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FIRST QUARTER NATURAL ATTENUATION GROUNDWATER MONITORING REPORT FOR OPERABLE UNIT 7 (OU 7) SITE 16 NAS CECIL FIELD FL

1/1/1999

TETRA TECH NUS INC

First Quarter Natural Attenuation Groundwater Monitoring Report Operable Unit 7, Site 16

for

Naval Air Station Cecil Field

Jacksonville, Florida

Southern Division Naval Facilities Engineering Command

Contract Number N62467-94-D-0888

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FIRST QUARTER NATURAL ATTENUATION GROUNDWATER MONITORING REPORT OPERABLE UNIT 7, SITE 16 FOR

NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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CERTIFICATION OF TECHNICAL
DATA CONFORMITY (MAY 1987)

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: _____January 8, 1999_____

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ACRONYM LIST

ABB-ES	ABB Environmental, Inc.
AIMD	Aircraft Intermediate Maintenance Department
AS/SVEAir	Sparging/Soil Vapor Extraction
bls	below land surface
BRA	Baseline Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CO_2	Carbon Dioxide
COCs	Chemicals of Concern
1,1-DCE	Dichloroethene
DO	Dissolved Oxygen
DOC	Dissolved Organic Carbon
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
ft/ft	feet per foot
ft/yr	feet per year
IRA	Interim Remedial Action
IZS	Intermediate Zones
K	Hydraulic Conductivity
LZS	Lower Zones
mg/L	milligrams per liter
msl	mean sea level
µg/L	micrograms per liter
NAS	Naval Air Station
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NPL	National Priority List
NTU	nephelometric turbidity unit
ORP	Oxidation-Reduction Potential
OU	Operable Unit
QAPP	Quality Assurance Project Plan
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SVOC	Semivolatile Organic Compounds
TtNUS	Tetra Tech NUS

TCE	Trichloroethene
U.S. EPA	U.S. Environmental Protection Agency
USGS	U. S. Geological Survey
UZS	Upper Zones
VOC	Volatile Organic Compounds

1.0 INTRODUCTION

This First Quarter Groundwater Monitoring Report has been prepared under Contract Task Order (CTO) 051 under the Comprehensive Long-Term Environmental Action Navy III (CLEAN) Contract No. N62467-94-D-0888 for the Southern Division, Naval Facilities Engineering Command. This report presents a summary of the work performed for the first quarter groundwater monitoring event at Operable Unit (OU) 7, Site 16 at the Naval Air Station (NAS) Cecil Field, located in Jacksonville, Florida. This report evaluates and monitors the effectiveness of biodegradation natural attenuation to remediate chlorinated solvents in groundwater.

Tetra Tech NUS, Inc. (TtNUS) collected and analyzed groundwater samples from 17 monitoring wells for biodegradation natural attenuation parameters in November 1998. These activities were conducted in accordance with the Pilot-Scale Air Sparging/Soil Vapor Extraction (AS/SVE) Work Plan and Natural Attenuation Sampling and Analysis Plan (TtNUS, 1998a) and the Work Plan Addendum for Long-term Groundwater Monitoring at Sites 3, 5, 8, and 16 (TtNUS, 1998b). The purpose of this work is to obtain long-term data to assess the performance, progress, and effectiveness of the biodegradation processes of natural attenuation in reducing volatile organic contaminant concentrations and retarding their migration. The evaluation consists of measuring the plume migration as well as geochemical and contaminant level trends over time. This report summarizes the results from the first quarter (November 1998) groundwater-monitoring event, provides an interpretation of the results, and presents recommendations for future actions.

This report consists of four sections and one appendix as listed below:

- Section 1.0 discusses the purpose of the report and provides a brief history of Site 16.

- Section 2.0 summarizes the conditions at Site 16 as they existed prior to the implementation of the natural attenuation remedy (Remedial Investigation data collected in 1995 and Baseline Groundwater Monitoring data collected in August/September 1998), including chemicals of concern.

- Section 3.0 presents the analytical results and evaluation of the first quarter groundwater sampling conducted in November 1998.

- Section 4.0 presents conclusion and recommendations based on the evaluation of the results from the November 1998 sampling and analysis.

- Appendix A contains the data validation effort for the November 1998 groundwater sample analytical results.

1.1 HISTORY AND LOCATION OF WASTE DISPOSAL

OU 7, Site 16 is located at NAS Cecil Field near Jacksonville, Florida as illustrated in Figure 1-1. From 1959 to 1980, Site 16 was used to dispose of greases, rusts, scale and paint wastes from the cleaning of machines and engine parts as well as waste glass beads and blasting grit from the airframes blasting shop. Most wastes were discharged to a 4,100-gallon underground concrete holding tank located north of Building 313 and from there to an adjacent pit which allowed seepage of the waste directly into the subsurface soil and groundwater. In the late 1960s, the seepage pit was modified to allow discharge to the storm sewer system (ABB-ES, July 1995).

Use of the seepage pit was discontinued in 1980 and connecting pipes were removed or plugged. A bead separator was installed and its discharge was connected to the sanitary sewer system. During that period, the holding tank was used as a Resource Conservation and Recovery Act (RCRA) permitted facility for the 90-day storage of hazardous wastes. In 1989, the system was abandoned. All piping connections between Building 313 and the bead separator and holding tank were removed and plugged and the contents of the holding tank were removed for offsite treatment and disposal. The tank itself remained in place (ABB-ES, July 1995).

In March 1993, a modification to the RCRA permit of the holding tank stipulated that this tank must be closed. In May 1994, the holding tank, seepage pit, and glass bead separator were excavated and removed from the site as part of an Interim Remedial Action (IRA). Associated piping was removed or plugged with grout and 1,500 cubic yards of surrounding contaminated soil was excavated and disposed of offsite (ABB-ES, July 1995).

Following the IRA, a Remedial Investigation (RI) (ABB-ES, July 1995) was conducted to evaluate residual site contamination and associated risks. Samples of surface soil, subsurface soil, and groundwater were collected and analyzed. At Site 16, the primary source of contamination was determined to be the liquid waste generated during the cleaning of machine and engine parts conducted at Building 313. The 1994 IRA adequately addressed soil contamination but, results from the RI (ABB-ES, July 1995) established that several chlorinated volatile organic compounds (VOCs), including trichloroethene (TCE) and 1,1-dichloroethene (1,1-DCE) were still present in the groundwater at concentrations in excess of regulatory criteria. Table 1-1 summarizes the analytical results for organic compounds detected in groundwater during the RI along with the clean-up levels. A detailed description of the nature and extent of contamination can be found in the RI Report for OU 7, Site 16 (ABB-ES, July 1995).

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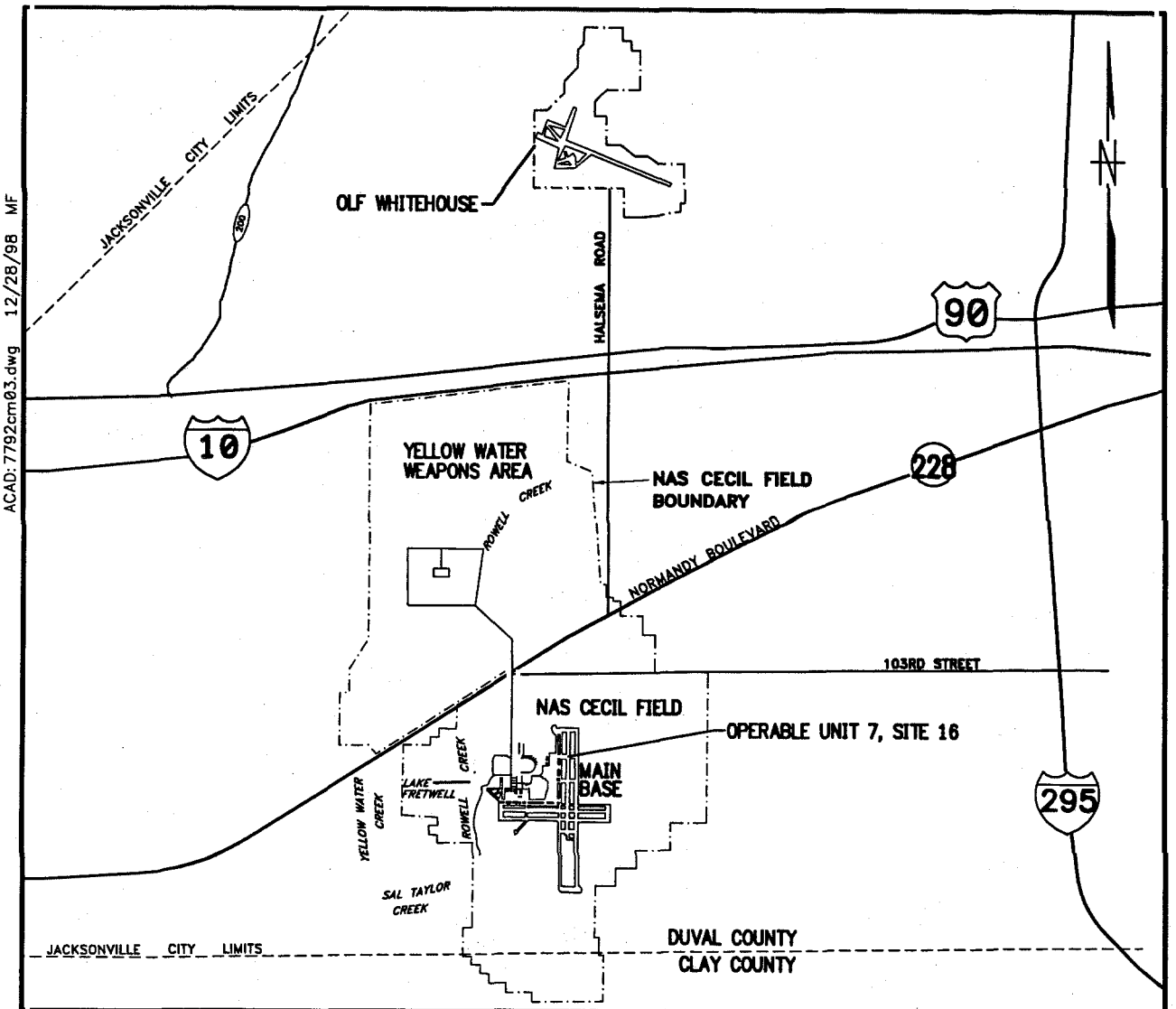

NOTES:
NAS = Naval Air Station
OLF = Outlying Landing Field

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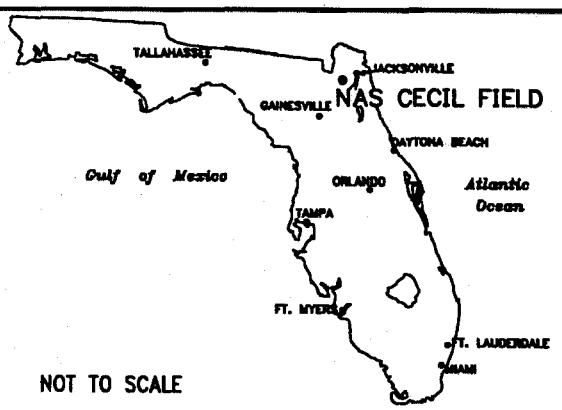

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TABLE 1-1

SUMMARY OF ORGANIC COMPOUNDS DETECTED IN GROUNDWATER
REMEDIAL INVESTIGATION
OPERABLE UNIT 7, SITE 16
NAS CECIL FIELD, JACKSONVILLE, FLORIDA

Analyte	Frequency of Detection	Range of Detected Concentration	Federal Primary MCL[3]	Florida Primary Standard [4]	Florida Guidance Concentration [5]	Florida Brown Field Concentration [7]
SURFICAL AQUIFER						
VOCs (µg/l)						
1,1,1-Trichloroethane	1/26	3,000[2]	200	200	200	NA
1,1-Dichloroethane	1/26	1	NA	NA	700	70
1,1-Dichloroethene	1/26	400[2]	7	7	7	NA
1,2-Dichloroethene(total)	2/26	270J to 12,500[2]J	70[6]	70[6]	70[6]	63
4-Methyl-2-pentanone	1/21	1	NA	NA	350	560
Trichloroethene	7/26	12J to 630[2]J	5	3	3	NA
SVOCs (µg/l)						
2-Methylnaphthalene	1/26	2.75[2]J	NA	NA	NA	20
Diethylphthalate	2/26	1J	NA	NA	5,600	5,600
Naphthalene	1/26	3.5[2]J	NA	NA	6.8	20
Phenanthrene	1/26	3J	NA	NA	10	210
Phenol	3/26	0.8J to 1.45[2]J	NA	NA	10	10
Bis (2-ethylhexyl) phthalate	21/26	0.5J to 20.5[2]	6	6	6	NA
Pesticides and PCBs (µg/l)						
Endrin	1/26	0.02J	2	2	2	NA
INTERMEDIATE AQUIFER						
SVOCs (µg/l)						
Di-n-butylphthalate	1/4	1J	NA	NA	700	700
Bis (2-ethylhexyl) phthalate	4/4	1J to 10	6	6	6	NA

Notes:

1 Frequency of detection is the number of samples in which the analyte was detected divided by the total number of samples analyzed.
2 Value is the average of a sample and its duplicate.
3 Federal Primary MCLs are taken from USEPA Drinking Water Regulations and Health Advisories (May 1994).
4 Florida Primary Standards are taken from Chapter 1 (Primary Standards) of the FDEP Groundwater Guidance Concentrations (June 1994).
5 Florida Guidance Concentrations are taken from Chapter 6 (Guidance Concentrations Index) of the FEDP Groundwater Guidance Concentrations (June 1994).
6 Primary MCL is for cis-1,2-dichloroethylene.
7 Chapter 62-785 F.A.C.

µg/l = microgram per liter PCBs = polychlorinated biphenyls NA = not applicable

1.2 SITE PHYSICAL AND GEOLOGICAL CONDITIONS

OU 7, Site 16 is located in the south-central portion of NAS Cecil Field, north of Building 313 (see Figure 1-2). The site includes the former Aircraft Intermediate Maintenance Department (AIMD) seepage pit and associated bead separator, holding tank, and pipelines from Building 313, as well as adjacent areas to the east and southeast of Building 313 that have been affected by activities at the site. Site 16 is partially vegetated with grass that is mowed regularly. The majority of the area adjacent to the site is covered with asphalt and concrete. The immediate area is crisscrossed with several utilities, including a water line, an overhead steam line, a fire water main, a sanitary sewer main, and both active and abandoned storm sewers. There are no inlets to the storm sewer system in the immediate vicinity of the site. During site visits, the ground surface exhibited no evidence of adverse effects (staining or absence of vegetation) from previous waste handling activities at the site (ABB-ES, July 1995).

1.2.1 Topography

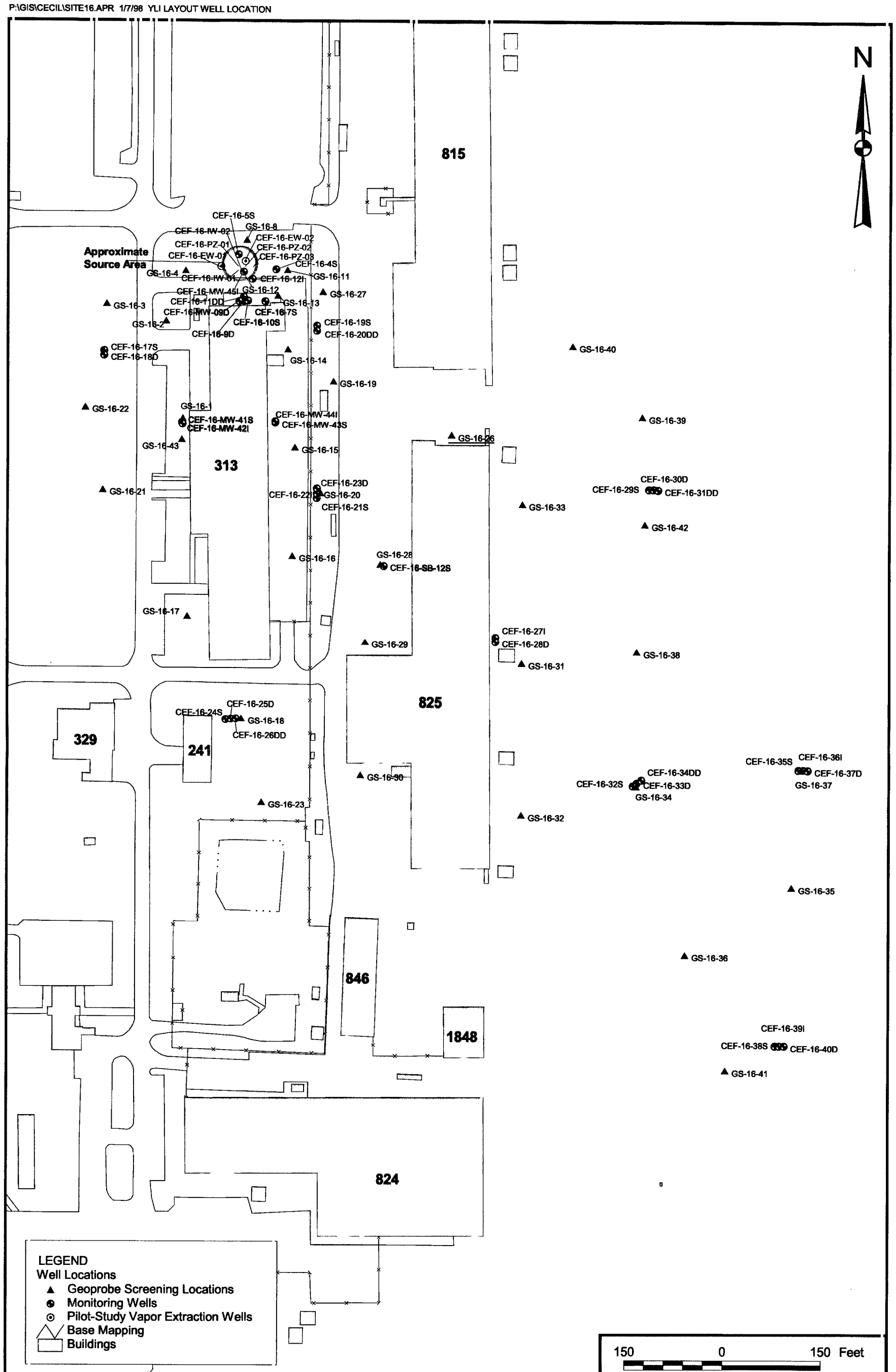
The general site area is relatively flat with no prominent hills or depressions. Elevations in the vicinity of Site 16 are approximately 80 feet above mean sea level (msl). Surface water flow from Site 16 is typically toward the adjacent paved roads and parking lots. To the east, an unlined grass drainage swale may receive some runoff and carry it toward a catch basin. The runoff from the paved roads and parking lots in the vicinity of Site 16 flows to the storm sewer system (ABB-ES, July 1995).

The storm sewer system collects surface water runoff in catch basins and transports it through underground piping that discharges into drainage ditches leading to the wetlands on the east side of the north-south runways and eventually to Sal Taylor Creek, farther to the east. Most of the storm sewer trunk (main) lines as well as some of the smaller tributary lines intersect the water table (ABB-ES, July 1995).

1.2.2 Site Lithology

Soil at OU 7, Site 16 and the immediate surrounding area is identified as Urban Land with the Arents soil type near the adjacent runway area according to the U. S. Department of Agriculture Soil Conservation Service Soil Survey of Duval County (USDA,1978). Urban Land is described as areas that are 85 percent or more covered with streets, houses, commercial buildings, parking lots, shopping centers, industrial parks, airports, and related facilities. Arents soil is soil that has been reworked by manmade earthmoving operations. As a result, a natural soil profile is absent. The excavation, usage, and subsequent regrading of OU 7, Site 16 would have destroyed the natural soil profile. Arents soil is nearly level and may be poorly drained (ABB-ES, July 1995).

P:\GIS\CECIL\SITE16.APR 1/7/98 YLI LAYOUT WELL LOCATION



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SITE LAYOUT AND MONITORING WELL LOCATIONS
OPERABLE UNIT 7, SITE 16
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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The subsurface consists of three geologic units encountered during the RI. The borings were advanced to a maximum depth of 118 feet bls. The subsurface consisted of fine-grained silty sands with some sandy clay, clayey sand, and clay to a depth of approximately 90 feet bls. This unit is underlain by clay containing 40 to 50 percent dolomite fragments to a depth of approximately 96 to 100 feet bls. The unconsolidated soils are underlain by a continuous carbonate-rich unit of dolomite, the Miocene age Hawthorn Group. The dolomite is a limestone or marble rich in magnesium carbonate and/or shell hash (ABB-ES, 1995).

The soil observed by TtNUS during the installation of the monitoring wells in August 1998 consisted of fine sand with a density ranging from loose to medium dense. The color of the soil was observed to be tan, brown and light brown. A gray and tan fine grained sand with some clay and sandy clay was observed from approximately 80 to 100 feet bls in IW-01.

1.2.3 Hydrologic Characteristics

There are three water-bearing systems in the area of NAS Cecil Field. These three water-bearing formations are: 1) the surficial aquifer, 2) the intermediate aquifer system and confining unit, and 3) the Floridan Aquifer. The surficial aquifer is unconfined and composed of fine- to medium-grained sand and underlying clay containing dolomite fragments extending down to approximately 100 feet bls. The surficial aquifer is considered to behave as one hydrological unit. The intermediate aquifer system and confining unit is present in the dolomite geologic unit. The Floridan Aquifer system was not encountered during the RI investigation (ABB-ES, 1995).

Monitoring wells were installed for the RI in the surficial aquifer system and intermediate aquifer system and confining unit up to a maximum depth of 118 feet bls. The wells in the surficial aquifer system were installed at three levels (shallow, intermediate, and deep) to investigate conditions in the shallow (UZS), intermediate (IZS) and deep (LZS) parts of the system (ABB-ES, 1995).

Water table depths in the surficial aquifer are approximately 6 feet bls and vary seasonally. Groundwater flow is to the southeast and indicates that the groundwater discharges to the wetland area and Sal Taylor Creek, east of the runways. The horizontal hydraulic gradient in the surficial aquifer measured along the flow path of the plume is approximately 0.003 feet per feet. The water level data indicate that there is a dramatic upward vertical gradient beginning southeast of well cluster CEF-16-21S, CEF-16-22I, and CEF-16-23D. The localized upwelling is interpreted to be caused by a localized absence, thinning, or increased hydraulic conductivity of the clay layer on top of the dolomite. The average hydraulic conductivity for the UZS wells, IZS wells, and LZS wells were estimated from slug test data to be 2.5 feet per day, 19 feet per day, and 18 feet per day, respectively (ABB-ES, 1995).

Water-level measurements were obtained from the monitoring wells sampled. Measurements were obtained with an electric water-level indicator using the top of the well casing pipe as the reference point. The water level measurements and calculated ground water elevations for the November 1998 sampling are summarized on Table 1-2. Groundwater elevation contours are shown on Figure 1-3. The groundwater elevations range from 68.33 feet msl to 70.74 feet msl. The groundwater flow is in a southeasterly direction.

1.3 SURFACE AND SUBSURFACE SOIL

Soil contaminated with trichloroethene (TCE) above the action level was excavated in May 1994, along with the removal of the holding tank, seepage pit, and glass bead separator as part of an Interim Remedial Action (IRA). Approximately 1,500 cubic yards of TCE contaminated soil was excavated to the top of the water table and disposed of offsite at a hazardous waste landfill. The area was backfilled with clean fill and restored to original grade (ABB-ES, July 1995).

Following the IRA, the RI (ABB-ES, July 1995) was conducted to evaluate residual site contamination and associated risks. Samples of surface and subsurface soil were collected and analyzed. The results of the RI soil sampling program indicated VOCs, semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and inorganics were present in the soil. However, the 1994 IRA adequately addressed soil contamination and the results of the Baseline Risk Assessment (BRA) indicated that none of the detections in the soil pose a significant risk to human receptors (ABB-ES, July 1995).

1.4 SUMMARY OF THE RECORD OF DECISION

The Site 16 ROD (ABB-ES, 1998) was signed by the Navy, Florida Department of Environmental Protection (FDEP), and U. S. Environmental Protection Agency (USEPA) in July 1998. The BRA identified an unacceptable human health risk from exposure to the groundwater from the surficial aquifer in the unlikely event that this aquifer would be developed in the future as a potable water supply. Therefore, a risk-based remedial action objective (RAO) was developed to protect humans from possible future risks resulting from potable water exposure to contaminants currently present in the surficial aquifer groundwater. This RAO is as follows:

- Protect humans from health risks resulting from potential exposure to groundwater from the surficial aquifer by preventing the use of this aquifer as a source of drinking water in areas where contaminant concentrations exceed site-specific risk-based criteria or regulatory standards and guidance criteria.

TABLE 1-2

GROUNDWATER LEVEL AND ELEVATION - NOVEMBER 1998
OPERABLE UNIT 7, SITE 16
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Monitoring Well	CEF-16-	10S	9D	11DD	13S	14D	MW45I	MW41S	MW42I	MW43S	MW44I	23D	22I	21S	27I	32S	35S	38S
Top of Casing		77.86	77.92	78.03	77.79	77.53	78.21	77.81	77.77	78.18	78.08	77.96	77.69	77.73	77.12	76.08	77.37	76.70
Ground Surface Elevation		78.10	78.20	78.20	78.10	78.10	78.22	77.90	77.94	78.35	78.35	78.20	78.10	78.00	77.50	76.40	77.60	76.90
Depth to Groundwater-bgs November 1998		7.45	7.29	7.20	6.35	6.17	7.47	8.40	7.96	7.97	8.06	8.19	8.07	8.05	8.46	7.75	9.27	8.95
Groundwater Elevation November 1998		70.41	70.63	70.83	71.44	71.36	70.74	69.41	69.81	70.21	70.02	69.77	69.62	69.68	68.66	68.33	68.10	67.75

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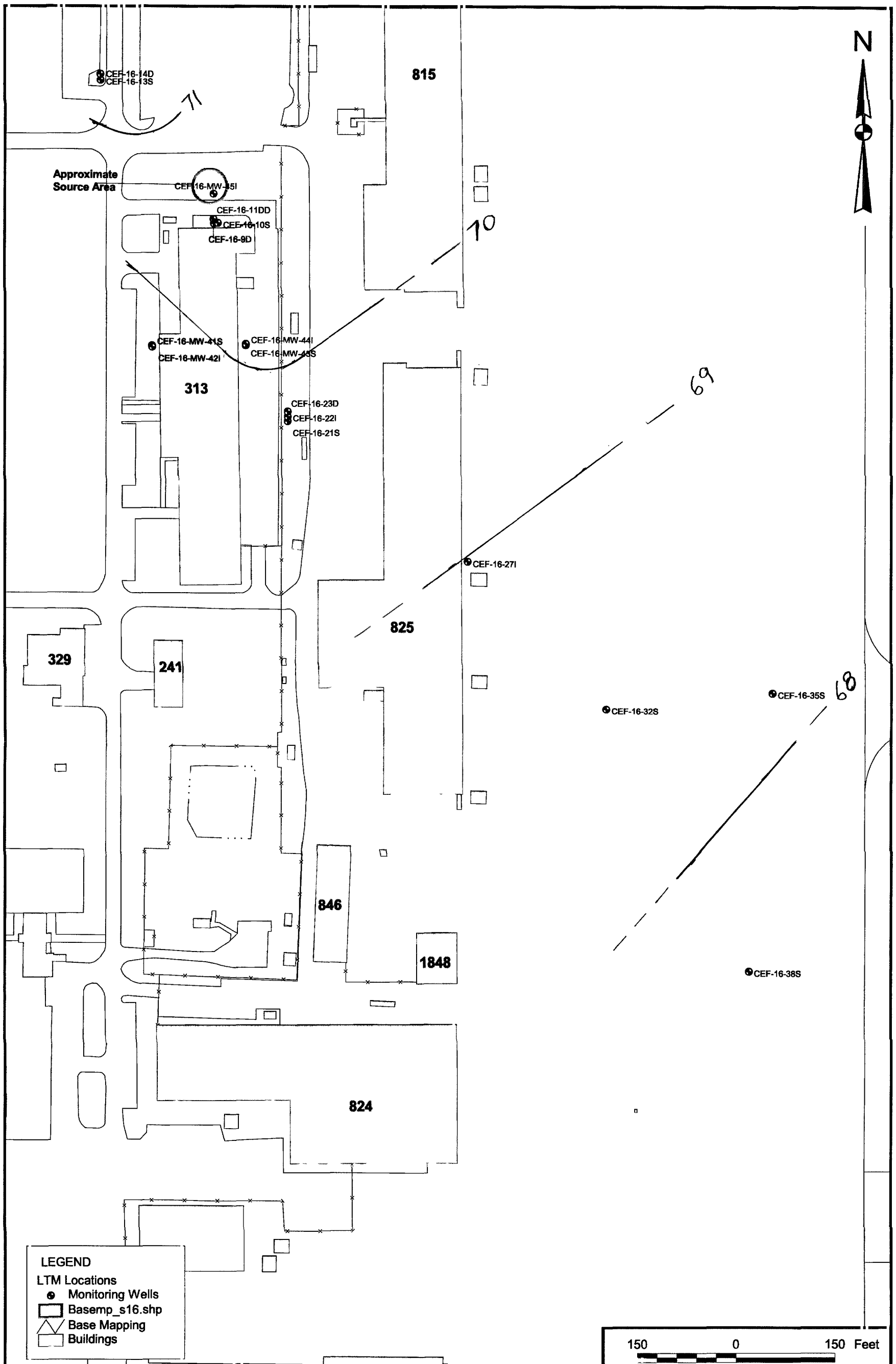

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GROUNDWATER ELEVATION CONTOURS
OPERABLE UNIT 7, SITE 16
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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A remedy was selected as part of the ROD to address the contaminants in the groundwater at OU 7, Site 16. The remedy was based upon the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the National Contingency Plan (NCP) (U.S. EPA, 1990a), the U.S. EPA, the Florida Department of Environmental Protection (FDEP), and public comments (ABB-ES, July 1996). The selected remedy included the following components:

Extraction, Pre-treatment, and Discharge of the Source Area Groundwater: The highly-contaminated groundwater from the source area would be extracted from strategically located wells, pre-treated with liquid-phase granular activated carbon (GAC) adsorption to remove the chlorinated VOCs of concern, and then discharged to the existing NAS Cecil Field wastewater treatment plant for additional treatment.

