJECT No.:	~~0039~~ 0496	DRILLER:	Nick	DATE COMPLETED:	6/29/00
SITE:	Cecil Field	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	M. Rude	DEV. METHOD:		EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / Depth of Top of Riser: 1

Elevation / Height of Top of Surface Casing: 10 inches

I.D. of Surface Casing: 8 inch

Type of Surface Casing: bolt down steel manhole

Type of Surface Seal: Concrete

I.D. of Riser: 2 inch

Type of Riser: Schedule 40 PVC

Borehole Diameter: 8 inch

Elevation / Depth Top of Rock: 1 NA

Type of Backfill: Portland type one cement

Elevation / Depth of Seal: 13 feet

Type of Seal: 30/65 fine sand

Elevation / Depth of Top of Filter Pack: 15.5 feet

Elevation / Depth of Top of Screen: 17.0 feet

Type of Screen: Schedule 40 PVC

Slot Size x Length: 0.010 inch x 10 feet

I.D. of Screen: 2 inch

Type of Filter Pack: 20/30 Sand

Elevation / Depth of Bottom of Screen: 17.0 feet

Elevation / Depth of Bottom of Filter Pack: 17.5 feet

Type of Backfill Below Well: 20/30 Sand

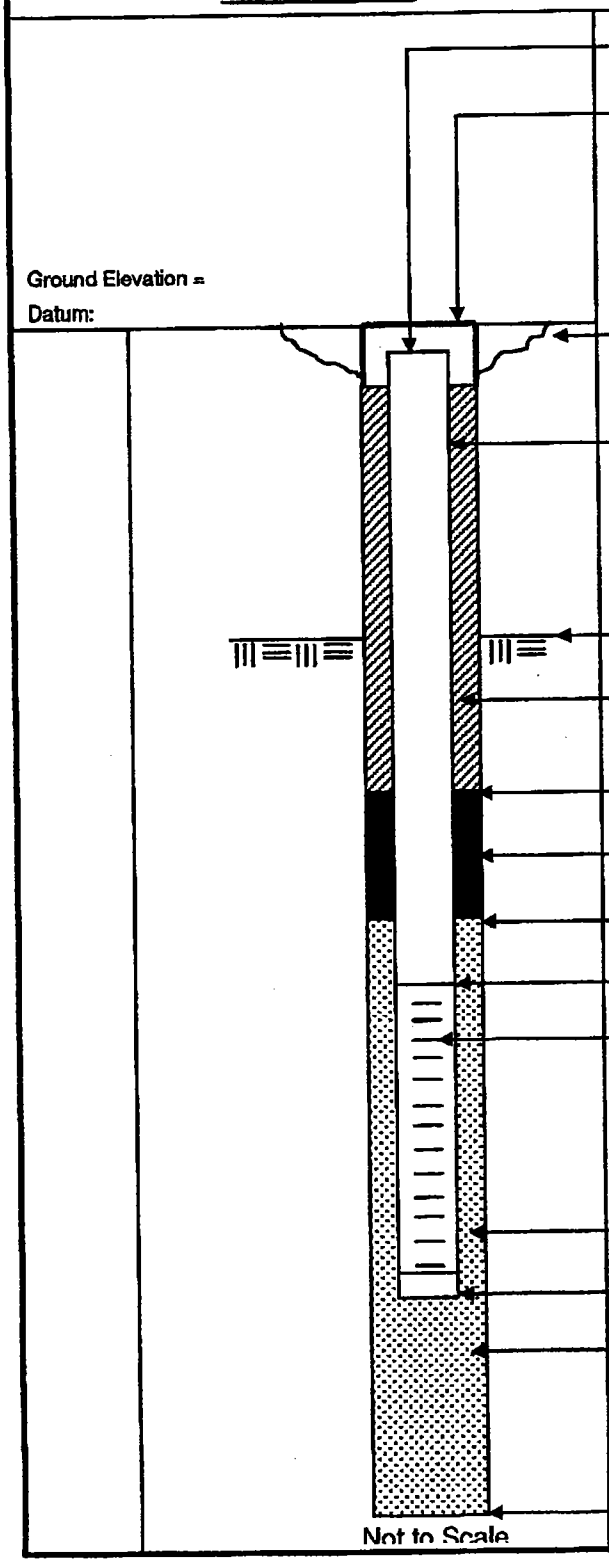
Elevation / Total Depth of Borehole: 17.5 feet

Tetra Tech NUS, Inc.

WELL No.: CEF-824A-6I

MONITORING WELL SHEET

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	Partridge	BORING No.:	001
PROJECT No.:	0039	DRILLER:	Allan Kelly	DATE COMPLETED:	09/11/00
SITE:	B.824A	DRILLING METHOD:	Hollow Stem	NORTHING:	
GEOLOGIST:	M. Dale	DEV. METHOD:	Submersible	EASTING:	



Elevation / Depth of Top of Riser: 11-2 in.

Elevation / Height of Top of Surface Casing: 1 0 FT.

I.D. of Surface Casing: 8 inch

Type of Surface Casing: Steel, boltdown

Type of Surface Seal: Concrete

I.D. of Riser: 2 inch

Type of Riser: Sch. 40, PVC

Borehole Diameter: 9 inch

Elevation / Depth Top of Rock: N/A

Type of Backfill: Portland Cement Type I + II.

Elevation / Depth of Seal: 132.5 FT.

Type of Seal: ~~Medium~~ FINE Sand (30/65 grade)

Elevation / Depth of Top of Filter Pack: 134.5 FT.

Elevation / Depth of Top of Screen: 135 FT.

Type of Screen: Sch. 40, PVC

Slot Size x Length: 0.010 inch x 5 FT.

I.D. of Screen: 2 inch

Type of Filter Pack: Coarse Sand (20/30 grade)

Elevation / Depth of Bottom of Screen: 140 FT.

Elevation / Depth of Bottom of Filter Pack: 140.5 FT.

Type of Backfill Below Well: Coarse Sand (20/30 grade)

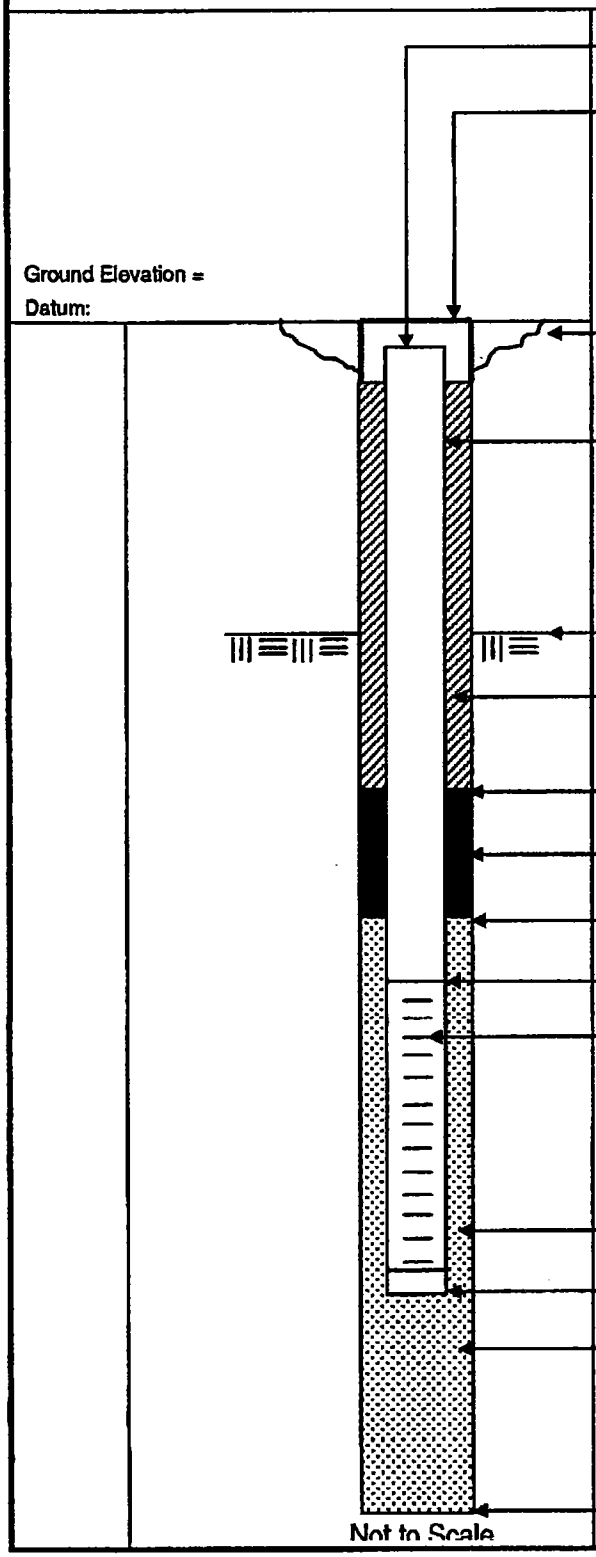
Elevation / Total Depth of Borehole: 140.5 FT.

Tetra Tech NUS, Inc.

WELL No.: CEF- 824A-75

MONITORING WELL SHEET

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	Partridge	BORING No.:	002
PROJECT No.:	0039	DRILLER:	Mike Nicholson	DATE COMPLETED:	9/12/00
SITE:	B-824A	DRILLING METHOD:	Hollow Stem	NORTHING:	
GEOLOGIST:	M. Dale	DEV. METHOD:	Submersible	EASTING:	



Elevation / Depth of Top of Riser: 1 ~~0~~ FT. MD

Elevation / Height of Top of Surface Casing: 1 0 FT.

I.D. of Surface Casing: 8 inch

Type of Surface Casing: Steel, boltdown

Type of Surface Seal: Concrete

I.D. of Riser: 2 inch

Type of Riser: Sch. 40, PVC

Borehole Diameter: 9 inch

Elevation / Depth Top of Rock: N/A

Type of Backfill: Portland Cement Type I + II

Elevation / Depth of Seal: 1 2 FT.

Type of Seal: MD ~~Medium~~ Fine Sand (30/65 grade)

Elevation / Depth of Top of Filter Pack: 1 4 FT.

Elevation / Depth of Top of Screen: 1 5 FT.

Type of Screen: Sch. 40, PVC

Slot Size x Length: 0.010 inch x 10 FT.

I.D. of Screen: 2 inch

Type of Filter Pack: Coarse Sand (20/30 grade)

Elevation / Depth of Bottom of Screen: 1 15 FT.

Elevation / Depth of Bottom of Filter Pack: 1 15 FT.

Type of Backfill Below Well: Coarse Sand (20/30 grade) / NATIVE SOIL

Elevation / Total Depth of Borehole: 1 15 FT.

Tetra Tech NUS, Inc.

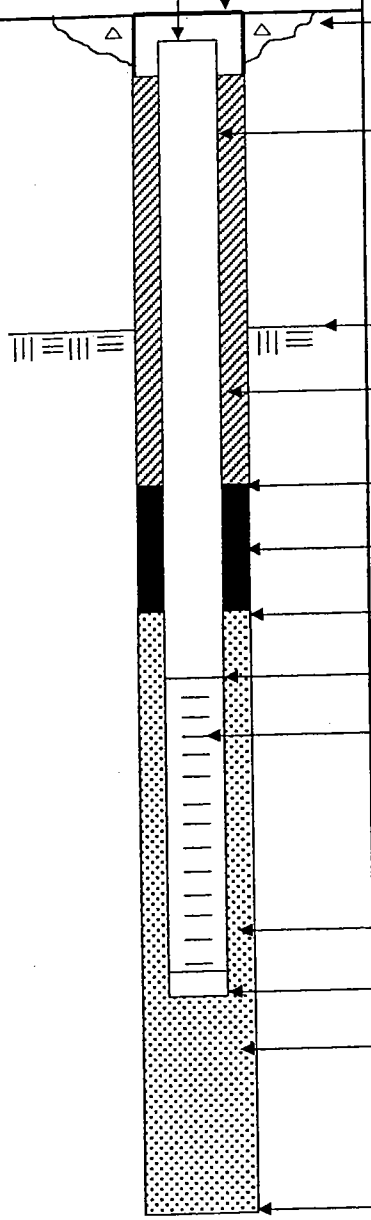
WELL No.: CEF-824A-08S

MONITORING WELL SHEET

PROJECT:	B. 824 A, PHIV	DRILLING Co.:	GPI	BORING No.:	3
PROJECT No.:	N0039. D50.05E.145	DRILLER:	N. Smarrido	DATE COMPLETED:	1-15-01
SITE:	Cecil Field	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	M.O'Neill	DEV. METHOD:	submersible	EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / Depth of Top of Riser: 1 ~~0~~ MDO 1.5"

Elevation / Height of Top of Surface Casing: 1 0

I.D. of Surface Casing: 8"

Type of Surface Casing: Steel Bolt down

Type of Surface Seal: concrete

I.D. of Riser: ~~3/4"~~ MDO 2"

Type of Riser: PVC, ~~Sch~~ Sch. 40

Borehole Diameter: ~~2"~~ MDO 8"

Elevation / Depth Top of Rock: 1 NA

Type of Backfill: Type 1, portland cement

Elevation / Depth of Seal: 1 2'

Type of Seal: 30/65 Sand

Elevation / Depth of Top of Filter Pack: 1 4'

Elevation / Depth of Top of Screen: 1 5'

Type of Screen: PVC, Sch 40

Slot Size x Length: .010" X 10'

I.D. of Screen: 2"

Type of Filter Pack: ~~Prepacked~~ MDO 20-30 sand

Elevation / Depth of Bottom of Screen: 1 15'

Elevation / Depth of Bottom of Filter Pack: 1 16'

Type of Backfill Below Well: 20-30 sand

Elevation / Total Depth of Borehole: 1 16'

Tetra Tech NUS, Inc.

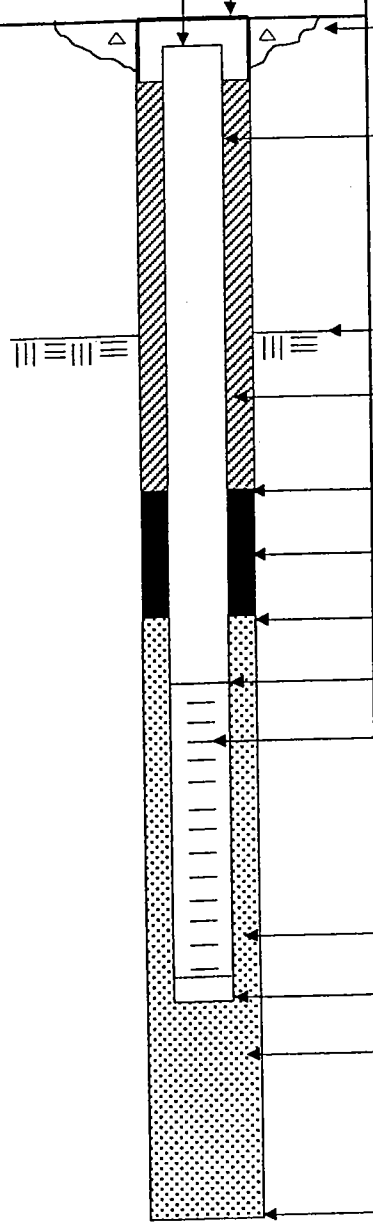
WELL No.: CEF-824A-G9S

MONITORING WELL SHEET

PROJECT:	B. 824 A, PHIV	DRILLING Co.:	GPI	BORING No.:	2
PROJECT No.:	N0039. D50.05E.145	DRILLER:	N. Smarrido	DATE COMPLETED:	1-15-01
SITE:	Cecil Field	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	M.O'Neill	DEV. METHOD:	submersible	EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / Depth of Top of Riser: 11.5"

Elevation / Height of Top of Surface Casing: 10

I.D. of Surface Casing: 8"

Type of Surface Casing: Steel Bolt down

Type of Surface Seal: concrete

I.D. of Riser: ~~3/4"~~ MDO 2"

Type of Riser: PVC, ~~Scd~~ Sch. 40

Borehole Diameter: ~~2"~~ MDO 8"

Elevation / Depth Top of Rock: NA

Type of Backfill: Type I, portland cement

Elevation / Depth of Seal: 12'

Type of Seal: 30/65 Sand

Elevation / Depth of Top of Filter Pack: 14'

Elevation / Depth of Top of Screen: ~~10'~~ MDO 5'

Type of Screen: PVC, Sch 40

Slot Size x Length: .010" X 10'

I.D. of Screen: 2"

Type of Filter Pack: ~~Prepacked~~ MDO 20-30 sand

Elevation / Depth of Bottom of Screen: 15'

Elevation / Depth of Bottom of Filter Pack: 16'

Type of Backfill Below Well: 20-30 sand

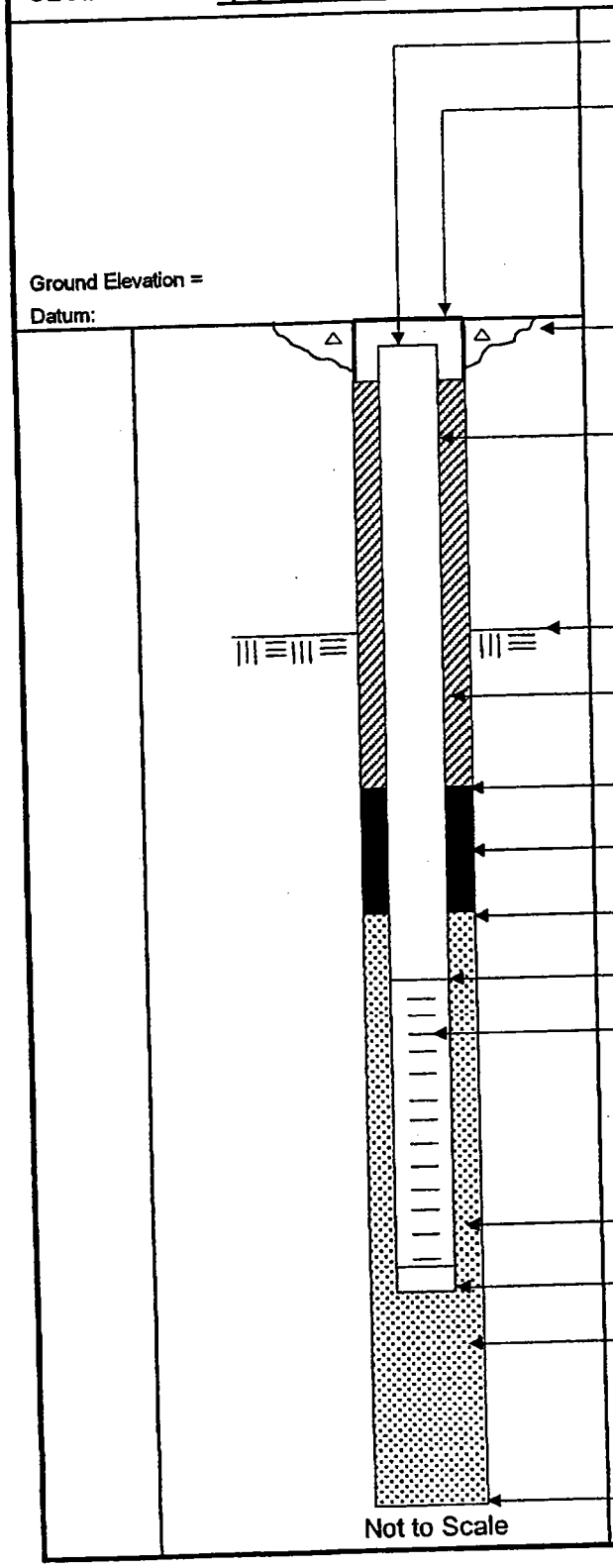
Elevation / Total Depth of Borehole: 16'

Tetra Tech NUS, Inc.