Enhanced Insitu Bioremediation of the Downgradient Area Groundwater: Air sparging and nutrient injection would be used to stimulate the biodegradation of the relatively low concentrations of organic contaminants present in the groundwater of the downgradient area by naturally-occurring microorganisms.

Long-term Groundwater Monitoring: Groundwater would be regularly sampled and analyzed to monitor the decrease in contaminant concentration and determine when cleanup goals have been reached.

Implementation of Institutional Controls: Deed restrictions and other administrative measures would be implemented to prevent the use of contaminated groundwater from the surficial aquifer as a source of potable water until cleanup goals had been met.

Five-Year Site Reviews: Site reviews would be conducted every five years to determine the progress achieved by the selected remedy and evaluate the continued adequacy of this remedy.

Subsequent to the publication of the ROD, certain site conditions changed. In particular, it was determined that, as a result of Base closure, the NAS Cecil Field wastewater treatment plant was not likely to be available to receive the pre-treated source area groundwater. It was also determined that other treatment technologies, such as air sparging and vapor extraction (AS/VE) would probably achieve cleanup goals in the source area quicker and more cost-effectively than a pump and treat system. Results from additional investigations established that natural attenuation has excellent potential for the remediation of the Site 16 groundwater. All of these factors have led to the preparation of a Draft Revised Proposed Plan (TtNUS, November 1998) where the first two components of the previous plan were replaced, as follows:

In-situ Air Sparging of Source Area Groundwater and Treatment of Extracted Vapors: Compressed air will be forced into the surficial aquifer in the source area through a network of injection wells. This will strip VOCs from the groundwater and the resulting vapors will be removed from the subsurface by application of a vacuum through a network of extraction wells. The VOCs contained in the extracted vapors will then be removed by catalytic oxidation. Following the in-situ air sparging treatment of the source area, residual TCE levels will be allowed to naturally attenuate until cleanup levels are achieved.

Natural Attenuation of Downgradient Groundwater: The naturally occurring processes that have been observed at Site 16, such as biological degradation, dispersion, and adsorption, will be relied upon to reduce contaminant concentrations in the groundwater to cleanup levels downgradient of the site.

Storm Sewer Inspection and Repair: A storm sewer inspection will be conducted to identify and record groundwater infiltration or anomalies in the storm sewer system within the area of the groundwater plume. Remediation options will be analyzed to select a technology to remove VOCs from the groundwater that infiltrates into the storm sewer system. A remedial design and repairs will be conducted to reduce groundwater infiltration which will reduce the concentration of VOCs at the outfall.

These proposed changes in the remedy will be documented in an upcoming Amended ROD. Any substantive requirements for off-gas emission permits associated with the catalytic oxidation system must be addressed at that time.

2.0 SITE CHEMICALS OF CONCERN

The chemical compounds detected in groundwater during the RI at OU 7 Site 16 will be summarized in this section as well as summarizing the conditions from the Baseline Groundwater Monitoring reported in the Draft Groundwater Remedial Design for Source Area Operable Unit 7, Site 16 report (TtNUS, 1998c).

2.1 REMEDIAL INVESTIGATION GROUNDWATER SAMPLING RESULTS

During the groundwater investigation for the RI, 40 monitoring wells were installed at the site. Six wells no longer exist. Thirteen of the remaining 34 wells were installed within the UZS with screen sections that intersect the water table for the majority of the year. Five of the 34 wells were installed in the IZS (screened at 25 to 81 feet bls) and twelve of the 34 wells were installed in the LZS (screened at 79 to 101 feet bls) of the surficial aquifer. Four monitoring wells were installed at the site in the intermediate aquifer system and confining unit. A groundwater sampling event, including laboratory analysis and data validation, occurred in August 1994 to support the ROD. The groundwater was only analyzed for VOCs, SVOCs, and inorganics during the RI.

Organic groundwater contamination consisting of five VOCs, six SVOCs and one pesticide was detected in the groundwater samples during the RI. The groundwater analytical results indicate that the contaminants extend radially outward from the former seepage pit (source area) as a result of mounding from discharging contaminants directly into the groundwater. The lateral extent of contamination extends to the southeast in the direction of groundwater flow in both the UZS and IZS well samples. The chemicals of concern (COCs), which are the chemicals with concentrations above the cleanup goals, were primarily VOCs and SVOCs and are listed in Table 1-1. Figure 2-1 shows the areal extent of organic contamination in groundwater from the 1994 RI data (ABB-ES, July 1995).

Groundwater from 12 selected monitoring wells was sampled and analyzed after completion of the RI in 1997 and February 1998 and analyzed for VOCs and geochemical parameters to evaluate the biodegradation processes of natural attenuation. Three wells were located upgradient of Site 16 (CEF-16-11DD, CE-16-13S, and CEF-16-17S), three wells were located in the source area of the site (CEF-16-9D, CEF-16-10S, and CEF-16-19S), and the remainder of the wells were located downgradient of the site either within the contaminant plume (CEF-16-22I, CEF-16-27I, and CEF-32S) or outside of it (CEF-16-24S, CEF-16-29S, and CEF-16-32S). Table 2-1 presents the chlorinated VOC data from the RI to the Baseline Groundwater Monitoring (1991 to 1998).

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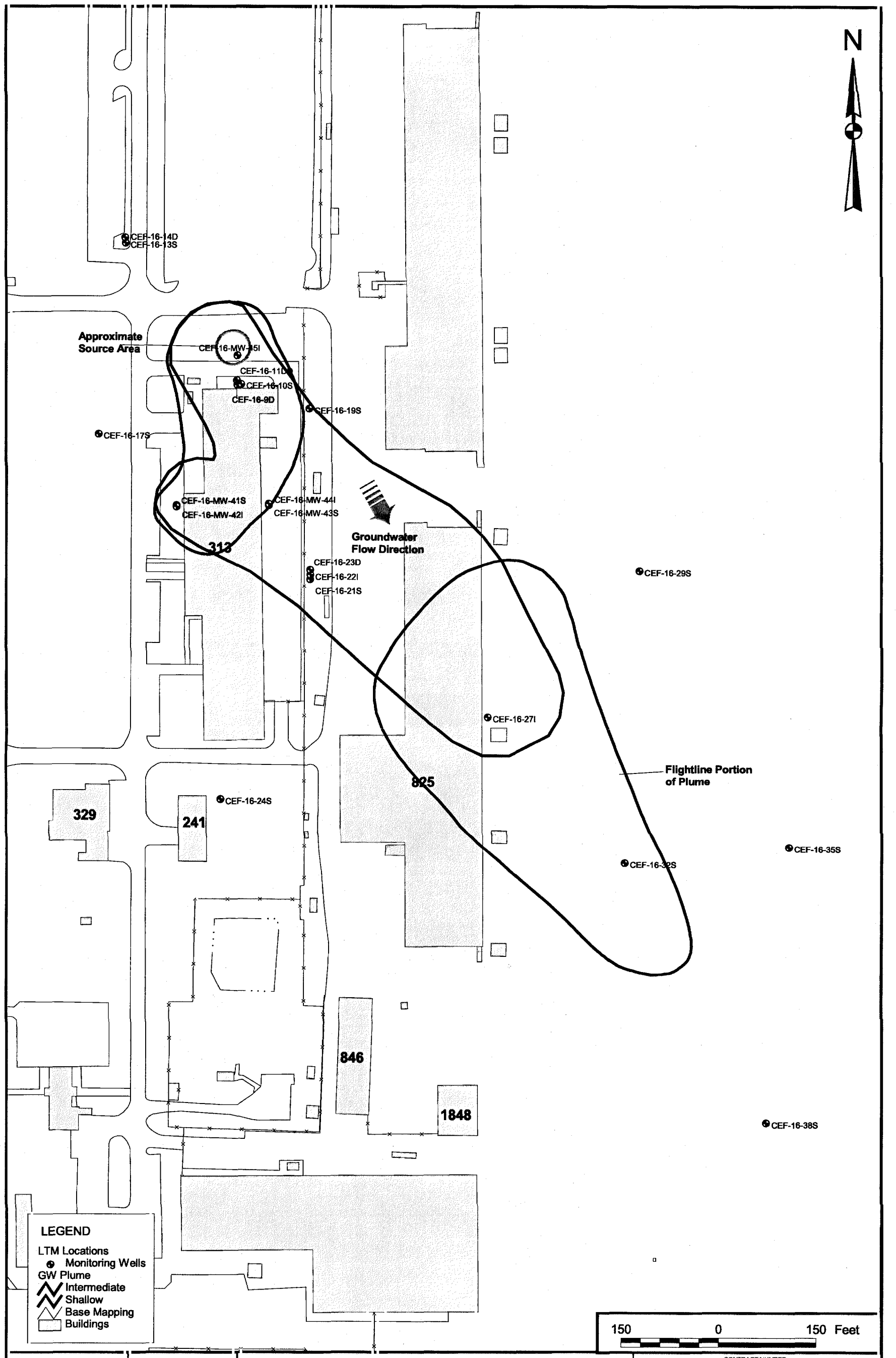

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VOC PLUME IN SHALLOW AND INTERMEDIATE DEPTH OF SURFICIAL AQUIFER
OPERABLE UNIT 7, SITE 16
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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TABLE 2-1

CHLORINATED VOLATILE ORGANIC COMPOUND DATA (1991-1998) IN SURFICIAL GROUNDWATER
OPERABLE UNIT 7, SITE 16
NAS CECEL FIELD, JACKSONVILLE, FLORIDA
PAGE 1 OF 3

	DETECTION	CEF-16-11DD				CEF-16-9D					CEF-16-10S				
PARAMETER	LIMIT	1994	1997	Feb-98	Sep-98	1991	1994	1997	Feb-98	Sep-98	1991	1994	1997	Feb-98	Sep-98
LABORATORY ANALYSIS															
TCE (ug/l)	3	ND	ND	ND	5	330	20J	5.6	ND	ND	2650	630	ND	22	45.9
1,1 DCE (ug/l)	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	400	ND	26	231
cis 1,2 DCE (ug/l)	5	ND	ND	ND	ND	8J	ND	2	ND	ND	1100	2500	1700	25	60
trans 1,2 DCE (ug/l)	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TCA (ug/l)	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3000J	ND	1200	1300
Vinyl Chloride (ug/l)	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	230	3	32
Ethane (ug/l)	5.8	NA	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA	148	ND	47.7
Ethene (ug/l)	6.2	NA	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA	458	ND	142

Notes:
NA=not analyzed
ND=not detected

Wells CEF-16-13S, CEF-16-17S, CEF-16-19S, CEF-16-29S were not sampled in September 1998

TABLE 2-1

CHLORINATED VOLATILE ORGANIC COMPOUND DATA (1991-1998) IN SURFICIAL GROUNDWATER
OPERABLE UNIT 7, SITE 16
NAS CECEL FIELD, JACKSONVILLE, FLORIDA
PAGE 2 OF 3

PARAMETER	DETECTION LIMIT	CEF-16-13S			CEF-16-17S			CEF-16-19S			CEF-16-22I				CEF-16-24S		
		1994	1997	Feb-98	1994	1997	Feb-98	1994	1997	Feb-98	1994	1997	Feb-98	Sep-98	1994	1997	Feb-98
LABORATORY ANALYSIS																	
TCE (ug/l)	3	ND	NA	NA	ND	NA	NA	ND	ND	ND	15	3.2	3	6.4	ND	NA	NA
1,1 DCE (ug/l)	5	ND	NA	NA	ND	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA
cis 1,2 DCE (ug/l)	5	ND	NA	NA	ND	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA
trans 1,2 DCE (ug/l)	5	ND	NA	NA	ND	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA
TCA (ug/l)	5	ND	NA	NA	ND	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA
Vinyl Chloride (ug/l)	1	ND	NA	NA	ND	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA
Ethane (ug/l)	5.8	NA	ND	ND	NA	ND	ND	NA	ND	ND	NA	ND	ND	ND	NA	ND	ND
Ethene (ug/l)	6.2	NA	ND	ND	NA	ND	ND	NA	ND	ND	NA	ND	ND	ND	NA	ND	ND

Notes:
NA=not analyzed
ND=not detected

Wells CEF-16-13S, CEF-16-17S, CEF-16-19S, CEF-16-29S were not sampled in September 1998

TABLE 2-1

CHLORINATED VOLATILE ORGANIC COMPOUND DATA (1991-1998) IN SURFICIAL GROUNDWATER
OPERABLE UNIT 7, SITE 16
NAS CECEL FIELD, JACKSONVILLE, FLORIDA
PAGE 3 OF 3

	DETECTION	CEF-16-27I				CEF-16-29S			CEF-16-32S				CEF-16-38S			
PARAMETER	LIMIT	1994	1997	Feb-98	Sep-98	1994	1997	Feb-98	1994	1997	Feb-98	Sep-98	1994	1997	Feb-98	Sep-98
LABORATORY ANALYSIS																
TCE (ug/l)	3	12J	25	32	33.3	ND	NA	NA	470J	220	150	126 J	ND	ND	NA	ND
1,1 DCE (ug/l)	5	ND	ND	ND	ND	ND	NA	NA	ND	ND	ND	0.3	ND	ND	NA	ND
cis 1,2 DCE (ug/l)	5	ND	ND	ND	0.6	ND	NA	NA	ND	ND	ND	0.9	ND	ND	NA	ND
trans 1,2 DCE (ug/l)	5	ND	ND	ND	ND	ND	NA	NA	ND	ND	ND	ND	ND	ND	NA	ND
TCA (ug/l)	5	ND	ND	ND	ND	ND	NA	NA	ND	ND	ND	ND	ND	ND	NA	ND
Vinyl Chloride (ug/l)	1	ND	ND	ND	ND	ND	NA	NA	ND	ND	ND	ND	ND	ND	NA	ND
Ethane (ug/l)	5.8	NA	ND	ND	ND	NA	ND	ND	NA	ND	ND	ND	NA	ND	ND	ND
Ethene (ug/l)	6.2	NA	ND	ND	ND	NA	ND	ND	NA	ND	ND	ND	NA	ND	ND	ND

Notes:
NA=not analyzed
ND=not detected

Wells CEF-16-13S, CEF-16-17S, CEF-16-19S, CEF-16-29S were not sampled in September 1998

2.2 BASELINE GROUNDWATER MONITORING

The Baseline Groundwater Monitoring event was conducted in August and September 1998. During this event, groundwater from a selected set of existing and recently installed monitoring wells was sampled and analyzed for chlorinated VOCs as well as biodegradation natural attenuation parameters. Figure 2-2 shows the selected set of monitoring wells that were sampled and summarizes the VOC analytical results from the Baseline Groundwater Monitoring. This recent groundwater data shows that at the source location north of Building 313, TCE concentrations are present up to a maximum of 410,000 µg/L.

Table 2-1 presents the chlorinated VOC data for 1991-1998, including data from the Baseline Groundwater Monitoring. The analytical results show that 1,1,1-trichloroethane (TCA), 1,1-dichloroethene (1,1-DCE), and trichloroethene (TCE) were detected above the clean-up levels in the groundwater samples from monitoring wells CEF-16-10S and CEF-16-45I. 1,1-DCE and TCE were detected above the clean-up levels in the groundwater samples from injection well IW-02. TCE was detected above the clean-up levels in the groundwater samples from injection well IW-01 and monitoring wells CEF-16-11DD, CEF-16-22I, CEF-16-23D, CEF-16-27I, CEF-16-32S, CEF-16-41S, and CEF-16-42I. The higher concentrations were detected in the source area shown on Figure 2-2 with a general trend of decreasing concentration in the direction of groundwater flow. The detection of these parameters was consistent with the findings of the previous sampling events, which also detected higher concentrations in the source area.

No VOCs were detected in the groundwater samples obtained from monitoring wells CEF-16-13S and CEF-16-14D, background wells; CEF-16-35S, a cross-gradient well; and CEF-16-38S, a well downgradient of the plume identified during the RI. VOC's were also not detected in groundwater samples from monitoring wells CEF-16-09D, CEF-16-43S, and CEF-16-44I.

Bis (2-ethylhexyl) phthalate (BEHP) is the only SVOC chemical of concern (COC) identified in the RI. The analytical results for Baseline Groundwater Monitoring event show that BEHP was detected in only one monitoring well (CEF-16-27I) at a concentration above its clean-up level.

BEHP was detected in 25 out of 30 wells sampled during the RI ranging in concentration from 0.5 J to 20.5 µg/L. Concentrations in 12 of these samples were above the clean-up level (6 µg/L). In the Baseline Groundwater Monitoring event, BEHP was detected in 12 of the 17 groundwater samples. However, only one sample was detected above the clean-up level at a concentration of 11 µg/L at monitoring well CEF-16-27I. These concentration levels of BEHP are possibly a reflection of contamination from laboratory equipment, and therefore BEHP is not regarded as a COC.

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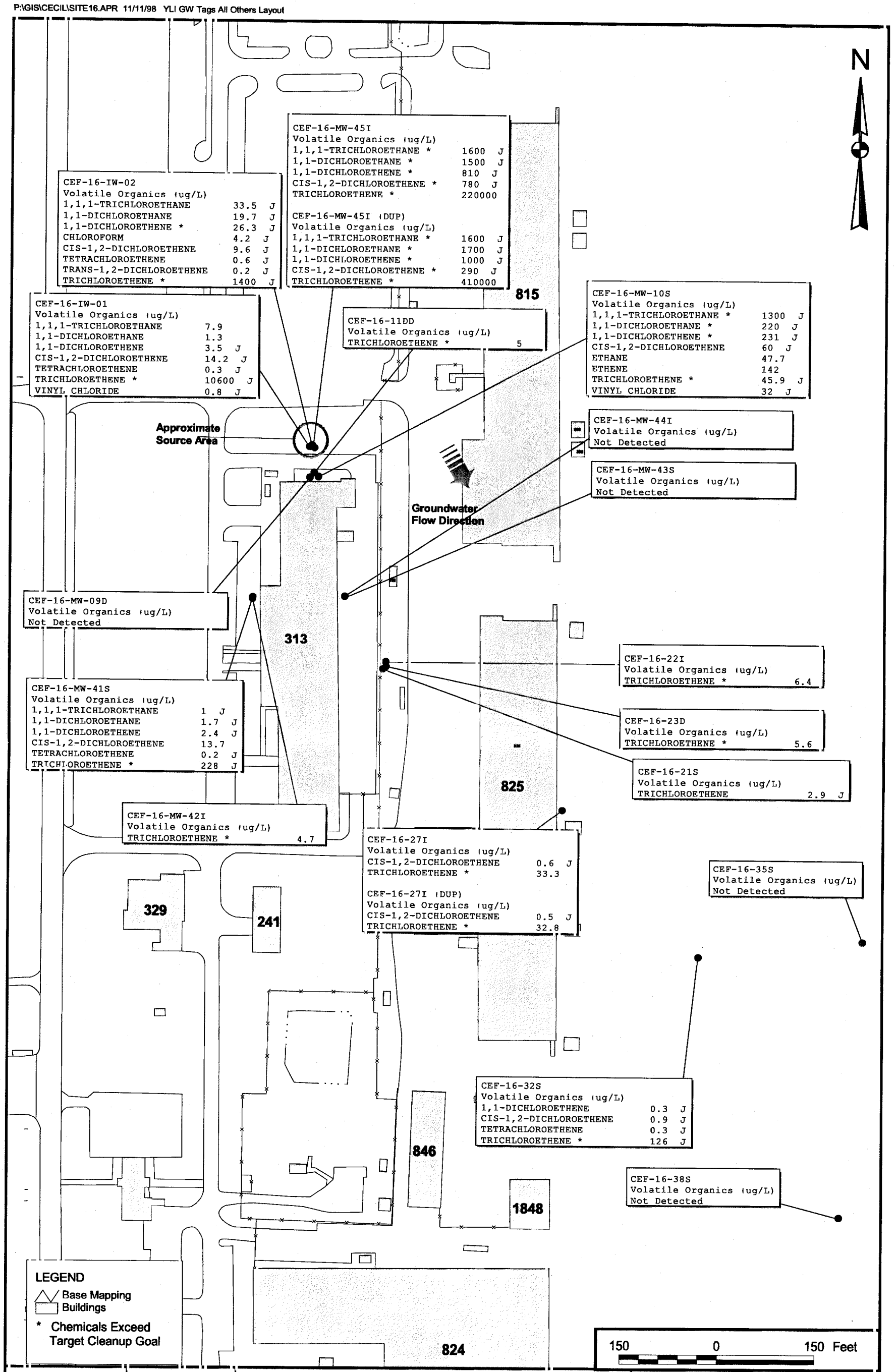

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CHLORINATED ALKANES/ALKENES AND NATURAL ATTENUATION
DEGRADATION PRODUCTS FROM BASELINE GROUNDWATER SAMPLING EVENT
(SOURCE AREA AND DOWNGRADIENT)
OPERABLE UNIT 7, SITE 16
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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3.0 ANALYTICAL RESULTS AND EVALUATION

The concentration and distribution of the COCs and biodegradation natural attenuation monitoring parameters in the groundwater samples from the first quarter (November 1998) sampling activities are presented in this section. Groundwater samples were collected from 15 selected monitoring wells and analyzed at a fixed-based laboratory for biodegradation natural attenuation and chemical parameters and analyzed in the field for some biodegradation natural attenuation parameters as shown in the tables of the Work Plan Addendum (TtNUS, 1998b). Additionally, groundwater from two existing monitoring wells (CEF-16-13S and CEF-16-14D) was sampled to provide data upgradient of the plume. The wells were sampled in accordance with TtNUS standard operating procedures and U. S. EPA Region 4's Environmental Investigation Standard Operating Procedures and Quality Assurance Manual for low-flow purging and sampling of monitoring wells. Two field duplicate samples were collected from monitoring wells CEF-16-41S (CEF-16-DUP1) and CEF-16-42I (CEF-16-DUP2). GPL Laboratories in Gaithersburg, Maryland was used for analysis of the groundwater samples.

The network of monitoring wells located upgradient, within, and immediately downgradient of the VOC plume were used to measure the long-term plume migration and natural attenuation parameters. The rationale for the location of the long-term monitoring wells is provided on Table 3-1.

3.1 CHEMICAL OF CONCERN DISTRIBUTION

The frequency of detection and range of positive values for all parameters is provided in Table 3-2. The target cleanup levels for site COCs are also included. Table 3-3 and Appendix A provides detailed positive analytical results for each well sampled. Figures 3-1 and 3-2 provide tag maps of the chlorinated VOC and SVOC analytical results, respectively.

There is a marked decrease in the groundwater contaminant concentrations for most of the chemicals of concern when compared to the Baseline Groundwater Monitoring (August/September 1998) sampling event. The analytical results for bis (2-ethylhexyl) phthalate (BEHP) (the only SVOC COC) decrease in concentration below the target cleanup levels in all of the monitoring wells. The chemicals of concern that were detected above the target cleanup levels included 1,1,1-trichloroethane (TCA), 1,1-dichloroethane (DCA), 1,1-dichloroethene (1,1-DCE), cis-1,2-DCE and trans-1,2-DCE, and trichloroethene (TCE).

3.1.1 VOCs

The analytical results show that the COCs (TCA, DCA, 1,1-DCE, cis-1,2-DCE and trans-1,2-DCE, TCE) and methylene chloride and vinyl chloride were detected above the clean-up levels in the groundwater

TABLE 3-1

MONITORING WELL LOCATIONS AND RATIONALE
LONG-TERM GROUNDWATER MONITORING
OPERABLE UNIT 7, SITE 16
NAS CECIL FIELD – JACKSONVILLE FLORIDA
PAGE 1 OF 2

Monitoring Well	Total Depth (feet bgs)	Screened Interval (feet bgs)	Rationale
CEF-16-41S	15	10-15	To monitor contaminant reductions in downgradient area as a result of air sparging. This well was selected to provide a sample location along the western edge of the downgradient portion of the source area plume area.
CEF-16-42I	32	27-32	To monitor contaminant reductions in downgradient area as a result of air sparging. This well was selected to provide a sample location along the western edge of the downgradient portion of the source area plume.
CEF-16-43S	15	10-15	To monitor contaminant reductions in downgradient area as a result of air sparging. This well was selected to provide a sample location along the eastern edge of the downgradient portion of the source area plume.
CEF-16-44I	32	27-32	To monitor contaminant reductions in downgradient area as a result of air sparging. This well was selected to provide a sample location along the eastern edge of the downgradient portion of the source area plume.
CEF-16-45I	32	27-32	To monitor contaminant reductions in the source area as a result of air sparging. This well was selected because the highest concentrations of TCE in the source area were detected at this location.
CEF-16-9D	101	91-101	To monitor contaminant reductions as a result of air sparging. This well was selected to provide a sample location in the deeper portion of the source area surficial aquifer.
CEF-16-10S	14	4-14	To monitor contaminant reductions as a result of air sparging. This well was selected to provide a sample location in the shallow portion of the source area surficial aquifer.
CEF-16-11DD	118	108-118	To monitor vertical migration of the plume.
CEF-16-13S	16	6-16	To obtain background groundwater geochemical data
CEF-16-14D	101	91-101	To obtain background groundwater geochemical data
CEF-16-21S	17	7-17	Evaluate contaminant concentrations outside of the area of influence of the air sparging wells and verify that aquifer has returned to anaerobic conditions in the shallow depth of downgradient portion of the source area plume.
CEF-16-22I	35	25-35	Evaluate contaminant concentrations outside of the area of influence of the air sparging wells and verify that aquifer has returned to anaerobic conditions in the intermediate depth of the downgradient portion of the source area plume.

TABLE 3-1

MONITORING WELL LOCATIONS AND RATIONALE
LONG-TERM GROUNDWATER MONITORING
OPERABLE UNIT 7, SITE 16
NAS CECIL FIELD – JACKSONVILLE FLORIDA
PAGE 2 OF 2

Monitoring Well	Total Depth (feet bgs)	Screened Interval (feet bgs)	Rationale
CEF-16-23D	17	7-17	Evaluate contaminant concentrations outside of the area of influence of the air sparging wells and verify that aquifer has returned to anaerobic conditions in the deeper zones of the downgradient portion of the source area plume.
CEF-16-27I	35	25-35	Monitor biodegradation of COCs over time in the intermediate depth of the flightline portion of the plume.
CEF-16-32S	17	7-17	Monitor biodegradation of COCs over time in the shallow portion of the aquifer in the flightline poriton of the plume.
CEF-16-35S	17	7-17	To verify that the identified plume is not expanding in the flightline portion of the plume
CEF-16-38S	17	7-17	To verify that the identified plume is not expanding in the flightline portion of the plume.

TABLE 3-2

FREQUENCY OF DETECTION FOR CHEMICALS OF CONCERN IN GROUNDWATER
OPERABLE UNIT 7, SITE 16
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Parameter	Baseline August/September 1998			First Quarter November 1998		
	Range/ Detection Frequency	Location of Maximum	Average of Detects	Range/ Detection Frequency	Location of Maximum	Average of Detects
Volatiles (ug/L)						
1,1,1-Trichloroethane	1 – 1600 (6/19)	CEF-16-45I	757	0.6 – 6550 (3/17)	CEF-16-45I	2473
1,1,2,2-Tetrachloroethane	ND	--	--	0.7 (1/17)	CEF-16-41S-AVG	0.7
1,1,2-Trichloroethane	1 – 1600 (6/19)	CEF-16-45I-D	757	273 (1/17)	CEF-16-45I	273
1,1-Dichloroethane	1.3 – 1700 (6/19)	CEF-16-45I-D	573	0.2 – 1873 (4/17)	CEF-16-45I	496
1,1-Dichloroethene	0.3 – 1000 (6/19)	CEF-16-45I-D	296	1.7 – 106 (2/17)	CEF-16-10S	54
1,2-Dichloroethane	ND	--	--	24.8 (1/17)	CEF-16-45I	25
Methylene Chloride	ND	--	--	389.8 (1/17)	CEF-16-45I	390
Tetrachloroethene	0.2 - 0.6 (6/19)	CEF-16-IW02	0.35	0.6 (1/17)	CEF-16-10S	0.6
Trans-1,2-dichloroethene	0.2 (6/19)	CEF-16-IW02	0.2	0.6 - 14.8 (2/17)	CEF-16-45I	7.7
Trichloroethene	2.9 – 410000 (6/19)	CEF-16-45I-D	45892	0.8 – 65500 (6/17)	CEF-16-45I	11064
Vinyl Chloride	0.8 – 32 (6/19)	CEF-16-10S	16.4	14 - 42.5 (2/17)	CEF-16-10S	28
cis-1,2-dichloroethene	0.5 – 780 (6/19)	CEF-16-45I	130	0.3 - 275.5 (5/17)	CEF-16-45I	68
Semivolatiles (ug/L)						
Bis (2-ethylhexyl) phthalate	1 – 11 (6/19)	CEF-16-27I	2.25	1 (2/17)	CEF-16-35S	1

Notes:

ND: Not detected at the analytical method detection limit
--: No information because of ND

TABLE 3-3

SUMMARY OF CHEMICALS OF CONCERN IN GROUNDWATER
OPERABLE UNIT 7, SITE 16
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 1 OF 4

PARAMETER	TARGET CLEAN UP LEVEL	CEF-16-13S		CEF-16-10S		CEF-16-41S			CEF-16-43S	
								Duplicate		
		Baseline	Nov-98	Baseline	Nov-98	Baseline	Nov-98	Nov-98	Baseline	Nov-98
Volatiles (µg/L)										
1,1,1-TRICHLOROETHANE	200	NT	5 U	**1300 J**	**870**	1 J	0.6 J	0.6 J	5 U	5 U
1,1,2,2-TETRACHLOROETHANE		NT	0.2 U	0.2 U	0.2 U	0.2 U	1.3	0.2 U	0.2 U	0.2 U
1,1,2-TRICHLOROETHANE		NT	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,1-DICHLOROETHANE	70	NT	5 U	**220 J**	**112**	1.7 J	0.9 J	0.9 J	5 U	5 U
1,1-DICHLOROETHENE	7	NT	5 U	**231 J**	**106**	2.4 J	1.7 J	1.7 J	5 U	5 U
1,2-DICHLOROETHANE		NT	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
1,2-DICHLOROPROPANE		NT	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
CARBON TETRACHLORIDE		NT	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
CHLOROBENZENE		NT	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
CHLOROETHANE		NT	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
CHLOROFORM		NT	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
CHLOROMETHANE		NT	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
CIS-1,2-DICHLOROETHENE	63	NT	5 U	60 J	53.8	13.7	9.9	9.5	5 U	5 U
CIS-1,3-DICHLOROPROPENE		NT	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
METHYLENE CHLORIDE	5	NT	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
TETRACHLOROETHENE		NT	3 U	3 U	0.6 J	0.2 J	3 U	3 U	3 U	3 U
TRANS-1,2-DICHLOROETHENE	63	NT	5 U	5 U	0.6 J	5 U	5 U	5 U	5 U	5 U
TRANS-1,3-DICHLOROPROPENE		NT	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
TRICHLOROETHENE	3	NT	3 U	**45.9 J**	**62.7 J**	**225 J**	**672**	**635**	3 U	3 U
VINYL CHLORIDE	1	NT	1 U	**32 J**	**42.5**	1 U	1 U	1 U	1 U	1 U
Semivolatiles (µg/L)										
BIS(2-ETHYLHEXYL)PHTHALATE	6	NT	6 U	1 J	6 U	7 U	6 U	1 J	1 J	6 U

Note: Bold & Shade exceed target clean up levels.

TABLE 3-3

SUMMARY OF CHEMICALS OF CONCERN IN GROUNDWATER
OPERABLE UNIT 7, SITE 16
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 2 OF 4

PARAMETER	TARGET CLEAN UP LEVEL	CEF-16-21S		CEF-16-32S		CEF-16-35S		CEF-16-38S	
		Baseline	Nov-98	Baseline	Nov-98	Baseline	Nov-98	Baseline	Nov-98
Volatiles (µg/L)									
1,1,1-TRICHLOROETHANE	200	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,1,2,2-TETRACHLOROETHANE		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1,2-TRICHLOROETHANE		5 UJ	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,1-DICHLOROETHANE	70	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,1-DICHLOROETHENE	7	5 U	5 U	0.3 J	5 U	5 U	5 U	5 U	5 U
1,2-DICHLOROETHANE		3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
1,2-DICHLOROPROPANE		5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
CARBON TETRACHLORIDE		3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
CHLOROBENZENE		5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
CHLOROETHANE		5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
CHLOROFORM		5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
CHLOROMETHANE		2 UJ	2 U	2 U	2 U	2 U	2 U	2 U	2 U
CIS-1,2-DICHLOROETHENE	63	5 U	5 U	0.9 J	0.9 J	5 U	5 U	5 U	5 U
CIS-1,3-DICHLOROPROPENE		0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
METHYLENE CHLORIDE	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
TETRACHLOROETHENE		3 U	3 U	0.3 J	3 U	3 U	3 U	3 U	3 U
TRANS-1,2-DICHLOROETHENE	63	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
TRANS-1,3-DICHLOROPROPENE		0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
TRICHLOROETHENE	3	2.9 J	5 U	**129 J**	**126**	3 U	3 U	3 U	3 U
VINYL CHLORIDE	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Semivolatiles (µg/L)									
BIS(2-ETHYLHEXYL)PHTHALATE	6	2 J	6 U	6 U	6 U	6 U	1 J	6 U	6 U

Note: Bold & Shade exceed target clean up level

TABLE 3-3

SUMMARY OF CHEMICALS OF CONCERN IN GROUNDWATER
OPERABLE UNIT 7, SITE 16
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 3 OF 4

PARAMETER	TARGET CLEAN UP LEVEL	CEF-16-45I			CEF-16-42I			CEF-16-44I		CEF-16-22I		CEF-16-27I		
		Baseline	Duplicate Baseline	Nov-98	Baseline	Nov-98	Duplicate Nov-98	Baseline	Nov-98	Baseline	Nov-98	Baseline	Duplicate Baseline	Nov-98
Volatiles (µg/L)														
1,1,1-TRICHLOROETHANE	200	**1600 J**	**1600 J**	**6550**	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,1,2,2-TETRACHLOROETHANE		100 U	100 U	5 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1,2-TRICHLOROETHANE		2500 UJ	2500 UJ	273	5 UJ	5 U	5 U	5 U	5 U	5 UJ	5 U	5 U	5 U	5 U
1,1-DICHLOROETHANE	70	**1500 J**	**1700 J**	**1873 J**	5 U	5 U	5 U	5 U	5 U	5 U	0.2 J	5 U	5 U	5 U
1,1-DICHLOROETHENE	7	**510 J**	**1000 J**	125 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,2-DICHLOROETHANE		1500 U	1500 U	24.8 J	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
1,2-DICHLOROPROPANE		2500 U	2500 U	125 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
CARBON TETRACHLORIDE		1500 U	1500 U	75 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
CHLOROBENZENE		2500 U	2500 U	125 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
CHLOROETHANE		2500 U	2500 U	125 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
CHLOROFORM		2500 U	2500 U	125 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
CHLOROMETHANE		1000 UJ	1000 UJ	50 U	2 UJ	2 U	2 U	2 U	2 U	2 UJ	2 U	2 U	2 U	2 U
CIS-1,2-DICHLOROETHENE	63	**780 J**	**290 J**	**275.5**	5 U	5 U	5 U	5 U	5 U	5 U	0.3 J	0.6 J	0.5 J	5 U
CIS-1,3-DICHLOROPROPENE		100 UJ	100 UJ	5 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U
METHYLENE CHLORIDE	5	2500 U	2500 U	**389.8**	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
TETRACHLOROETHENE		1500 U	1500 U	75 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
TRANS-1,2-DICHLOROETHENE	63	2500 U	2500 U	**14.6 J**	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
TRANS-1,3-DICHLOROPROPENE		100 UJ	100 UJ	5 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U
TRICHLOROETHENE	3	**220000**	**410000**	**65500**	**4.7**	1 J	0.6 J	3 U	5 U	**6.4**	5 U	**33.3**	**32.8**	**39.9**
VINYL CHLORIDE	1	500 U	500 U	**14 J**	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Semivolatiles (µg/L)														
BIS(2-ETHYLHEXYL)PHTHALATE	6	2 J	1 J	7 U	3 J	6 U	6 U	1 J	6 U	1 J	6 U	11	6 U	6 U

Note: Bold & Shade exceed target clean up level

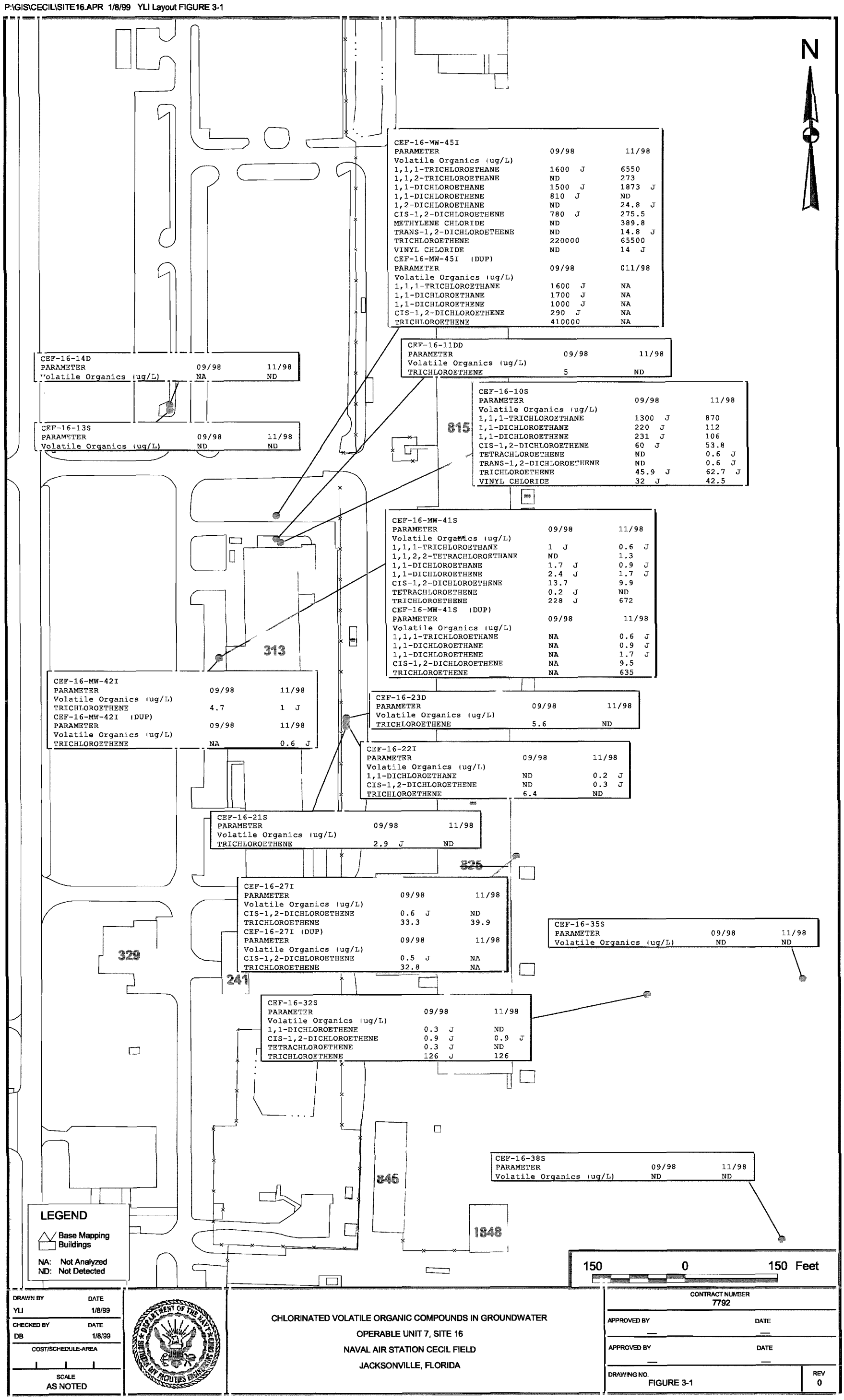
TABLE 3-3

SUMMARY OF CHEMICALS OF CONCERN IN GROUNDWATER
OPERABLE UNIT 7, SITE 16
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 4 OF 4

PARAMETER	TARGET CLEAN UP LEVEL	CEF-16-11DD		CEF-16-14D		CEF-16-09D		CEF-16-23D	
		Baseline	Nov-98	Baseline	Nov-98	Baseline	Nov-98	Baseline	Nov-98
Volatiles (µg/L)									
1,1,1-TRICHLOROETHANE	200	5 U	5 U	NT	5 U	5 U	5 U	5 U	5 U
1,1,2,2-TETRACHLOROETHANE		0.2 U	0.2 U	NT	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1,2-TRICHLOROETHANE		5 UJ	5 U	NT	5 U	5 U	5 U	5 UJ	5 U
1,1-DICHLOROETHANE	70	5 U	5 U	NT	5 U	5 U	5 U	5 U	5 U
1,1-DICHLOROETHENE	7	5 U	5 U	NT	5 U	5 U	5 U	5 U	5 U
1,2-DICHLOROETHANE		3 U	3 U	NT	3 U	3 U	3 U	3 U	3 U
1,2-DICHLOROPROPANE		5 U	5 U	NT	5 U	5 U	5 U	5 U	5 U
CARBON TETRACHLORIDE		3 U	3 U	NT	3 U	3 U	3 U	3 U	3 U
CHLOROBENZENE		5 U	5 U	NT	5 U	5 U	5 U	5 U	5 U
CHLOROETHANE		5 U	5 U	NT	5 U	5 U	5 U	5 U	5 U
CHLOROFORM		5 U	5 U	NT	5 U	5 U	5 U	5 U	5 U
CHLOROMETHANE		2 UJ	2 U	NT	2 U	2 U	2 U	2 UJ	2 U
CIS-1,2-DICHLOROETHENE	63	5 U	5 U	NT	5 U	5 U	5 U	5 U	5 U
CIS-1,3-DICHLOROPROPENE		0.2 UJ	0.2 U	NT	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 U
METHYLENE CHLORIDE	5	5 U	5 U	NT	5 U	5 U	5 U	5 U	5 U
TETRACHLOROETHENE		3 U	3 U	NT	3 U	3 U	3 U	3 U	3 U
TRANS-1,2-DICHLOROETHENE	63	5 U	5 U	NT	5 U	5 U	5 U	5 U	5 U
TRANS-1,3-DICHLOROPROPENE		0.2 UJ	0.2 U	NT	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 U
TRICHLOROETHENE	3	**5**	3 U	NT	3 U	3 U	5 U	**5.8**	3 U
VINYL CHLORIDE	1	1 U	1 U	NT	1 U	1 U	1 U	1 U	1 U
Semivolatiles (µg/L)									
BIS(2-ETHYLHEXYL)PHTHALATE	6	1 J	6 U	NT	6 U	1 J	6 U	2 J	6 U

Note: Bold & Shade exceed target clean up level

P:\GIS\CECIL\SITE16.APR 1/8/99 YLI Layout FIGURE 3-1



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DB	1/8/99

COST/SCHEDULE-AREA

SCALE
AS NOTED

CHLORINATED VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER
OPERABLE UNIT 7, SITE 16
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

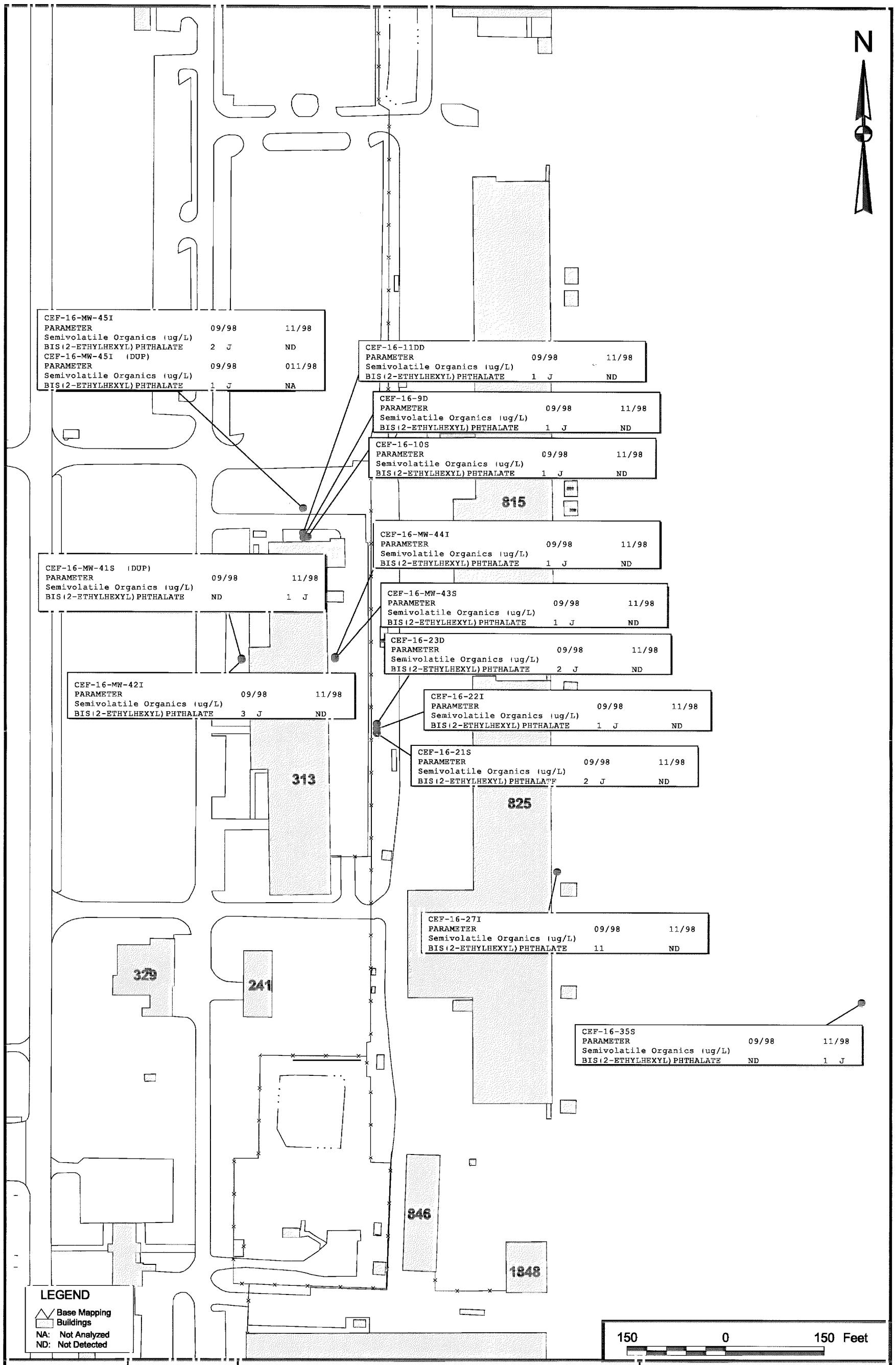
CONTRACT NUMBER
7792

APPROVED BY — DATE —

APPROVED BY — DATE —

DRAWING NO. FIGURE 3-1 REV 0

P:\GIS\CECIL\SITE16.APR 12/29/98 YLI Layout FIGURE 3-2



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YLI	1/8/99
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DB	1/8/99

COST/SCHEDULE-AREA

SCALE
AS NOTED

SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER
OPERABLE UNIT 7, SITE 16
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NUMBER 7792

APPROVED BY — DATE —

APPROVED BY — DATE —

DRAWING NO. FIGURE 3-2 REV 0

sample from monitoring well CEF-16-45I. TCA, DCA, 1,1-DCE, TCE and vinyl chloride were detected above the clean-up levels in the groundwater sample from monitoring well CEF-16-10S. TCE was detected above the clean-up levels in the groundwater samples from monitoring wells CEF-16-27I, CEF-16-32S, and CEF-16-41S. The higher concentrations were detected in the source area shown on Figure 3-1 with a general trend of decreasing concentration in the direction of groundwater flow. The detection of these parameters was consistent with the findings of the previous sampling events, which also detected higher concentrations in the source area.

In general, the concentration of the COCs decreased compared to the Baseline Groundwater Monitoring (August/September 1998) sampling event. There was a marked decrease in the TCE concentration in monitoring well CEF-16-45I. The concentration of TCE decreased from 220,000 µg/L (410,000 µg/L in the duplicate sample) to 65,500 µg/L. Exceptions to the general decrease in concentration of the COCs include:

- TCA increased (from approximately 1600 µg/L to 6550 µg/L) in CEF-16-45I
- TCE (from approximately 46 µg/L to 63 µg/L) and vinyl chloride (from approximately 32 µg/L to 43 µg/L) increased slightly in CEF-16-10S
- TCE increased (from approximately 228 µg/L to 650 µg/L) in CEF-16-41S
- TCE increased slightly (from approximately 33 µg/L to 40 µg/L) in CEF-16-27I

Methylene chloride was detected for the first time in this groundwater sampling event. Methylene chloride did not appear in the past sampling events including the RI, the three natural attenuation monitoring events conducted by Harding Larson Associates, nor the Baseline (August/September 1998) sampling event. The methylene chloride concentration is suspected as possible laboratory contaminant. Future quarterly sampling will indicate whether this is an anomaly or a site-related concern.

Vinyl chloride was detected in the monitoring wells in the source area at concentrations of 42.5 µg/L at monitoring well CEF-16-10S and 14 J µg/L at monitoring well CEF-16-45I. The concentration of vinyl chloride has increased since the Baseline (August/September 1998) sampling event. Vinyl chloride is a by product from the reductive dechlorination of chloriated ethanes. The presence vinyl chloride in areas of contaminated groundwater is a key indicator of biodegradation of the chloriated ethanes.

No VOCs were detected in the groundwater samples obtained from monitoring wells CEF-16-35S, a cross-gradient well; CEF-16-38S, a well downgradient of the plume; and CEF-16-13S and CEF-14D, background monitoring wells. VOCs were also not detected in groundwater samples from monitoring wells CEF-16-11DD, CEF-16-09D, CEF-16-23D, CEF-16-43S, and CEF-16-44I.

3.1.2 SVOCs

Bis (2-ethylhexyl) phthalate (BEHP) is the only SVOC COC identified in the RI. The analytical results for this sampling event (see Figure 3-2) show that BEHP was not detected in the monitoring wells at concentrations that exceed the established clean-up level. BEHP was estimated in two monitoring wells at a concentration of 1 J µg/L, which is below the detection limit of the test method (6 µg/L). The BEHP was detected in monitoring well CEF-16-35S and the duplicate sample from monitoring well CEF-16-41S.

In the Baseline (August/September 1998) sampling event, BEHP was detected in 12 of the 17 groundwater samples. Only one sample was above the clean-up level (6 µg/L) at a concentration of 11 µg/L at monitoring well CEF-16-27I. BEHP was not detected in the two monitoring wells listed above. BEHP was detected in 25 out of 30 wells sampled during the RI ranging in concentration from 0.5 J to 20.5 µg/L. Concentrations in 12 of the RI samples were above the clean-up level.

The maximum concentration of BEHP over time from the RI to this sampling event has decreased from 20.5 µg/L to 1 µg/L. The concentration of BEHP is possibly a reflection of contamination from laboratory equipment, and therefore BEHP is not regarded as a COC. It is recommended that BEHP analysis in future sampling events be conducted only for the rest of the first year to make sure that seasonal variations are not significant, than eliminated from the analysis.

3.2 NATURAL ATTENUATION PARAMETERS

Fixed-base laboratory analyses and field analytical tests were performed on samples of groundwater from the monitoring wells for biodegradation natural attenuation parameters. The fixed-base laboratory parameters included alkalinity, biochemical oxygen demand, chemical oxygen demand, chloride, dissolved iron and manganese, methane, ethane, ethene, nitrate, nitrite, orthophosphate, sulfate, dissolved sulfide, and total organic carbon. Field analytical tests included pH, conductivity, temperature, turbidity, dissolved oxygen, hydrogen sulfide, sulfide, dissolved carbon dioxide, ferrous iron, oxidation-reduction potential, manganese, and alkalinity. This section presents the analytical results from the first quarter groundwater sampling conducted in November 1998.

The biodegradation natural attenuation data collected at the site provide supporting evidence that biodegradation natural attenuation is occurring. The biodegradation natural attenuation data are provided in Table 3-4. Figures 3-3, 3-4, 3-5, 3-6, 3-7, 3-8, 3-9, and 3-10 provide tag maps of the biodegradation natural attenuation analytical results. The location of the wells is shown of Figure 3-1. An evaluation of the data is provided.

TABLE 3-4
SUMMARY OF NATURAL ATTENUATION DATA IN GROUNDWATER
OPERABLE UNIT 7, SITE 16
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 1 OF 4

Monitoring Parameters	Monitoring Wells							
	CEF-16-13S		CEF-16-10S		CEF-16-41S		CEF-16-43S	
	Baseline	Nov-98	Baseline	Nov-98	Baseline	Nov-98	Baseline	Nov-98
DISSOLVED OXYGEN (mg/L)	NA	0.57	0.4	0.5	0	0.13	0.3	0
NITRATE (mg/L)	NA	0.1 UJ	0.1 UJ	0.2 UJ	0.1 UJ	0.1 U/0.1 U	0.2 UJ	0.2 UJ
NITRITE (mg/L)	NA	0.1 U	0.1 U	0.2 UR	0.1 U	0.1 U/0.1 U	0.2 U	0.2 UR
FERROUS IRON (mg/L)	NA	0.14	110	0.62	1.8	1.21	1	0.96
IRON[2] (ug/L)	NA	567	815	718	1250	1120 /1090	1030	1260
MANGANESE[2] (ug/L)	NA	20	339	292	78.3	17 /16.6	84.1	10.6
MANGANESE, FIELD (mg/L)	NA	0	NA	0.6	NA	ND	NA	0
SULFATE (mg/L)	NA	0.1 UJ	9.7	18.5 J	12.3	11.7 J/12.8	16.9	7.41 J
DISSOLVED SULFIDE (mg/L)	NA	3.92	2 U	4	2 U	2 U/5	2 U	3
HYDROGEN SULFIDE (H_2S) (mg/L)	NA	0	0.3	0.3	0.7	0.3	0.3	1.5
FIELD SULFIDE (S^-_2) (mg/L)	NA	0	NA	0.268	NA	0.631	NA	0.719
ORTHOPHOSPHATE (mg/L)	NA	0.1 UJ	0.1 UJ	0.1 UJ	0.1 U	0.1 U/0.1 U	0.2 U	0.1 UJ
METHANE (ug/L)	NA	32.2	2590 J	828	19.6 J	23.4 /20.3	31.5 J	146
ETHANE (ug/L)	NA	5.8 U	47.7	5.8 U	5.8 U	5.8 U/5.8 U	5.8 U	5.8 U
ETHENE (ug/L)	NA	6.2 U	142	81.9	6.2 U	6.2 U/6.2 U	6.2 U	6.2 U
OXIDATION/REDUCTION POTENAIAL (mV)	NA	162.5	-100	51.6	25	-112.5	-23	0.5
TOTAL ORGANIC CARBON (mg/L)	NA	2.36	57.4 J	24.2	12.5 J	14 /13.5	61.3 J	28.3
CARBON DIOXIDE (mg/L)	NA	113	273.6	359	123.2	87	191.2	235
ALKALINITY (mg/L)	NA	45.1	302	275	14.6	2.2 J/2.38 J	34.4	19.2
ALKALINITY, FIELD (mg/L)	NA	22.2	258	275	11.4	51.2	35.8	42.4
CHLORIDE (mg/L)	NA	7.74 J	2.84 J	6.71 J	4.18 J	4.47 J/4.23	7.12 J	3.39 J
BIOCHEMICAL OXYGEN DEMAND (mg/L)	NA	2 U	3.29	2.07	2 U	2 UJ/2 UJ	26.4	6.35
CHEMICAL OXYGEN DEMAND (mg/L)	NA	5 U	57.1	60.2	36.4	37.1 /38.6	156	79.5
pH (unitless)	NA	5.65	6.06	6.05	4.95	4.79	5.03	4.8
TEMPERATURE (°C)	NA	24.8	25.9	24	26.9	26.3	28.7	24.1
SPECIFIC CONDUCTIVITY (mS/cm)	NA	0.103	0.609	0.589	0.088	0.071	0.136	0.082
TURBIDITY (NAU)	NA	2	0	0	0	0	87	0

1. Duplicate Sample Results Included
2. Sample was not filtered for iron and manganese in the Baseline event. Samples were filtered for the other sampling events

NA = Not Analyzed

TABLE 3-4
SUMMARY OF NATURAL ATTENUATION DATA IN GROUNDWATER
OPERABLE UNIT 7, SITE 16
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 2 OF 4

Monitoring Parameters	Monitoring Wells							
	CEF-16-21S		CEF-16-32S		CEF-16-35S		CEF-16-38S	
	Baseline	Nov-98	Baseline	Nov-98	Baseline	Nov-98	Baseline	Nov-98
DISSOLVED OXYGEN (mg/L)	0.52	0.05	0.66	0.31	0.98	0	0.56	0.17
NITRATE (mg/L)	0.1 UJ	0.1 U	0.1 UJ	0.811 J	0.1 UJ	0.1 U	0.339 J	0.1 U
NITRITE (mg/L)	0.1 U	0.1 U	0.1 UJ	0.1 U	0.1 UJ	0.1 U	0.1 UJ	0.1 U
FERROUS IRON (mg/L)	0	0.09	1	0.18	1	0.25	1	0.09
IRON[2] (ug/L)	238	105	149	195	303	294	215	110
MANGANESE[2] (ug/L)	1.5	9	7.7 U	5 U	3.1 U	5 U	8.4 U	5 U
MANGANESE, FIELD (mg/L)	NA	0.4	NA	0	NA	ND	NA	ND
SULFATE (mg/L)	0.471	18.9 J	3.22 J	5.07 J	3.43 J	4.9 J	9.92 J	14.9 J
DISSOLVED SULFIDE (mg/L)	NA	2 U	2 U	2 U	2 U	2 U	2 U	2 U
HYDROGEN SULFIDE (H_2S) (mg/L)	0	0	0	0.4	1	0.7	0	0
FIELD SULFIDE (S^-_2) (mg/L)	NA	0.029	NA	0.228	NA	0.719	NA	0.012
ORTHOPHOSPHATE (mg/L)	0.1 UJ	0.1 UJ	0.1 UJ	0.1 U	0.1 UJ	0.1 U	0.1 UJ	0.1 U
METHANE (ug/L)	3.4 U	6 U	5.7 U	9.5 U	46.9 J	31.9	22.5 J	12
ETHANE (ug/L)	5.8 U	5.8 U	5.8 U	5.8 U	5.8 U	5.8 U	5.8 U	5.8 U
ETHENE (ug/L)	6.2 U	6.2 U	6.2 U	6.2 U	6.2 U	6.2 U	6.2 U	6.2 U
OXIDATION/REDUCTION POTENAIAL (mV)	213	-0.4	43	0.4	30	0.4	22	0.4
TOTAL ORGANIC CARBON (mg/L)	16.6 J	19.3	3.04	4.3	7.46	7.37	24.2	6.09
CARBON DIOXIDE (mg/L)	80	66.2	82	197	90	197	92	260
ALKALINITY (mg/L)	7.9	1 U	12.6	3.66 J	5.25	2.75 J	14.7	2.02 J
ALKALINITY, FIELD (mg/L)	NA	2.8	36	13.4	30	13.6	40	106
CHLORIDE (mg/L)	2.81 J	2.33 J	5.34 J	0.808 J	11.1 J	3.09 J	7.7 J	2.11 J
BIOCHEMICAL OXYGEN DEMAND (mg/L)	2 U	2 UJ	8.28	2 U	2 U	2 U	2 U	2 U
CHEMICAL OXYGEN DEMAND (mg/L)	28.6	41	20.2	16.9	30.4	22.6	35.4	11.1
pH (unitless)	4.73	4.65	5.04	5.28	4.82	4.2	5	4.79
TEMPERATURE (°C)	26.6	25.1	28.5	27.5	28.1	27.7	29.6	27.6
SPECIFIC CONDUCTIVITY (mS/cm)	0.075	0.07	0.052	0.053	0.062	0.059	0.083	0.087
TURBIDITY (NAU)	0	0	0	0	0	1	0	0