WELL No.: CEF-824A-10S

MONITORING WELL SHEET

PROJECT:	NAS Cecil Field	DRILLING Co.:	GPI	BORING No.:	002
PROJECT No.:	0039	DRILLER:	Jeff Ziegler	DATE COMPLETED:	1-18-01
SITE:	824A	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	Michele O'Neill	DEV. METHOD:	Submersible	EASTING:	



Elevation / Depth of Top of Riser: 12"

Elevation / Height of Top of Surface Casing: 0

I.D. of Surface Casing: 8"

Type of Surface Casing: Steel

Type of Surface Seal: concrete

I.D. of Riser: MOD ~~3/4"~~ 2"

Type of Riser: PVC sch 40

Borehole Diameter: MOD ~~2"~~ 8"

Elevation / Depth Top of Rock: NA

Type of Backfill: Type I Portland cement

Elevation / Depth of Seal: 2'

Type of Seal: 30/65 Sand

Elevation / Depth of Top of Filter Pack: 4'

Elevation / Depth of Top of Screen: 5'

Type of Screen: PVC sch 40

Slot Size x Length: .010 x 10'

I.D. of Screen: 2"

Type of Filter Pack: ~~Prepacked~~ 20-30 sand

Elevation / Depth of Bottom of Screen: 15'

Elevation / Depth of Bottom of Filter Pack: 16'

Type of Backfill Below Well: 20-30 sand

Elevation / Total Depth of Borehole: 16'

Tetra Tech NUS, Inc.

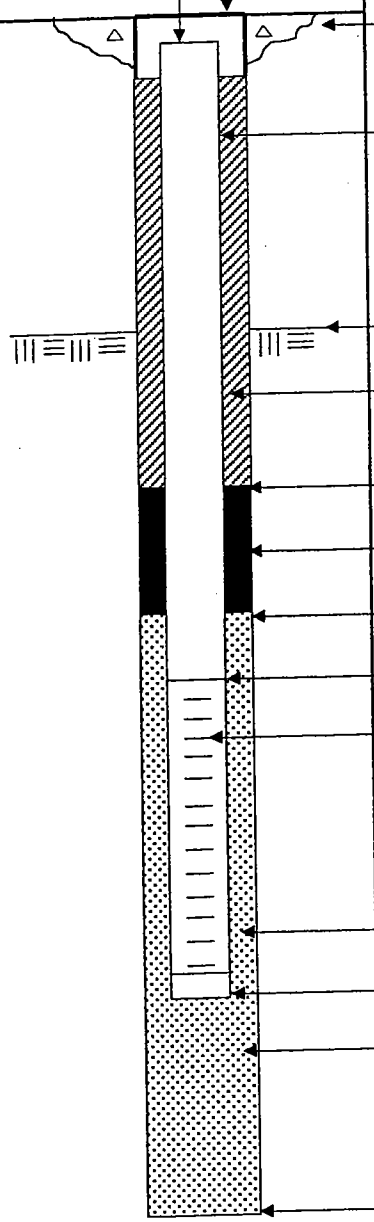
WELL No.: CEF-824A-115

MONITORING WELL SHEET

PROJECT:	B. 824 A, PHII	DRILLING Co.:	GPI	BORING No.:	3
PROJECT No.:	N0039. D50.05E.145	DRILLER:	N. Smarrido	DATE COMPLETED:	1-15-01
SITE:	Cecil Field	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	M.O'Neill	DEV. METHOD:	submersible	EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / Depth of Top of Riser: / 1.5"

Elevation / Height of Top of Surface Casing: / 0'

I.D. of Surface Casing: 8"

Type of Surface Casing: Steel Bolt down

Type of Surface Seal: concrete

I.D. of Riser: ~~3/4"~~ MDO 2"

Type of Riser: PVC, ~~Sch~~ Sch. 40

Borehole Diameter: ~~2"~~ MDO 8"

Elevation / Depth Top of Rock: / NA

Type of Backfill: Type I, portland cement

Elevation / Depth of Seal: / 2'

Type of Seal: 30/65 Sand

Elevation / Depth of Top of Filter Pack: / 4'

Elevation / Depth of Top of Screen: / 5'

Type of Screen: PVC, Sch 40

Slot Size x Length: .010" X 10'

I.D. of Screen: 2"

Type of Filter Pack: ~~Prepacked~~ MDO 20-30 sand

Elevation / Depth of Bottom of Screen: / 15'

Elevation / Depth of Bottom of Filter Pack: / 16'

Type of Backfill Below Well: 20-30 sand

Elevation / Total Depth of Borehole: / 16'

Tetra Tech NUS, Inc.

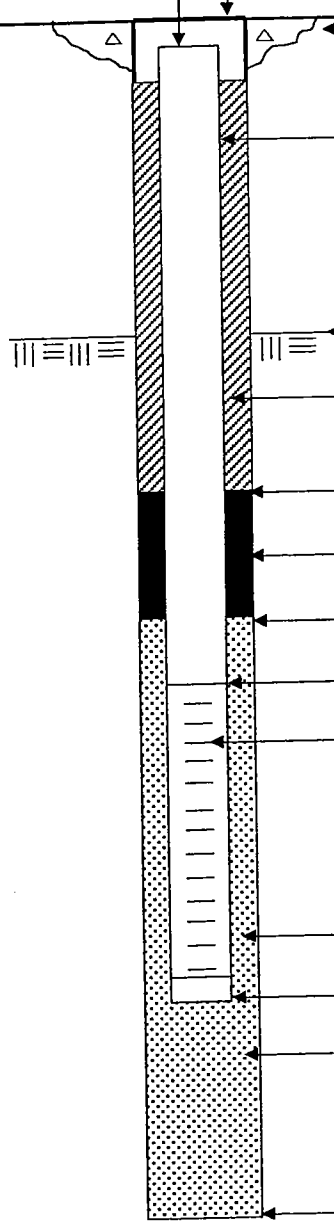
WELL No.: CEF-824A-12I

MONITORING WELL SHEET

PROJECT:	B. 824 A, PHTV	DRILLING Co.:	GPI	BORING No.:	1
PROJECT No.:	N0039. D50.05E.145	DRILLER:	N. Smarrido	DATE COMPLETED:	1-15-01
SITE:	Cecil Field	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	M.O'Neill	DEV. METHOD:	submersible	EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / Depth of Top of Riser:	1 1.5"
Elevation / Height of Top of Surface Casing:	1 0'
I.D. of Surface Casing:	8"
Type of Surface Casing:	Steel Bolt down
Type of Surface Seal:	concrete
I.D. of Riser:	~~3/4"~~ MDO 2"
Type of Riser:	PVC, ~~Sch~~ Sch. 40 MDO
Borehole Diameter:	~~2"~~ MDO 8"
Elevation / Depth Top of Rock:	1 NA
Type of Backfill:	Type 1, portland cement
Elevation / Depth of Seal:	1 31.5'
Type of Seal:	30/65 Sand
Elevation / Depth of Top of Filter Pack:	1 33.5'
Elevation / Depth of Top of Screen:	1 35'
Type of Screen:	PVC, Sch 40
Slot Size x Length:	.010" X 5'
I.D. of Screen:	2"
Type of Filter Pack:	~~Prepacked~~ MDO 20-30 sand
Elevation / Depth of Bottom of Screen:	1 46'
Elevation / Depth of Bottom of Filter Pack:	1 41'
Type of Backfill Below Well:	20-30 sand
Elevation / Total Depth of Borehole:	1 41'

Tetra Tech NUS, Inc.

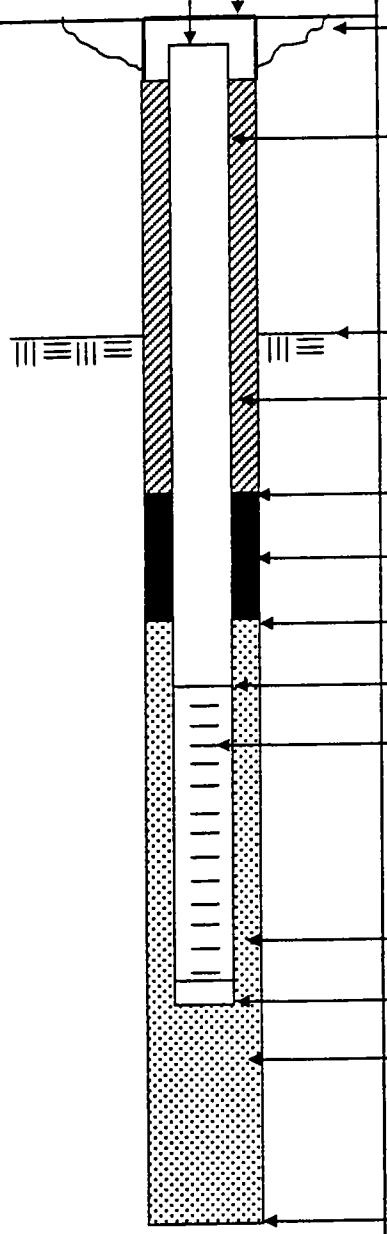
WELL No.: CEF-824A-13D

MONITORING WELL SHEET - POST COMPLETION

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	Precision	BORING No.:	13D
PROJECT No.:	39	DRILLER:	T. LYNCH	DATE COMPLETED:	9-11-01
SITE:	B.824A	DRILLING METHOD:	Mud ROTARY	NORTHING:	
GEOLOGIST:	L. KNIGHT	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Elevation / Depth of Top of Riser: /

Elevation / Height of Top of Surface Casing: /

I.D. of Surface Casing:

Type of Surface Casing: Steel, boltdown

Type of Surface Seal: Concrete

I.D. of Riser: 2 inch

Type of Riser: Sch. 40, PVC

Borehole Diameter: 6"

Elevation / Depth Top of Rock: N/A

Type of Backfill: Portland Cement Type I

Elevation / Depth of Seal: 173.0

Type of Seal: ~~Medium Sand (30/65 grade)~~ BENTONITE SLURRY

Elevation / Depth of Top of Filter Pack: 178.0

Elevation / Depth of Top of Screen: 181.2

Type of Screen: Sch. 40, PVC

Slot Size x Length: 0.010 inch x 10 ft.

I.D. of Screen: 2 inch

Type of Filter Pack: Coarse Sand (20/30 grade)

Elevation / Depth of Bottom of Screen: 186.2

Elevation / Depth of Bottom of Filter Pack: 187.0

Type of Backfill Below Well: Coarse Sand (20/30 grade)

Elevation / Total Depth of Borehole: 187.0

9-19-01 (1410)

Tetra Tech NUS, Inc.

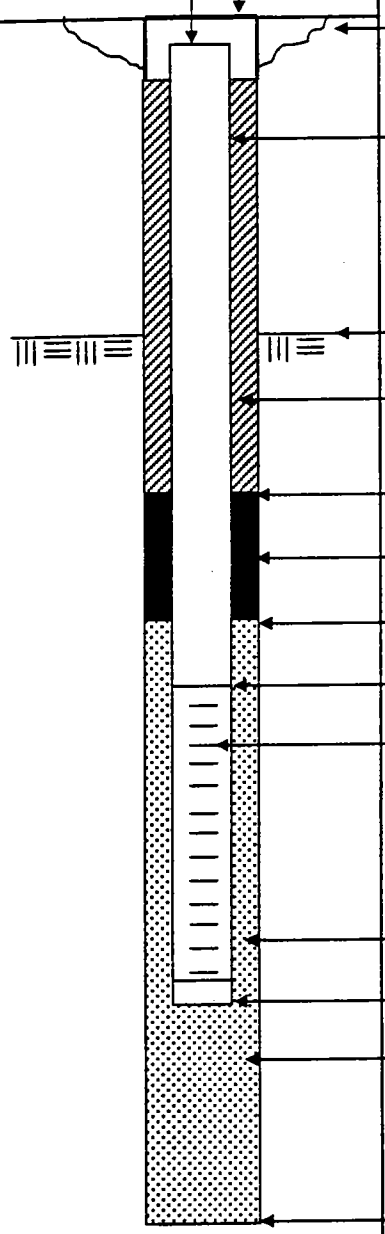
WELL No.: CEF- 824A·14S

MONITORING WELL SHEET — post COMPLETION

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	Precision	BORING No.:	14S
PROJECT No.:	39	DRILLER:	T. LYNCH	DATE COMPLETED:	9·13·01
SITE:	B.824A	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	L. KNIGHT	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Elevation / Depth of Top of Riser: /

Elevation / Height of Top of Surface Casing: /

I.D. of Surface Casing:

Type of Surface Casing: Steel, boltdown

Type of Surface Seal: Concrete

I.D. of Riser: 2 inch

Type of Riser: Sch. 40, PVC

Borehole Diameter: 8"

Elevation / Depth Top of Rock: /

Type of Backfill: Portland Cement Type I

Elevation / Depth of Seal: / 2.0

Type of Seal: Medium Sand (30/65 grade)

Elevation / Depth of Top of Filter Pack: / 2.5

Elevation / Depth of Top of Screen: / ~~3.7~~ 4.0

Type of Screen: Sch. 40, PVC

Slot Size x Length: 0.010 inch x 10 ft.

I.D. of Screen: 2 inch

Type of Filter Pack: Coarse Sand (20/30 grade) 14.0

Elevation / Depth of Bottom of Screen: / ~~13.7~~

Elevation / Depth of Bottom of Filter Pack: / 15.0

Type of Backfill Below Well: Coarse Sand (20/30 grade)

Elevation / Total Depth of Borehole: / 15.0

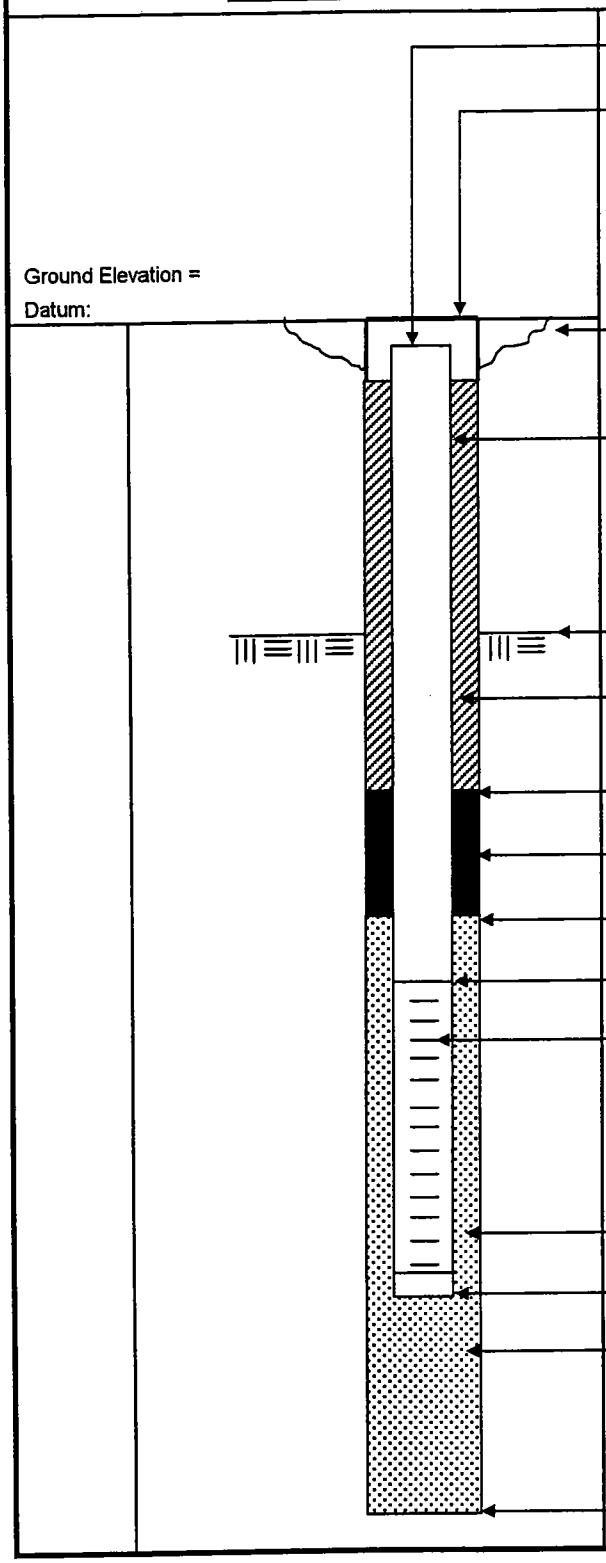
9·19·01 (1130)

Tetra Tech NUS, Inc.

WELL No.: CEF- 824A-15I

MONITORING WELL SHEET

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	Precision	BORING No.:	15I
PROJECT No.:	39	DRILLER:	T. LYNCH	DATE COMPLETED:	9·13·01
SITE:	B.824A	DRILLING METHOD:	Mud Rotary	NORTHING:	
GEOLOGIST:	L. KNIGHT	DEV. METHOD:	Submersible	EASTING:	



Elevation / Depth of Top of Riser: /

Elevation / Height of Top of Surface Casing: /

I.D. of Surface Casing:

Type of Surface Casing: Steel, boltdown

Type of Surface Seal: Concrete

I.D. of Riser: 2 inch

Type of Riser: Sch. 40, PVC

Borehole Diameter: 6"

Elevation / Depth Top of Rock: /

Type of Backfill: Portland Cement Type I

Elevation / Depth of Seal: 130

Type of Seal: ~~Medium Sand (30/65 grade)~~ BENTONITE SLURRY

Elevation / Depth of Top of Filter Pack: 133

Elevation / Depth of Top of Screen: 135.5

Type of Screen: Sch. 40, PVC

Slot Size x Length: 0.010 inch x 10 ft.

I.D. of Screen: 2 inch

Type of Filter Pack: Coarse Sand (20/30 grade)

Elevation / Depth of Bottom of Screen: 140.5

Elevation / Depth of Bottom of Filter Pack: 141.0

Type of Backfill Below Well: Coarse Sand (20/30 grade)

Elevation / Total Depth of Borehole: 141.0

9·19·01 (1235)

Tetra Tech NUS, Inc.

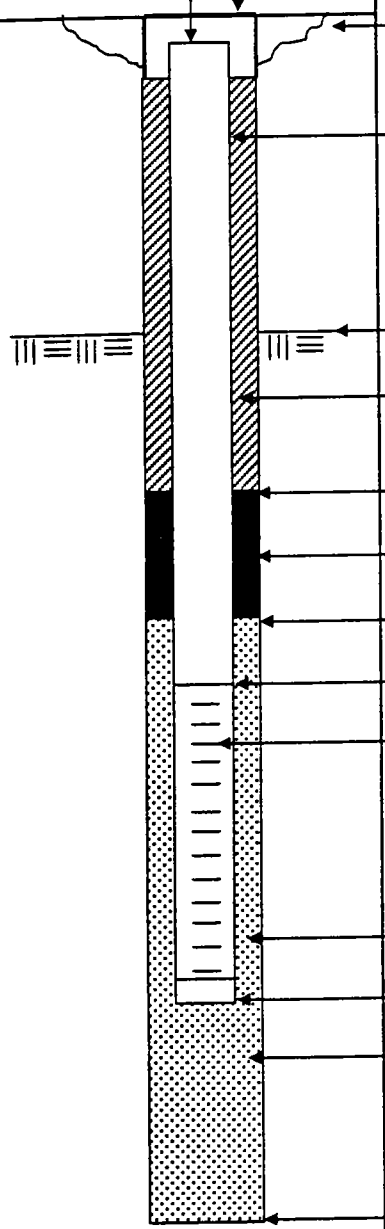
WELL No.: CEF- 824A-16D

MONITORING WELL SHEET – POST COMPLETION

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	Precision	BORING No.:	16D
PROJECT No.:	39	DRILLER:	T. LYNCH	DATE COMPLETED:	9·12·01
SITE:	B.824A	DRILLING METHOD:	Mud Rotary	NORTHING:	
GEOLOGIST:	L·KNIGHT	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Elevation / Depth of Top of Riser: 1

Elevation / Height of Top of Surface Casing: 1

I.D. of Surface Casing:

Type of Surface Casing: Steel, boltdown

Type of Surface Seal: Concrete

I.D. of Riser: 2 inch

Type of Riser: Sch. 40, PVC

Borehole Diameter: 6"

Elevation / Depth Top of Rock: N/A

Type of Backfill: Portland Cement Type I

Elevation / Depth of Seal: 171.5

Type of Seal: ~~Medium Sand (30/65 grade)~~ BENTONITE SLURRY

Elevation / Depth of Top of Filter Pack: 176.5

Elevation / Depth of Top of Screen: 179.7

Type of Screen: Sch. 40, PVC

Slot Size x Length: 0.010 inch x 10 ft.

I.D. of Screen: 2 inch

Type of Filter Pack: Coarse Sand (20/30 grade)

Elevation / Depth of Bottom of Screen: 184.7

Elevation / Depth of Bottom of Filter Pack: 185.0

Type of Backfill Below Well: Coarse Sand (20/30 grade)

Elevation / Total Depth of Borehole: 185.0

9·19·01 (1125)

Tetra Tech NUS, Inc.

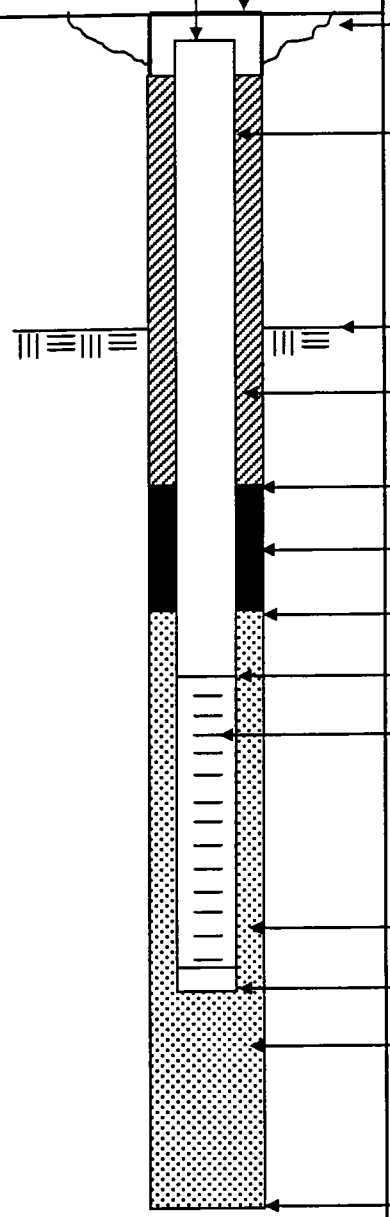
WELL No.: CEF-824A-171

MONITORING WELL SHEET – POST COMPLETION

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	Precision	BORING No.:	171
PROJECT No.:	39	DRILLER:	T. LYNCH	DATE COMPLETED:	9·13·01
SITE:	B.824A	DRILLING METHOD:	MUD ROTARY	NORTHING:	
GEOLOGIST:	L. KNIGHT	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Elevation / Depth of Top of Riser: /

Elevation / Height of Top of Surface Casing: /

I.D. of Surface Casing:

Type of Surface Casing: Steel, boltdown

Type of Surface Seal: Concrete

I.D. of Riser: 2 inch

Type of Riser: Sch. 40, PVC

Borehole Diameter: 6'

Elevation / Depth Top of Rock: /

Type of Backfill: Portland Cement Type I

Elevation / Depth of Seal: 129.5

Type of Seal: ~~Medium Sand (30/65 grade)~~ BENTONITE SLURRY

Elevation / Depth of Top of Filter Pack: 132.5

Elevation / Depth of Top of Screen: 135.55

Type of Screen: Sch. 40, PVC

Slot Size x Length: 0.010 inch x 10 ft.

I.D. of Screen: 2 inch

Type of Filter Pack: Coarse Sand (20/30 grade)

Elevation / Depth of Bottom of Screen: 140.55

Elevation / Depth of Bottom of Filter Pack: 141.0

Type of Backfill Below Well: Coarse Sand (20/30 grade)

Elevation / Total Depth of Borehole: 141.0

9·19·01 (1105)

Tetra Tech NUS, Inc.

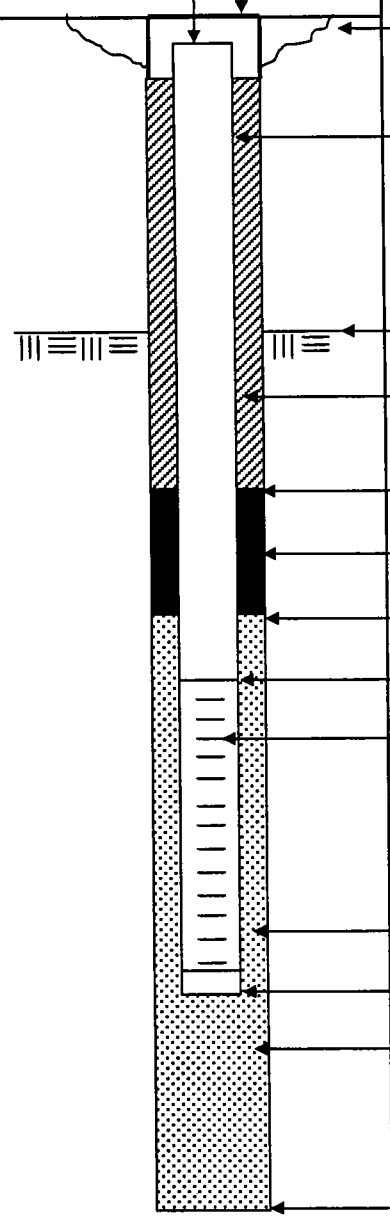
WELL No.: CEF- 824A-18S

MONITORING WELL SHEET - POST COMPLETION

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	Precision	BORING No.:	18S
PROJECT No.:	39	DRILLER:	T. LYNCH	DATE COMPLETED:	9-18-01
SITE:	B.824A	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	L. KNIGHT	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Elevation / Depth of Top of Riser: /

Elevation / Height of Top of Surface Casing: /

I.D. of Surface Casing:

Type of Surface Casing: Steel, boltdown

Type of Surface Seal: Concrete

I.D. of Riser: 2 inch

Type of Riser: Sch. 40, PVC

Borehole Diameter:

Elevation / Depth Top of Rock: N/A

Type of Backfill: Portland Cement Type I

Elevation / Depth of Seal: 12.0

Type of Seal: Medium Sand (30/65 grade)

Elevation / Depth of Top of Filter Pack: 12.5

Elevation / Depth of Top of Screen: 14.0

Type of Screen: Sch. 40, PVC

Slot Size x Length: 0.010 inch x 10 ft.

I.D. of Screen: 2 inch

Type of Filter Pack: Coarse Sand (20/30 grade)

Elevation / Depth of Bottom of Screen: 114.0

Elevation / Depth of Bottom of Filter Pack: 115.0

Type of Backfill Below Well: Coarse Sand (20/30 grade)

Elevation / Total Depth of Borehole: 115.0

9.19.01 (1400)

Tetra Tech NUS, Inc.

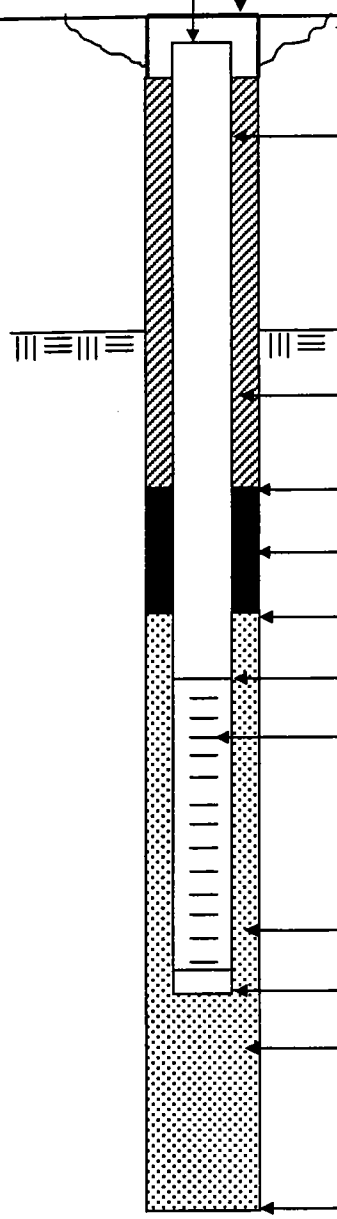
WELL No.: CEF-824A-19S

MONITORING WELL SHEET - POST COMPLETION

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	Precision	BORING No.:	19S
PROJECT No.:	39	DRILLER:	T. LYNCH	DATE COMPLETED:	9.18.01
SITE:	B.824A	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	L. KNIGHT	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Elevation / Depth of Top of Riser:	/
Elevation / Height of Top of Surface Casing:	/
I.D. of Surface Casing:	
Type of Surface Casing:	Steel, boltdown
Type of Surface Seal:	Concrete
I.D. of Riser:	2 inch
Type of Riser:	Sch. 40, PVC
Borehole Diameter:	
Elevation / Depth Top of Rock:	/
Type of Backfill:	Portland Cement Type I
Elevation / Depth of Seal:	12.0
Type of Seal:	Medium Sand (30/65 grade)
Elevation / Depth of Top of Filter Pack:	12.5
Elevation / Depth of Top of Screen:	1 ~~3.7~~ (4) 4.0
Type of Screen:	Sch. 40, PVC
Slot Size x Length:	0.010 inch x 10 ft.
I.D. of Screen:	2 inch
Type of Filter Pack:	Coarse Sand (20/30 grade) 14.0
Elevation / Depth of Bottom of Screen:	1 ~~13.7~~ (12)
Elevation / Depth of Bottom of Filter Pack:	15.0
Type of Backfill Below Well:	Coarse Sand (20/30 grade)
Elevation / Total Depth of Borehole:	15.0

9.19.01 (1340)

Tetra Tech NUS, Inc.

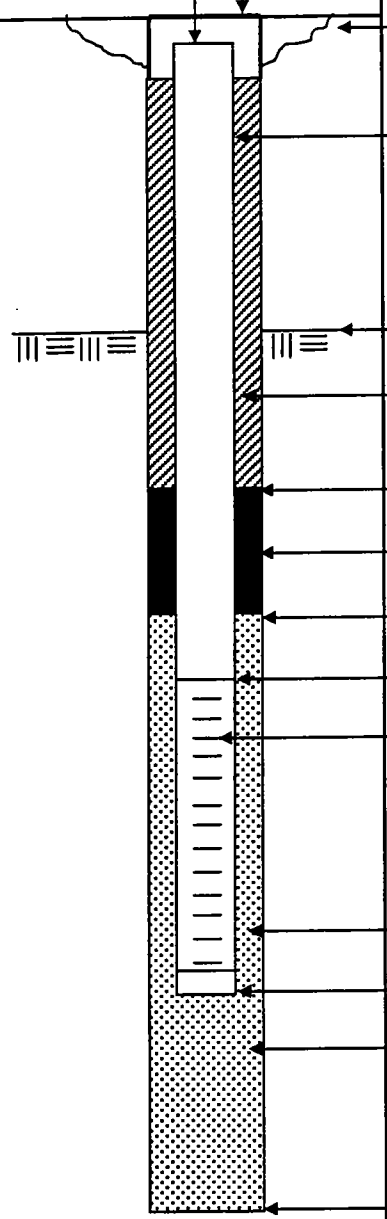
WELL No.: CEF-824A-~~185~~ 205 (LK)

MONITORING WELL SHEET – POST COMPLETION

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	Precision	BORING No.:	(LK) 205 ~~185~~
PROJECT No.:	39	DRILLER:	T. LYNCH	DATE COMPLETED:	9-18-01
SITE:	B.824A	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	L KNIGHT	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Elevation / Depth of Top of Riser: 1'

Elevation / Height of Top of Surface Casing: 1

I.D. of Surface Casing:

Type of Surface Casing: Steel, boltdown

Type of Surface Seal: Concrete

I.D. of Riser: 2 inch

Type of Riser: Sch. 40, PVC

Borehole Diameter:

Elevation / Depth Top of Rock: N/A

Type of Backfill: Portland Cement Type I

Elevation / Depth of Seal: 12.0

Type of Seal: Medium Sand (30/65 grade)

Elevation / Depth of Top of Filter Pack: 12.5

Elevation / Depth of Top of Screen: 13.7 (LK) 4.0

Type of Screen: Sch. 40, PVC

Slot Size x Length: 0.010 inch x 10 ft.