1. Duplicate Sample Results Included
2. Sample was not filtered for iron and manganese in the Baseline event. Samples were filtered for the other sampling events

NA = Not Analyzed

TABLE 3-4
SUMMARY OF NATURAL ATTENUATION DATA IN GROUNDWATER
OPERABLE UNIT 7, SITE 16
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 3 OF 4

Monitoring Parameters	Monitoring Wells									
	CEF-16-45I		CEF-16-42I		CEF-16-44I		CEF-16-22I		CEF-16-27I	
	Baseline	Nov-98	Baseline	Nov-98	Baseline	Nov-98	Baseline	Nov-98	Baseline	Nov-98
DISSOLVED OXYGEN (mg/L)	0	0	4.48	0	2.6	0	1.26	0	0.8	0.07
NITRATE (mg/L)	0.1 UJ/0.1 U	0.1 U	0.1 U	0.1 U/0.1 U	0.1 UJ	0.2 UJ	0.1 U	0.1 U	0.1 UJ/0.1 UJ	0.1 U
NITRITE (mg/L)	0.1 U/0.1 UJ	0.1 U	0.1 U	0.1 U/0.1 U	0.1 U	0.2 UR	0.1 U	0.1 U	0.1 UJ/0.1 UJ	0.1 U
FERROUS IRON (mg/L)	10	5.1	1	0.57	0.6	0.69	1	0.8	1	1.53
IRON[2] (ug/L)	34700/34300	12200	921	511 /608	499	612	597	763	1740 /1790	1590
MANGANESE[2] (ug/L)	126/124	88.4	29.2	9.5 /11.2	19.7	44.3	1.8	5 U	4.2 U/43.8	5 U
MANGANESE, FIELD (mg/L)	NA	0	NA	ND	NA	ND	NA	0.1	NA	ND
SULFATE (mg/L)	1 U/1.1	16.2 J	3.9	4.58 J/4.6 J	2	1.2 U	51.5	6.56 J	2.5 J/2.59 J	3.07
DISSOLVED SULFIDE (mg/L)	NA/NA	2 U	2 U	2 /2	2 U	2 U	19	2	2 U/2 U	3.92
HYDROGEN SULFIDE (H_2S) (mg/L)	0	0	0.3	0.1	0.5	0.3	2	1	0	0.05
FIELD SULFIDE (S^-_2) (mg/L)	NA	0	NA	0.152	NA	0.571	NA	0.719	NA	0.132
ORTHOPHOSPHATE (mg/L)	0.1 UJ/0.1 UJ	0.1 UJ	0.1 UJ	0.1 U/0.1 U	0.1 U	0.1 UJ	0.1 UJ	0.1 UJ	0.1 UJ/0.1 UJ	0.1 UJ
METHANE (ug/L)	2.5 U/2.5 U	6.2 U	2.5 U	5 U/4.8 U	54.9 J	25	14.7 J	14	14 J/13.7 J	7.7 U
ETHANE (ug/L)	5.8 U/5.8 U	5.4 J	5.8 U	5.8 U/5.8 U	5.8 U	5.8 U	5.8 U	5.8 U	5.8 U/5.8 U	5.8 U
ETHENE (ug/L)	6.2 U/6.2 U	6 U	6.2 U	6.2 U/6.2 U	6.2 U	6.2 U	6.2 U	6.2 U	6.2 U/6.2 U	6.2 U
OXIDATION/REDUCTION POTENIAL (mV)	140	220	16	-67.7	-18	62.4	-11	-135	140	23
TOTAL ORGANIC CARBON (mg/L)	16.1 J/19.8 J	23.4	2.57	3.61 /1.89	8.28 J	10	4.33	7.28	2.88 /2.48	2.32
CARBON DIOXIDE (mg/L)	198	105	32.6	230	68.8	103	78.4	77.8	80	124
ALKALINITY (mg/L)	1 U/1 U	1 UJ	4.2	1.28 J/1.65 J	8.33	2.75	1 U	1.83	5.25 /2.1	3.22
ALKALINITY, FIELD (mg/L)	40	125	3.2	18	6.5	11	3.2	0	32	6
CHLORIDE (mg/L)	1.45 J/111 J	79.5 J	2.14 J	3.58 J/4.13 J	4.19 J	0.377 U	3.62 J	4.68 J	2.76 J/3.23 J	3.57
BIOCHEMICAL OXYGEN DEMAND (mg/L)	2 U /5.64	53.7	2 U	2 UJ/2 UJ	2 U	3.76	2 U	2 UJ	2 U/2 U	2 UJ
CHEMICAL OXYGEN DEMAND (mg/L)	83.1/83.3	122	7.75	5 U/8.19	36.4	31.3	10.3	16.9	20.2 /17.7	7.23
pH (unitless)	4.06	5.93	4.78	4.49	5	5.22	4.5	4.39	4.81	4.72
TEMPERATURE (°C)	25.3	25.2	24.3	25.1	26.1	24.4	24.5	24.4	28	25
SPECIFIC CONDUCTIVITY (mS/cm)	0.461	0.261	0.03	0.029	0.042	0.041	0.041	0.42	0.033	0.03
TURBIDITY (NAU)	0	12	0	0	96	0	0	0	0	0

1. Duplicate Sample Results Included
2. Sample was not filtered for iron and manganese in the Baseline event. Samples were filtered for the other sampling events

NA = Not Analyzed

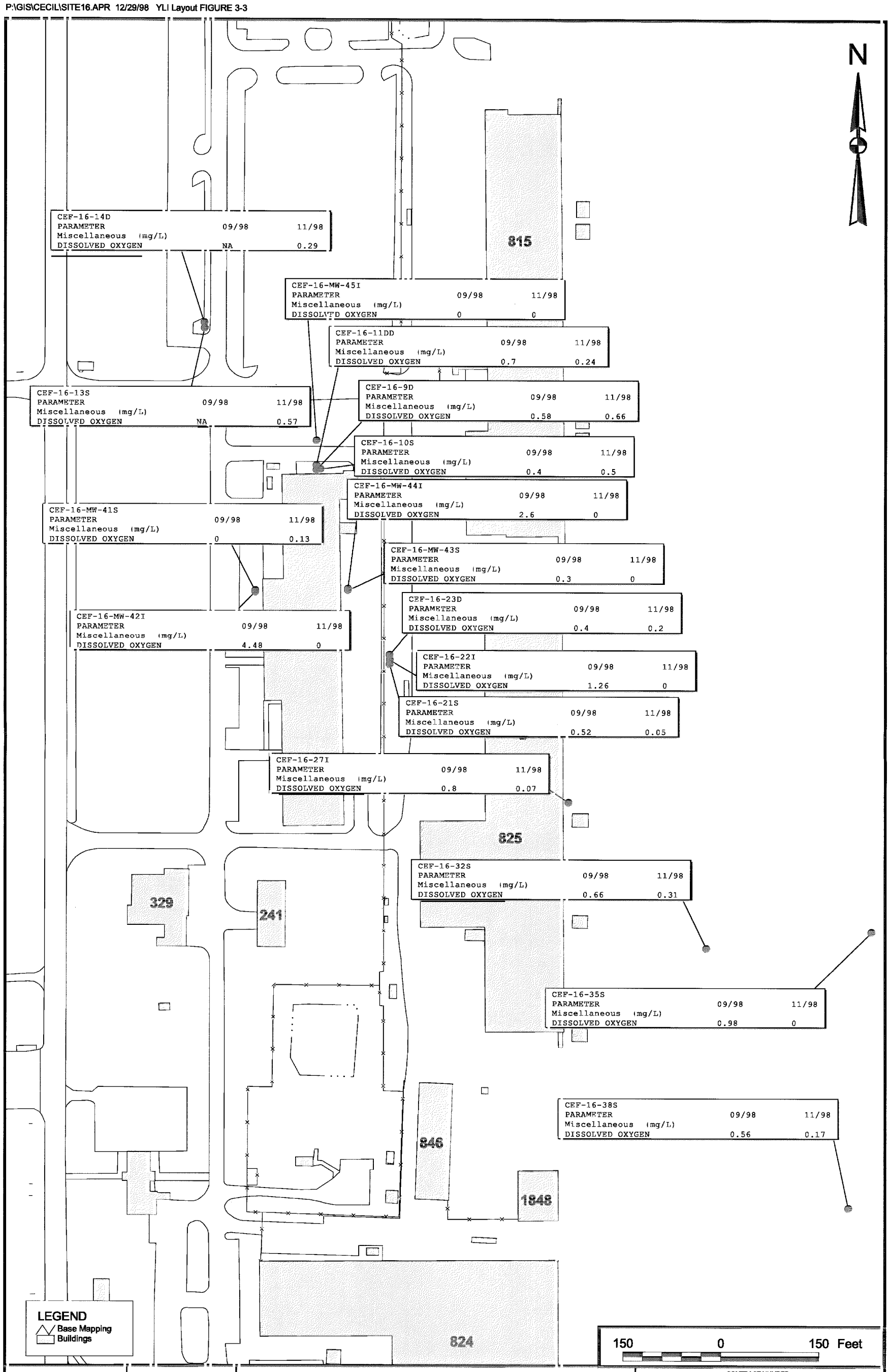
TABLE 3-4
SUMMARY OF NATURAL ATTENUATION DATA IN GROUNDWATER
OPERABLE UNIT 7, SITE 16
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA
PAGE 4 OF 4

Monitoring Parameters	Monitoring Wells							
	CEF-16-11DD		CEF-16-14D		CEF-16-9D		CEF-16-23D	
	Baseline	Nov-98	Baseline	Nov-98	Baseline	Nov-98	Baseline	Nov-98
DISSOLVED OXYGEN (mg/L)	0.7	0.24	NA	0.29	0.58	0.66	0.4	0.2
NITRATE (mg/L)	0.1 UJ	0.1 UJ	NA	3.9 J	0.1 UJ	0.1 UJ	0.1 UJ	0.1 U
NITRITE (mg/L)	0.1 U	0.1 UR	NA	0.1 U	0.1 U	0.1 UR	0.1 U	0.1 U
FERROUS IRON (mg/L)	0.6	0.3	NA	0.4	1	0.87	1	0.14
IRON[2] (ug/L)	365	367	NA	144	875	810	495	474
MANGANESE[2] (ug/L)	40.6	43.5	NA	5 U	19.8	19.1	49.4	51.8
MANGANESE, FIELD (mg/L)	NA	0	NA	0	NA	ND	NA	0
SULFATE (mg/L)	105	0.1 UJ	NA	4.05 J	0.26	0.1 UJ	18.1	0.1 U
DISSOLVED SULFIDE (mg/L)	NA	4	NA	3.92	2 U	2	NA	8
HYDROGEN SULFIDE (H_2S) (mg/L)	0	0	NA	0	0	0	0	0.05
FIELD SULFIDE (S^-_2) (mg/L)	NA	0.3	NA	0.022	NA	0.17	NA	0.022
ORTHOPHOSPHATE (mg/L)	0.1 UJ	0.1 UJ	NA	0.1 UJ	0.14	0.1 UJ	0.1 UJ	0.1 U
METHANE (ug/L)	141 J	147	NA	3.4 U	47.2 J	26.9	44.5 J	127
ETHANE (ug/L)	5.8 U	5.8 U	NA	5.8 U	5.8 U	5.8 U	5.8 U	5.8 U
ETHENE (ug/L)	6.2 U	6.2 U	NA	6.2 U	6.2 U	6.2 U	6.2 U	6.2 U
OXIDATION/REDUCTION POTENAIAL (mV)	66	27.8	NA	116.2	66	0.5	28	-36.7
TOTAL ORGANIC CARBON (mg/L)	1.95 J	2.88	NA	1.11	2.78 J	5.11	2.41 J	1.77
CARBON DIOXIDE (mg/L)	84.2	171	NA	134	82	144	79.6	176
ALKALINITY (mg/L)	260	234	NA	22.4	36.5	35.7	243	229 J
ALKALINITY, FIELD (mg/L)	200	232	NA	62.8	30	43.2	167	139.6
CHLORIDE (mg/L)	9.46 J	9.97 J	NA	4.71	9.08 J	11.2 J	3.15 J	9.33 J
BIOCHEMICAL OXYGEN DEMAND (mg/L)	2 U	2 UJ	NA	2 U	2 U	2 UJ	2 U	2 UJ
CHEMICAL OXYGEN DEMAND (mg/L)	5 U	7.23	NA	5 U	5 U	5 U	5.2	7.23
pH (unitless)	6.7	6.81	NA	5.75	5.46	5.69	6.81	6.78
TEMPERATURE (°C)	24.1	22.2	NA	24.2	24.5	22	24.1	23.2
SPECIFIC CONDUCTIVITY (mS/cm)	0.483	0.476	NA	0.102	0.11	0.115	0.473	0.459
TURBIDITY (NAU)	0	0	NA	0	0	0	0	0

1. Duplicate Sample Results Included
2. Sample was not filtered for iron and manganese in the Baseline event. Samples were filtered for the other sampling events

NA = Not Analyzed

P:\GIS\CECIL\SITE16.APR 12/29/98 YLI Layout FIGURE 3-3



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COST/SCHEDULE-AREA

SCALE
AS NOTED

DISSOLVED OXYGEN IN GROUNDWATER
OPERABLE UNIT 7, SITE 16
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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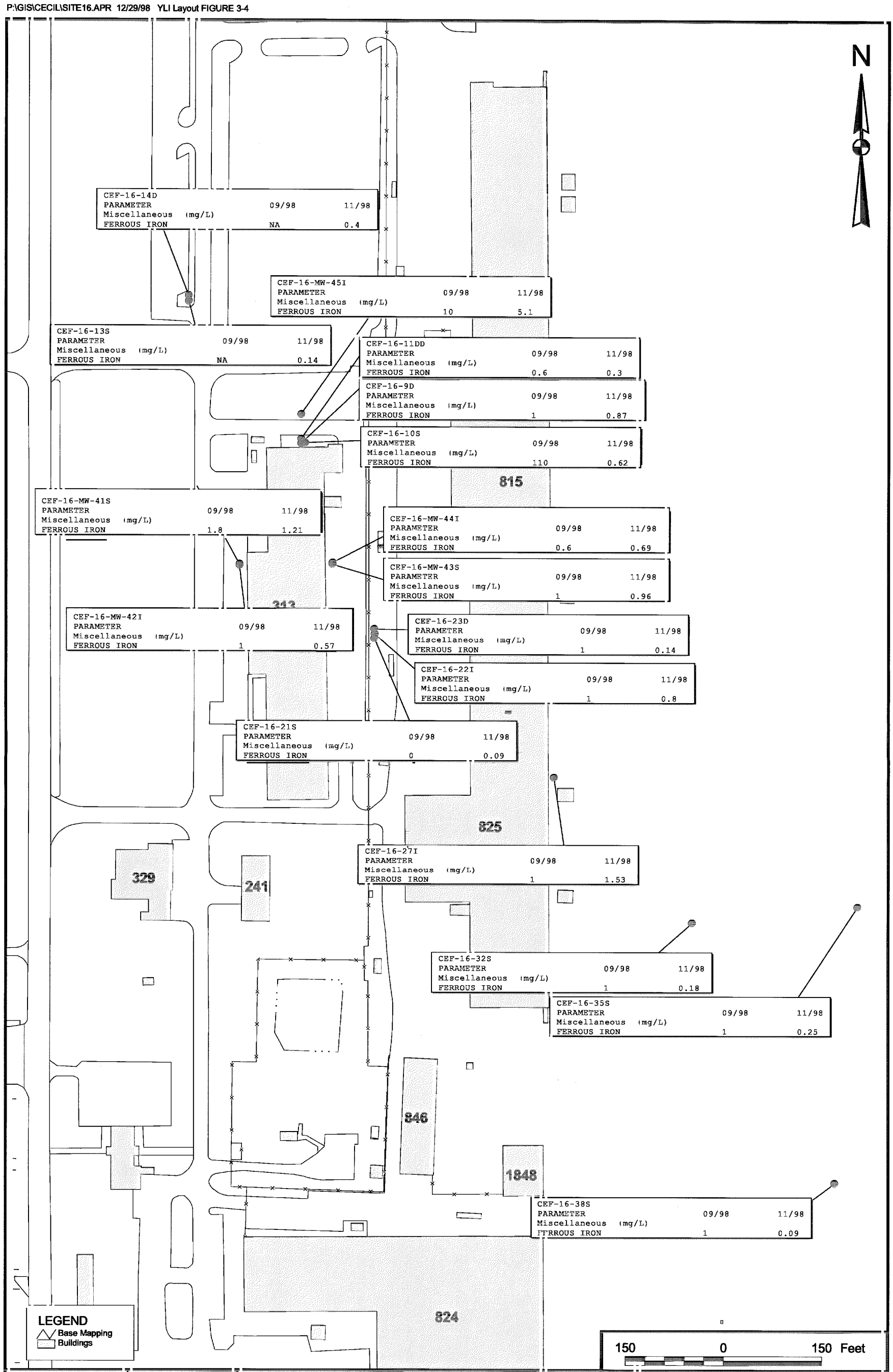

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SCALE	
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FERROUS IRON IN GROUNDWATER
OPERABLE UNIT 7, SITE 16
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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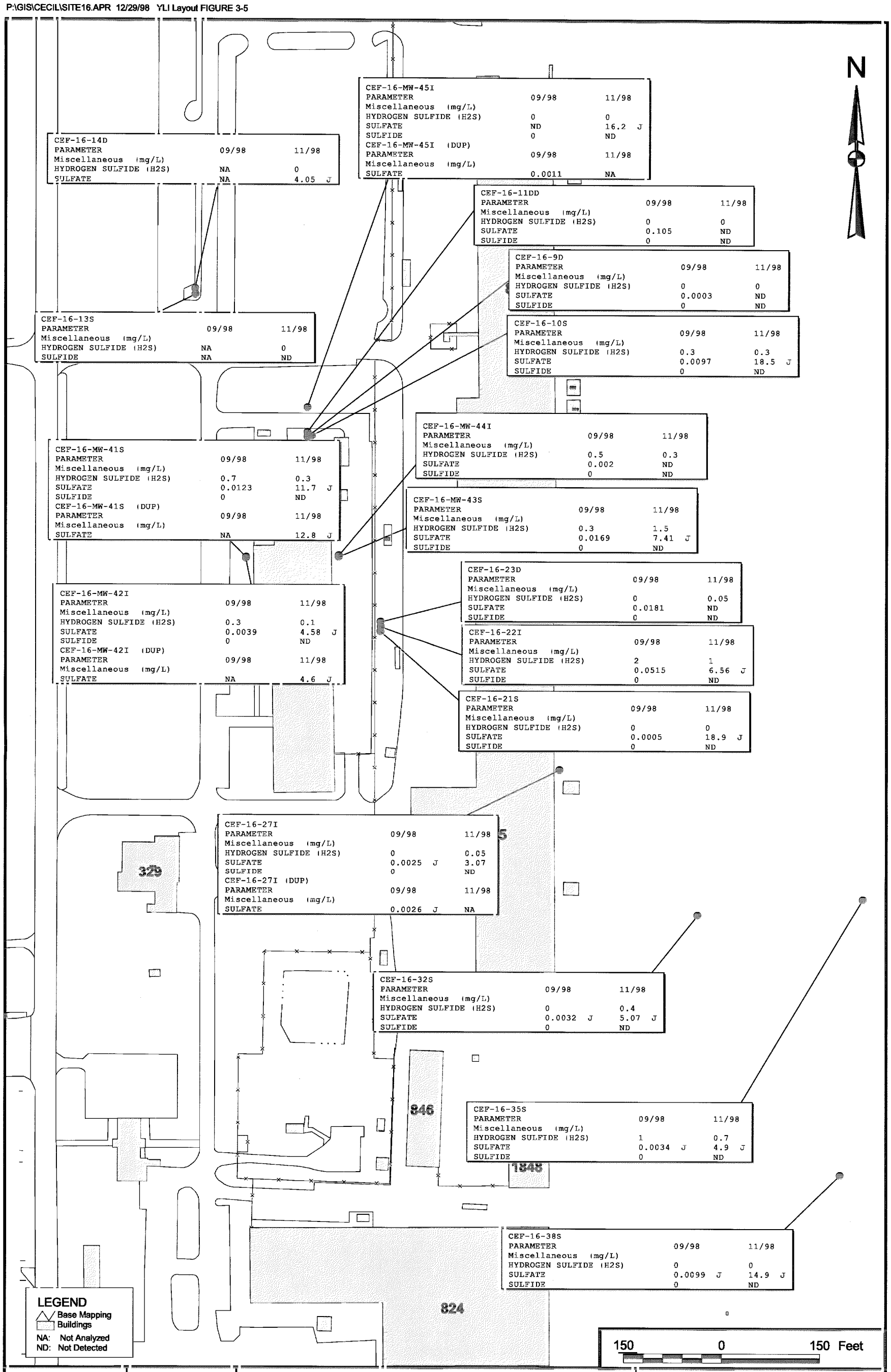
P:\GIS\CECIL\SITE16.APR 12/29/98 YLI Layout FIGURE 3-5



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COST/SCHEDULE-AREA

SCALE
AS NOTED

SULFATE, SULFIDE, AND HYDROGEN SULFIDE IN GROUNDWATER
OPERABLE UNIT 7, SITE 16
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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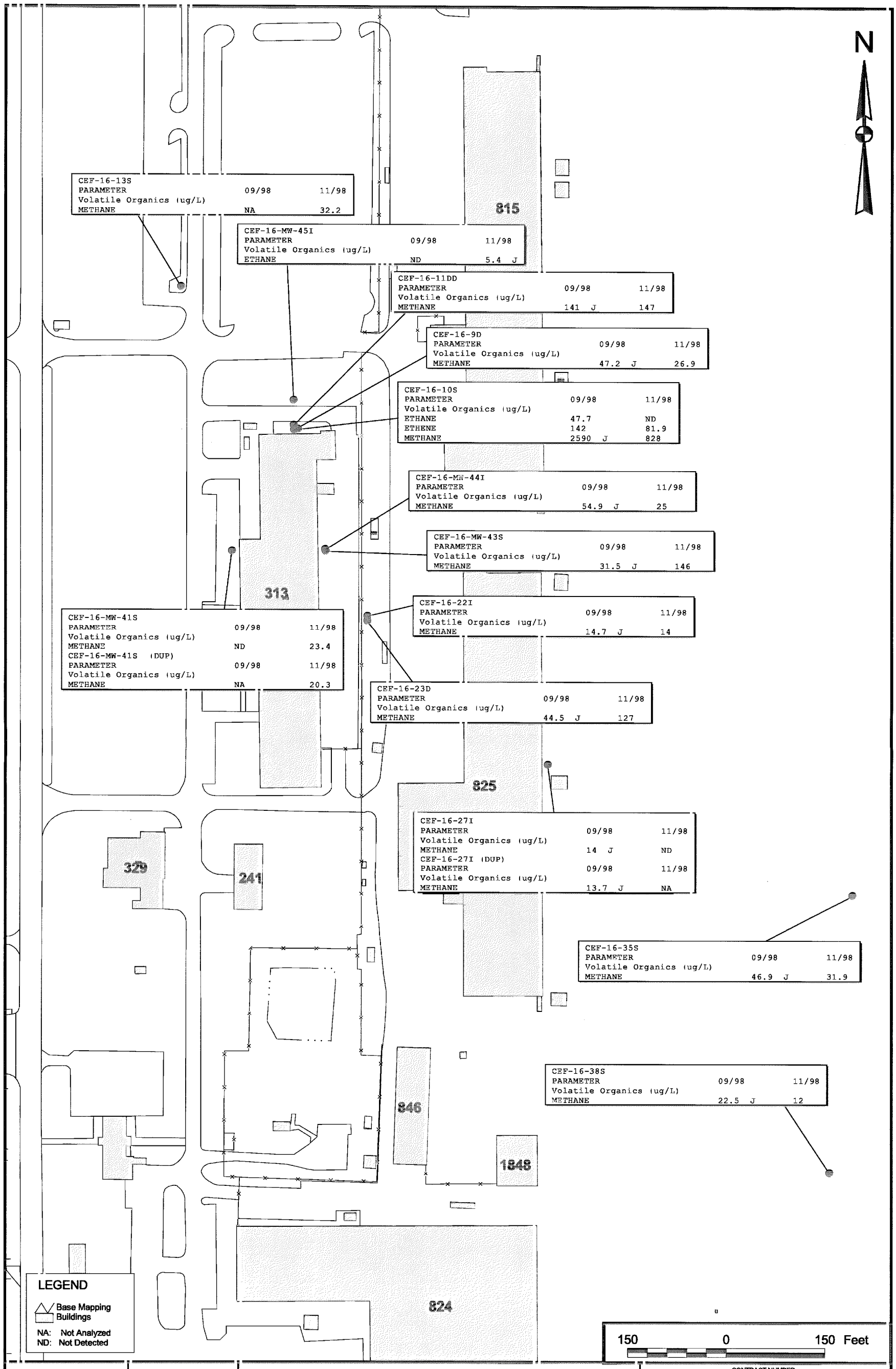
P:\GIS\CECIL\SITE16.APR 12/29/98 YLI Layout FIGURE 3-6



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COST/SCHEDULE-AREA

SCALE
AS NOTED

METHANE, ETHANE, AND ETHENE IN GROUNDWATER
OPERABLE UNIT 7, SITE 16
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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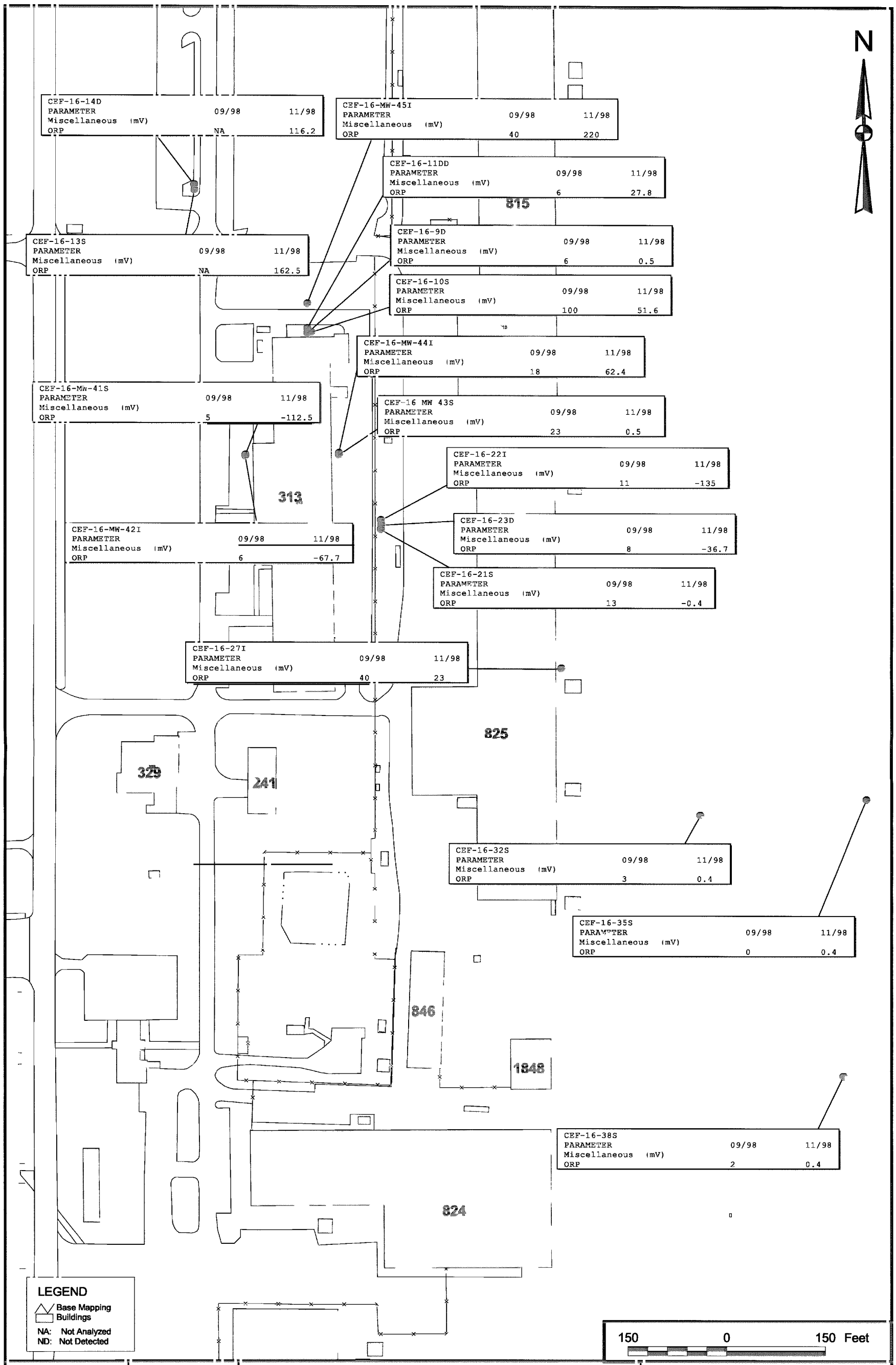
P:\GIS\CECIL\SITE16.APR 12/29/98 YLI Layout FIGURE 3-7