I.D. of Screen: 2 inch

Type of Filter Pack: Coarse Sand (20/30 grade) 14.0

Elevation / Depth of Bottom of Screen: 13.7 (LK)

Elevation / Depth of Bottom of Filter Pack: 15.0

Type of Backfill Below Well: Coarse Sand (20/30 grade)

Elevation / Total Depth of Borehole: 15.0

9-19-01 (1325)

Tetra Tech NUS, Inc.

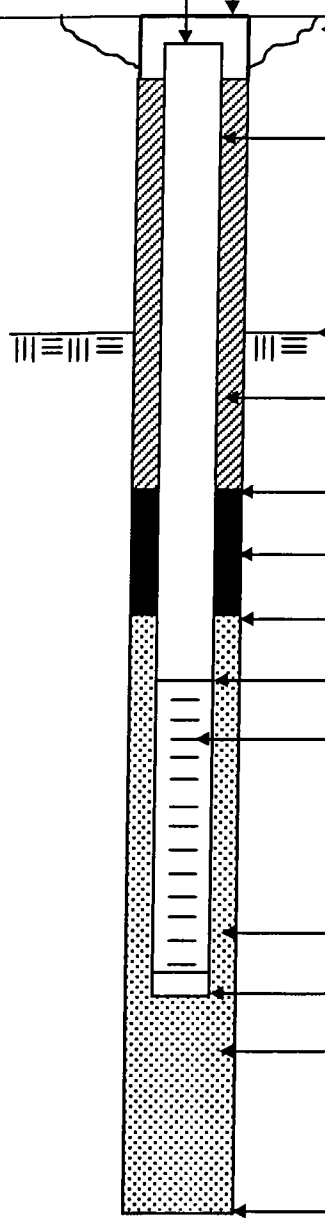
WELL No.: CEF-824A-21I

MONITORING WELL SHEET

PROJECT:	SITE 59	DRILLING Co.:	TRANSAMERICAN	BORING No.:	CEF-824A-21I
PROJECT No.:	N0039	DRILLER:	D. BOHN	DATE COMPLETED:	12-6-01
SITE:	BLDG-824A	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	L. KNIGHT	DEV. METHOD:	PERISTALTIC	EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / Depth of Top of Riser:	1
Elevation / Height of Top of Surface Casing:	1
I.D. of Surface Casing:	8"
Type of Surface Casing:	Steel
Type of Surface Seal:	QUIKRETE CONCRETE
I.D. of Riser:	2"
Type of Riser:	PVC
Borehole Diameter:	8"
Elevation / Depth Top of Rock:	N/A
Type of Backfill:	TYPE I PORTLAND CEMENT
Elevation / Depth of Seal:	130.0
Type of Seal:	30/65 Sand
Elevation / Depth of Top of Filter Pack:	133.0
Elevation / Depth of Top of Screen:	135.0
Type of Screen:	PVC
Slot Size x Length:	0.010" x 5'
I.D. of Screen:	2"
Type of Filter Pack:	20/30 SILICA SAND
Elevation / Depth of Bottom of Screen:	140.0
Elevation / Depth of Bottom of Filter Pack:	140.5
Type of Backfill Below Well:	
Elevation / Total Depth of Borehole:	140.5

Tetra Tech NUS, Inc.

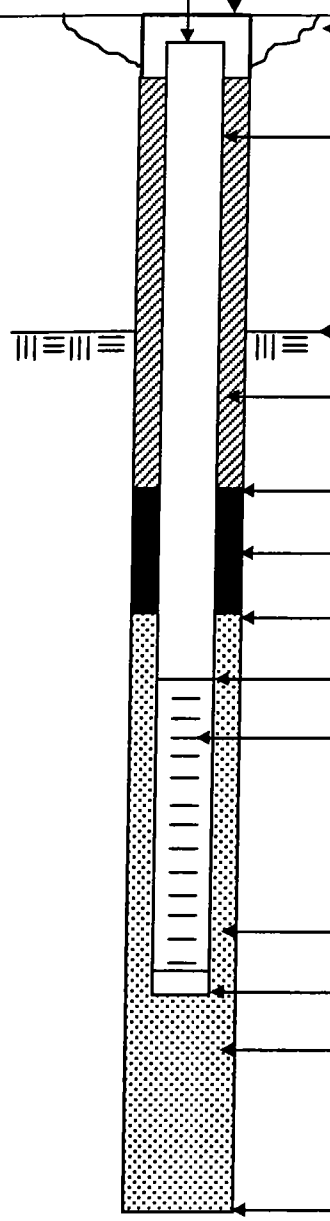
WELL No.: CEF. 824A-22S

MONITORING WELL SHEET

PROJECT:	SITE 57	DRILLING Co.:	TRANSAMERICAN	BORING No.:	CEF-824A-22S
PROJECT No.:	N0039	DRILLER:	D. HEARNE	DATE COMPLETED:	12-7-01
SITE:	Bldg. 824A	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	L. KNIGHT	DEV. METHOD:	PERISTALTIC	EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / Depth of Top of Riser:	1
Elevation / Height of Top of Surface Casing:	1
I.D. of Surface Casing:	8"
Type of Surface Casing:	Steel
Type of Surface Seal:	QUIKRETE CONCRETE
I.D. of Riser:	2"
Type of Riser:	PVC
Borehole Diameter:	8"
Elevation / Depth Top of Rock:	1
Type of Backfill:	TYPE I PORTLAND CEMENT
Elevation / Depth of Seal:	11.0
Type of Seal:	30/65 Sand
Elevation / Depth of Top of Filter Pack:	12.0
Elevation / Depth of Top of Screen:	13.5
Type of Screen:	PVC
Slot Size x Length:	0.010" x 10'
I.D. of Screen:	2"
Type of Filter Pack:	20/30 SILICA SAND
Elevation / Depth of Bottom of Screen:	13.5
Elevation / Depth of Bottom of Filter Pack:	14.0
Type of Backfill Below Well:	
Elevation / Total Depth of Borehole:	14.0

Tetra Tech NUS, Inc.

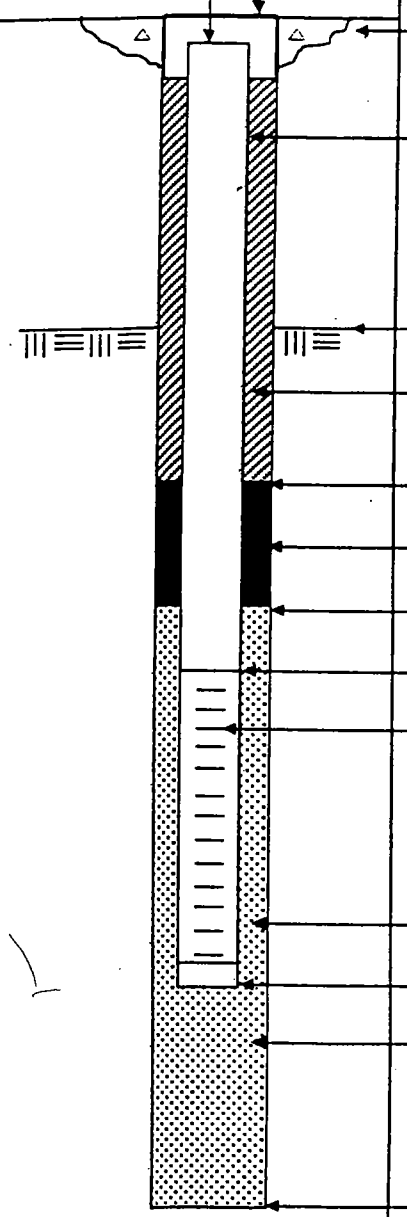
WELL No.: CEF-312-1S

MONITORING WELL SHEET

PROJECT:	SAR - B.312	DRILLING Co.:	Groundwater protects	BORING No.:	003
PROJECT No.:	0486	DRILLER:	Nick	DATE COMPLETED:	6/28/00
SITE:	Cecil Field	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	M. Dale	DEV. METHOD:		EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / Depth of Top of Riser: 10 inches

Elevation / Height of Top of Surface Casing: 1

I.D. of Surface Casing: 8 inch

Type of Surface Casing: bolt down steel manhole

Type of Surface Seal: Concrete

I.D. of Riser: 2 inch

Type of Riser: Schedule 40 pvc

Borehole Diameter: 8 inch

Elevation / Depth Top of Rock: 1 na

Type of Backfill: portland type one cement

Elevation / Depth of Seal: 1 1.5 feet

Type of Seal: 30/65 fine sand

Elevation / Depth of Top of Filter Pack: 1 3 feet

Elevation / Depth of Top of Screen: 1 4 feet

Type of Screen: Schedule 40 PVC

Slot Size x Length: 0.010 inch x 10 feet

I.D. of Screen: 2 inch

Type of Filter Pack: 20/30 Sand

Elevation / Depth of Bottom of Screen: 1 14 feet

Elevation / Depth of Bottom of Filter Pack: 1 15 feet

Type of Backfill Below Well: 20/30 Sand

Elevation / Total Depth of Borehole: 1 15 feet

Tetra Tech NUS, Inc.

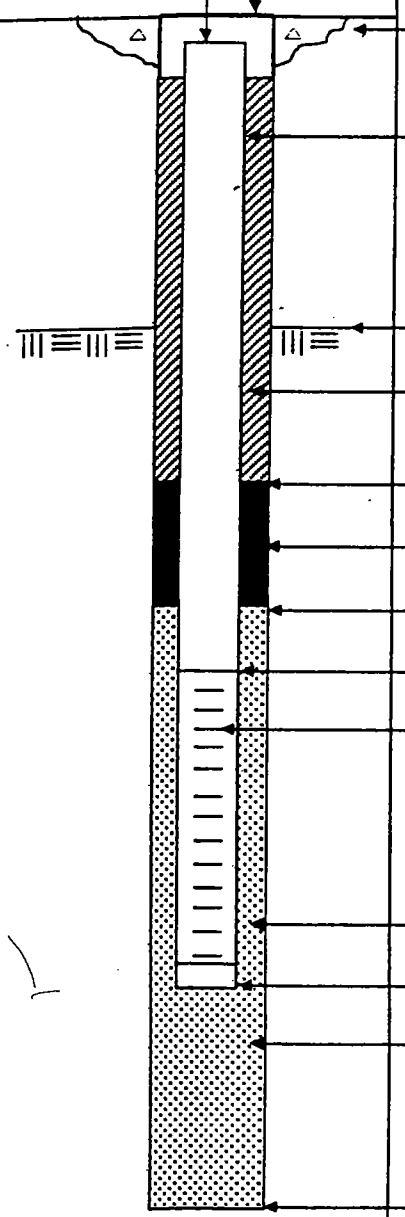
WELL No.: CEF-312-2S

MONITORING WELL SHEET

PROJECT:	SAR-B. 312	DRILLING Co.:	Groundwater Protect.	BORING No.:	002
PROJECT No.:	0486	DRILLER:	Nick	DATE COMPLETED:	6/29/00
SITE:	Cecil Field	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	M. Dale	DEV. METHOD:		EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / Depth of Top of Riser: 1 1.5 inches

Elevation / Height of Top of Surface Casing: 1

I.D. of Surface Casing: 8 inch

Type of Surface Casing: Bolt down steel manhole

Type of Surface Seal: Concrete

I.D. of Riser: 2 inch

Type of Riser: Schedule 40 PVC

Borehole Diameter: 8 inch

Elevation / Depth Top of Rock: 1 Na

Type of Backfill: Portland type one cement

Elevation / Depth of Seal: 1 ~~1 foot 6.5 inches~~ 1½ feet

Type of Seal: 30/65 fine sands

Elevation / Depth of Top of Filter Pack: 1 3 feet

Elevation / Depth of Top of Screen: 1 4 feet

Type of Screen: Schedule 40 PVC

Slot Size x Length: 0.010 inch x 10 feet

I.D. of Screen: 2 inch

Type of Filter Pack: 20/30 Sand

Elevation / Depth of Bottom of Screen: 1 14 feet

Elevation / Depth of Bottom of Filter Pack: 1 15 feet

Type of Backfill Below Well: 20/30 sand

Elevation / Total Depth of Borehole: 1 15 feet

Tetra Tech NUS, Inc.

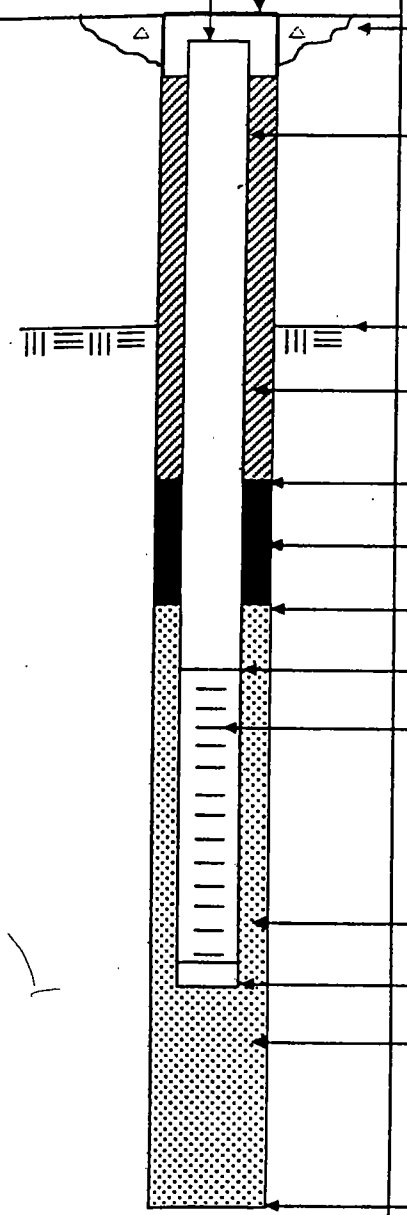
WELL No.: CEF-312-35

MONITORING WELL SHEET

PROJECT:	SAR-B.312	DRILLING Co.:	Groundwater Prot.	BORING No.:	001
PROJECT No.:	0486	DRILLER:	Nick	DATE COMPLETED:	6/28/00
SITE:	Cecil Field	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	M. Dale	DEV. METHOD:		EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / Depth of Top of Riser: 1 0 feet

Elevation / Height of Top of Surface Casing: 1

I.D. of Surface Casing: 8 inch

Type of Surface Casing: Bolt down steel manhole

Type of Surface Seal: Concrete

I.D. of Riser: 2 inch

Type of Riser: schedule 40 pvc

Borehole Diameter: 8 inch

Elevation / Depth Top of Rock: 1 NA

Type of Backfill: portland type one cement

Elevation / Depth of Seal: 1 1½ feet

Type of Seal: 30/65 fine sand

Elevation / Depth of Top of Filter Pack: 1 3 feet

Elevation / Depth of Top of Screen: 1 4 feet

Type of Screen: schedule 40 pvc

Slot Size x Length: 0.010 inch x 10 feet

I.D. of Screen: 2 inch

Type of Filter Pack: 20/30 Sand

Elevation / Depth of Bottom of Screen: 1 14 feet

Elevation / Depth of Bottom of Filter Pack: 1 15 feet

Type of Backfill Below Well: 20/30 sand

Elevation / Total Depth of Borehole: 1 15 feet

Tetra Tech NUS, Inc.

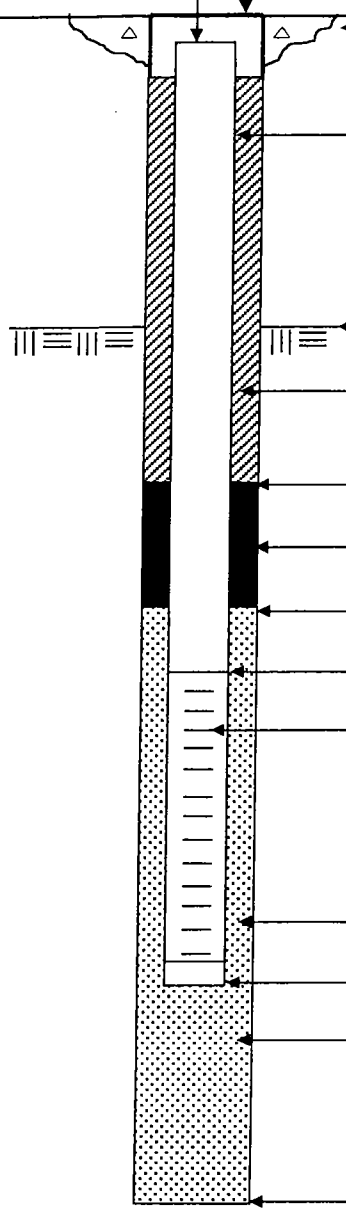
WELL No.: CEF-B312-4S

MONITORING WELL SHEET

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	PARTRIDGE	BORING No.:	SB-2
PROJECT No.:	~~0030~~ 0486	DRILLER:	J. WEATHERFORD	DATE COMPLETED:	11/20/00
SITE:	B. 312	DRILLING METHOD:	Hollow Stem	NORTHING:	
GEOLOGIST:	M. DALE	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / Depth of Top of Riser: 1 ~ 2 IN.