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COST/SCHEDULE-AREA

SCALE
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GROUNDWATER OXIDATION REDUCTION POTENTIAL
OPERABLE UNIT 7, SITE 16
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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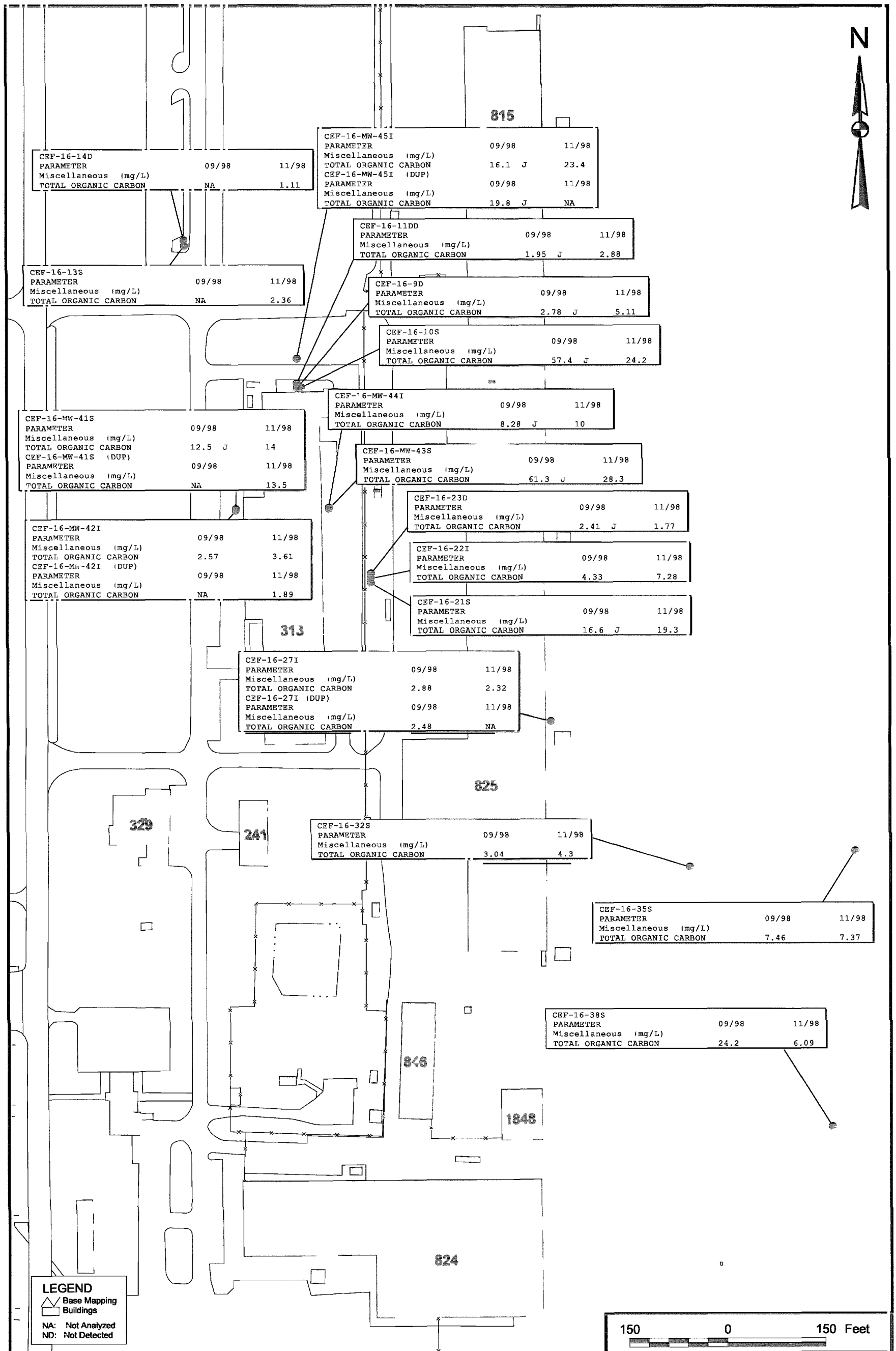

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TOTAL ORGANIC CARBON IN GROUNDWATER
OPERABLE UNIT 7, SITE 16
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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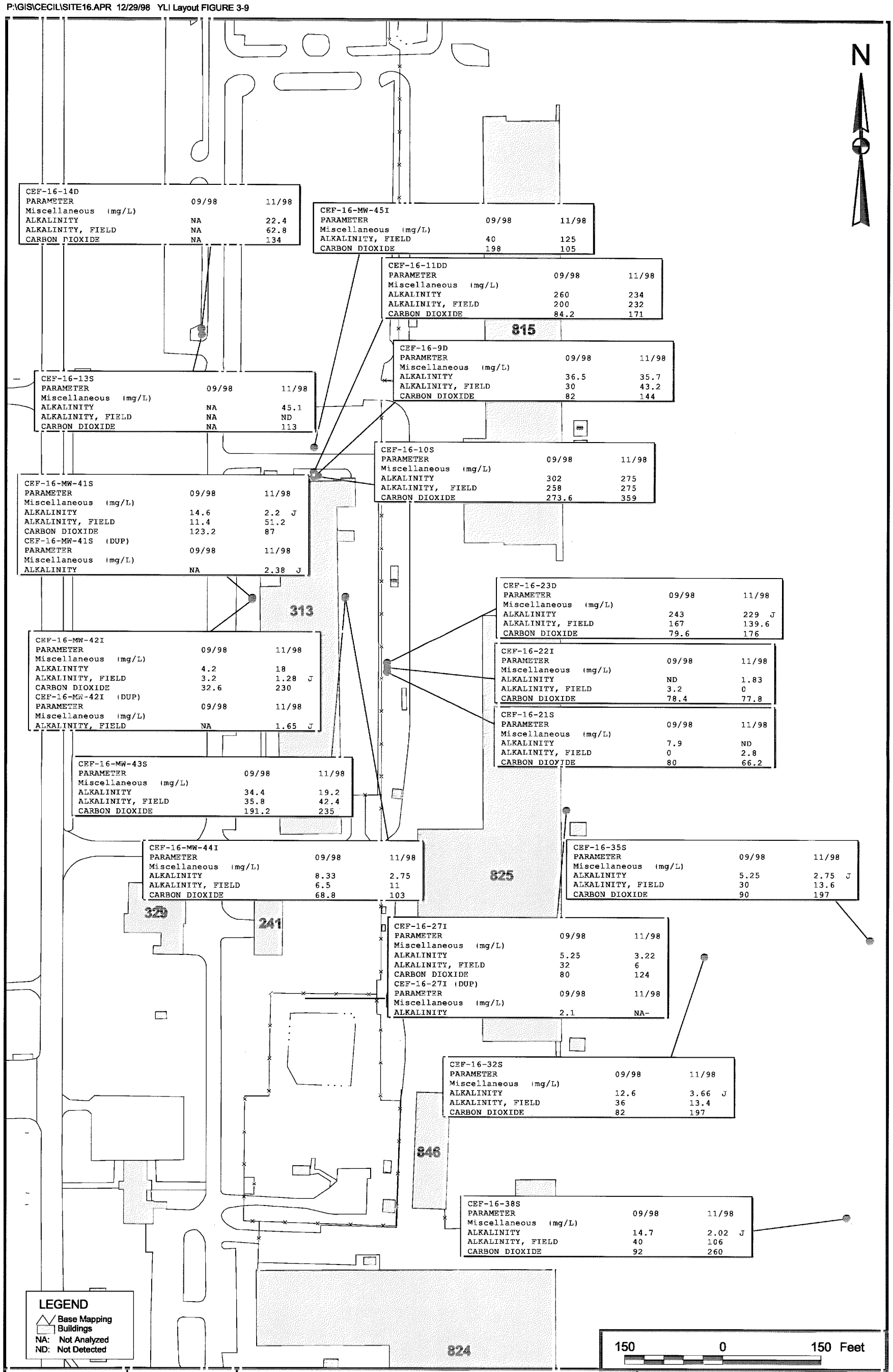
P:\GIS\CECIL\SITE16.APR 12/29/98 YLI Layout FIGURE 3-9



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COST/SCHEDULE-AREA	
SCALE	AS NOTED

ALKALINITY AND CARBON DIOXIDE IN GROUNDWATER
OPERABLE UNIT 7, SITE 16
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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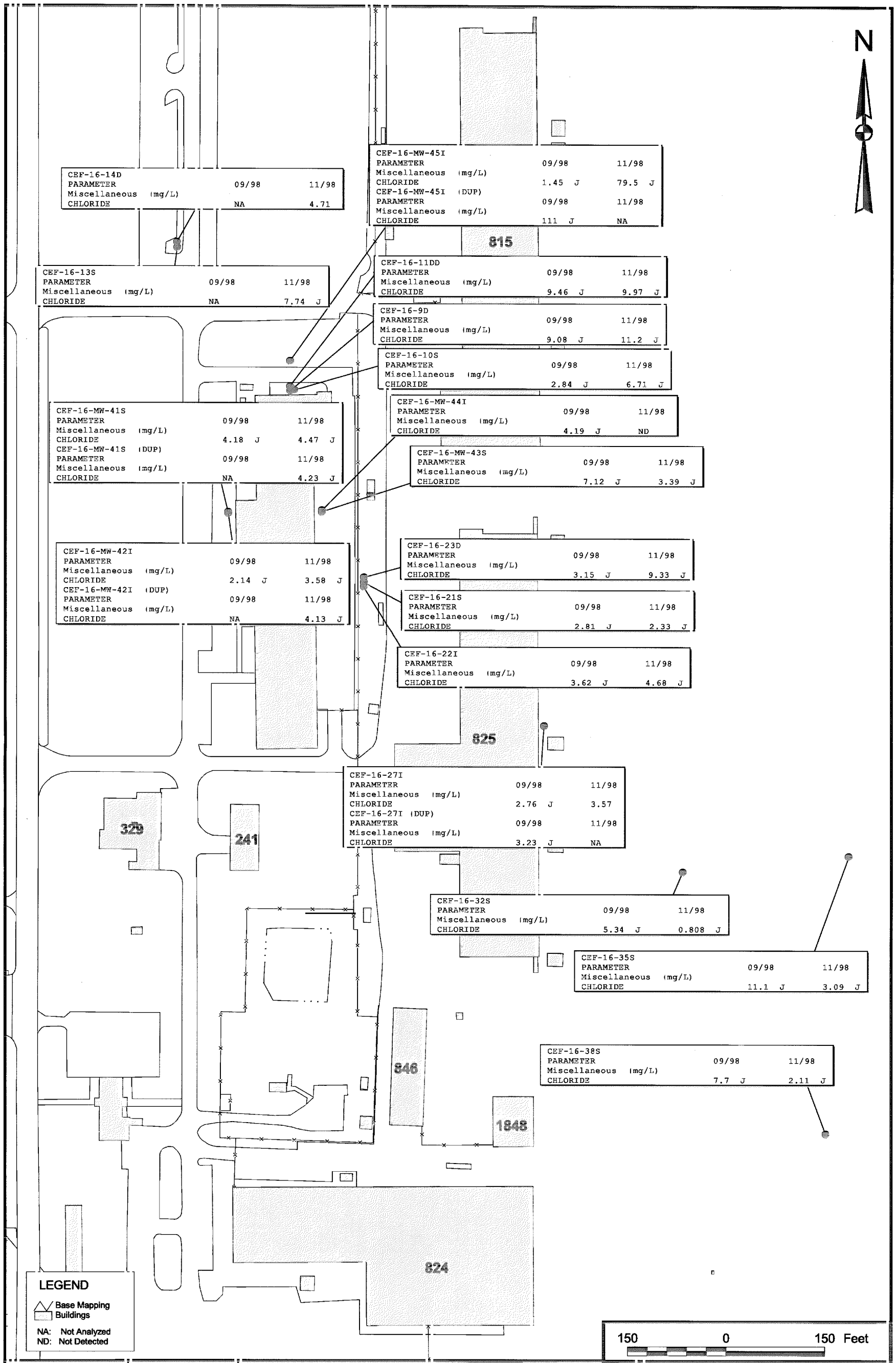
DRAWING NO. FIGURE 3-9	REV 0

P:\GIS\CECIL\SITE16.APR 12/29/98 YLI Layout FIGURE 3-10



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COST/SCHEDULE-AREA

SCALE
AS NOTED

CHLORIDE IN GROUNDWATER
OPERABLE UNIT 7, SITE 16
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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3.2.1 Dissolved Oxygen

The dissolved oxygen concentration in groundwater was measured using a Horiba® Water-quality Meter (Model U-10) and a high resolution, low-range test kit Hach® Model OX-DT using the modified Winkler digital titration method. Dissolved oxygen acts as a primary substrate or cosubstrate during the initial stages of metabolism. During aerobic respiration, oxygen is utilized as an electron acceptor to minerialize hydrocarbons into carbon dioxide and water.

However, for chlorinated hydrocarbons, anaerobic pathways (reductive dechlorination) are more efficient than aerobic pathways. Therefore, if dissolved oxygen concentrations are greater than approximately 0.5 mg/L, aerobic conditions exist and reductive dechlorination will not occur. Dissolved oxygen at concentrations less than 0.5 mg/L provides strong evidence of indigenous bacteria populations that are already established and actively degrading natural or anthropogenic organic carbon, utilizing anaerobic pathways.

Depleted dissolved oxygen concentrations (less than 0.66 mg/L) were observed in the wells that are in the source area and within the plume at the site as shown on Figure 3-3. The dissolved oxygen concentration in well CEF-16-13S and CEF-16-14D located at the upgradient side of the site were 0.57 mg/L and 0.29 mg/L, respectively. The dissolved oxygen concentration in the source area was 0.0 mg/L in monitoring well CEF-16-45I (an IZS well), 0.5 mg/L in monitoring well CEF-16-10S (an UZS well), 0.66 mg/L in the monitoring well CEF-16-9D (a LZS well), and 0.24 mg/L in the monitoring well CEF-16-11DD (a well in the intermediate aquifer system and confining unit). The dissolved oxygen concentration within the plume ranged from 0.0 mg/L to 0.31 mg/L. These concentrations indicate that anaerobic pathways have developed for reductive dechlorination to occur and provides strong evidence that indigenous bacteria populations are already established and actively degrading natural or anthropogenic organic carbon.

The dissolved oxygen concentrations have remained the same in three of the wells, decreased in eleven of the wells, and increased in one of the wells compared to Baseline (August/September 1998) sampling event. The decrease in oxygen occurs in the wells in the source area and plume. The increase in dissolved oxygen occurs in monitoring well CEF-16-41S.

3.2.2 Nitrate and Nitrite

During denitrification (an anaerobic biodegradation process) bacteria can use nitrate (NO_3) as an electron acceptor to degrade hydrocarbons, generating carbon dioxide. However, because chlorinated hydrocarbons are used as electron acceptors during reductive dechlorination, nitrate may compete as an

electron acceptor if present at moderate concentrations (>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 for nitrate reduction to be a predominant microbial process.

Groundwater samples were sent to GPL Laboratories for nitrate and nitrite analysis. Nitrate was detected in only two monitoring wells, CEF-16-14D and CEF-16-32S, at concentrations of 3.9 J mg/L and 0.811 mg/L, respectively. Nitrite was not detected in the sampled monitoring wells. The nitrate results indicate that there is some nitrate in the LZS groundwater zone available for nitrate reduction, however it does not appear to be a predominant microbial process at this site.

The nitrate and nitrite results are consistant with the Baseline (August/September 1998) sampling results. The results indicate that nitrate reduction is not a predominant microbial process. Nitrate and nitrite analysis in future sampling events should be considered only for the first year to determine if seasonal variations are significant.

3.2.3 Ferrous Iron, Dissolved Iron and Dissolved Manganese

The ferrous iron concentration in groundwater was measured in the field using a portable colorimeter (Hach® Model DR-700). 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.

During this sampling event, ferrous iron ranged from 0.09 mg/L at monitoring well CEF-16-21S and CEF-16-38S to 5.1 mg/L at monitoring well CEF-16-45I. The concentration of ferrous iron at each monitoring well is shown of Figure 3-4. Monitoring well CEF-16-45I in the source area and monitoring wells CEF-16-27I, CEF-16-41S and CEF-16-43S (downgradient wells within the plume area) show elevated ferrous iron concentrations compared to the background wells CEF-16-13S and CEF-16-14D indicating ferric iron reduction is a likely anaerobic pathway for biodegradation of the contamination. Ferric iron reduction is most likely a predominant biodegradation process in the area of these wells (CEF-16-41S, CEF-16-43S, CEF-16-45I, and CEF-16-27I).

When compared to the Baseline (August/September 1998) sampling event, the ferrous iron concentrations were approximately the same in two of the monitoring wells, increased in two of the monitoring wells, and decreased in eleven of the monitoring wells. This is an indication that the ferric iron reduction processes are decreasing as a predominant biodegradation mechanism in the groundwater system since the Baseline (August/September 1998) sampling event.

Dissolved iron concentrations from the filtered groundwater samples were analyzed by GPL Laboratories. Dissolved iron concentrations from the laboratory testing ranged from 105 µg/ to 12,200 µg/L in the groundwater at the site. The maximum dissolved iron concentration was detected in monitoring well CEF-16-45I. The dissolved iron concentration indicates a sufficient supply of iron available as potential electron receptor in the area of CEF-16-45I. However, the concentration of dissolved iron is one or two orders of magnitude less at the other monitoring wells indicating there is only a small supply of dissolved iron available as a potential electron receptor for the rest of the site.

Comparing the dissolved iron concentration to the ferrous iron concentration at each of the wells indicates a trend that should be expected. The dissolved iron concentration in background well (CEF-16-13S) consists of a small amount of ferrous iron and most likely a lot of ferric iron. There appears to be an anomaly with the dissolved iron and ferrous iron concentrations in background well CEF-16-14D. The results of the analysis for the monitoring wells in the source area, plume and downgradient of the plume show the dissolved iron concentration consists of mostly ferrous iron with a small amount of ferric iron. When the groundwater system returns to an aerobic state the dissolved iron concentration will probably return to the conditions observed in the background monitoring well CEF-16-13S.

Similar to ferric iron reduction, manganese can be used as an electron acceptor during anaerobic biodegradation processes. Decreasing concentrations of manganese along the flow path within the plume area indicate that biodegradation by manganese reduction maybe occurring and that it maybe a predominant microbial process. The manganese concentration in groundwater was measured in the field using a portable colorimeter (Hach® Model DR-700). Filtered groundwater samples were analyzed at GPL Laboratories.

The manganese concentration measured in the field ranged from not detected to 0.6 mg/L. The manganese concentrations measured in the laboratory ranged from not detected to 0.292 mg/L. These manganese concentrations are not significant enough to be utilized in the anaerobic biodegradation process. Manganese analysis in future sampling events should be considered only for the first year to determine if seasonal variations are significant.

3.2.4 Sulfate, Sulfide, and Hydrogen Sulfide

Sulfate and dissolved sulfide concentrations from the groundwater samples were analyzed by GPL Laboratories. Sulfide and hydrogen sulfide concentrations from the groundwater samples were measured in the field using a portable colorimeter (Hach Model DR-700) and Hach® Model HS-C test kit, respectively. 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 (>20 mg/L). Therefore, in order for reductive dechlorination to occur, sulfate concentrations should be present but less than 20.0 mg/L in the plume. The process of sulfate reduction results in the generation of hydrogen sulfide. The results of the sulfate, dissolved sulfide, and hydrogen sulfide analyses are shown on Figure 3-5.

The sulfate concentration in the groundwater samples ranged from 3.07 mg/L to 18.9 mg/L at the site. The results show sulfate is available as an electron acceptor in the source area and at monitoring well CEF-16-21S. The results also show there is a decreasing trend in the sulfate concentrations in the plume after the source area and after monitoring well CEF-16-21S. The decreasing trend indicates that sulfate reduction is probably occurring. In general, the sulfate concentrations have increased in most (eight) of monitoring wells compared to the results of past sampling events.

The laboratory sulfide concentrations ranged from not detected to 8 mg/L and did not show a pattern of increasing in the downgradient direction. Field sulfide concentration range from not detected to 0.719 mg/L. There was little correlation or trend with the sulfide concentrations. Sulfide analysis in future sampling events should be considered only for the first year to determine if seasonal variations are significant.

The hydrogen sulfide concentrations from the field testing in the downgradient wells (CEF-16-22I, CEF-16-43S, CEF-16-32S, and CEF-16-35S) were greater than 0.4 mg/L and were higher than the background monitoring wells (CEF-16-13S and CEF-16-14D) concentration (not detected). The concentration of hydrogen sulfide increased in the downgradient direction to a maximum concentration of 1.5 mg/L in monitoring well CEF-16-43S for the UZS and to a maximum concentration of 1 mg/L in monitoring well CEF-16-22I for the IZS.

The hydrogen sulfide concentrations remained the same in six of the monitoring wells, decreased in five of the monitoring wells, and increased in four of the monitoring wells compared to the Baseline (August/September 1998) sampling event. The increase of hydrogen sulfide concentrations at monitoring wells CEF-16-32S and CEF-16-43S indicates that the area around these wells has developed into a sulfate-reduction zone since the Baseline (August/September 1998) sampling event.

A decreasing trend in sulfate concentration and an increasing trend in hydrogen sulfide in groundwater is noted with the groundwater flow direction. This is an indicator of a sulfate-reducing environment. Sulfate reduction is most likely a predominant biodegradation process in the area of monitoring wells CEF-16-43S and CEF-16-22I. This sulfate-reduction zone has developed since the Baseline (August/September 1998) sampling event.

3.2.5 Phosphate

Similar to sulfate reduction (but to a lesser degree) phosphate reduction is a minor anaerobic biodegradation process whereby bacteria can use phosphate (PO_4) as an electron acceptor to degrade hydrocarbons. Phosphate concentrations were non-detect in all of the well sampled. Due to the lack of phosphate as an electron acceptor in the groundwater system, it is unlikely that phosphate reduction is a significant portion of the total biodegradation capacity of the aquifer. In addition, phosphorous is an important nutrient for microbes, and its absence may limit the overall biodegradation capacity of the aquifer. Phosphate analysis in future sampling events should be considered only for the first year to determine if seasonal variations are significant.

3.2.6 Methane, Ethene, and Ethane

Methane, ethene, and ethane in the groundwater was analyzed by GPL Laboratories. 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 ethene and ethane in areas of contaminated groundwater is a key indicator of biodegradation of the chlorinated ethanes. The results of the methane, ethene, and ethane analyses are shown on Figure 3-6.

Methane, ethane, and ethene were detected in the groundwater sample from monitoring well CEF-16-10S, indicating that a reducing environment and biodegradation of the chlorinated hydrocarbons was occurring in this area. The methane concentration in monitoring well CEF-16-43S decreased compared to monitoring well CEF-16-10S but the concentration was four times higher than the background concentration indicating that methanogensis in occurring. However ethene and ethane were not detected in this groundwater sample or any of the other groundwater samples.

The findings of this sampling event were consistent with findings of past sampling events. The concentration of methane was the highest in CEF-16-10S and ethene and ethane (byproducts of the degradation of chlorinated hydrocarbons) were also detected. However the concentrations of these parameters have decreased since the Baseline (August/September 1998) sampling event. The past sampling events and this sampling event indicate that methanogenic conditions exist in the shallow source area, and it is a predominant biodegradation mechanism.

3.2.7 Oxidation/Reduction Potential

The 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. The ORP depends upon and influences the rates and types of biodegradation processes. Therefore, the measurement of ORP (in millivolts; mV) can provide evidence of the type of biodegradation processes that are active in a particular plume or even within different portions of the same plume. Great care must be taken during the evaluation of ORP data since most natural waters are usually mixed potentials, which cannot be related to a single electron couple. Therefore, ORP should only be used as a qualitative indicator of the overall oxidation/reduction state.

The relative ORP measurement is proportional to the efficiency of the bioremediation pathway. The following is a general comparison of common metabolic pathways and related ORP measurements, quantified under laboratory conditions:

Pathway	Electron Acceptor	ORP (mV)
Aerobic Respiration	Oxygen	+820
Denitrification	Nitrate	+740
Manganese Reduction	Manganese	+520
Iron Reduction	Ferric Iron	-50
Sulfate Reduction	Sulfate	-220
Methanogenesis	Carbon dioxide	-240

(Reference: Wiedmeier, 1995)

ORP values across the site ranged from –135 mV to 220 mVas shown on Figure 3-7. There appears to be a decreasing trend in the ORP values for both the UZS and IZS groundwater zones at the site. This indicates an overall loss in energy efficiency in the downgradient direction of the plume. The ORP values in the source area and the plume downgradient of the source indicate an energy efficiency range associated with possible anaerobic biodegradation by means of iron reduction. The analysis of the ferrous iron and dissolved iron parameters in the previous sections also indicate that iron reduction along with sulfate reduction and methanogenesis appear to be active reductive pathways at the site. These pathways are the most important and frequently documented reduction pathways for chlorinated hydrocarbons (Wiedmeier, 1995).

The ORP decreased in eleven of the monitoring wells and increased in four of the monitoring wells compared to the Baseline (August/September 1998) sampling event. This indicated that the conditions are changing and there is an overall loss in the energy efficiency in the ground water system over the

time period between the sampling events. The decrease in the ferric iron reduction processes along with the development of the sulfate-reduction zone since the Baseline (August/September 1998) sampling event corresponds with the decreasing ORP.

3.2.8 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. Total organic carbon (TOC) is a measure of the natural and anthropogenic carbon present in the aquifer.

The results of the total organic carbon analysis are shown on Figure 3-8. TOC concentrations in the background wells were measured at 2.36 mg/L and 1.11 mg/L. The cross-gradient well CEF-16-35S had a measured TOC concentration of 7.37 mg/L. The background and cross-gradient well indicate that a minimal amount of organic carbon is present in the aquifer to act as the primary substrate for reductive dechlorination. Therefore, the general lack of organic carbon as an energy source may limit the biodegradation potential at the site.

3.2.9 Carbon Dioxide

Carbon dioxide in the groundwater was measured in the field using a low-range digital titration method (Hach® Model CA-DT). The results of the carbon dioxide analysis are shown on Figure 3-9. Elevated carbon dioxide concentrations, an end-product of anaerobic biodegradation, were measured in the downgradient wells when compared to the upgradient wells. The carbon dioxide concentration ranged from 113 mg/L to 135 mg/L in the background wells. The carbon dioxide concentration ranged from 105 mg/L to 359 mg/L in the source area and 66 mg/L to 260 mg/L in the plume downgradient of the source. The elevated carbon dioxide concentrations were approximately two times the concentrations in the background wells, an indicator that biodegradation is occurring. The carbon dioxide increase (in excess of background) along with the presence of methane indicates active biodegradation is occurring.

The carbon dioxide concentrations remained approximately the same in one of the monitoring wells, decreased in three of the monitoring wells, and increased in eleven of the monitoring wells compared to the Baseline (August/September 1998) sampling event. This is an indication that carbon dioxide is being generated as a by product of the biodegradation process at a greater rate compared to the Baseline (August/September 1998) sampling event.

3.2.10 Alkalinity

Alkalinity in groundwater was analyzed by GPL Laboratories and was also measured in the field using a low-range digital titration method (Hach Model AL-DT). Alkalinity is a measure of the buffering (neutralizing) capacity of acids in water, and is expressed as mg/L $CaCO_3$. The alkalinity can give a general indication of the amount of CO_2 generated in a plume.

The results of the alkalinity analysis are shown on Figure 3-9 with the carbon dioxide analysis. The alkalinity concentration from the laboratory testing ranges from not detected in monitoring well CEF-16-22I and CEF-16-45I to 275 mg/L in monitoring well CEF-16-10S. The alkalinity concentration, from field testing, ranged from not detected in well CEF-16-22I to 275 mg/L in the shallow source well CEF-16-10S. The alkalinity is higher in the source area compared to the background concentrations and this indicates microbial mediated reactions are causing biodegradation. The alkalinity decreases in the downgradient direction indicating an overall decrease in the carbon dioxide production or an increase in carbon dioxide utilization. In general, the alkalinity concentrations decreased in most of the monitoring wells compared to the Baseline (August/September 1998) sampling event.

3.2.11 Chloride

Chloride is released into groundwater during dechlorination of a solvent plume. Therefore, an increase in chloride ion concentration in the downgradient direction provides direct evidence of dechlorination. The results of the chloride analysis are shown on Figure 3-10. The chloride concentration increased in the source area in the intermediate groundwater well (CEF-16-45I) by an order of magnitude when compared to the background monitoring wells. In general, the chloride concentrations decrease along the flow path within the plume area. The chloride concentrations in the samples from the background monitoring wells ranged from approximately 4 mg/L to 8 mg/L, increased to 79.5 mg/L in well CEF-16-45I and decreased to 0.808 L mg/L in monitoring well CEF-16-32S.

The increase in chloride concentration provides another line of evidence that indicates reductive dechlorination is occurring at the source area in the IZS groundwater zone. Chloride concentrations decreased in most of the monitoring wells compared to the past sampling events.

3.2.12 Biochemical Oxygen Demand

Biochemical oxygen demand (BOD) provides a general indication of the amount of oxygen required to biologically and chemically stabilize organic matter. It is an indication of the amount of food (organic matter) that is present and available for bacteria to biodegrade. Since the test also measures the chemical degradation capacity due to oxidation-reduction processes, it also includes inorganic species

(e.g. dissolved iron and manganese) that can artificially inflate the BOD value. BOD was selected as a parameter of interest in order to evaluate the oxygen requirements for the natural attenuation process. However, BOD tests have many limitations particularly when the analysis is performed on natural groundwater samples.