Elevation / Height of Top of Surface Casing: 1 0 FT.

I.D. of Surface Casing: 8 inch

Type of Surface Casing: Steel, bolt down manhole

Type of Surface Seal: QUIKRETE Concrete

I.D. of Riser: 2 inch

Type of Riser: Sch. 40, PVC

Borehole Diameter: 8 inch

Elevation / Depth Top of Rock: N/A

Type of Backfill: Portland Cement Type I & II

Elevation / Depth of Seal: 11.5 FT.

Type of Seal: Sand 30/65

Elevation / Depth of Top of Filter Pack: 13 FT.

Elevation / Depth of Top of Screen: 14 FT.

Type of Screen: Sch. 40 PVC

Slot Size x Length: 0.010 in. x 10 FT.

I.D. of Screen: 2 inch

Type of Filter Pack: Sand 20/30

Elevation / Depth of Bottom of Screen: 114 FT.

Elevation / Depth of Bottom of Filter Pack: 114.5 FT.

Type of Backfill Below Well: Sand 20/30

Elevation / Total Depth of Borehole: 114.5 FT.

Tetra Tech NUS, Inc.

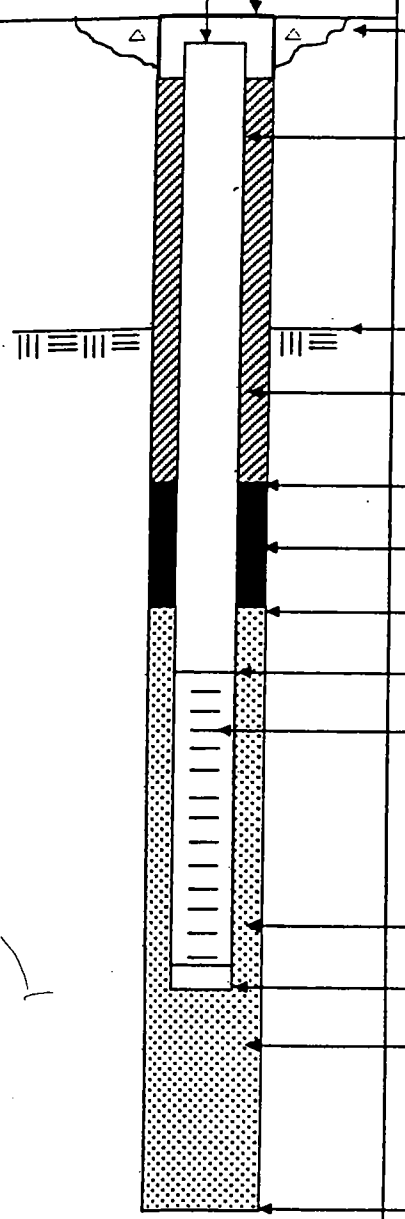
WELL No.: CEF - B312 - 5S

MONITORING WELL SHEET

PROJECT:	B.312, Ph. II	DRILLING Co.:	PARTRIDGE	BORING No.:	SB-3 ~~002~~
PROJECT No.:	N0486	DRILLER:	J. WEATHERFORD	DATE COMPLETED:	11/16/00
SITE:	B.312, CECIL	DRILLING METHOD:	Hollow Stem	NORTHING:	
GEOLOGIST:	M. DALE	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / Depth of Top of Riser:	1~2 inch
Elevation / Height of Top of Surface Casing:	1 0 FT.
I.D. of Surface Casing:	8 inch
Type of Surface Casing:	Steel, boltdown manhole
Type of Surface Seal:	Concrete
I.D. of Riser:	2 inch
Type of Riser:	Sch. 40, PVC
Borehole Diameter:	8 inch
Elevation / Depth Top of Rock:	N/A
Type of Backfill:	Portland Cement Type I & II
Elevation / Depth of Seal:	1 1.5 FT.
Type of Seal:	30/65 Sand
Elevation / Depth of Top of Filter Pack:	1 3 FT.
Elevation / Depth of Top of Screen:	1 4 FT.
Type of Screen:	Sch. 40, PVC
Slot Size x Length:	0.010 IN x 10 FT.
I.D. of Screen:	2 inch
Type of Filter Pack:	20/30 Sand
Elevation / Depth of Bottom of Screen:	1 14 FT.
Elevation / Depth of Bottom of Filter Pack:	1 15 FT.
Type of Backfill Below Well:	Sand 20/30
Elevation / Total Depth of Borehole:	1 15 FT.

~~877 592-1628 MD~~

Tetra Tech NUS, Inc.

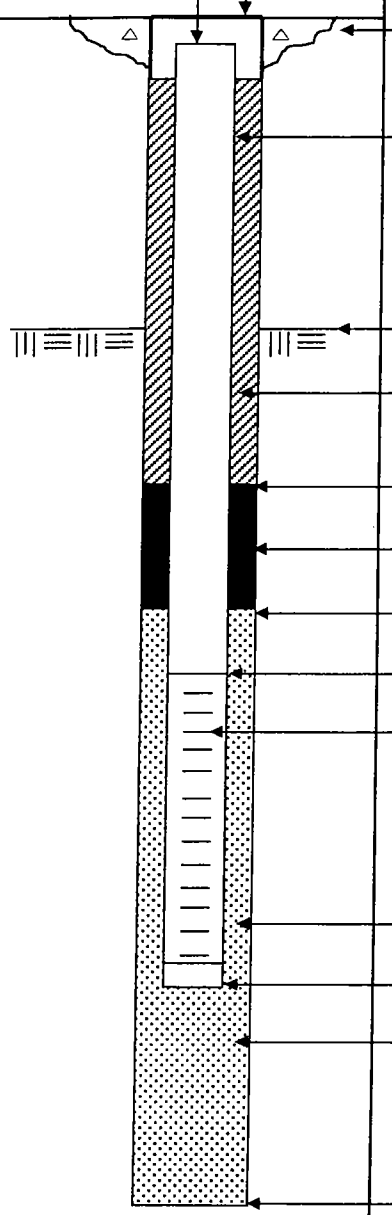
WELL No.: CEF-B312-65

MONITORING WELL SHEET

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	PARTRIDGE	BORING No.:	SB-4
PROJECT No.:	~~9039~~ 0486	DRILLER:	J. WEATHERFORD	DATE COMPLETED:	11/20/00
SITE:	B. 312	DRILLING METHOD:	Hollow Stem	NORTHING:	
GEOLOGIST:	M. DALE	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / Depth of Top of Riser: 1 ~ 2 IN.

Elevation / Height of Top of Surface Casing: 1 & FT.

I.D. of Surface Casing: 8 inch

Type of Surface Casing: Steel, boltdown manhole

Type of Surface Seal: Concrete

I.D. of Riser: 2 inch

Type of Riser: Sch. 40 PVC

Borehole Diameter: 8 inch

Elevation / Depth Top of Rock: N/A

Type of Backfill: Portland Cement Type I & II

Elevation / Depth of Seal: 16.5 FT.

Type of Seal: Sand 30/65

Elevation / Depth of Top of Filter Pack: 13 FT.

Elevation / Depth of Top of Screen: 14 FT.

Type of Screen: Sch. 40 PVC

Slot Size x Length: 0.010 IN. X 10 FT.

I.D. of Screen: 2 inch

Type of Filter Pack: Sand 20/30

Elevation / Depth of Bottom of Screen: 14 FT.

Elevation / Depth of Bottom of Filter Pack: 14.5 FT.

Type of Backfill Below Well: Sand 20/30

Elevation / Total Depth of Borehole: 14.5 FT.

Tetra Tech NUS, Inc.

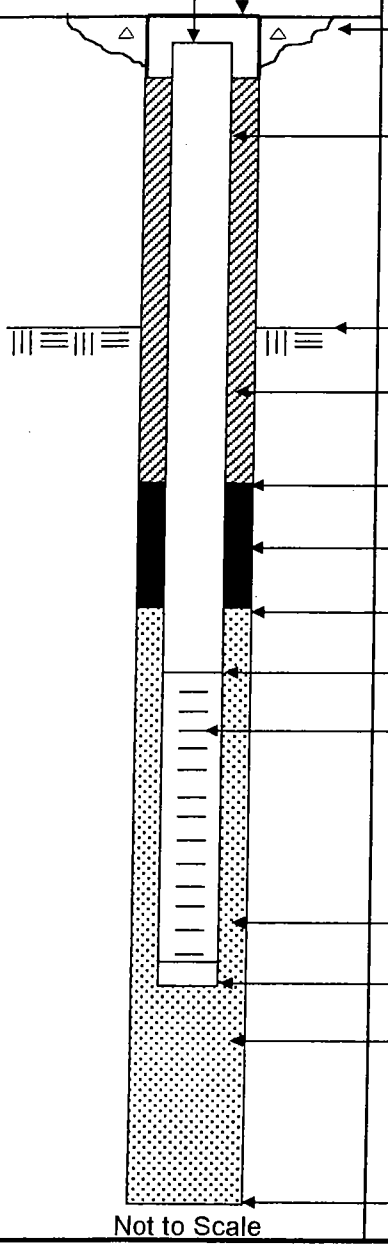
WELL No.: CEF-B312-75

MONITORING WELL SHEET

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	PARTRIDGE	BORING No.:	SB-5
PROJECT No.:	~~0039~~ 0486	DRILLER:	J. WEATHERFORD	DATE COMPLETED:	11/20/00
SITE:	B.312	DRILLING METHOD:	Hollow Stem	NORTHING:	
GEOLOGIST:	M. DALE	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / Depth of Top of Riser: 1 ~ 2 IN.

Elevation / Height of Top of Surface Casing: 1 & FT.

I.D. of Surface Casing: 8 inch

Type of Surface Casing: Steel, boltdown manhole

Type of Surface Seal: Concrete

I.D. of Riser: 2 inch

Type of Riser: Sch. 40 PVC

Borehole Diameter: 8 inch

Elevation / Depth Top of Rock: N/A

Type of Backfill: Portland Cement Type I & II

Elevation / Depth of Seal: 11.5 FT.

Type of Seal: Sand 30/65

Elevation / Depth of Top of Filter Pack: 13 FT.

Elevation / Depth of Top of Screen: 14 FT.

Type of Screen: Sch. 40 PVC

Slot Size x Length: 0.010 IN. x 10 FT.

I.D. of Screen: 2 inch

Type of Filter Pack: Sand 20/30

Elevation / Depth of Bottom of Screen: 114 FT.

Elevation / Depth of Bottom of Filter Pack: 114.5 FT

Type of Backfill Below Well: Sand 20/30

Elevation / Total Depth of Borehole: 114.5 FT.

Tetra Tech NUS, Inc.

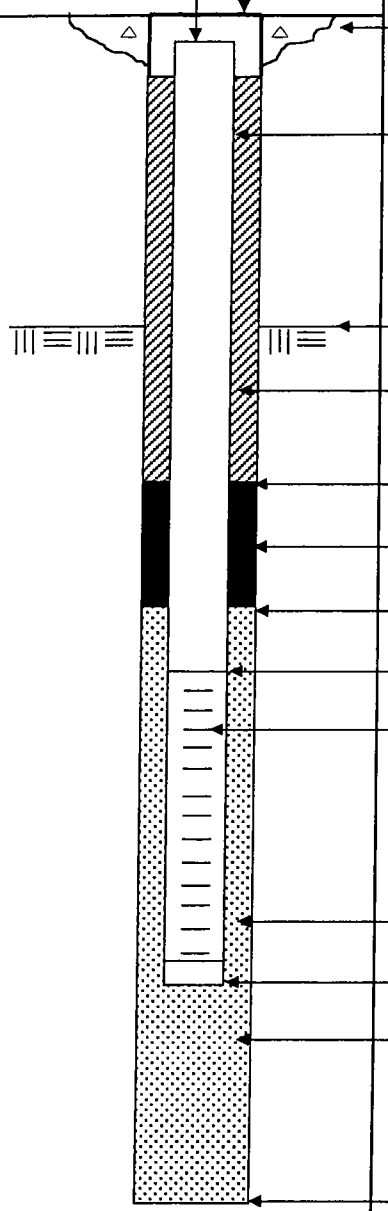
WELL No.: CEF-B312-05

MONITORING WELL SHEET

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	PARTRIDGE	BORING No.:	SB6
PROJECT No.:	~~0039~~ 0486	DRILLER:	J. WEATHERFORD	DATE COMPLETED:	11/21/00
SITE:	Bldg. 312	DRILLING METHOD:	Hollow Stem	NORTHING:	
GEOLOGIST:	M. BALK	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Not to Scale

Elevation / Depth of Top of Riser: 1 ~ 2 IN.

Elevation / Height of Top of Surface Casing: 1 & FT.

I.D. of Surface Casing: 8 inch

Type of Surface Casing: Steel, bolted down manhole

Type of Surface Seal: Concrete

I.D. of Riser: 2 inch

Type of Riser: Sch. 40 PVC

Borehole Diameter: 8 inch

Elevation / Depth Top of Rock: N/A

Type of Backfill: PORTLAND Cement Type 1&2

Elevation / Depth of Seal: 11.5 FT.

Type of Seal: Sand 30/65

Elevation / Depth of Top of Filter Pack: 13 FT.

Elevation / Depth of Top of Screen: 14 FT.

Type of Screen: Sch. 40 PVC

Slot Size x Length: 0.010 IN. X 10 FT.

I.D. of Screen: 2 inch

Type of Filter Pack: Sand 20/30

Elevation / Depth of Bottom of Screen: 114 FT.

Elevation / Depth of Bottom of Filter Pack: 114.5 FT.

Type of Backfill Below Well: Sand 20/30

Elevation / Total Depth of Borehole: 114.5 FT.

Tetra Tech NUS, Inc.

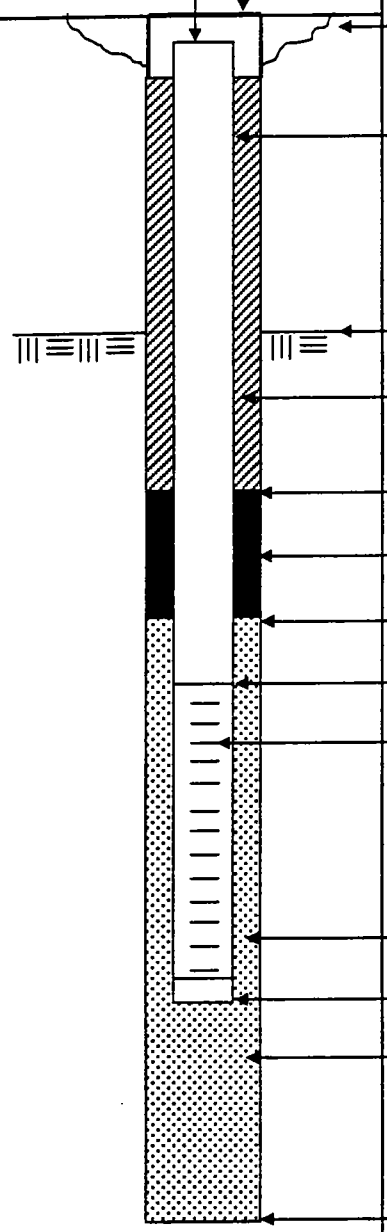
WELL No.: CEF-B312-9S

MONITORING WELL SHEET - POST COMPLETION

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	Precision	BORING No.:	9S
PROJECT No.:	39	DRILLER:	T. LYNCH	DATE COMPLETED:	9·18·01
SITE:	B.~~824A~~ 312	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	L. KNIGHT	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Elevation / Depth of Top of Riser:	/
Elevation / Height of Top of Surface Casing:	/
I.D. of Surface Casing:	
Type of Surface Casing:	Steel, boltdown
Type of Surface Seal:	Concrete
I.D. of Riser:	2 inch
Type of Riser:	Sch. 40, PVC
Borehole Diameter:	8"
Elevation / Depth Top of Rock:	N/A
Type of Backfill:	Portland Cement Type I
Elevation / Depth of Seal:	12.0
Type of Seal:	Medium Sand (30/65 grade)
Elevation / Depth of Top of Filter Pack:	12.5
Elevation / Depth of Top of Screen:	14.5
Type of Screen:	Sch. 40, PVC
Slot Size x Length:	0.010 inch x 10 ft.
I.D. of Screen:	2 inch
Type of Filter Pack:	Coarse Sand (20/30 grade)
Elevation / Depth of Bottom of Screen:	14.5
Elevation / Depth of Bottom of Filter Pack:	15.0
Type of Backfill Below Well:	Coarse Sand (20/30 grade)
Elevation / Total Depth of Borehole:	15.0

9·19·01 (1615)

Tetra Tech NUS, Inc.

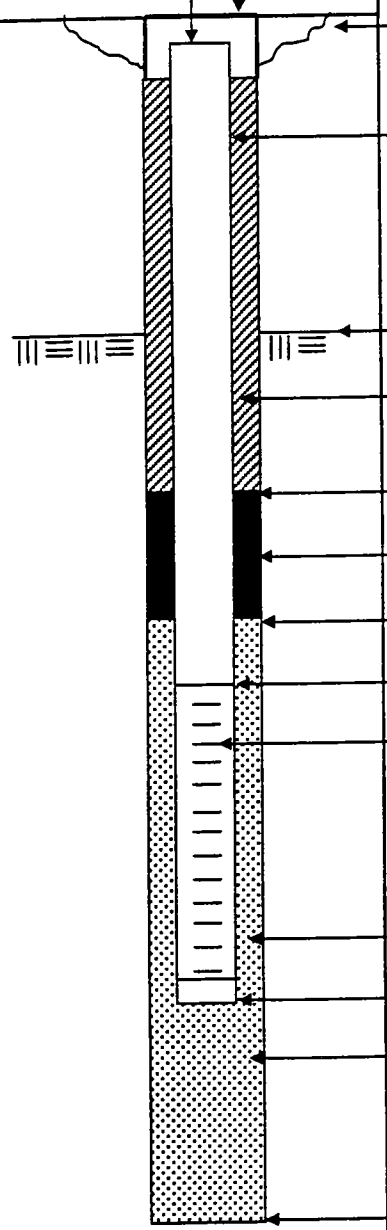
WELL No.: CEF-B312-105

MONITORING WELL SHEET - POST COMPLETION

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	Precision	BORING No.:	105
PROJECT No.:	39	DRILLER:	T. Lynch	DATE COMPLETED:	9.17.01
SITE:	B.~~824A~~ 312	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	L. KNIGHT	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Elevation / Depth of Top of Riser:	1
Elevation / Height of Top of Surface Casing:	1
I.D. of Surface Casing:	
Type of Surface Casing:	Steel, boltdown
Type of Surface Seal:	Concrete
I.D. of Riser:	2 inch
Type of Riser:	Sch. 40, PVC
Borehole Diameter:	8"
Elevation / Depth Top of Rock:	N/A
Type of Backfill:	Portland Cement Type I
Elevation / Depth of Seal:	12.0
Type of Seal:	Medium Sand (30/65 grade)
Elevation / Depth of Top of Filter Pack:	12.50
Elevation / Depth of Top of Screen:	14.30
Type of Screen:	Sch. 40, PVC
Slot Size x Length:	0.010 inch x 10 ft.
I.D. of Screen:	2 inch
Type of Filter Pack:	Coarse Sand (20/30 grade)
Elevation / Depth of Bottom of Screen:	114.30
Elevation / Depth of Bottom of Filter Pack:	115.0
Type of Backfill Below Well:	Coarse Sand (20/30 grade)
Elevation / Total Depth of Borehole:	115.0

9.19.01 (0950)

Tetra Tech NUS, Inc.

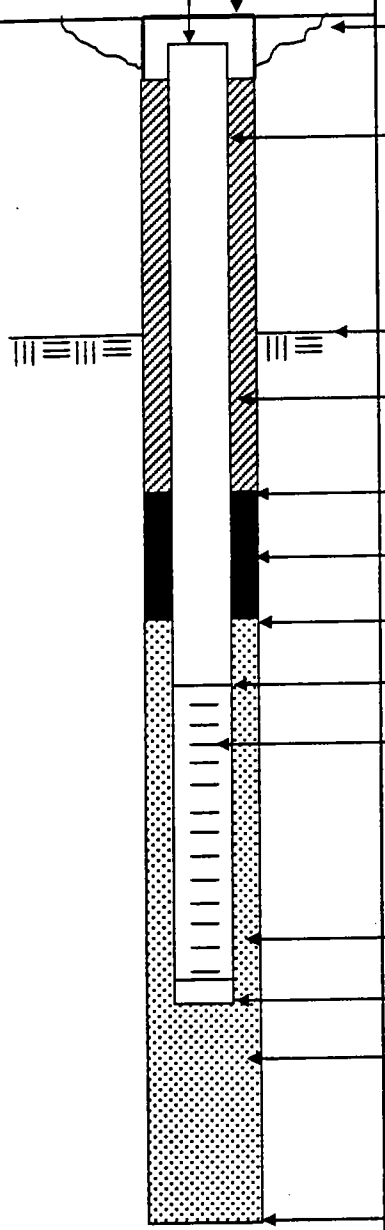
WELL No.: CEF- B312-11S

MONITORING WELL SHEET – POST COMPLETION

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	Precision	BORING No.:	11S
PROJECT No.:	39	DRILLER:	T. LYNCH	DATE COMPLETED:	9-17-01
SITE:	B.~~824A~~ 312	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	L. KNIGHT	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Elevation / Depth of Top of Riser:	/
Elevation / Height of Top of Surface Casing:	/
I.D. of Surface Casing:	
Type of Surface Casing:	Steel, boltdown
Type of Surface Seal:	Concrete
I.D. of Riser:	2 inch
Type of Riser:	Sch. 40, PVC
Borehole Diameter:	8"
Elevation / Depth Top of Rock:	/
Type of Backfill:	Portland Cement Type I
Elevation / Depth of Seal:	12.0
Type of Seal:	Medium Sand (30/65 grade)
Elevation / Depth of Top of Filter Pack:	12.5
Elevation / Depth of Top of Screen:	14.5
Type of Screen:	Sch. 40, PVC
Slot Size x Length:	0.010 inch x 10 ft.
I.D. of Screen:	2 inch
Type of Filter Pack:	Coarse Sand (20/30 grade)
Elevation / Depth of Bottom of Screen:	14.5
Elevation / Depth of Bottom of Filter Pack:	15.0
Type of Backfill Below Well:	Coarse Sand (20/30 grade)
Elevation / Total Depth of Borehole:	15.0

9-19-01 (1435)

Tetra Tech NUS, Inc.

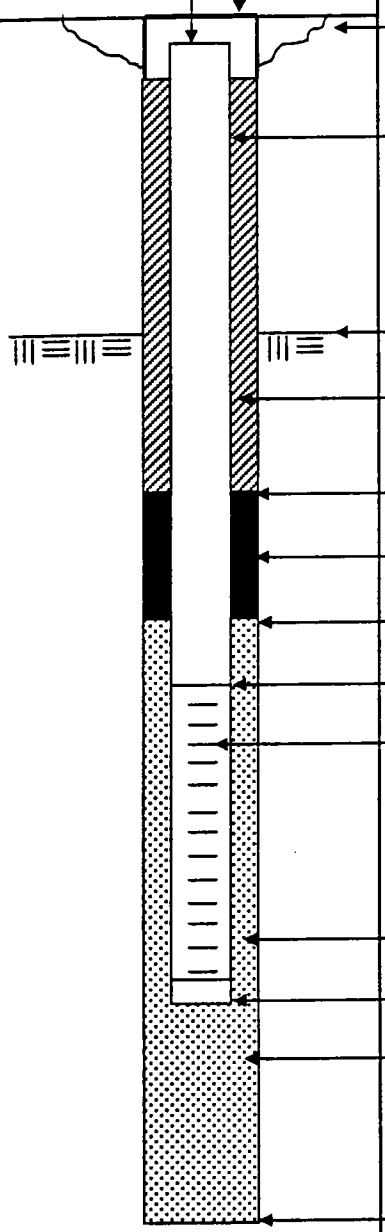
WELL No.: CEF-B312-12S

MONITORING WELL SHEET - POST COMPLETION

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	Precision	BORING No.:	12S
PROJECT No.:	39	DRILLER:	T. Lynch	DATE COMPLETED:	9.17.01
SITE:	B.824A	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	L. Knight	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Elevation / Depth of Top of Riser:	/
Elevation / Height of Top of Surface Casing:	/
I.D. of Surface Casing:	
Type of Surface Casing:	Steel, boltdown
Type of Surface Seal:	Concrete
I.D. of Riser:	2 inch
Type of Riser:	Sch. 40, PVC
Borehole Diameter:	8"
Elevation / Depth Top of Rock:	N/A
Type of Backfill:	Portland Cement Type I
Elevation / Depth of Seal:	/ 2.0
Type of Seal:	Medium Sand (30/65 grade)
Elevation / Depth of Top of Filter Pack:	/ 2.5
Elevation / Depth of Top of Screen:	/ 4.5
Type of Screen:	Sch. 40, PVC
Slot Size x Length:	0.010 inch x 10 ft.
I.D. of Screen:	2 inch
Type of Filter Pack:	Coarse Sand (20/30 grade)
Elevation / Depth of Bottom of Screen:	/ 14.5
Elevation / Depth of Bottom of Filter Pack:	/ 15.0
Type of Backfill Below Well:	Coarse Sand (20/30 grade)
Elevation / Total Depth of Borehole:	/ 15.0

9.19.01 (1450)

Tetra Tech NUS, Inc.

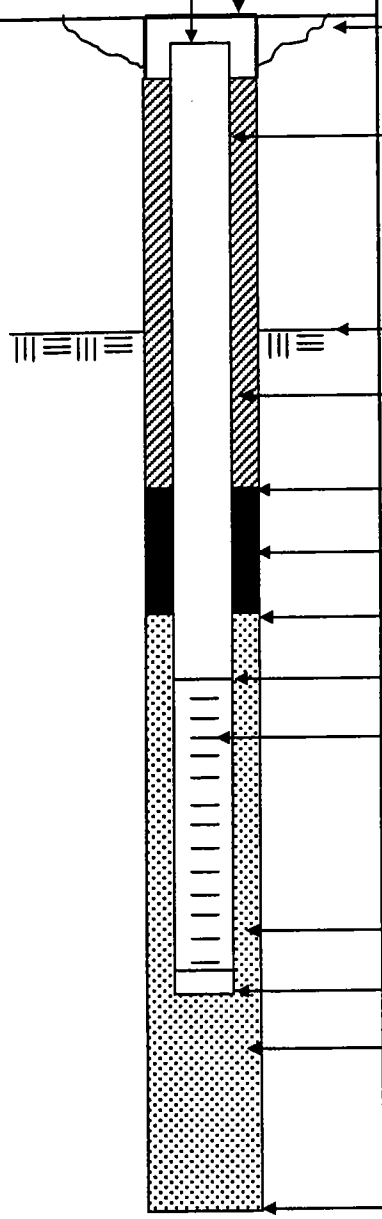
WELL No.: CEF- B312-13S

MONITORING WELL SHEET– POST COMPLETION

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	Precision	BORING No.:	13S
PROJECT No.:	39	DRILLER:	T. LYNCH	DATE COMPLETED:	9.17.01
SITE:	B.~~824A~~ 312	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	L. KNIGHT	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Elevation / Depth of Top of Riser: /

Elevation / Height of Top of Surface Casing: /

I.D. of Surface Casing:

Type of Surface Casing: Steel, boltdown

Type of Surface Seal: Concrete

I.D. of Riser: 2 inch

Type of Riser: Sch. 40, PVC

Borehole Diameter: 8"

Elevation / Depth Top of Rock: N/A

Type of Backfill: Portland Cement Type I

Elevation / Depth of Seal: 12.0

Type of Seal: Medium Sand (30/65 grade)

Elevation / Depth of Top of Filter Pack: 12.5

Elevation / Depth of Top of Screen: 14.35

Type of Screen: Sch. 40, PVC

Slot Size x Length: 0.010 inch x 10 ft.

I.D. of Screen: 2 inch

Type of Filter Pack: Coarse Sand (20/30 grade)

Elevation / Depth of Bottom of Screen: 114.35

Elevation / Depth of Bottom of Filter Pack: 115.0

Type of Backfill Below Well: Coarse Sand (20/30 grade)

Elevation / Total Depth of Borehole: 115.0

9.19.01 (0940)

Tetra Tech NUS, Inc.

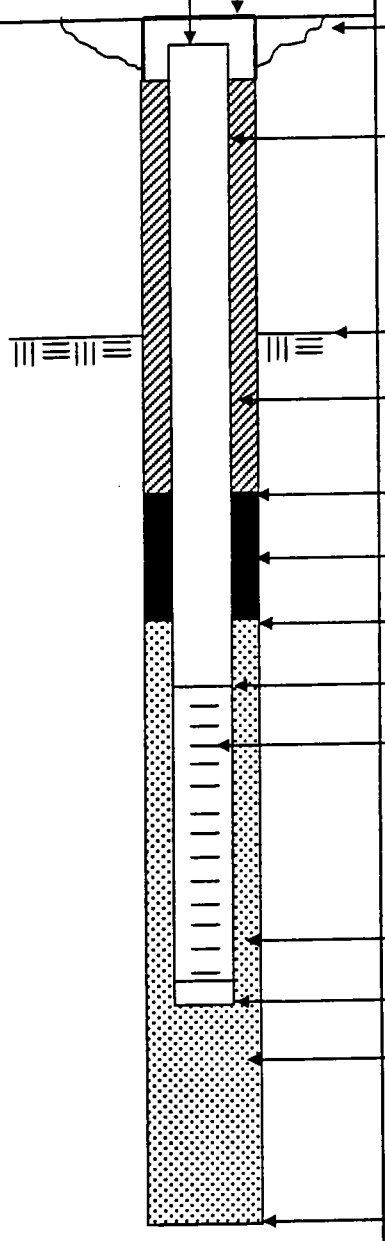
WELL No.: CEF-B312-14S

MONITORING WELL SHEET - POST COMPLETION

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	Precision	BORING No.:	14S
PROJECT No.:	39	DRILLER:	T. LYNCH	DATE COMPLETED:	9·18·01
SITE:	B.~~624A~~ 312	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	L. KNIGHT	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Elevation / Depth of Top of Riser: /

Elevation / Height of Top of Surface Casing: /

I.D. of Surface Casing:

Type of Surface Casing: Steel, boltdown

Type of Surface Seal: Concrete

I.D. of Riser: 2 inch

Type of Riser: Sch. 40, PVC

Borehole Diameter: 8"

Elevation / Depth Top of Rock: /

Type of Backfill: Portland Cement Type I

Elevation / Depth of Seal: 12.0

Type of Seal: Medium Sand (30/65 grade)

Elevation / Depth of Top of Filter Pack: 12.5

Elevation / Depth of Top of Screen: 14.0

Type of Screen: Sch. 40, PVC

Slot Size x Length: 0.010 inch x 10 ft.

I.D. of Screen: 2 inch

Type of Filter Pack: Coarse Sand (20/30 grade)

Elevation / Depth of Bottom of Screen: 114.0

Elevation / Depth of Bottom of Filter Pack: 115.0

Type of Backfill Below Well: Coarse Sand (20/30 grade)

Elevation / Total Depth of Borehole: 115.0

9.19.01 (1025)

Tetra Tech NUS, Inc.

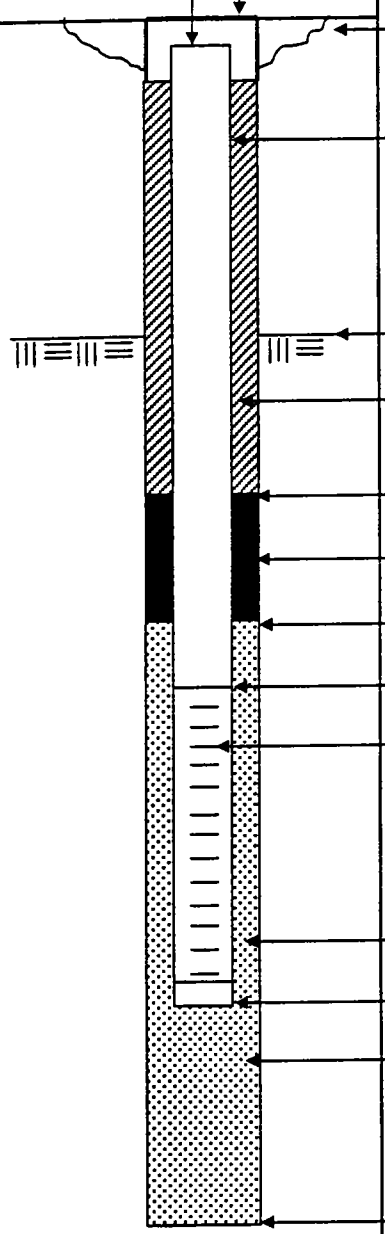
WELL No.: CEF- B312.15I

MONITORING WELL SHEET – POST COMPLETION

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	Precision	BORING No.:	15I
PROJECT No.:	39	DRILLER:	T. LYNCH	DATE COMPLETED:	9.14.01
SITE:	B.~~824A~~ 312	DRILLING METHOD:	Mud ROTARY	NORTHING:	
GEOLOGIST:	L. KNIGHT	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =

Datum:



Elevation / Depth of Top of Riser:	/
Elevation / Height of Top of Surface Casing:	/
I.D. of Surface Casing:	
Type of Surface Casing:	Steel, boltdown
Type of Surface Seal:	Concrete
I.D. of Riser:	2 inch
Type of Riser:	Sch. 40, PVC
Borehole Diameter:	6"
Elevation / Depth Top of Rock:	N/A
Type of Backfill:	Portland Cement Type I
Elevation / Depth of Seal:	130.0
Type of Seal:	~~Medium Sand (30/65 grade)~~ BENTONITE SLURRY
Elevation / Depth of Top of Filter Pack:	133.0
Elevation / Depth of Top of Screen:	135.2
Type of Screen:	Sch. 40, PVC
Slot Size x Length:	0.010 inch x 10 ft.
I.D. of Screen:	2 inch
Type of Filter Pack:	Coarse Sand (20/30 grade)
Elevation / Depth of Bottom of Screen:	140.2
Elevation / Depth of Bottom of Filter Pack:	141.0
Type of Backfill Below Well:	Coarse Sand (20/30 grade)
Elevation / Total Depth of Borehole:	141.0