BOD was detected in the groundwater samples from the monitoring wells in the source area and monitoring wells CEF-16-43S and CEF-16-44I. There was no correlation between the concentrations of BOD and COCs. The BOD increased in monitoring well CEF-16-45I and decreased in monitoring wells CEF-16-10S and CEF-16-43S compared to the Baseline (August/September 1998) sampling event.

Since the biodegradation of the chlorinated hydrocarbons is occurring under anaerobic conditions, the results of this parameter provide little information. BOD analysis in future sampling events should not be considered.

3.2.13 Chemical Oxygen Demand

Similar to BOD, chemical oxygen demand (COD) is generally defined as the amount of oxygen required to chemically degrade (oxidize) organic compounds, regardless of the biological capacity to degrade the substances. COD concentrations were detect for all wells (except the background wells) and ranged from 7.23 mg/L in well CEF-16-11DD to 122 mg/L in well CEF-16-45I. These concentrations were similar to the Baseline (August/September 1998) sampling event.

Since the biodegradation of the chlorinated hydrocarbons is occurring under anaerobic conditions, the results of this parameter provide little information. COD analysis in future sampling events should not be considered.

3.2.14 pH

pH is a measurement of the hydrogen ion (H^+) concentration in terms of its negative logarithm (Sawyer, 1978). The scale ranges from 0 to 14; values less than 7 termed acidic and values grater than 7 termed basic. pH affects the presence and efficiency of bacteria population in natural groundwater conditions. Neutral groundwater (i.e., pH 7) is the preferred condition for most microbes.

pH values ranged from 4.2 to 6.81 and generally decreased in the downgradient direction. The pH is within the tolerable range for biodegradation. The pH in the UZS increases between monitoring wells CEF-16-21S and CEF-16-32S and than decreases and the pH in the IZS increases at monitoring well CEF-16-27I. The general decreasing trend indicates a generally neutral groundwater system becoming

more acidic (pH decreasing) as the alkalinity decreases. The pH was approximately the same as the Baseline (August/September 1998) sampling event.

3.2.15 Specific Conductivity

Specific conductivity (mS/cm) is a measure of a solution's ability to carry an electrical current, and is a controlled by the different quantities and types of ions present in the solution. Generally, conductivity increases as ion concentration increases and can fluctuate within a plume based upon the geochemistry at that particular location. Conductivity is most frequently used as an indicator of a consistent groundwater source. For example, conductivity of different water sources will typically have different conductivity values.

The maximum specific conductivity value was measured as 0.589 mS/cm in the monitoring well (CEF-16-10S). The minimum specific conductivity was measured as 0.029 mS/cm in monitoring well CEF-16-42I. The background monitoring wells have measured specific conductivity of approximately 0.102 mS/cm. This minor fluctuation indicates that all groundwater samples were from a consistent source. The specific conductivity generally increased in the source area and than decreased in the direction of groundwater flow. The specific conductivity was approximately the same as the Baseline (August/September 1998) sampling event.

3.2.16 Temperature

The temperature of groundwater effects the solubility of oxygen and other geochemical species, as well as the metabolic activity bacteria. Therefore, microbes are generally more active and efficient in warm water. The rate of hydrocarbon bioremediation doubles for every 10-degree Celsius (^{0}C) increase in temperature (referred to as the "Q_{10}" rule) in the range of 5 to 25 ^{0}C.

Temperature values ranged from approximately 22 ^{0}C to 27.7 ^{0}C across the site during the November 1998 sampling event. These temperatures are within the range of values acceptable for bioremediation to take place. These temperatures were a few degrees cooler that the groundwater samples collected during the Baseline (August/September 1998) sampling event.

3.3 SUMMARY OF ANALYSIS

The reduction in the VOCs concentration since the RI and the Baseline (August/September 1998) sampling event is the strongest line of evidence that natural attenuation is working at Site 16. In general, the concentration of the COCs decreased compared to the Baseline (August/September 1998) sampling event. There was a marked decrease in the TCE concentration in monitoring well CEF-16-45I, which

could be a result of operation of the pilot air sparging/soil vapor extraction system. However, TCE increased in three wells, TCA increased in one well, and methylene chloride was detected for the first time in this groundwater sampling event.

The geochemical data support natural attenuation by bioegradation. The concentrations of by-product indicators (chloride, vinyl chloride, methane, ethane, ethene, and carbon dioxide) suggest that active biodegradation is occurring in the source area with minor activity occurring in the plume. The specific anerobic biodegradation processes include iron reduction occurring in the areas of monitoring wells CEF-16-45I, CEF-16-43S, CEF-16-41S, and CEF-16-27I; sulfate-reduction occurring in the area of CEF-16-43S, CEF-16-32S, and CEF-16-22I; and methanogenesis occurring in the area of CEF-16-10S.

3.4 NATURAL ATTENUATION OVERVIEW

As stated in the EPA technical documents (U.S. EPA, 1997 and U.S. EPA, 1998), “Natural attenuation in ground-water systems results from the integration of several subsurface attenuation mechanisms that are classified as either destructive or nondestructive. Biodegradation is the most important destructive attenuation mechanism”. Therefore, it is important to be able to estimate the potential for natural biodegradation when selecting the natural attenuation remedial alternative. The following data is required to determine the efficiency of natural biodegradation (i.e., natural attenuation) to degrade a chlorinated hydrocarbon groundwater plume:

- biodegradation indicators (e.g., dissolved oxygen, nitrate, sulfate, methane); and
- contaminant concentrations (parent and daughter products).

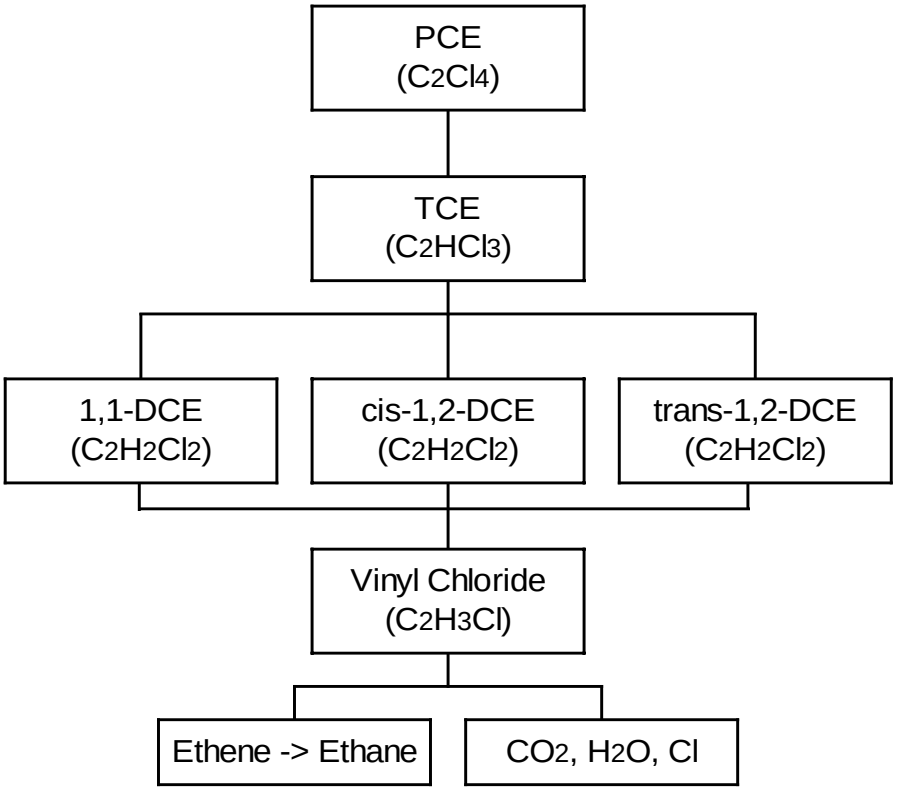
3.4.1 Natural Attenuation Pathways

Chlorinated hydrocarbons have been shown to biodegrade along three primary pathways; as an electron acceptor; as an electron donor; or through cometabolism.

Highly chlorinated hydrocarbons can be used as electron acceptors. This process involves the reductive dechlorination of the solvent mass. During reductive dechlorination, a chlorine atom is removed and replaced by a hydrogen atom. Dechlorination typically occurs in a sequential order from most chlorinated to least chlorinated as seen in the following figure. Reductive dechlorination is efficient and occurs at a faster rate when reducing PCE and TCE compared to the reductive dechlorination of vinyl chloride. Vinyl chloride (VC) can be reduced to ethane and then to ethane under these reducing conditions but at a much slower rate than PCE, TCE, and even DCE. Therefore, VC tends to accumulate in the source area or along the downgradient edge of the plume.

Methanogenesis and sulfate reduction are the most efficient and common reduction pathways demonstrated during reductive dechlorination. Other, less common, pathways include nitrate- and iron-reducing conditions.

It has also been documented that the less chlorinated hydrocarbons, such as vinyl chloride (C_2H_3Cl), can be utilized as the primary substrate in both aerobic and anaerobic environments. Under aerobic conditions, vinyl chloride can be mineralized into carbon dioxide, water, and free chloride atoms.



Cometabolism involves the biodegradation of a chlorinated hydrocarbon using an enzyme or cofactor that is incidentally produced by microbes for other purposes, such as the degradation of BTEX or other carbon source. The organism does not benefit from the degradation of the chlorinated hydrocarbon, and may actually be harmed by the process. Most cases of cometabolism have been documented under aerobic conditions.

3.4.2 Geochemical Behavior Of Chlorinated Plumes

Chlorinated hydrocarbon plumes have been documented to exhibit three types of “behavior” depending upon the natural and extent of contamination, available carbon, and the type of electron acceptors available.

Type 1 behavior describes a chlorinated solvent plume where the primary substrate is anthropogenic carbon such as BTEX or landfill leachate. The biodegradation of the anthropogenic carbon source drives the reductive dechlorination of the solvent. This is a very efficient process for the dechlorination of the more highly chlorinated solvents such as PCE, TCE, and DCE. Although vinyl chloride can be reduced anaerobically into ethene and further to ethane, this process occurs much more slowly than that of PCE, TCE, and DCE dechlorination. Therefore, under strictly Type 1 behavior, vinyl chloride will tend to accumulate in the source area or along the downgradient edge of the plume.

Type 2 behavior describes a chlorinated solvent plume where the primary substrate is native organic carbon. The biodegradation of the native carbon source drives the reductive dechlorination of the solvent. This is very similar to Type 1 behavior but is not as efficient for the dechlorination of the more highly chlorinated solvents. As with Type 1 behavior, vinyl chloride will tend to accumulate in the source area or along the downgradient edge of the plume.

Type 3 behavior describes a chlorinated solvent plume where there is an inadequate source of either native or anthropogenic carbon to drive reductive dechlorination. Therefore, the dissolved oxygen that is typically present in an aquifer is not utilized and the plume remains aerobic. Under Type 3 behavior, reductive dechlorination will not occur. However, under such aerobic conditions vinyl chloride can be rapidly oxidized directly to carbon dioxide, water, and chloride ions.

3.5 NATURAL ATTENUATION EVALUATION – NOVEMBER 1998 DATA

3.5.1 Natural Attenuation Screening Matrix

In accordance with the EPA technical documents (U.S. EPA, 1997 and U.S. EPA, 1998), the analytical data was evaluated quantitatively using the preliminary screening matrix to derive an interpretive score. The following table presents the range of possible scores and provides an interpretation for each score.

Score	Interpretation
0 to 5	Inadequate evidence for biodegradation of chlorinated organics
6 to 14	Limited evidence for biodegradation of chlorinated organics
15 to 20	Adequate evidence for biodegradation of chlorinated organics
>20	Strong evidence for biodegradation of chlorinated organics

The screening matrix was used to evaluate the source area and downgradient plume. The source area and downgradient plume were compared to the background monitoring wells CEF-16-13S and CEF-16-14D. The scores for the screening matrices range in value from 15 to 20. The preliminary screening

matrix for these contaminated wells are shown on Tables 3-5 and 3-6. Comparing these scores to the above table, the scores indicate there is adequate evidence for the biodegradation of the chlorinated solvents at this site. Compared to the Baseline (August/September 1998) sampling event scores, the score for both the source area and the plume have increased indicating that biodegradation of the chlorinated solvents in continuing and becoming more active.

3.5.2 Degradation Pathways

The monitoring wells in the source area (CEF-16-10S and CEF-16-45I) and plume (CEF-16-41S) contain concentrations of TCE, the assumed source product, and many of the assumed reductive dechlorination daughter products, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, vinyl chloride, methane, ethene, ethane, and/or carbon dioxide. Concentrations of the TCE and daughter products decrease significantly outside the source area in the downgradient direction in monitoring wells CEF-16-43S, CEF-16-44I, CEF-16-21S, CEF-16-22I and CEF-16-32S.

The type of geochemical behavior the groundwater plume is exhibiting in the source area and plume cannot be completely defined since no analysis of other anthropogenic carbon sources was conducted. Total organic carbon was detected in the background groundwater samples ranging from 1.11 mg/L to 2.36 mg/L. The cross-gradient well CEF-16-35S had a measured TOC concentration of 7.37 mg/L. The background and cross-gradient well indicate that a small amount of organic carbon is present in the aquifer to act as the primary substrate for reductive dechlorination. These TOC concentrations, along with the lack of oxygen and concentrations of ferrous iron and methane, indicate the source area has conditions for Type 2 geochemical behavior. The TOC concentrations, along with the lack of oxygen and concentrations of hydrogen sulfide, indicate the plume has conditions for Type 2 geochemical behavior. However, the general lack of organic carbon as an energy source may limit the biodegradation potential at the site.

The dissolved oxygen concentrations at the site are less than 0.66 mg/L indicating the groundwater at the site is anaerobic. The condition of the source area and plume, based on a comparison of the dissolved oxygen concentrations from this sampling to the Baseline (August/September 1998) sampling, indicates the groundwater is becoming more anaerobic. There does not appear to be any area at the site where Type 3 geochemical behavior is occurring.

The major active reductive pathway appears to be iron reduction and methanogenesis in the source area. Therefore, ferric iron and carbon dioxide, are being used as electron acceptors, resulting in the generation of ferrous iron, methane, ethene, ethane, and carbon dioxide. Therefore, it appears that TCE is being reductively dechlorinated to 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, vinyl chloride, ethene, and ethane.

It appears that the plume is developing a sulfate reduction zone in the area of monitoring wells CEF-16-43S, CEF-16-32S and CEF-16-22I, based on the hydrogen sulfide concentrations from this sampling event. The sulfate reduction in this zone may become a major active pathway for the dechlorination of the chlorinated solvents.

Type 2 geochemical behavior is a relatively efficient process for the dechlorination of TCE. Although vinyl chloride can be reduced anaerobically into ethene and further to ethane, this process occurs much more slowly than the dechlorination of TCE. Therefore, it would be expected that vinyl chloride might accumulate in the source area near monitoring wells CEF-16-10S and CEF-16-45I. This is occurring at this site. The vinyl chloride concentrations have increased since the Baseline (August/September 1998) sampling however vinyl chloride was not detected in the downgradient monitoring wells within the plume. Since the plume is in an anaerobic condition, the vinyl chloride can not be oxidized into carbon dioxide, water, and chloride under Type 3 conditions. Vinyl chloride is most likely being simultaneously reduced via cometabolism that it is not being detected in the downgradient monitoring wells. This could occur as a result of large quantities of cometabolic enzymes generated during reduction of the sulfate to sulfide. If this were true, there would be an increase of ethene and ethane concentrations in the source area and downgradient portions of the plume. Ethane and ethene were detected in the source area wells but were not detected in the downgradient wells.

TABLE 3-5
Analytical Parameters and Weighting for Preliminary Screening for Anaerobic Biodegradation Processes
SOURCE AREA
Operable Unit 7, Site 16
NAS Cecil Field, Jacksonville, Florida

Analyte	Units	Threshold Concentration	OU 7, Site 16* Concentration	Available Points	Site Points	Intrepretation
Oxygen	mg/L	<0.5	0-0.5	3	3	Tolerated; supresses reductive dechlorination at higher concentrations
	mg/L	>5 >1(a)		-3		Not tolerated: however, vinyl chloride may be oxidized aerobically
Nitrate	mg/L	<1	ND	2	0	At higher concentrations may compete with reductive pathway
Ferrous Iron (Fe2+)	mg/L	>1	0.62-5.1	3	3	Reductive pathway possible; vinyl chloride may be oxidized under Fe (III) reducing conditions
Sulfate	mg/L	<20	16.2-18.5	2	2	At higher concentrations may compete with reductive pathway
Sulfide	mg/L	>1	0-0.3	3	0	Reductive pathway possible
Methane	mg/L	<0.5	ND-0.8	0	3	Vinyl chloride oxidizes
	mg/L	>0.5		3		Ultimate reductive daughter product, vinyl chloride accumulates
ORP (Eh)	mV	<50	51.6-220	1	0	Reductive pathway possible
	mV	<-100		2		Reductive pathway likely
pH	unitless	5<pH<9	6	0	0	Optimal range for reductive pathway
	unitless	5>pH>9		-2		Outside optimal range for reductive pathway
TOC (total organic carbon)	mg/L	>20	1.11-2.36	2	0	Carbon and energy source; drives dechlorination; can be natural or anthropogenic
Temperature	deg-C	>20	24-25	1	1	At T> 20°C, biochemical process is accelerated
Carbon Dioxide	mg/L	>2x BG (BG=130)	105-359	1	1	Ultimate oxidative daughter product
Alkalinity	mg/L	>2x BG (BG=22/63)	125-275	1	1	Results from interaction of carbon dioxide with aquifer minerals
Chloride	mg/L	>2x BG (BG=4.7/7.7)	6.71-79.5	2	2	Daughter product of organic chlorine
Hydrogen	nM	>1	NA	3	NA	Reductive pathway possible; vinyl chloride may accumulate
	nM	<1		0		Vinyl chloride oxidized
Volatile Fatty Acids	mg/L	>0.1	NA	2	NA	Carbon and energy source; drives dechlorination
BTEX	ug/L	>100	NA	2	NA	Carbon and energy source; drives dechlorination
Tetrachloroethene	ug/L	-	ND	-	0	Material released
Trichloroethene	ug/L	-	63-65500	0	0	Material released
	ug/L	-		2 (b)		Daughter product of tetrachloroethene
Dichloroethene	ug/L	-	106-125	0	2	Material released
	ug/L	-		2 (b)		Daughter product of trichloroethene; if amount of cis-1,2-dichloroethene is greater than 80% of total dichloroethene, it is likely a daughter product of trichloroethene; 1,1-DCE can be a reaction product of TCA
Vinyl Chloride	ug/L	-	14-42.5	0	2	Material released
	ug/L	-		2 (b)		Daughter product of dichloroethenes
1,1,1-Trichloroethane	ug/L	-	870-6550	-	0	Material released
Dichloroethane	ug/L	-	112-1873	-	0	Daughter product of 1,1,1-trichloroethane under reducing conditions
Carbon Tetrachloride	ug/L	-	ND	0	0	Material released
Chloroethane	ug/L	-	ND	2	0	Daughter product of DCA or VC under reducing conditions
Ethene/Ethane	mg/L	>0.01	ND-0.087	2	0	Daughter product of vinyl chloride/ethene
	mg/L	>0.1		3		Daughter product of vinyl chloride/ethene
Chloroform	ug/L	-	ND	0	0	Material released
	ug/L	-		2		Daughter product of carbon tetrachloride
Dichloromethane	ug/L	-	390	0	0	Material released
	ug/L	-		2		Daughter product of chloroform
Total Score				36	20	

Reference: Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater - EPA/600/R-98/128

* - Value may be an average of two or more numbers or a maximum detection.

(a) - Draft EPA Region 4 Suggested Practices for Evaluation of a Site for Natural Attenuation (Biological Degradation) of Chlorinated Solvents

(b) - Points awarded only if if it can be shown that the compound is a daughter product.

Background monitoring well is assumed to be CEF-16-13S and CEF-16-14D

NA = Not Analyzed

ND = Not Detected

TABLE 3-6
Analytical Parameters and Weighting for Preliminary Screening for Anaerobic Biodegradation Processes
DOWNGRADIENT PLUME
Operable Unit 7, Site 16
NAS Cecil Field, Jacksonville, Florida

Analyte	Units	Threshold Concentration	OU 7, Site 16* Concentration	Available Points	Site Points	Intrepretation
Oxygen	mg/L	<0.5	0-0.2	3	3	Tolerated; supresses reductive dechlorination at higher concentrations
	mg/L	>5 >1(a)		-3		Not tolerated: however, vinyl chloride may be oxidized aerobically
Nitrate	mg/L	<1	ND	2	0	At higher concentrations may compete with reductive pathway
Ferrous Iron (Fe2+)	mg/L	>1	0.09-1.53	3	3	Reductive pathway possible; vinyl chloride may be oxidized under Fe (III) reducing conditions
Sulfate	mg/L	<20	ND-18.9	2	2	At higher concentrations may compete with reductive pathway
Sulfide	mg/L	>1	ND-1.5	3	3	Reductive pathway possible
Methane	mg/L	<0.5	ND-.146	0	0	Vinyl chloride oxidizes
	mg/L	>0.5		3		Ultimate reductive daughter product, vinyl chloride accumulates
ORP (Eh)	mV	<50	-135-62	1	1	Reductive pathway possible
	mV	<-100		2		Reductive pathway likely
pH	unitless	5<pH<9	4.2-5.3	0	-2	Optimal range for reductive pathway
	unitless	5>pH>9		-2		Outside optimal range for reductive pathway
TOC (total organic carbon)	mg/L	>20	1.11-2.36	2	0	Carbon and energy source; drives dechlorination; can be natural or anthropogenic
Temperature	deg-C	>20	23-28	1	1	At T> 20°C, biochemical process is accelerated
Carbon Dioxide	mg/L	>2x BG (BG=130)	66-235	1	1	Ultimate oxidative daughter product
Alkalinity	mg/L	>2x BG (BG=22/63)	ND-106	1	1	Results from interaction of carbon dioxide with aquifer minerals
Chloride	mg/L	>2x BG (BG=4.7/7.7)	0.8-9.3	2	0	Daughter product of organic chlorine
Hydrogen	nM	>1	NA	3	NA	Reductive pathway possible; vinyl chloride may accumulate
	nM	<1		0		Vinyl chloride oxidized
Volatile Fatty Acids	mg/L	>0.1	NA	2	NA	Carbon and energy source; drives dechlorination
BTEX	ug/L	>100	NA	2	NA	Carbon and energy source; drives dechlorination
Tetrachloroethene	ug/L	-	ND	-	0	Material released
Trichloroethene	ug/L	-	ND-672	0	0	Material released
	ug/L	-		2 (b)		Daughter product of tetrachloroethene
Dichloroethene	ug/L	-	ND-1.7	0	2	Material released
	ug/L	-		2 (b)		Daughter product of trichloroethene; if amount of cis-1,2-dichloroethene is greater than 80% of total dichloroethene, it is likely a daughter product of trichloroethene; 1,1-DCE can be a reaction product of TCA
Vinyl Chloride	ug/L	-	ND	0	0	Material released
	ug/L	-		2 (b)		Daughter product of dichloroethenes
1,1,1-Trichloroethane	ug/L	-	ND-0.6	-	0	Material released
Dichloroethane	ug/L	-	ND-0.9	-	0	Daughter product of 1,1,1-trichloroethane under reducing conditions
Carbon Tetrachloride	ug/L	-	ND	0	0	Material released
Chloroethane	ug/L	-	ND	2	0	Daughter product of DCA or VC under reducing conditions
Ethene/Ethane	mg/L	>0.01	ND	2	0	Daughter product of vinyl chloride/ethene
	mg/L	>0.1		3		Daughter product of vinyl chloride/ethene
Chloroform	ug/L	-	ND	0	0	Material released
	ug/L	-		2		Daughter product of carbon tetrachloride
Dichloromethane	ug/L	-	ND	0	0	Material released
	ug/L	-		2		Daughter product of chloroform
Total Score				36	15	

Reference: Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater - EPA/600/R-98/128

* - Value may be an average of two or more numbers or a maximum detection.

(a) - Draft EPA Region 4 Suggested Practices for Evaluation of a Site for Natural Attenuation (Biological Degradation) of Chlorinated Solvents

(b) - Points awarded only if if it can be shown that the compound is a daughter product.

Background monitoring well is assumed to be CEF-16-13S and CEF-16-14D

NA = Not Analyzed

ND = Not Detected

4.0 CONCLUSIONS AND RECOMMENDATIONS

A quarterly groundwater monitoring event was conducted in November 1998 to obtain data on the site conditions at Cecil Field Operable Unit 7, Site 16 to evaluate the effectiveness of the biodegratation processes of natural attenuation at the source area and downgradient plume. The conclusions and recommendations from this groundwater monitoring event are summarized below.

4.1 CONCLUSIONS

Based upon the past and current plume configuration, and the results of chlorinated volatile organic and geochemical testing, it is apparent that biodegradation natural attenuation processes are occurring in the source area at Site 16. The reduction in the VOCs concentration since the RI and the Baseline (August/September 1998) sampling event is the strongest line of evidence that natural attenuation is working at Site 16. In general, the concentration of the COCs decreased compared to the Baseline (August/September 1998) sampling event. There was a marked decrease in the TCE concentration in monitoring well CEF-16-45I.

The geochemical data support biodegradation natural attenuation. The concentrations of by-product indicators (chloride, vinyl chloride, methane, ethane, ethene, and carbon dioxide) of biodegradation suggest that active biodegradation is occurring in the source area with some activity occurring in the plume. The source area and downgradient chlorinated groundwater plume are exhibiting Type 2 geochemical behavior. Organic carbon is being used as the primary substrate to drive reductive dechlorination of the solvent mass. However, the general lack of organic carbon as an energy source may limit the biodegration potential at the site.

Iron reduction and methanogenesis appear to be the most active reductive pathway in the source area. Sulfate reduction appears to be a reductive pathway that is developing in the area of monitoring well CEF-16-43S and CEF-16-22I. Carbon dioxide, ferric iron, and sulfate are being used as electron acceptors, resulting in the production of methane, carbon dioxide, ferrous iron, and hydrogen sulfide. The apparent source material, TCE, is being anerobically degraded to 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, vinyl chloride, ethene, and ethane in the source area. Vinyl chloride is accumulating and being reduced to ethene and ethane in the source area. Outside of the source area, vinyl chloride is probably cometabolized to carbon dioxide, water, and chloride since the conditions at the site are anaerobic and vinyl chloride is not being detected in the downgradient monitoring wells.

4.2 RECOMMENDATIONS

During the first 5-year period, sampling and analysis of the long-term monitoring well network is recommended; quarterly for the first year and semiannually for the remaining four years. The first year quarterly sampling event should be conducted in order to determine if there are significant temporal changes as a result of seasonal variation. If the data collected during this initial period supports the observed efficiency of natural attenuation (documentation that the plume is either in a steady-state condition or declining), the monitoring frequency may be reduced. If data collected at any time during the monitoring program indicate plume migration or a risk to human health and the environment, the sampling frequency should be adjusted accordingly and a contingency plan should be developed.

Long-term groundwater monitoring should include all wells sampled during the November 1998 event, including background monitoring wells CEF-16-13S and CEF-16-14D. Depending on the results of the first year of monitoring, the number of wells sampled in the future rounds may be reduced. The selection of wells for the future monitoring will depend on the detection of natural attenuation parameters and chlorinated hydrocarbons in the initial rounds. Following the results of the future rounds of monitoring, it may be possible to reduce the number of wells to a representative set, plus CEF-16-38S and CEF-16-35S (the downgradient and cross gradient wells, respectively) that will be retained for monitoring for the duration of the project. The representative set of wells for each monitoring year will be refined based on the locations where indications of natural attenuation are strongest from the previous rounds**.**

All of the wells should be analyzed for a specific suite of chemical and geochemical parameters for the initial one-year period. This should include low-concentration chlorinated VOCs, bis (2-ethylhexyl) phthalate, dissolved inorganic carbon/alkalinity, dissolved oxygen, carbon dioxide, chloride, dissolved iron and manganese, nitrate/nitrite, ferrous iron, sulfate, sulfide, hydrogen sulfide, orthophosphate, ORP, TOC, methane, COD, BOD, temperature, pH, specific conductivity and ethane/ethene.

Based on this sampling event, the concentration of nitrate, nitrite, manganese, sulfide, and orthophosphate in the groundwater was not a significant portion of the biodegradation capacity. The analysis for BOD and COD is not required since the biodegradation of the chlorinated hydrocarbons occurs in an anaerobic system that is beneficial for reductive dechlorination. Upon completion of the first year of sampling, the analysis for BOD, COD, nitrate, nitrite, and orthophosphate should be evaluated and probably discontinued**.** Also, bis (2-ethylhexyl) phthalate concentrations were below the clean up levels and this analysis should be discontinued upon completion of the first year of sampling.

Upon completion of each round of sampling, a brief data summary report will be prepared documenting the investigative activities that were performed, presenting the analytical data generated, and making recommendations for the next round. Annually, a comprehensive monitoring report will be prepared that

presents the nature and extent of chemical and geochemical (when applicable) results. Monitoring results will be tabulated and presented to the Base Realignment and Closure Team in the form of annual reports. If natural attenuation is determined to be occurring at an unacceptable rate, then further remedial measures may be considered.

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APPENDIX A

ANALYTICAL LABORATORY RESULTS

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-12-8-127

TO: **MR. MARK SPERANZA** **DATE: DECEMBER 18, 1998**

FROM: **JUSTIN ORBICH** **CC: DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION – VOA/SVOA/GAS**
CTO 051 – NAS CECIL FIELD, FLORIDA
SDG 9811092

SAMPLES: 15/Aqueous

CEF-16-DUP1-02
CEF-16-GW-13S-02
CEF-16-GW-23D-02
CEF-16-GW-32S-02
CEF-16-GW-38S-02
CEF-16-GW-42I-02
TB-111098-01
TB-111398-01
CEF-16-DUP2-02
CEF-16-GW-14D-02
CEF-16-GW-27I-02
CEF-16-GW-35S-02
CEF-16-GW-41S-02
TB-110998-01
TB-111198-01

OVERVIEW

The sample set for CTO 051, SDG 9811092, Naval Air Station (NAS) Cecil Field, Florida consists of fifteen (15) aqueous environmental samples, which includes four (4) trip blanks (designated TB). All samples were analyzed for Target Compound List (TCL) chlorinated volatile organic compounds. All samples, except for the trip blanks, were analyzed for semivolatile, bis(2-ethylhexyl)phthalate, and dissolved gases, methane, ethane, and ethene. Two (2) field duplicates (CEF-16-DUP1-02 and CEF-16-DUP2-02) were in this SDG.