9.19.01 (1035)

B.3 Conformance Reports

CERTIFICATE OF CONFORMANCE

Well Designation: CEF-824A-2S
Site Name: Bldg 824A, CECIL FIELD
Date Installed: 06/29/00
Project Name: GROUNDWATER INVESTIGATION, B. 824A

Site Geologist: MERVIN DALE
Drilling Company: GROUNDWATER PROTECTION, INC.
Driller: NICK SMARITTO
Project Number: N0039

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Sch. 40 PVC, 2 IN. DIAM.	Toney Drilling Supply, Orlando, FL	NO
Well Screen	Sch. 40 PVC, 2 IN. DIAM. 0.010 IN. SLOTS	(10 FT.) Toney Drilling, ORLANDO, FL	NO
End Cap	Sch. 40 PVC, 2 IN. DIAM., 6 IN.		
Drilling Fluid	None	N/A	—
Drilling Fluid Additives	None	N/A	—
Backfill Material	None	N/A	—
Annular Filter Pack	GRADE 20/30 Sand (50 lb bags)	Standard Sand, JAX, FL	NO
~~Bentonite Seal~~ (FINE SAND)	GRADE 30/65 (50 lb. bags)	Standard Sand, JAX, FL	NO
Annular Grout	PORTLAND Type I Cement	HOLNAM TAMPA, FL	NO
Surface Cement	QUIKRETE CONCRETE	QUIKRETE ATLANTA, GA	NO
Protective Casing	BOLTDOWN 8 IN. MANHOLE (Flush)	Toney Drilling, ORLANDO, FL	NO
Paint	None	N/A	~~NO~~
Rod Lubricant	None	N/A	~~NO~~
Compressor Oil	None	N/A	~~NO~~

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Mervin W. Dale

CERTIFICATE OF CONFORMANCE

Well Designation: CEF-824A-3S
Site Name: Bldg. 824A, CECIL FIELD
Date Installed: 06/29/00
Project Name: GROUNDWATER INVESTIGATION, B. 824A

Site Geologist: MERVIN DALE
Drilling Company: GROUNDWATER PROTECTION, INC.
Driller: NICK SMARITTO
Project Number: N0039

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Sch. 40 PVC, 2 IN. DIAM.	Toney Drilling Supply, Orlando, FL	NO
Well Screen	Sch. 40 PVC, 2 IN. DIAM. 0.010 IN. SLOTS	(10 FT.) Toney Drilling, ORLANDO, FL	NO
End Cap	Sch. 40 PVC, 2 IN. DIAM., 6 IN.		
Drilling Fluid	None	N/A	—
Drilling Fluid Additives	None	N/A	—
Backfill Material	None	N/A	—
Annular Filter Pack	GRADE 20/30 Sand (50 lb bags)	Standard Sand, JAX, FL	NO
~~Bentonite~~ Seal (FINE SAND)	GRADE 30/65 (50 lb. bags)	Standard Sand, JAX, FL	NO
Annular Grout	PORTLAND Type I Cement	HOLNAM TAMPA, FL	NO
Surface Cement	QUIKRETE CONCRETE	QUIKRETE, ATLANTA, GA	NO
Protective Casing	BOLTDOWN 8 IN. MANHOLE (Flush)	Toney Drilling, ORLANDO, FL	NO
Paint	None	N/A	~~NO~~
Rod Lubricant	None	N/A	~~NO~~
Compressor Oil	None	N/A	~~NO~~

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Mervin W. Dale

CERTIFICATE OF CONFORMANCE

Well Designation: CEF-824A-4S
Site Name: Bldg. 824A, CECIL FIELD
Date Installed: 06/29/00
Project Name: GROUNDWATER INVESTIGATION, B.824A

Site Geologist: MERVIN DALE
Drilling Company: GROUNDWATER PROTECTION, INC.
Driller: NICK SMARITTO
Project Number: N0039

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Sch. 40 PVC, 2 IN. DIAM.	Toney Drilling Supply, Orlando, FL	NO
Well Screen	Sch. 40 PVC, 2 IN. DIAM. 0.010 IN. SLOTS	(10 FT.) Toney Drilling, ORLANDO, FL	NO
End Cap	Sch. 40 PVC, 2 IN. DIAM., 6 IN.		
Drilling Fluid	None	N/A	—
Drilling Fluid Additives	None	N/A	—
Backfill Material	None	N/A	—
Annular Filter Pack	GRADE 20/30 Sand (50 lb bags)	Standard Sand, JAX, FL	NO
~~Bentonite Seal~~ (FINE SAND)	GRADE 30/65 (50 lb. bags)	Standard Sand, JAX, FL	NO
Annular Grout	PORTLAND Type I Cement	HOLNAM TAMPA, FL	NO
Surface Cement	QUIKRETE CONCRETE	QUIKRETE ATLANTA, GA	NO
Protective Casing	BOLTDOWN 8 IN. MANHOLE (Flush)	Toney Drilling, ORLANDO, FL	NO
Paint	None	N/A	~~NO~~
Rod Lubricant	None	N/A	~~NO~~
Compressor Oil	None	N/A	~~NO~~

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Mervin W. Dale

CERTIFICATE OF CONFORMANCE

Well Designation: CEF-824A-5S
Site Name: Bldg 824A, CECIL FIELD
Date Installed: 06/29/00
Project Name: GROUNDWATER INVESTIGATION, B824A

Site Geologist: MERVIN DALE
Drilling Company: GROUNDWATER PROTECTION, INC.
Driller: NICK SMARITTO
Project Number: N0039

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Sch. 40 PVC, 2 IN. DIAM.	Toney Drilling Supply, Orlando, FL	NO
Well Screen	Sch. 40 PVC, 2 IN. DIAM., 0.010 IN. SLOTS	(10 FT.) Toney Drilling, ORLANDO, FL	NO
End Cap	Sch. 40 PVC, 2 IN. DIAM., 6 IN.		
Drilling Fluid	None	N/A	—
Drilling Fluid Additives	None	N/A	—
Backfill Material	None	N/A	—
Annular Filter Pack	GRADE 20/30 Sand (50 lb bags)	Standard Sand, JAX, FL	NO
~~Bentonite~~ Seal (FINE SAND)	GRADE 30/65 (50 lb. bags)	Standard Sand, JAX, FL	NO
Annular Grout	PORTLAND Type I Cement	HOLNAM TAMPA, FL	NO
Surface Cement	QUIKRETE CONCRETE	QUIKRETE, ATLANTA, GA	NO
Protective Casing	BOLTDOWN 8 IN. MANhole (Flush)	Toney Drilling, ORLANDO, FL	NO
Paint	None	N/A	~~NO~~
Rod Lubricant	None	N/A	~~NO~~
Compressor Oil	None	N/A	~~NO~~

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Mervin W. Dale

CERTIFICATE OF CONFORMANCE

Well Designation: CEF-824A-6I
Site Name: Bldg. 824A, CECIL FIELD
Date Installed: 09/11/00
Project Name: Bldg 824A

Site Geologist: MERVIN DALE
Drilling Company: PARTRIDGE DRILLING
Driller: Mike Nicholson
Project Number: N0039.DS0.05P.S20

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Sch. 40 PVC, 2in. I.D.	Johnson Filters	NO
Well Screen	Sch. 40 PVC, 2in. I.D., 0.010 W. Slots.	Johnson Filters	NO
End Cap	Sch. 40 PVC, 2in. I.D., 6in. well pt.	Johnson Filters	NO
Drilling Fluid	None	—	
Drilling Fluid Additives	None	—	
Backfill Material	None	—	
Annular Filter Pack	20/30 GRADE SAND	Standard Sand, Tmx, FL.	
~~Bentonite~~ Fine Sand Seal	30/65 GRADE SAND	Standard Sand, Tmx, FL.	
Annular Grout	Type I & II PORTLAND Cement	Lehigh Allentown, PA.	
Surface Cement	Concrete	Quikrete Atlanta, GA.	
Protective Casing	8in. Steel Boltdown Flush MT.	PEMCO, Hialeah, FL.	
Paint	None		
Rod Lubricant	None		
Compressor Oil	None		

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Mervin W. Dale

CERTIFICATE OF CONFORMANCE

Well Designation: CEF-824A-7S
Site Name: Bldg. 824A, CECIL FIELD
Date Installed: 09/12/00
Project Name: Bldg 824A

Site Geologist: MERVIN DALE
Drilling Company: PARTRIDGE DRILLING
Driller: Mike Nicholson
Project Number: N0039.DS0.05P.S20

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Sch. 40 PVC, 2IN. I.D.	Johnson Filters	NO
Well Screen	Sch. 40 PVC, 2IN. I.D., 0.010 W. Slots.	Johnson Filters	NO
End Cap	Sch. 40 PVC, 2IN. I.D., 6IN. well pt.	Johnson Filters	NO
Drilling Fluid	None	—	
Drilling Fluid Additives	None	—	
Backfill Material	None	—	
Annular Filter Pack	20/30 GRADE SAND	Standard Sand, Tax, FL.	
~~Bentonite~~ FINE SAND Seal	30/65 GRADE SAND	Standard Sand, Tax. FL.	
Annular Grout	Type I & II PORTLAND Cement	LeHigh Allentown, PA.	
Surface Cement	Concrete	Quikrete Atlanta, GA.	
Protective Casing	8IN. Steel Boltdown Flush MT.	PEMCO, Hialeah, FL.	
Paint	None		
Rod Lubricant	none		
Compressor Oil	none		

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Mervin W. Dale

MONITORING WELL MATERIALS
CERTIFICATE OF CONFORMANCE

Well Designation: CEF-824A-08S
Site Name: Bldg. 824A
Date Installed: 01/15/01
Project Name: Phase IV, B.824A SAWP

Site Geologist: MERVIN DALE / Michele O'Neill
Drilling Company: G.P.I.
Driller: N. SMARRITO
Project Number: N0039. DS0.05E.145

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	2IN. SCH 40 PVC	TONEY DRILLING MIAMI, FL	NO
Well Screen	2IN. Sch. 40 PVC, 0.010 W. SLOTS, 10' screen	TONEY MIAMI, FL	NO
End Cap	2IN. Sch. 40 PVC, 6IN. HELL PT.	TONEY MIAMI, FL	NO
Drilling Fluid	NO		
Drilling Fluid Additives	NO		
Backfill Material	~~NO~~ MD 20/30 Sand under well pt.		
Annular Filter Pack	20/30 GRADE SAND	STANDARD SAND CO. JAX, FL	NO
MD ~~Bentonite~~ Seal, FINE SAND	30/65 GRADE SAND	STANDARD SAND CO. JAX, FL	NO
Annular Grout	PORTLAND CEMENT, TYPE I	HOLNAM TAMPA FL	NO
Surface Cement	QUIKRETE	QUIKRETE ATLANTA GA	NO
Protective Casing	8 IN. I.D. BOLTDOWN FLUSH MT.	PEMCO Hollywood, FL	NO
Paint	NO		
Rod Lubricant	NO		
Compressor Oil	NO		

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Mervin Dale [illegible]

MONITORING WELL MATERIALS
CERTIFICATE OF CONFORMANCE

Well Designation: CEF 824 A-09S
Site Name: Bldg. 824A
Date Installed: 01/15/01
Project Name: Phase IV, B.824A SAWP

Site Geologist: MERVIN DALE / Michele O'Neill
Drilling Company: G.P.I.
Driller: N. SMARRITO
Project Number: N0039. DS0.05E.145

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	2IN. SCH 40 PVC	TONEY DRILLING MIAMI, FL	NO
Well Screen	2IN. Sch. 40 PVC, 0.010 IN. SLOT, 10' sch.	TONEY MIAM, FL	NO
End Cap	2IN. Sch. 40 PVC, 6IN. WELL PT.	TONEY MIAMI, FL	NO
Drilling Fluid	NO		
Drilling Fluid Additives	NO		
Backfill Material	~~NO~~ MD 20/30 SAND under well pt		
Annular Filter Pack	20/30 GRADE SAND	STANDARD SAND CO. JAX, FL	NO
MD ~~Bentonite~~ Seal, FINE SAND	30/65 GRADE SAND	STANDARD SAND CO. JAX, FL	NO
Annular Grout	PORTLAND CEMENT, TYPE I	HOLNAM TAMPA FL	NO
Surface Cement	QUIKRETE	QUIKRETE ATLANTA GA	NO
Protective Casing	8 IN. I.D. BOLTDOWN FLUSH MT.	PEMCO Hollywood, FL	NO
Paint	NO		
Rod Lubricant	NO		
Compressor Oil	NO		

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Mervin Dale

CEF- P45-135
CEF-824-10S
CEF-428-1SR

MONITORING WELL MATERIALS CERTIFICATE OF CONFORMANCE

Well Designation: CEF-428-2SR
Site Name: Cecil field
Date Installed: 01/18/01
Project Name: PSC 45, B. 824, B. 428

Site Geologist: M. ONeill
Drilling Company: GROUNDWATER PROTECTION
Driller: Charles Bucher / Jeff Ziegler
Project Number: N0039, N0486

Material	Brand/Description	Source/Supplier		Sample Collected ?
Well Casing	Sch. 40 PVC, 2 IN. DIAM.	Toney Drilling	MIAMI, FL	NO
Well Screen	Sch. 40 PVC 2 IN. DIAM., 10 slot	Toney Drilling	MIAMI, FL	NO
End Cap	Sch. 40 PVC, 2 IN. DIAM, 6 IN. long point	Toney Drilling	MIAMI, FL	NO
Drilling Fluid	None			
Drilling Fluid Additives	None			
Backfill Material	20/30 SAND (below well Screen)	Std. Sand	JAX, FL.	NO
Annular Filter Pack	20/30 SAND	Std. Sand	JAX, FL.	NO
~~Bentonite~~ Seal, FINE SAND	30/65 SAND	Std. Sand	JAX, FL	NO
Annular Grout	Type I Portland Cement	~~Std. S~~ HOLNAM	TAMPA, FL	NO
Surface Cement	Quikrete	Quikrete Co.	Atlanta, GA	NO
Protective Casing	8 IN. I.D. Steel boltdown	PEMCO	Hollywood, FL	NO
Paint	No			
Rod Lubricant	No			
Compressor Oil	No			

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: [signature]

MONITORING WELL MATERIALS
CERTIFICATE OF CONFORMANCE

Well Designation: CEF-824A-115
Site Name: Bldg. 824A
Date Installed: 01/15/01
Project Name: Phase IV, B.824A SAWP

Site Geologist: MERVIN DALE / Michele O'Neill
Drilling Company: G.P.I.
Driller: N. SMARRITO
Project Number: N0039. DS0.05E.145

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	2IN. SCH 40 PVC	TONEY DRILLING MIAMI, FL	NO
Well Screen	2IN. Sch. 40 PVC, 0.010 W. SLOTS, 10' screen	TONEY MIAMI, FL	NO
End Cap	2IN. Sch. 40 PVC, 6IN. HELL PT.	TONEY MIAMI, FL	NO
Drilling Fluid	NO		
Drilling Fluid Additives	NO		
Backfill Material	~~NO~~ MD 20/30 SAND under well pt		
Annular Filter Pack	20/30 GRADE SAND	STANDARD SAND CO. JAX FL	NO
MD ~~Bentonite~~ Seal, FINE SAND	30/65 GRADE SAND	STANDARD SAND CO. JAX, FL	NO
Annular Grout	PORTLAND CEMENT, TYPE I	HOLNAM TAMPA FL	NO
Surface Cement	QUIKRETE	QUIKRETE ATLANTA GA	NO
Protective Casing	8 IN. I.D. BOLTDOWN FLUSH MT.	PEMCO Hollywood, FL	NO
Paint	NO		
Rod Lubricant	NO		
Compressor Oil	NO		

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Mervin Dale [illegible]

MONITORING WELL MATERIALS
CERTIFICATE OF CONFORMANCE

Well Designation: CEF-824-12I
Site Name: Bldg. 824A
Date Installed: 01/15/01
Project Name: Phase IV, B.824A SAWP

Site Geologist: MERVIN DALE / Michele O'Neill
Drilling Company: G.P.I.
Driller: N. SMARRITO
Project Number: N0039.050.05E.145

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	2IN. SCH 40 PVC	TONEY DRILLING MIAMI, FL	NO
Well Screen	2IN. Sch. 40 PVC, 0.010 IN. SLOT 5 screen	TONEY MIAMI, FL	NO
End Cap	2IN. Sch. 40 PVC, 6IN. HELL PT.	TONEY MIAMI, FL	NO
Drilling Fluid	NO		
Drilling Fluid Additives	NO		
Backfill Material	~~NO~~ MD 20/30 SAND under well pt.		
Annular Filter Pack	20/30 GRADE SAND	STANDARD SAND CO. JAX, FL	NO
MD ~~Bentonite~~ Seal, FINE SAND	30/65 GRADE SAND	STANDARD SAND CO. JAX, FL	NO
Annular Grout	PORTLAND CEMENT, TYPE I	HOLNAM TAMPA FL	NO
Surface Cement	QUIKRETE	QUIKRETE ATLANTA GA	NO
Protective Casing	8 IN. I.D. BOLTDOWN FLUSH MT.	PEMCO Hollywood, FL	NO
Paint	NO		
Rod Lubricant	NO		
Compressor Oil	NO		