The samples were collected by Tetra Tech, NUS on November 9th, 10th, 11th, and 13th, 1998, and analyzed by GPL Laboratories. All analyses were performed in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The volatile and semivolatile samples were analyzed according to SW 846 Method 8260B and 8270C. The dissolved gases were analyzed according to GC/FID. The data in this SDG were validated with regard to the following parameters:

- Data Completeness
- * Holding Times
- Initial/continuing calibrations
- Laboratory method/field quality control blank results

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings is presented in Appendix C. Qualified analytical results are presented in Appendix A.

VOLATILE FRACTION

The following compounds were detected in the laboratory method and/or field quality control blanks at the maximum concentrations indicated below:

Compound	Concentration	Aqueous Action Level
Methylene Chloride	2.0µg/L	20.0µg/L
Chloroform	1.4µg/L	7.0µg/L

Blank Actions

- Value < Contract Required Quantitation Limit (CRQL); report CRQL followed by a U.
- Value > CRQL and < Action level; report value followed by a U.
- Value > CRQL and > action level; report value unqualified.

Sample aliquots and dilution factors were taken into consideration during the application of all action levels. The positive results for methylene chloride reported at concentrations below the action level was qualified according to the blank action table. It should be noted that field quality control blanks were not qualified for field control blank contamination.

Samples, CEF-16-DUP1-02 and CEF-16-GW-41S-02, were diluted 25X due to the presence of trichloroethene above the instrument's linear calibration range. The results from the diluted trichloroethene were transposed over the undiluted sample result and used for validation purposes.

Sample, CEF-16-GW-32S-02, was diluted 5X due to the presence of trichloroethene above the instrument's linear calibration range. The result from the diluted trichloroethene was transposed over the undiluted sample result and used for validation purposes.

Several volatile samples contained positive results for compounds below the contract required quantitation limits (CRQL). These results were qualified as estimated (J).

SEMIVOLATILE FRACTION

Semivolatile sample contained positive results for a compound below the contract required quantitation limits (CRQL). The result was qualified as estimated (J).

DISSOLVED GAS

The following compound was detected in the laboratory method and/or field quality control blanks at the maximum concentrations indicated below:

Compound	Concentration	Aqueous Action Level
Methane	2.0µg/L	10.0µg/L

Blank Actions

- Value < Contract Required Quantitation Limit (CRQL); report CRQL followed by a U.
- Value > CRQL and < Action level; report value followed by a U.
- Value > CRQL and > action level; report value unqualified.

Sample aliquots and dilution factors were taken into consideration during the application of all action levels. The positive results for methane reported at concentrations below the action level were qualified according to the blank action table. It should be noted that field quality control blanks were not qualified for field control blank contamination.

Sample, CEF-16-GW-23D-02, was diluted 5X due to the presence of methane above the instrument's calibration range. The result from the reanalysis was transposed over the original results and used for validation purposes.

The laboratory incorrectly labeled the sample numbers on the Form Is. By using the laboratory identification as a reference, the validator determined the correct sample numbers. The impacted data was not effected.

EXECUTIVE SUMMARY

Laboratory Performance Issues: Methylene chloride, chloroform, and methane were detected as blank contamination in the method blanks. Several samples exceeded the linear calibration range and as a result were diluted in the volatile and dissolved gas fractions. The laboratory incorrectly labeled several samples.

Other Issues Affecting Data Quality: None.

MEMO TO: MR. MARK SPERANZA
DATE: DECEMBER 18, 1998 – PAGE 5

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (February, 1994), and the NFESC guidelines "Navy Installation Restoration Program Laboratory Quality Assurance Guide" (February, 1996). The text of this report has been formulated to address only those problems affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Justin Orbich

Chemist/Data Validator
Tetra Tech, NUS

Joseph A. Samchuck

Data Validation Quality Assurance Officer
Tetra Tech, NUS

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MEMO TO: **MR. MARK SPERANZA**
DATE: **DECEMBER 18, 1998 – PAGE 6**

NAS CECIL FIELD
SDG 9811092

TABEL 1 – RECOMMENDATION SUMMARY

Sample	VOA	SVOA	GAS
CEF-16-DUP1-02	A^1 J^1	J^1	
CEF-16-DUP2-02	A^1 J^1		A^3
CEF-16-GW-13S-02	A^1		
CEF-16-GW-14D-02	A^1		A^3
CEF-16-GW-23D-02	A^1		
CEF-16-GW-27I-02	A^1		A^3
CEF-16-GW-32S-02	A^1 J^1		A^3
CEF-16-GW-35S-02	A^1	J^1	
CEF-16-GW-38S-02	A^1		
CEF-16-GW-41S-02	A^1 J^1		
CEF-16-GW-42I-02	A^1 J^1		A^3
TB-110998-01	$A^{1,2}$		
TB-111098-01	$A^{1,2}$		
TB-111198-01	$A^{1,2}$		
TB-111398-01	$A^{1,2}$		

If the field is left blank, the qualifier is A - accept all data.

A^1 - Accept data, but qualify results as nondetected, (U), as a result of blank contamination for methylene chloride.

A^2 - Accept data, but qualify results as nondetected, (U), as a result of blank contamination for chloroform.

A^3 - Accept data, but qualify results as nondetected, (U), as a result of blank contamination for methane.

J^1 - Accept data, but qualify those compounds with positive results less than the CRQL as estimated, (J).

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-DUP1-02

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811092-05A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: F13173.D

Level: (low/med) LOW Date Received: 11/10/98

% Moisture: not dec. _____ Date Analyzed: 11/20/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	1.7	J
75-09-2	Methylene chloride	1.3	JB
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	0.9	J
156-59-2	Cis-1,2-dichloroethene	9.5	
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	0.6	J
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	192.8	E
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-DUP1-02DL

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811092-05BDL

Sample wt/vol: 1.0 (g/ml) ML Lab File ID: F13318.D

Level: (low/med) LOW Date Received: 11/10/98

% Moisture: not dec. Date Analyzed: 12/02/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 25.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	50.0	U
75-01-4	Vinyl chloride	25.0	U
75-00-3	Chloroethane	125.0	U
75-35-4	1,1-Dichloroethene	125.0	U
75-09-2	Methylene chloride	20.0	JBD
156-60-5	Trans-1,2-dichloroethene	125.0	U
75-34-3	1,1-Dichloroethane	125.0	U
156-59-2	Cis-1,2-dichloroethene	125.0	U
67-66-3	Chloroform	34.5	JBD
71-55-6	1,1,1-Trichloroethane	125.0	U
56-23-5	Carbon tetrachloride	75.0	U
107-06-2	1,2-Dichloroethane	75.0	U
79-01-6	Trichloroethene	635.2	D
78-87-5	1,2-Dichloropropane	125.0	U
10061-01-5	Cis-1,3-dichloropropene	5.0	U
10061-02-6	Trans-1,3-dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	125.0	U
127-18-4	Tetrachloroethene	75.0	U
108-90-7	Chlorobenzene	125.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-DUP2-02

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811092-06A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: F13174.D

Level: (low/med) LOW Date Received: 11/10/98

% Moisture: not dec. Date Analyzed: 11/20/98 ✓

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-09-2	Methylene chloride	1.4	JB•
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	Cis-1,2-dichloroethene	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	0.6	J
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-13S-02

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811150-01A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: F13230.D

Level: (low/med) LOW Date Received: 11/14/98

% Moisture: not dec. Date Analyzed: 11/24/98 ✓

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-09-2	Methylene chloride	0.6	J
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	Cis-1,2-dichloroethene	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	3.0	U
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-14D-02

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811150-02A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: F13231.D

Level: (low/med) LOW Date Received: 11/14/98

% Moisture: not dec. Date Analyzed: 11/24/98 ✓

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-09-2	Methylene chloride	0.7	J
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	Cis-1,2-dichloroethene	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	3.0	U
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-23D-02

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811092-03A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: F13171.D

Level: (low/med) LOW Date Received: 11/10/98

% Moisture: not dec. Date Analyzed: 11/20/98 ✓

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-09-2	Methylene chloride	1.2	JB
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	Cis-1,2-dichloroethene	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	3.0	U
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-27I-02

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811115-01A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: F13218.D

Level: (low/med) LOW Date Received: 11/12/98

% Moisture: not dec. _____ Date Analyzed: 11/24/98 ✓

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-09-2	Methylene chloride	0.9	J
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	Cis-1,2-dichloroethene	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	39.9	.
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-32S-02

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811101-03A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: F13214.D

Level: (low/med) LOW Date Received: 11/11/98

% Moisture: not dec. Date Analyzed: 11/24/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-09-2	Methylene chloride	1.2	J
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	Cis-1,2-dichloroethene	0.9	J
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	90.5	E
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-32S-02DL

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811101-03ADL

Sample wt/vol: 5.0 (g/ml) ML Lab File ID: F13308.D

Level: (low/med) LOW Date Received: 11/11/98

% Moisture: not dec. _____ Date Analyzed: 12/01/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 5.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	10.0	U
75-01-4	Vinyl chloride	5.0	U
75-00-3	Chloroethane	25.0	U
75-35-4	1,1-Dichloroethene	25.0	U
75-09-2	Methylene chloride	5.8	JBD
156-60-5	Trans-1,2-dichloroethene	25.0	U
75-34-3	1,1-Dichloroethane	25.0	U
156-59-2	Cis-1,2-dichloroethene	25.0	U
67-66-3	Chloroform	5.6	JBD
71-55-6	1,1,1-Trichloroethane	25.0	U
56-23-5	Carbon tetrachloride	15.0	U
107-06-2	1,2-Dichloroethane	15.0	U
79-01-6	Trichloroethene	126.1	D
78-87-5	1,2-Dichloropropane	25.0	U
10061-01-5	Cis-1,3-dichloropropene	1.0	U
10061-02-6	Trans-1,3-dichloropropene	1.0	U
79-00-5	1,1,2-Trichloroethane	25.0	U
127-18-4	Tetrachloroethene	15.0	U
108-90-7	Chlorobenzene	25.0	U
79-34-5	1,1,2,2-Tetrachloroethane	1.0	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-35S-02

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811101-02A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: F13213.D

Level: (low/med) LOW Date Received: 11/11/98

% Moisture: not dec. Date Analyzed: 11/24/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-09-2	Methylene chloride	1.3	J
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	Cis-1,2-dichloroethene	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	3.0	U
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-38S-02

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811101-01A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: F13212.D

Level: (low/med) LOW Date Received: 11/11/98

% Moisture: not dec. _____ Date Analyzed: 11/24/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-09-2	Methylene chloride	1.5	J
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	Cis-1,2-dichloroethene	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	3.0	U
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-41S-02

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811092-01A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: F13169.D

Level: (low/med) LOW Date Received: 11/10/98

% Moisture: not dec. _____ Date Analyzed: 11/20/98 ✓

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	1.7	J
75-09-2	Methylene chloride	1.3	JB
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	0.9	J
156-59-2	Cis-1,2-dichloroethene	9.9	
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	0.6	J
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	190.4	E
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	1.3	

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-41S-02DL

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811092-01BDL

Sample wt/vol: 1.0 (g/ml) ML Lab File ID: F13317.D

Level: (low/med) LOW Date Received: 11/10/98

% Moisture: not dec. Date Analyzed: 12/02/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 25.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	50.0	U
75-01-4	Vinyl chloride	25.0	U
75-00-3	Chloroethane	125.0	U
75-35-4	1,1-Dichloroethene	125.0	U
75-09-2	Methylene chloride	23.5	JBD
156-60-5	Trans-1,2-dichloroethene	125.0	U
75-34-3	1,1-Dichloroethane	125.0	U
156-59-2	Cis-1,2-dichloroethene	125.0	U
67-66-3	Chloroform	36.8	JBD
71-55-6	1,1,1-Trichloroethane	125.0	U
56-23-5	Carbon tetrachloride	75.0	U
107-06-2	1,2-Dichloroethane	75.0	U
79-01-6	Trichloroethene	672.2	D
78-87-5	1,2-Dichloropropane	125.0	U
10061-01-5	Cis-1,3-dichloropropene	5.0	U
10061-02-6	Trans-1,3-dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	125.0	U
127-18-4	Tetrachloroethene	75.0	U
108-90-7	Chlorobenzene	125.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-41I-02

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811092-02A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: F13170.D

Level: (low/med) LOW Date Received: 11/10/98

% Moisture: not dec. _____ Date Analyzed: 11/20/98 ✓

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-09-2	Methylene chloride	1.4	JB
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	Cis-1,2-dichloroethene	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	1.0	J
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

TB-110998

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811092-04A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: F13172.D

Level: (low/med) LOW Date Received: 11/10/98

% Moisture: not dec. Date Analyzed: 11/20/98 ✓

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-09-2	Methylene chloride	1.6	JB
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	Cis-1,2-dichloroethene	5.0	U
67-66-3	Chloroform	1.1	JB
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	3.0	U
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

TB-11098-01

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811101-04A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: F13215.D

Level: (low/med) LOW Date Received: 11/11/98

% Moisture: not dec. Date Analyzed: 11/24/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-09-2	Methylene chloride	1.4	JB
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	Cis-1,2-dichloroethene	5.0	U
67-66-3	Chloroform	0.8	JB
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	3.0	U
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

TB-111198-01

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811115-02A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: F13219.D

Level: (low/med) LOW Date Received: 11/12/98

% Moisture: not dec. _____ Date Analyzed: 11/24/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-09-2	Methylene chloride	1.2	J
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	Cis-1,2-dichloroethene	5.0	U
67-66-3	Chloroform	0.8	JB
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	3.0	U
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

0o2a4d1e42F

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

TB-111398

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811150-03A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: F13232.D

Level: (low/med) LOW Date Received: 11/14/98

% Moisture: not dec. Date Analyzed: 11/24/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-09-2	Methylene chloride	0.9	J
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	Cis-1,2-dichloroethene	5.0	U
67-66-3	Chloroform	0.9	JB
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	3.0	U
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF16DUP102

Lab Name: GPL_LABORATORIES, LLLP Contract: NUS_SOUTHD

Lab Code: GPLL Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811092-05C

Sample wt/vol: 960 (g/ml) ML Lab File ID: C18362.D

Level: (low/med) LOW Date Received: 11/10/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 11/13/98 ✓

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 11/25/98

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 6

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
117-81-7	bis(2-Ethylhexyl)phthalate	1	J

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF16DUP202

Lab Name: GPL_LABORATORIES, LLLP Contract: NUS_SOUTHD

Lab Code: GPLL Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811092-06C

Sample wt/vol: 950 (g/ml) ML Lab File ID: C18363.D

Level: (low/med) LOW Date Received: 11/10/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 11/13/98 ✓

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 11/25/98

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
117-81-7	bis(2-Ethylhexyl)phthalate	6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF16GW13S02

Lab Name: GPL_LABORATORIES, LLLP Contract: NUS_SOUTHD

Lab Code: GPLL Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811150-01C

Sample wt/vol: 980 (g/ml) ML Lab File ID: C18477.D

Level: (low/med) LOW Date Received: 11/14/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 11/19/98 ✓

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 12/01/98

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
117-81-7	bis(2-Ethylhexyl)phthalate	6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF16GW14D02

Lab Name: GPL_LABORATORIES, LLLP Contract: NUS_SOUTHD

Lab Code: GPLL Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811150-02C

Sample wt/vol: 970 (g/ml) ML Lab File ID: C18402.D

Level: (low/med) LOW Date Received: 11/14/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 11/19/98 ✓

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 11/28/98

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
117-81-7	bis(2-Ethylhexyl)phthalate	6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF16GW14D02RE

Lab Name: GPL_LABORATORIES, LLLP Contract: NUS_SOUTHD

Lab Code: GPLL Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811150-02CRE

Sample wt/vol: 970 (g/ml) ML Lab File ID: C18441.D

Level: (low/med) LOW Date Received: 11/14/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 11/19/98 ✓

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 11/30/98

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
117-81-7	bis(2-Ethylhexyl)phthalate	6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF16GW23D02

Lab Name: GPL_LABORATORIES, LLLP Contract: NUS_SOUTHD

Lab Code: GPLL Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811092-03C

Sample wt/vol: 970 (g/ml) ML Lab File ID: C18361.D

Level: (low/med) LOW Date Received: 11/10/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 11/13/98 ✓

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 11/25/98

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 8

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
117-81-7	bis(2-Ethylhexyl)phthalate	6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF16GW27I02

Lab Name: GPL_LABORATORIES, LLLP Contract: NUS_SOUTHD

Lab Code: GPLL Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811115-01C

Sample wt/vol: 960 (g/ml) ML Lab File ID: C18396.D

Level: (low/med) LOW Date Received: 11/12/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 11/17/98 ✓

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 11/28/98

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
117-81-7	bis(2-Ethylhexyl)phthalate	6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF16GW32S02

Lab Name: GPL_LABORATORIES, LLLP Contract: NUS_SOUTHD

Lab Code: GPLL Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811101-03C

Sample wt/vol: 980 (g/ml) ML Lab File ID: C18366.D

Level: (low/med) LOW Date Received: 11/11/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 11/13/98 ✓

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 11/25/98

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 6

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
117-81-7	bis(2-Ethylhexyl)phthalate	6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF16GW35S02

Lab Name: GPL_LABORATORIES, LLLP Contract: NUS_SOUTHD

Lab Code: GPLL Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811101-02C

Sample wt/vol: 980 (g/ml) ML Lab File ID: C18365.D

Level: (low/med) LOW Date Received: 11/11/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 11/13/98 ✓

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 11/25/98

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 6

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
117-81-7	bis(2-Ethylhexyl)phthalate	1	J

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF16GW38S02

Lab Name: GPL_LABORATORIES, LLLP Contract: NUS_SOUTHD

Lab Code: GPLL Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811101-01C

Sample wt/vol: 990 (g/ml) ML Lab File ID: C18364.D

Level: (low/med) LOW Date Received: 11/11/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 11/13/98 ✓

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 11/25/98

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 6

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
117-81-7	bis(2-Ethylhexyl)phthalate	6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF16GW41S02

Lab Name: GPL_LABORATORIES, LLLP Contract: NUS_SOUTHD

Lab Code: GPLL Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811092-01C

Sample wt/vol: 960 (g/ml) ML Lab File ID: C18359.D

Level: (low/med) LOW Date Received: 11/10/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 11/13/98 ✓

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 11/25/98

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
117-81-7	bis(2-Ethylhexyl)phthalate	6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF16GW42I02

Lab Name: GPL_LABORATORIES, LLLP Contract: NUS_SOUTHD

Lab Code: GPLL Case No.: N/A SAS No.: N/A SDG No.: CF51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811092-02C

Sample wt/vol: 980 (g/ml) ML Lab File ID: C18360.D

Level: (low/med) LOW Date Received: 11/10/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 11/13/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 11/25/98

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
117-81-7	bis(2-Ethylhexyl)phthalate	6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF- 16-DUP1-02

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPL Case No.: 9811092 SAS No.: N/A SDG No.: CF-51-2

Matrix: (soil/water) WATER Lab Sample ID: 98011092-05F

Sample wt/vol: 10 (g/ml) ML Lab File ID: N12104.D

Level: (low/med) LOW Date Received: 11/10/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: _____

Concentrated Extract Volume: 1 (uL) Date Analyzed: 11/17/98 ✓

Injection Volume: 500. (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	20.3	B
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	6.2	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF- 16-DUP2-02

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPL Case No.: 9811092 SAS No.: N/A SDG No.: CF-51-2

Matrix: (soil/water) WATER Lab Sample ID: 98011092-06F

Sample wt/vol: 10 (g/ml) ML Lab File ID: N12105.D

Level: (low/med) LOW Date Received: 11/10/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: _____

Concentrated Extract Volume: 1 (uL) Date Analyzed: 11/17/98

Injection Volume: 500. (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	4.8	B
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	6.2	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-13S-02

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPL Case No.: 9811150 SAS No.: N/A SDG No.: CF-51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811150-01F

Sample wt/vol: 10 (g/ml) ML Lab File ID: N12281.D

Level: (low/med) LOW Date Received: 11/14/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: _____

Concentrated Extract Volume: 1 (uL) Date Analyzed: 11/24/98

Injection Volume: 500. (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	32.2	B
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	6.2	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-14D-02

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPL Case No.: 9811150 SAS No.: N/A SDG No.: CF-51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811150-02F

Sample wt/vol: 10 (g/ml) ML Lab File ID: N12282.D

Level: (low/med) LOW Date Received: 11/14/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: _____

Concentrated Extract Volume: 1 (uL) Date Analyzed: 11/24/98

Injection Volume: 500. (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	3.4	B
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	6.2	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-23D-02

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPL Case No.: 9811092 SAS No.: N/A SDG No.: CF-51-2

Matrix: (soil/water) WATER Lab Sample ID: 98011092-03F

Sample wt/vol: 10 (g/ml) ML Lab File ID: N12102.D

Level: (low/med) LOW Date Received: 11/10/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: _____

Concentrated Extract Volume: 1 (uL) Date Analyzed: 11/17/98

Injection Volume: 500. (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	97.1	EB
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	6.2	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-16-GW-23D-02 DL

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPL Case No.: 9811092 SAS No.: N/A SDG No.: CF-51-2

Matrix: (soil/water) WATER Lab Sample ID: 98011092-03F 5X

Sample wt/vol: 10 (g/ml) ML Lab File ID: N12103.D

Level: (low/med) LOW Date Received: 11/10/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: _____

Concentrated Extract Volume: 1 (uL) Date Analyzed: 11/17/98 ✓

Injection Volume: 500. (uL) Dilution Factor: 5.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	127.3	BD
74-84-0	Ethane	29.0	U
74-85-1	Ethylene	31.2	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-27I-02

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPL Case No.: 9811092 SAS No.: N/A SDG No.: CF-51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811115-01F

Sample wt/vol: 10 (g/ml) ML Lab File ID: N12094.D

Level: (low/med) LOW Date Received: 11/12/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: _____

Concentrated Extract Volume: 1 (uL) Date Analyzed: 11/17/98 ✓

Injection Volume: 500. (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-82-8	Methane	7.7	B
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	6.2	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-32S-02

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPL Case No.: 9811092 SAS No.: N/A SDG No.: CF-51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811101-03F

Sample wt/vol: 10 (g/ml) ML Lab File ID: N12093.D

Level: (low/med) LOW Date Received: 11/11/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: _____

Concentrated Extract Volume: 1 (uL) Date Analyzed: 11/17/98

Injection Volume: 500. (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	9.5	B
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	6.2	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-35S-02

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPL Case No.: 9811092 SAS No.: N/A SDG No.: CF-51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811101-02F

Sample wt/vol: 10 (g/ml) ML Lab File ID: N12092.D

Level: (low/med) LOW Date Received: 11/11/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: _____

Concentrated Extract Volume: 1 (uL) Date Analyzed: 11/17/98 ✓

Injection Volume: 500. (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	31.9	B
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	6.2	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CGF-16-GW-38S-02

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPL Case No.: 9811101 SAS No.: N/A SDG No.: CF-51-2

Matrix: (soil/water) WATER Lab Sample ID: 9811101-01F

Sample wt/vol: 10 (g/ml) ML Lab File ID: N12091.D

Level: (low/med) LOW Date Received: 11/11/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: _____

Concentrated Extract Volume: 1 (uL) Date Analyzed: 11/17/98 ✓

Injection Volume: 500. (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	12.0	B
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	6.2	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CSF-16-GW-41S-02

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPL Case No.: 9811092 SAS No.: N/A SDG No.: CF-51-2

Matrix: (soil/water) WATER Lab Sample ID: 98011092-01F

Sample wt/vol: 10 (g/ml) ML Lab File ID: N12100.D

Level: (low/med) LOW Date Received: 11/10/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: _____

Concentrated Extract Volume: 1 (uL) Date Analyzed: 11/17/98

Injection Volume: 500. (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	23.4	B
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	6.2	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CGF-16-GW-42I-02

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPL Case No.: 9811092 SAS No.: N/A SDG No.: CF-51-2

Matrix: (soil/water) WATER Lab Sample ID: 98011092-02F

Sample wt/vol: 10 (g/ml) ML Lab File ID: N12101.D

Level: (low/med) LOW Date Received: 11/10/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: _____

Concentrated Extract Volume: 1 (uL) Date Analyzed: 11/17/98

Injection Volume: 500. (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	5.0	B
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	6.2	U

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-12-8-108

TO: **MR. MARK SPERANZA** **DATE: APRIL 12, 1998**

FROM: **JUSTIN ORBICH** **CC: DV REVISION 1**

SUBJECT: **ORGANIC DATA VALIDATION – VOA/SVOA/GAS**
CTO 051 – NAS CECIL FIELDS, FLORIDA
SDG 9811030

SAMPLES: 12/Aqueous

CEF-16-GW-10S-02	CEF-16-GW-11DD-02
CEF-16-GW-21S-02	CEF-16-GW-22I-02
CEF-16-GW-43S-02	CEF-16-GW-44I-02
CEF-16-GW-45I-02	CEF-16-GW-9D-02
TB-110398-01	TB-110498-01
TB-110598-01	TB-110698-01

OVERVIEW

The sample set for CTO 051, SDG 9811030, Naval Air Station (NAS) Cecil Field, Florida consists of twelve (12) aqueous environmental samples, which includes four (4) trip blanks (designated TB). All samples were analyzed for selected Target Compound List (TCL) volatile organic compounds. All samples, except for the trip blanks, were analyzed for semivolatile, bis(2-ethylhexyl)phthalate, and dissolved gases, methane, ethane, and ethene.

The samples were collected by Tetra Tech, NUS on November 3rd – 6th, 1998, and analyzed by GPL Laboratories. All analyses were performed in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The volatile and semivolatile samples were analyzed according to SW 846 Method 8260B and 8270C. The dissolved gases were analyzed according to GC/FID. The data in this SDG were validated with regard to the following parameters:

- Data Completeness
- Holding Times
- Initial/continuing calibrations
- Laboratory method/field quality control blank results

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings is presented in Appendix C. Qualified analytical results are presented in Appendix A.

VOLATILE FRACTION

The following compounds were detected in the laboratory method and/or field quality control blanks at the maximum concentrations indicated below:

Compound	Concentration	Aqueous Action Level
Methylene Chloride	2.0µg/L	20.0µg/L
Chloroform	1.4µg/L	7.0µg/L
Trichloroethene	1.4µg/L	7.0µg/L
1,1,2,2-Tetrachloroethane*	2.1µg/L	10.5µg/L

* Trip Blank

Blank Actions

- Value < Contract Required Quantitation Limit (CRQL); report CRQL followed by a U.
- Value > CRQL and < Action level; report value followed by a U.
- Value > CRQL and > action level; report value unqualified.

Sample aliquots and dilution factors were taken into consideration during the application of all action levels. The positive results for methylene chloride, chloroform, and trichloroethene reported at concentrations below the action level were qualified according to the blank action table. It should be noted that field quality control blanks were not qualified for field control blank contamination.

The original analysis of sample TB-110398-01 contained trichloroethene (TCE) due to carryover from the previous sample. The sample was reanalyzed fourteen (14) days past the contractual holding time, and detected no TCE. As a result of the contamination in the original analysis, the reanalysis was used for validation purposes. The positive and nondetected results were qualified as estimated, (J) and (UJ), respectively.

Sample CEF-16-GW-10S-02 was diluted 50X due to the presence of 1,1,1-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethene, and trichloroethene above the instrument's linear calibration range. The result from the diluted 1,1,1-trichloroethane was transposed over the undiluted sample result and used for validation purposes.

Sample CEF-16-GW-45I-02 was diluted 5000X due to the presence of trichloroethene, 1,1,1-trichloroethane, and 1,1-dichloroethane above the instrument's linear calibration range. The results from the diluted trichloroethene, 1,1,1-trichloroethane, and 1,1-dichloroethane were transposed over the undiluted sample result and used for validation purposes.

The laboratory incorrectly labeled all the sample numbers on the Form Is in each fraction. By using the laboratory identification as a reference, the validator determined the correct sample numbers.

The laboratory incorrectly reported the result from sample CEF-16-GW-10S-02 for 1,1-dichloroethene. The laboratory was notified, and in return, amended the form ones and the raw data associated with the sample. The impacted data was amended on the electronic data, also. The positive result was qualified as estimated, (J), for 1,1-dichloroethene.

Several volatile samples contained positive results for compounds below the contract required quantitation limits (CRQL). These results were qualified as estimated (J).

SEMIVOLATILE FRACTION

The following compound was detected in the laboratory method and/or field quality control blanks at the maximum concentrations indicated below:

Compound	Concentration	Aqueous Action Level
Bis(2-ethylhexyl)phthalate	2.0µg/L	20.0µg/L

Blank Action Table

- Value < Contract Required Quantitation Limit (CRQL); report CRQL followed by a U.
- Value > CRQL and < Action level; report value followed by a U.
- Value > CRQL and > action level; report value unqualified.

Sample aliquots and dilution factors were taken into consideration during the application of all action levels. The positive results for bis(2-ethylhexyl)phthalate reported at concentrations below the action level were qualified according to the blank action table. It should be noted that field quality control blanks were not qualified for field control blank contamination.

The laboratory incorrectly labeled several of the sample numbers on the form ones. By using the laboratory identification as a reference, the validator determined the correct sample numbers and corrected the sample number on the form ones.

DISSOLVED GAS

The following compound was detected in the laboratory method and/or field quality control blanks at the maximum concentrations indicated below:

Compound	Concentration	Aqueous Action Level
Methane	1.9µg/L	9.5µg/L

Blank Actions

- Value < Contract Required Quantitation Limit (CRQL); report CRQL followed by a U.
- Value > CRQL and < Action level; report value followed by a U.
- Value > CRQL and > action level; report value unqualified.