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Mervin W. Dale

MONITORING WELL MATERIALS
CERTIFICATE OF CONFORMANCE

Well Designation: CEF-824A-21I
Site Name: SITE 57 - Bldg 824A
Date Installed: 12-6-01
Project Name: SITE 57 - Bldg. 824A RI

Site Geologist: LOUIS KNIGHT
Drilling Company: TRANSAMERICAN
Driller: D. BOHN
Project Number: N0039

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	2" SCH 40 PVC	TONEY DRILLING SUPPLIES / ORLANDO, FL	NO
Well Screen	2" SCH 40 PVC	TONEY DRILLING SUPPLIES / ORLANDO, FL	
End Cap	2" SCH 40 PVC	TONEY DRILLING SUPPLIES / ORLANDO, FL	
Drilling Fluid	N/A	N/A	
Drilling Fluid Additives	N/A	N/A	
Backfill Material	N/A	N/A	
Annular Filter Pack	STANDARD / 20/30 SILICA SAND	STANDARD SAND CO.	
~~Bentonite Seal~~ CHOKESAND	STANDARD / 30-65 SILICA SAND	STANDARD SAND CO.	
Annular Grout	TARMAC - TYPE I PORTLAND CEMENT	FLORIDA IRRIGATION	
Surface Cement	QUIKRETE - CONCRETE	FLORIDA IRRIGATION	
Protective Casing	N/A	N/A	
Paint	N/A	N/A	
Rod Lubricant	N/A	N/A	
Compressor Oil	N/A	N/A	
MANHOLE (8" DIAM)	PETROLEUM EQUIPMENT MANUFACTURING Co (PEMCO)	TONEY DRILLING SUPPLIES / ORLANDO, FL	

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Louis Knight

MONITORING WELL MATERIALS
CERTIFICATE OF CONFORMANCE

Well Designation: CEF-824A-22S
Site Name: SITE 57
Date Installed: 12-7-01
Project Name: SITE 57-Bldg 824A RI

Site Geologist: LOUIS KNIGHT
Drilling Company: TRANSAMERICAN
Driller: D. HEARNE
Project Number: N0039

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	2" SCH 40 PVC	TONEY DRILLING SUPPLIES / ORLANDO, FL	NO
Well Screen	2" SCH 40 PVC	TONEY DRILLING SUPPLIES / ORLANDO, FL	
End Cap	2" SCH 40 PVC	TONEY DRILLING SUPPLIES / ORLANDO, FL	
Drilling Fluid	N/A	N/A	
Drilling Fluid Additives	N/A	N/A	
Backfill Material	N/A	N/A	
Annular Filter Pack	STANDARD / 20/30 SILICA SAND	STANDARD SAND CO.	
~~Bentonite Seal~~ CHOKESAND	STANDARD / 30-65 SILICA SAND	STANDARD SAND CO.	
Annular Grout	TARMIC - TYPE I PORTLAND CEMENT	FLORIDA IRRIGATION	
Surface Cement	QUIKRETE - CONCRETE	FLORIDA IRRIGATION	
Protective Casing	N/A	N/A	
Paint	N/A	N/A	
Rod Lubricant	N/A	N/A	
Compressor Oil	N/A	N/A	
MANHOLE (8" DIAM)	PETROLEUM EQUIPMENT MANUFACTURING Co (PEMCO)	TONEY DRILLING SUPPLIES / ORLANDO, FL	

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Louis Knight

CERTIFICATE OF CONFORMANCE

Well Designation: CEF-312-1S
Site Name: Bldg. 312, CECIL FIELD
Date Installed: 06/28/00
Project Name: SAR - Bldg. 312

Site Geologist: MERVIN DALE
Drilling Company: GROUNDWATER PROTECTION, INC.
Driller: NICK SMARITTO
Project Number: N0486

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Sch. 40 PVC, 2 IN. DIAM.	Toney Drilling Supply, Orlando, FL	NO
Well Screen	Sch. 40 PVC, 2 IN. DIAM., 0.010 IN. SLOTS	(10 FT.) Toney Drilling, ORLANDO, FL	NO
End Cap	Sch. 40 PVC, 2 IN. DIAM., 6 IN.		
Drilling Fluid	None	N/A	—
Drilling Fluid Additives	None	N/A	—
Backfill Material	None	N/A	—
Annular Filter Pack	GRADE 20/30 Sand (50 lb bags)	Standard Sand, JAX, FL	NO
~~Bentonite~~ Seal (FINE SAND)	GRADE 30/65 (50 lb. bags)	Standard Sand, JAX, FL	NO
Annular Grout	PORTLAND Type I Cement	HOUNAM TAMPA, FL	NO
Surface Cement	QUIKRETE CONCRETE	QUIKRETE, ATLANTA, GA	NO
Protective Casing	BOLTDOWN 8 IN. MANHOLE (Flush)	Toney Drilling, ORLANDO, FL	NO
Paint	None	N/A	~~NO~~
Rod Lubricant	None	N/A	~~NO~~
Compressor Oil	None	N/A	~~NO~~

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Mervin W. Dale

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: CEF-B312-1I
Site Name: NAS CECIL FIELD
Date Installed: 11/15/00
Project Name: Bldg. 312 SAR

Site Geologist: MELVIN DALE
Drilling Company: PARTRIDGE Well DRILLERS
Driller: Jeff Weatherford
Project Number: N0486

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Sch.40 PVC 2in. DIAM.	ESLON, Charlotte, NC	NO
Well Screen	Sch.40 PVC, 2in. DIAM., 0.010 IN. Slots	ESLON, Charlotte, NC	NO
End Cap	Sch.40 PVC, 2in. DIAM., well point	ESLON, Charlotte, NC	NO
Drilling Fluid	WATER	NASCF POTABLE WATER	NO
Drilling Fluid Additives	SODIUM BENTONITE POWDER	QUIKGEL	NO
Backfill Material	None	—	—
Annular Filter Pack	Sand 20/30 GRADE	Standard Sand, JAX, FL	NO
~~Bentonite~~ Seal, FINE Sand	Sand 30/65 GRADE	Standard Sand, JAX, FL	NO
Annular Grout	PORTLAND CEMENT Type I+II	Lehigh, Allentown, PA	NO
Surface Cement	QUIKRETE	Quikrete Cos., Atlanta, GA	NO
Protective Casing	PEMCO Steel boltdown 12 IN I.D.	PEMCO Hollywood, FL.	NO
Paint	None	—	—
Rod Lubricant	None	—	—
Compressor Oil	None	—	—
OUTER CASING	Sch.40 PVC, 6 IN. DIAM.	ESLON, Charlotte, NC	NO

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Melvin W. Dale

CERTIFICATE OF CONFORMANCE

Well Designation: CEF-312-2S
Site Name: Bldg. 312, CECIL FIELD
Date Installed: 06/28/00
Project Name: SAR - Bldg. 312

Site Geologist: MERVIN DALE
Drilling Company: GROUNDWATER PROTECTION, INC.
Driller: NICK SMARITO
Project Number: N0486

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Sch. 40 PVC, 2 IN. DIAM.	Toney Drilling Supply, Orlando, FL	NO
Well Screen	Sch. 40 PVC, 2 IN. DIAM., 0.010 IN. SLOTS	(10 FT.) Toney Drilling, ORLANDO, FL	NO
End Cap	Sch. 40 PVC, 2 IN. DIAM., 6 IN.		
Drilling Fluid	None	N/A	—
Drilling Fluid Additives	None	N/A	—
Backfill Material	None	N/A	—
Annular Filter Pack	GRADE 20/30 Sand (50 lb bags)	Standard Sand, JAX, FL	NO
~~Bentonite~~ Seal (FINE SAND)	GRADE 30/65 (50 lb. bags)	Standard Sand, JAX, FL	NO
Annular Grout	PORTLAND Type I Cement	HOLNAM TAMPA, FL	NO
Surface Cement	QUIKRETE CONCRETE	QUIKRETE, ATLANTA, GA	NO
Protective Casing	BOLTDOWN 8 IN. MANhole (Flush)	Toney Drilling, ORLANDO, FL	NO
Paint	None	N/A	~~NO~~
Rod Lubricant	None	N/A	~~NO~~
Compressor Oil	None	N/A	~~NO~~

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Mervin W. Dale

CERTIFICATE OF CONFORMANCE

Well Designation: CEF-312-35
Site Name: Bldg. 312, CECIL FIELD
Date Installed: 06/28/00
Project Name: SAR- Bldg. 312

Site Geologist: MERVIN DALE
Drilling Company: GROUNDWATER PROTECTION, INC.
Driller: NICK SMARITTO
Project Number: NO 486

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Sch. 40 PVC, 2 IN. DIAM.	Toney Drilling Supply, Orlando, FL	NO
Well Screen	Sch. 40 PVC, 2 IN. DIAM., 0.010 IN. SLOTS	(10 FT.) Toney Drilling, ORLANDO, FL	NO
End Cap	Sch. 40 PVC, 2 IN. DIAM., 6 IN.		
Drilling Fluid	None	N/A	—
Drilling Fluid Additives	None	N/A	—
Backfill Material	None	N/A	—
Annular Filter Pack	GRADE 20/30 Sand (50 lb bags)	Standard Sand, JAX, FL	NO
~~Bentonite~~ Seal (FINE SAND)	GRADE 30/65 (50 lb. bags)	Standard Sand, JAX, FL	NO
Annular Grout	PORTLAND Type I Cement	HOLNAM TAMPA, FL	NO
Surface Cement	QUIKRETE CONCRETE	QUIKRETE ATLANTA, GA	NO
Protective Casing	BOLTDOWN 8 IN. MANHOLE (Flush)	Toney Drilling, ORLANDO, FL	NO
Paint	None	N/A	~~NO~~
Rod Lubricant	None	N/A	~~NO~~
Compressor Oil	None	N/A	~~NO~~

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Mervin W. Dale

Rev. 0
March 27, 1997

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: CEF-B312-45'
Site Name: NAS CECIL FIELD
Date Installed: 11/20/00
Project Name: Bldg. 312 SAR

Site Geologist: MERVIN DALE
Drilling Company: PARTRIDGE WELL DRILLERS
Driller: JEFF WEATHERFORD
Project Number: N0486

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Sch. 40 PVC, 2 inch DIAM.	ESLON, Charlotte, NC	NO
Well Screen	Sch. 40 PVC, 2 IN. DIAM, 0.010 IN. Slots	ESLON, Charlotte, NC	NO
End Cap	Sch. 40 PVC, 2 IN. DIAM, well point	ESLON, Charlotte, NC	NO
Drilling Fluid	None	—	—
Drilling Fluid Additives	none	—	—
Backfill Material	none	—	—
Annular Filter Pack	SAND 20/30 GRADE	Standard Sand, JAX, FL	NO
ND ~~Bentonite~~ Seal Sand Fin	SAND 30/65 GRADE	Standard Sand, JAX, FL	NO
Annular Grout	PORTLAND Cement Type 1911	Lehigh, Allentown, PA	NO
Surface Cement	QUIKRETE	QUIKRETE Cos., Atlanta GA	NO
Protective Casing	PEMCO, Steel boltdown 8 IN. ID.	PEMCO Hollywood, FL	NO
Paint	None	—	—
Rod Lubricant	None	—	—
Compressor Oil	None	—	—

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Mervin W. Dale

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: CEF-B312-5S
Site Name: NAS CECIL FIELD
Date Installed: 11/16/00
Project Name: Bldg. 312 SAR

Site Geologist: MERVIN DALE
Drilling Company: PARTRIDGE WELL DRILLERS
Driller: JEFF WEATHERFORD
Project Number: N0486

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Sch. 40 PVC, 2 inch DIAM.	ESLON, Charlotte, NC	NO
Well Screen	Sch. 40 PVC, 2 IN. DIAM, 0.010 IN. Slots	ESLON, Charlotte, NC	NO
End Cap	Sch. 40 PVC, 2 IN. DIAM. well point	ESLON, Charlotte, NC	NO
Drilling Fluid	None	—	—
Drilling Fluid Additives	none	—	—
Backfill Material	none	—	—
Annular Filter Pack	Sand 20/30 GRADE	Standard Sand, JAX, FL	NO
~~Bentonite Seal~~ Sand Fin	Sand 30/65 GRADE	Standard Sand, JAX, FL	NO
Annular Grout	PORTLAND Cement Type 1 & 11	Lehigh, Allentown, PA	NO
Surface Cement	QUIKRETE	QUIKRETE Co., Atlanta GA	NO
Protective Casing	PEMCO, Steel boltdown 8 IN. ID.	PEMCO Hollywood, FL	NO
Paint	None	—	—
Rod Lubricant	None	—	—
Compressor Oil	None	—	—

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Mervin W. Dale

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: CEF-B312-6S
Site Name: NAS CECIL FIELD
Date Installed: 11/20/00
Project Name: Bldg. 312 SAR

Site Geologist: MERVIN DALE
Drilling Company: PARTRIDGE WELL DRILLERS
Driller: JEFF WEATHERFORD
Project Number: N0486

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Sch. 40 PVC, 2 inch DIAM.	ESLON, Charlotte, NC	NO
Well Screen	Sch. 40 PVC, 2 IN. DIAM, 0.010 IN. Slots	ESLON, Charlotte, NC	NO
End Cap	Sch. 40 PVC, 2 IN. DIAM. well point	ESLON, Charlotte, NC	NO
Drilling Fluid	None	—	—
Drilling Fluid Additives	none	—	—
Backfill Material	none	—	—
Annular Filter Pack	Sand 20/30 GRADE	Standard Sand, JAX, FL	NO
~~Bentonite Seal~~ Sand Fine	Sand 30/65 GRADE	Standard Sand, JAX, FL	NO
Annular Grout	PORTLAND Cement Type 1 & 11	Lehigh, Allentown, PA	NO
Surface Cement	QUIKRETE	Quikrete Co., Atlanta GA	NO
Protective Casing	PEMCO, Steel boltdown 8 IN. ID.	PEMCO Hollywood, FL	NO
Paint	None	—	—
Rod Lubricant	None	—	—
Compressor Oil	None	—	—

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Mervin W. Dale

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: CEF- B312-7S
Site Name: NAS CECIL FIELD
Date Installed: 11/20/00
Project Name: Bldg. 312 SAR

Site Geologist: MERVIN DALE
Drilling Company: PARTRIDGE WELL DRILLERS
Driller: JEFF WEATHERFORD
Project Number: N0486

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Sch. 40 PVC, 2 inch DIAM.	ESLON, Charlotte, NC	NO
Well Screen	Sch. 40 PVC, 2 IN. DIAM, 0.010 IN. Slots	ESLON, Charlotte, NC	NO
End Cap	Sch. 40 PVC, 2 IN. DIAM. well point	ESLON, Charlotte, NC	NO
Drilling Fluid	None	—	—
Drilling Fluid Additives	none	—	—
Backfill Material	none	—	—
Annular Filter Pack	Sand 20/30 GRADE	Standard Sand, JAX, FL	NO
~~Bentonite Seal~~ Sand Fin	Sand 30/65 GRADE	Standard Sand, JAX, FL	NO
Annular Grout	PORTLAND Cement Type 1 & 11	Lehigh, Allentown, PA	NO
Surface Cement	QUIKRETE	Quikrete. Cos., Atlanta GA	NO
Protective Casing	PEMCO, Steel boltdown 8 IN. ID.	PEMCO Hollywood, FL	NO
Paint	none	—	—
Rod Lubricant	None	—	—
Compressor Oil	None	—	—

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Mervin W. Dale

Tetra Tech NUS. Inc.
CERTIFICATE OF CONFORMANCE

Well Designation: CEF-B312-SS
Site Name: NAS CECIL FIELD
Date Installed: 11/21/00
Project Name: Bldg. 312 SAR

Site Geologist: MERVIN DALE
Drilling Company: PARTRIDGE WELL DRILLERS
Driller: JEFF WEATHERFORD
Project Number: N0486

Material	Brand/Description	Source/Supplier	Sample Collected ?
Well Casing	Sch. 40 PVC, 2 inch DIAM.	ESLON, Charlotte, NC	NO
Well Screen	Sch. 40 PVC, 2 IN. DIAM, 0.010 IN. Slots	ESLON, Charlotte, NC	NO
End Cap	Sch. 40 PVC, 2 IN. DIAM. well point	ESLON, Charlotte, NC	NO
Drilling Fluid	None	—	—
Drilling Fluid Additives	none	—	—
Backfill Material	none	—	—
Annular Filter Pack	Sand 20/30 GRADE	Standard Sand, JAX, FL	NO
~~Bentonite Seal~~ Sand Fine	Sand 30/65 GRADE	Standard Sand, JAX, FL	NO
Annular Grout	PORTLAND Cement Type 1 & 11	Lehigh, Allentown, PA	NO
Surface Cement	QUIKRETE	Quikrete Co., Atlanta GA	NO
Protective Casing	PEMCO, Steel boltdown 8 IN. ID.	PEMCO Hollywood, FL	NO
Paint	None	—	—
Rod Lubricant	None	—	—
Compressor Oil	None	—	—

To the best of my knowledge, I certify that the above described materials were used during installation of this monitoring well.

Signature of Site Geologist: Mervin W. Dale