Sample aliquots and dilution factors were taken into consideration during the application of all action levels. The positive results for methane reported at concentrations below the action level were qualified according to the blank action table. It should be noted that field quality control blanks were not qualified for field control blank contamination.

Sample CEF-16-GW-10S-02 was diluted 2X and 50X due to the presence of ethene and methane above the instrument's calibration range. The results from the reanalysis were transposed over the original results and used for validation purposes.

Sample CEF-16-GW-11DD-02 and CEF-16-GW-43S-02 were diluted 10X and 5X due to the presence of methane above the instrument's calibration range. The results from the reanalysis were transposed over the original results and used for validation purposes.

The laboratory incorrectly labeled several of the sample numbers on the form ones. By using the laboratory identification as a reference, the validator determined the correct sample numbers and corrected the sample number on the form ones.

MEMO TO: MR. MARK SPERANZA
DATE: DECEMBER 17, 1998 – PAGE 4

EXECUTIVE SUMMARY

Laboratory Performance Issues: Methylene chloride, chloroform, trichloroethene, bis(2-ethylhexyl)phthalate, and methane were detected as blank contamination in the method blanks. Sample TB-110398-01 exceeded the contractual holding time until analysis by fourteen (14) days. Several samples exceeded the linear calibration range and as a result were diluted. The laboratory incorrectly labeled several samples.

Other Issues Affecting Data Quality: 1,1,2,2-Tetrachloroethane was detected as blank contamination in the field quality control blank.

MEMO TO: MR. MARK SPERANZA
DATE: DECEMBER 17, 1998 – PAGE 5

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (February, 1994), and the NFESC guidelines "Navy Installation Restoration Program Laboratory Quality Assurance Guide" (February, 1996). The text of this report has been formulated to address only those problems affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Justin Orbich

Chemist/Data Validator
Tetra Tech, NUS

Joseph A. Samchuck

Data Validation Quality Assurance Officer
Tetra Tech, NUS

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MEMO TO: **MR. MARK SPERANZA**
DATE: **DECEMBER 17, 1998 – PAGE 6**

NAS CECIL FIELD
SDG 9811030

TABEL 1 – RECOMMENDATION SUMMARY

Sample	VOA	SVOA	GAS
CEF-16-GW-10S-02	$A^{1,2}$ $J^{1,3}$	A^4	J^4
CEF-16-GW-11DD-02	A^1	A^4	J^5
CEF-16-GW-21S-02	$A^{1,3}$	A^4	A^5
CEF-16-GW-22I-02	$A^{1,3}$ J^1	A^4	
CEF-16-GW-43S-02		A^4	J^5
CEF-16-GW-44I-02	$A^{1,3}$	A^4	
CEF-16-GW-45I-02	A^1 $J^{1,6}$	A^4	A^5
CEF-16-GW-9D-02	$A^{1,3}$	A^4	
TB-110398-01	A^2 J^2		
TB-110498-01	$A^{1,2,3}$		
TB-110598-01	$A^{1,2,3}$		
TB-110698-01	$A^{1,2}$		

If the field is left blank, the qualifier is A - accept all data.

A^1 - Accept data, but qualify results as nondetected, (U), as a result of blank contamination for methylene chloride.

A^2 - Accept data, but qualify results as nondetected, (U), as a result of blank contamination for chloroform.

A^3 - Accept data, but qualify results as nondetected, (U), as a result of blank contamination for trichloroethene.

A^4 - Accept data, but qualify results as nondetected, (U), as a result of blank contamination for bis(2-ethylhexyl)phthalate.

A^5 - Accept data, but qualify results as nondetected, (U), as a result of blank contamination for methane.

J^1 - Accept data, but qualify those compounds with positive results less than the CRQL as estimated, (J).

J^2 - Accept data, but qualify the positive and nondetected results as estimated, (J) and (UJ), respectively, due to the exceedence of the contractual holding time until analysis by fourteen (14) days.

J^3 - Accept data, but qualify the positive results as estimated, (J), due to the presence of trichloroethene above the instruments linear calibration range.

J^4 - Accept data, but qualify the positive results as estimated, (J), due to the presence of ethene and methane above the instruments linear calibration range.

J^5 - Accept data, but qualify the positive results as estimated, (J), due to the presence of methane above the instruments linear calibration range.

J[6] - Accept data, but qualify the positive result as estimated, (J), due to the presence of 1,1-dichloroethane above the instruments linear calibration range.

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-10S-02

Lab Name: GP ENVIRONMENTAL Contract: NUS SOUT

Lab Code: GPES Case No.: SAS No.: SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811061-03A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B16119.D

Level: (low/med) LOW Date Received: 11/06/98

% Moisture: not dec. Date Analyzed: 11/18/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	42.5	
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-09-2	Methylene chloride	1.0	J
156-60-5	Trans-1,2-dichloroethene	0.6	J
75-34-3	1,1-Dichloroethane	158.2	E
156-59-2	Cis-1,2-dichloroethene	53.8	
67-66-3	Chloroform	1.0	JB
71-55-6	1,1,1-Trichloroethane	601.0	E
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	62.7	EB
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	0.6	J
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-10S--02

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUTH

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID 9811061-03A

Sample wt/vol: 25.000 (g/ml) ML Lab File ID: B16119.D

Level: (low/med) LOW Date Received 11/06/98

% Moisture: not dec. Date Analyzed 11/18/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND			Q
74-87-3	Chloromethane		2.0	U
75-01-4	Vinyl chloride		42.5	
75-00-3	Chloroethane		5.0	U
75-35-4	1,1-Dichloroethene		119.8	E
75-09-2	Methylene chloride		5.0	U
156-60-5	Trans-1,2-dichloroethene		5.0	U
75-34-3	1,1-Dichloroethane		158.2	E
156-59-2	Cis-1,2-dichloroethene		53.8	
67-66-3	Chloroform		5.0	U
71-55-6	1,1,1-Trichloroethane		601.0	E
56-23-5	Carbon tetrachloride		3.0	U
107-06-2	1,2-Dichloroethane		3.0	U
79-01-6	Trichloroethene		62.7	EB
78-87-5	1,2-Dichloropropane		5.0	U
10061-01-5	Cis-1,3-dichloropropene		0.2	U
10061-02-6	Trans-1,3-dichloropropene		0.2	U
79-00-5	1,1,2-Trichloroethane		5.0	U
127-18-4	Tetrachloroethene		3.0	U
108-90-7	Chlorobenzene		5.0	U
79-34-5	1,1,2,2-Tetrachloroethane		0.2	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-~~10GDL~~ 10S-02RE JO 12/15/98

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811061-03BDL

Sample wt/vol: 0.5 (g/ml) ML Lab File ID: F13333.D

Level: (low/med) LOW Date Received: 11/06/98

% Moisture: not dec. _____ Date Analyzed: 12/02/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 50.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	100.0	U
75-01-4	Vinyl chloride	44.0	JD
75-00-3	Chloroethane	250.0	U
75-35-4	1,1-Dichloroethene	105.5	JD
75-09-2	Methylene chloride	52.0	JBD
156-60-5	Trans-1,2-dichloroethene	250.0	U
75-34-3	1,1-Dichloroethane	122.5	JD
156-59-2	Cis-1,2-dichloroethene	56.0	JD
67-66-3	Chloroform	73.5	JBD
71-55-6	1,1,1-Trichloroethane	870.0	D
56-23-5	Carbon tetrachloride	150.0	U
107-06-2	1,2-Dichloroethane	150.0	U
79-01-6	Trichloroethene	58.5	JD
78-87-5	1,2-Dichloropropane	250.0	U
10061-01-5	Cis-1,3-dichloropropene	10.0	U
10061-02-6	Trans-1,3-dichloropropene	10.0	U
79-00-5	1,1,2-Trichloroethane	250.0	U
127-18-4	Tetrachloroethene	150.0	U
108-90-7	Chlorobenzene	250.0	U
79-34-5	1,1,2,2-Tetrachloroethane	10.0	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-11DD-02

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: N/A SAS No.: N/A SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811078-02A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: F13119.D

Level: (low/med) LOW Date Received: 11/07/98

% Moisture: not dec. _____ Date Analyzed: 11/18/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	2	U
75-01-4	Vinyl chloride	1	U
75-00-3	Chloroethane	5	U
75-35-4	1,1-Dichloroethene	5	U
75-09-2	Methylene chloride	1	JB
156-60-5	Trans-1,2-dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
156-59-2	Cis-1,2-dichloroethene	5	U
67-66-3	Chloroform	5	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon tetrachloride	3	U
107-06-2	1,2-Dichloroethane	3	U
79-01-6	Trichloroethene	3	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	Cis-1,3-dichloropropene	0	U
10061-02-6	Trans-1,3-dichloropropene	0	U
79-00-5	1,1,2-Trichloroethane	5	U
127-18-4	Tetrachloroethene	3	U
108-90-7	Chlorobenzene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	0	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-21S-02

Lab Name: GP ENVIRONMENTAL Contract: NUS SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811033-01B

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B16123.D

Level: (low/med) LOW Date Received: 11/05/98

% Moisture: not dec. _____ Date Analyzed: 11/18/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-09-2	Methylene chloride	0.6	J
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	Cis-1,2-dichloroethene	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	0.2	JB
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-22I-02

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: SAS No.: SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811033-02B

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B16124.D

Level: (low/med) LOW Date Received: 11/05/98

% Moisture: not dec. Date Analyzed: 11/18/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-09-2	Methylene chloride	0.6	J
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	0.2	J
156-59-2	Cis-1,2-dichloroethene	0.3	J
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	3.0	B
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-43S-02

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: SAS No.: SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811061-01A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B16117.D

Level: (low/med) LOW Date Received: 11/06/98

% Moisture: not dec. Date Analyzed: 11/18/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	Cis-1,2-dichloroethene	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	3.0	U
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-44I-02

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811061-02A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B16118.D

Level: (low/med) LOW Date Received: 11/06/98

% Moisture: not dec. _____ Date Analyzed: 11/18/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-09-2	Methylene chloride	0.8	J
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	Cis-1,2-dichloroethene	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	0.3	JB
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-~~44IRE~~ 441-02RE SO 12/15/98

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811061-02BRE

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: F13332.D

Level: (low/med) LOW Date Received: 11/06/98

% Moisture: not dec. _____ Date Analyzed: 12/02/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-09-2	Methylene chloride	0.7	JB
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	Cis-1,2-dichloroethene	5.0	U
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	3.0	U
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-451-02
~~CEF-16-451-02DL~~
JO 12/15/98

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811030-01BDL

Sample wt/vol: 1.0 (g/ml) ML Lab File ID: B16088.D

Level: (low/med) LOW Date Received: 11/04/98

% Moisture: not dec. _____ Date Analyzed: 11/17/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 25.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	50.0	U
75-01-4	Vinyl chloride	14.0	JD
75-00-3	Chloroethane	125.0	U
75-35-4	1,1-Dichloroethene	125.0	U
75-09-2	Methylene chloride	389.8	D
156-60-5	Trans-1,2-dichloroethene	14.8	JD
75-34-3	1,1-Dichloroethane	1873.0	ED
156-59-2	Cis-1,2-dichloroethene	275.5	D
67-66-3	Chloroform	66.0	JBD
71-55-6	1,1,1-Trichloroethane	5296.2	ED
56-23-5	Carbon tetrachloride	75.0	U
107-06-2	1,2-Dichloroethane	24.8	JD
79-01-6	Trichloroethene	52016.5	ED
78-87-5	1,2-Dichloropropane	125.0	U
10061-01-5	Cis-1,3-dichloropropene	5.0	U
10061-02-6	Trans-1,3-dichloropropene	5.0	U
79-00-5	1,1,2-Trichloroethane	273.0	D
127-18-4	Tetrachloroethene	75.0	U
108-90-7	Chlorobenzene	125.0	U
79-34-5	1,1,2,2-Tetrachloroethane	5.0	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CFF-16-GW-451-02TB5
~~CFF-16-451-02DL1~~

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811030-01BDL1

Sample wt/vol: 0.0 (g/ml) ML Lab File ID: F13329.D

Level: (low/med) LOW Date Received: 11/04/98

% Moisture: not dec. _____ Date Analyzed: 12/02/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 5000.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	10000.0	U
75-01-4	Vinyl chloride	5000.0	U
75-00-3	Chloroethane	25000.0	U
75-35-4	1,1-Dichloroethene	25000.0	U
75-09-2	Methylene chloride	6350.0	JBD
156-60-5	Trans-1,2-dichloroethene	25000.0	U
75-34-3	1,1-Dichloroethane	25000.0	U
156-59-2	Cis-1,2-dichloroethene	25000.0	U
67-66-3	Chloroform	7500.0	JBD
71-55-6	1,1,1-Trichloroethane	6550.0	JD
56-23-5	Carbon tetrachloride	15000.0	U
107-06-2	1,2-Dichloroethane	15000.0	U
79-01-6	Trichloroethene	654850.0	ED
78-87-5	1,2-Dichloropropane	25000.0	U
10061-01-5	Cis-1,3-dichloropropene	1000.0	U
10061-02-6	Trans-1,3-dichloropropene	1000.0	U
79-00-5	1,1,2-Trichloroethane	25000.0	U
127-18-4	Tetrachloroethene	15000.0	U
108-90-7	Chlorobenzene	25000.0	U
79-34-5	1,1,2,2-Tetrachloroethane	1000.0	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-9D-02

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: N/A SAS No.: N/A SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811078-01A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: F13118.D

Level: (low/med) LOW Date Received: 11/07/98

% Moisture: not dec. _____ Date Analyzed: 11/18/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND (ug/L or ug/Kg)	UG/L	Q
74-87-3	Chloromethane	2	U
75-01-4	Vinyl chloride	1	U
75-00-3	Chloroethane	5	U
75-35-4	1,1-Dichloroethene	5	U
75-09-2	Methylene chloride	2	JB
156-60-5	Trans-1,2-dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
156-59-2	Cis-1,2-dichloroethene	5	U
67-66-3	Chloroform	5	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon tetrachloride	3	U
107-06-2	1,2-Dichloroethane	3	U
79-01-6	Trichloroethene	1	J
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	Cis-1,3-dichloropropene	0	U
10061-02-6	Trans-1,3-dichloropropene	0	U
79-00-5	1,1,2-Trichloroethane	5	U
127-18-4	Tetrachloroethene	3	U
108-90-7	Chlorobenzene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	0	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-~~9DRE~~ 9D-02RE

Lab Name: GP ENVIRONMENTAL Contract: NUS SOUT

Lab Code: GPES Case No.: N/A SAS No.: N/A SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811078-01BRE

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: F13139.D

Level: (low/med) LOW Date Received: 11/07/98

% Moisture: not dec. _____ Date Analyzed: 11/19/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	2	U
75-01-4	Vinyl chloride	1	U
75-00-3	Chloroethane	5	U
75-35-4	1,1-Dichloroethene	5	U
75-09-2	Methylene chloride	1	JB
156-60-5	Trans-1,2-dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
156-59-2	Cis-1,2-dichloroethene	5	U
67-66-3	Chloroform	5	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon tetrachloride	3	U
107-06-2	1,2-Dichloroethane	3	U
79-01-6	Trichloroethene	3	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	Cis-1,3-dichloropropene	0	U
10061-02-6	Trans-1,3-dichloropropene	0	U
79-00-5	1,1,2-Trichloroethane	5	U
127-18-4	Tetrachloroethene	3	U
108-90-7	Chlorobenzene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	0	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
TB-110398-01
TRIP BLANK 10
12/15/98

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811030-02A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B16089.D

Level: (low/med) LOW Date Received: 11/04/98

% Moisture: not dec. _____ Date Analyzed: 11/17/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-09-2	Methylene chloride	1.4	J
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	Cis-1,2-dichloroethene	5.0	U
67-66-3	Chloroform	0.9	JB
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	22.0	
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

TB-110398-0125
~~TRIP BLANKRE~~
JO 12/15/98

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: ~~CF51-1~~

Matrix: (soil/water) WATER Lab Sample ID: 9811030-02BRE

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: F13330.D

Level: (low/med) LOW Date Received: 11/04/98

% Moisture: not dec. _____ Date Analyzed: 12/02/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-09-2	Methylene chloride	1.1	JB
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	Cis-1,2-dichloroethene	5.0	U
67-66-3	Chloroform	1.0	JB
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	3.0	U
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

TB-110498-01 ~~TRIP BLANK~~ 12/15/98

Lab Name: GP ENVIRONMENTAL Contract: NUS SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811033-03A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B16113.D

Level: (low/med) LOW Date Received: 11/04/98

% Moisture: not dec. _____ Date Analyzed: 11/18/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-09-2	Methylene chloride	0.4	J
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	Cis-1,2-dichloroethene	5.0	U
67-66-3	Chloroform	0.8	JB
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	0.3	JB
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	2.1	

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

TB-110498-01RE
~~TRIP BLANKRE~~
JO 12/15/98

Lab Name: GP ENVIRONMENTAL Contract: NUS SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811033-03BRE

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: F13331.D

Level: (low/med) LOW Date Received: 11/05/98

% Moisture: not dec. _____ Date Analyzed: 12/02/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND (ug/L or ug/Kg)	UG/L	Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-09-2	Methylene chloride	1.1	JB
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	Cis-1,2-dichloroethene	5.0	U
67-66-3	Chloroform	0.9	JB
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	3.0	U
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

TB-110598-01

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811061-04A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B16116.D

Level: (low/med) LOW Date Received: 11/04/98

% Moisture: not dec. _____ Date Analyzed: 11/18/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-09-2	Methylene chloride	0.8	J
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	Cis-1,2-dichloroethene	5.0	U
67-66-3	Chloroform	0.6	JB
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	0.3	JB
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

TB-110598-01RE

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811061-04BRE

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: F13334.D

Level: (low/med) LOW Date Received: 11/06/98

% Moisture: not dec. _____ Date Analyzed: 12/02/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	2.0	U
75-01-4	Vinyl chloride	1.0	U
75-00-3	Chloroethane	5.0	U
75-35-4	1,1-Dichloroethene	5.0	U
75-09-2	Methylene chloride	5.0	U
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	5.0	U
156-59-2	Cis-1,2-dichloroethene	5.0	U
67-66-3	Chloroform	1.0	JB
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	3.0	U
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
10061-02-6	Trans-1,3-dichloropropene	0.2	U
79-00-5	1,1,2-Trichloroethane	5.0	U
127-18-4	Tetrachloroethene	3.0	U
108-90-7	Chlorobenzene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

TB-110698-1
~~TB-110598-01~~
JO 12/15/98

Lab Name: GP ENVIRONMENTAL Contract: NUS SOUT

Lab Code: GPES Case No.: N/A SAS No.: N/A SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811078-03A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: F13120.D

Level: (low/med) LOW Date Received: 11/07/98

% Moisture: not dec. _____ Date Analyzed: 11/18/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND (ug/L or ug/Kg) UG/L		Q
74-87-3	Chloromethane	2	U
75-01-4	Vinyl chloride	1	U
75-00-3	Chloroethane	5	U
75-35-4	1,1-Dichloroethene	5	U
75-09-2	Methylene chloride	1	JB
156-60-5	Trans-1,2-dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
156-59-2	Cis-1,2-dichloroethene	5	U
67-66-3	Chloroform	1	JB
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon tetrachloride	3	U
107-06-2	1,2-Dichloroethane	3	U
79-01-6	Trichloroethene	3	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	Cis-1,3-dichloropropene	0	U
10061-02-6	Trans-1,3-dichloropropene	0	U
79-00-5	1,1,2-Trichloroethane	5	U
127-18-4	Tetrachloroethene	3	U
108-90-7	Chlorobenzene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	0	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CFF-16-GW-105-02
~~GW106~~
JW 12/15/98

Lab Name: GPL_LABORATORIES, LLLP Contract: NUS_SOUT

Lab Code: GPLL Case No.: N/A SAS No.: N/A SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811061-03C

Sample wt/vol: 970 (g/ml) ML Lab File ID: C18191.D

Level: (low/med) LOW Date Received: 11/06/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 11/11/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 11/18/98

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
117-81-7	bis(2-Ethylhexyl)phthalate	4	JB

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-11DD-02
~~GW11DD~~
JO 12/15/98

Lab Name: GPL LABORATORIES, LLLP Contract: NUS_SOUT

Lab Code: GPLL Case No.: N/A SAS No.: N/A SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811078-02C

Sample wt/vol: 970 (g/ml) ML Lab File ID: C18202.D

Level: (low/med) LOW Date Received: 11/07/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 11/11/98 ✓

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 11/19/98 ✓

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
117-81-7	bis(2-Ethylhexyl)phthalate	2	JB

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-10-GW-215-02
~~GW21502~~
JO 12/15/98

Lab Name: GPL LABORATORIES, LLLP Contract: NUS SOUT

Lab Code: GPLL Case No.: N/A SAS No.: N/A SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811033-01C

Sample wt/vol: 980 (g/ml) ML Lab File ID: C18197.D

Level: (low/med) LOW Date Received: 11/05/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 11/11/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 11/18/98

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
117-81-7	bis(2-Ethylhexyl)phthalate	2	JB

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CFF-16-GW-22I-02
~~GW22102~~
12/15/98

Lab Name: GPL_LABORATORIES, LLLP Contract: NUS_SOUT

Lab Code: GPLL Case No.: N/A SAS No.: N/A SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811033-02C

Sample wt/vol: 950 (g/ml) ML Lab File ID: C18188.D

Level: (low/med) LOW Date Received: 11/05/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 11/11/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 11/18/98

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
117-81-7	bis(2-Ethylhexyl)phthalate	6	JB

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-435-02
~~GW436~~
JO 12/15/98

Lab Name: GPL LABORATORIES, LLLP Contract: NUS_SOUT

Lab Code: GPLL Case No.: N/A SAS No.: N/A SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811061-01C

Sample wt/vol: 960 (g/ml) ML Lab File ID: C18189.D

Level: (low/med) LOW Date Received: 11/06/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 11/11/98 ✓

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 11/18/98 ✓

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
117-81-7	bis(2-Ethylhexyl)phthalate	4	JB

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-441-02
~~GW441~~
JO 12/15/98

Lab Name: GPL LABORATORIES, LLLP Contract: ~~NUS_SOUT~~

Lab Code: GPLL Case No.: N/A SAS No.: N/A SDG No.: ~~CF51-1~~

Matrix: (soil/water) WATER Lab Sample ID: ~~9811061-02C~~

Sample wt/vol: 910 (g/ml) ML Lab File ID: C18190.D

Level: (low/med) LOW Date Received: ~~11/06/98~~

% Moisture: _____ decanted:(Y/N) N Date Extracted: ~~11/11/98~~ ✓

Concentrated Extract Volume: 1000 (uL) Date Analyzed: ~~11/18/98~~ ✓

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
117-81-7	bis(2-Ethylhexyl)phthalate	4	JB

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-4CI-02
~~45182~~
12/15/98

Lab Name: GPL LABORATORIES, LLLP Contract: NUS_SOUT

Lab Code: GPLL Case No.: N/A SAS No.: N/A SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811030-01C

Sample wt/vol: 940 (g/ml) ML Lab File ID: H06134 D

Level: (low/med) LOW Date Received: 11/04/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 11/06/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 11/17/98

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
117-81-7	bis(2-Ethylhexyl)phthalate	7	

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-9D-02
~~GW9D~~

Lab Name: GPL_LABORATORIES, LLLP Contract: NUS_SOUT

Lab Code: GPLL Case No.: N/A SAS No.: N/A SDG No.: CF51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811078-01C

Sample wt/vol: 960 (g/ml) ML Lab File ID: C18194.D

Level: (low/med) LOW Date Received: 11/07/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 11/11/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 11/18/98

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
117-81-7	bis(2-Ethylhexyl)phthalate	5	JB

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-10S-02

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPL Case No.: 9811061 SAS No.: N/A SDG No.: CF-51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811061-03F

Sample wt/vol: 10 (g/ml) ML Lab File ID: N12084.D

Level: (low/med) LOW Date Received: 11/06/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: _____

Concentrated Extract Volume: 1 (uL) Date Analyzed: 11/16/98

Injection Volume: 500. (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	998.5	EB
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	78.2	E

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

103-0285 ~~CFF~~-16-GW-~~106 DL~~

Lab Name: GPL LABORATORIES Contract: NUS SOUT

Lab Code: GPL Case No.: 9811061 SAS No.: N/A SDG No.: CF-51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811061-03F 2X

Sample wt/vol: 10 (g/ml) ML Lab File ID: N12085.D

Level: (low/med) LOW Date Received: 11/06/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: _____

Concentrated Extract Volume: 1 (uL) Date Analyzed: 11/16/98

Injection Volume: 500. (uL) Dilution Factor: 2.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	1089.6	EBD
74-84-0	Ethane	11.6	U
74-85-1	Ethylene	81.9	D

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CFF-16-GW-10S-~~DL~~ -02DL

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPL Case No.: 9811061 SAS No.: N/A SDG No.: CF-51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811061-03F_50X

Sample wt/vol: 10 (g/ml) ML Lab File ID: N12086.D

Level: (low/med) LOW Date Received: 11/06/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: _____

Concentrated Extract Volume: 1 (uL) Date Analyzed: 11/16/98

Injection Volume: 500. (uL) Dilution Factor: 50.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	828.0	BD
74-84-0	Ethane	290.0	U
74-85-1	Ethylene	312.0	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-11DD-02

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPL Case No.: 9811078 SAS No.: N/A SDG No.: CF-51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811078-02F

Sample wt/vol: 10 (g/ml) ML Lab File ID: N12096.D

Level: (low/med) LOW Date Received: 11/07/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: _____

Concentrated Extract Volume: 1 (uL) Date Analyzed: 11/17/98

Injection Volume: 500. (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	116.3	EB
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	6.2	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-11DD ~~DL~~ -02RE

Lab Name: GPL LABORATORIES Contract: NUS SOUT

Lab Code: GPL Case No.: 9811078 SAS No.: N/A SDG No.: CF-51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811078-02F 10X

Sample wt/vol: 10 (g/ml) ML Lab File ID: N12097.D

Level: (low/med) LOW Date Received: 11/07/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: _____

Concentrated Extract Volume: 1 (uL) Date Analyzed: 11/17/98

Injection Volume: 500. (uL) Dilution Factor: ~~1.0~~ 10.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-82-8	Methane	147 ~~14.7~~	B
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	6.2	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CFF-16-GW-21S-02

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPL Case No.: 9811033 SAS No.: N/A SDG No.: CF-51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811033-01F

Sample wt/vol: 10 (g/ml) ML Lab File ID: N12079.D

Level: (low/med) LOW Date Received: 11/05/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: _____

Concentrated Extract Volume: 1 (uL) Date Analyzed: 11/16/98

Injection Volume: 500. (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	6.0	B
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	6.2	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GBLKB

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPL Case No.: _____ SAS No.: N/A SDG No.: CF-51-1

Matrix: (soil/water) WATER Lab Sample ID: GBLKB

Sample wt/vol: 10 (g/ml) ML Lab File ID: N12090.D

Level: (low/med) LOW Date Received: _____

% Moisture: _____ decanted:(Y/N) N Date Extracted: _____

Concentrated Extract Volume: 1 (uL) Date Analyzed: 11/17/98

Injection Volume: 500. (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-82-8	Methane	1.7	J
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	6.2	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF- 16-GW-22I-02

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPL Case No.: 9811033 SAS No.: N/A SDG No.: CF-51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811033-02F

Sample wt/vol: 10 (g/ml) ML Lab File ID: N12080.D

Level: (low/med) LOW Date Received: 11/05/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: _____

Concentrated Extract Volume: 1 (uL) Date Analyzed: 11/16/98

Injection Volume: 500. (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	14.0	B
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	6.2	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-43S-02

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPL Case No.: 9811061 SAS No.: N/A SDG No.: CF-51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811061-01F

Sample wt/vol: 10 (g/ml) ML Lab File ID: N12081.D

Level: (low/med) LOW Date Received: 11/05/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: _____

Concentrated Extract Volume: 1 (uL) Date Analyzed: 11/16/98

Injection Volume: 500. (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	124.7	EB
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	6.2	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CSF-16-GW-43S ~~BL-02~~ RE

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPL Case No.: 9811061 SAS No.: N/A SDG No.: CF-51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811061-01F 5X

Sample wt/vol: 10 (g/ml) ML Lab File ID: N12082.D

Level: (low/med) LOW Date Received: 11/06/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: _____

Concentrated Extract Volume: 1 (uL) Date Analyzed: 11/16/98

Injection Volume: 500. (uL) Dilution Factor: 5.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	145.9	BD
74-84-0	Ethane	29.0	U
74-85-1	Ethylene	31.2	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-44I-02

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPL Case No.: 9811061 SAS No.: N/A SDG No.: CF-51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811061-02F

Sample wt/vol: 10 (g/ml) ML Lab File ID: N12083.D

Level: (low/med) LOW Date Received: 11/06/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: _____

Concentrated Extract Volume: 1 (uL) Date Analyzed: 11/16/98

Injection Volume: 500. (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	25.0	B
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	6.2	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-~~45I-02~~ GW-45I-02

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPL Case No.: 9811030 SAS No.: N/A SDG No.: CF-51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811030-01F

Sample wt/vol: 10 (g/ml) ML Lab File ID: N12078.D

Level: (low/med) LOW Date Received: 11/04/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: _____

Concentrated Extract Volume: 1 (uL) Date Analyzed: 11/16/98

Injection Volume: 500. (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	6.2	B
74-84-0	Ethane	5.4	J
74-85-1	Ethylene	6.2	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CEF-16-GW-9D-02

Lab Name: GPL LABORATORIES Contract: NUS SOUT

Lab Code: GPL Case No.: 9811078 SAS No.: N/A SDG No.: CF-51-1

Matrix: (soil/water) WATER Lab Sample ID: 9811078-01F

Sample wt/vol: 10 (g/ml) ML Lab File ID: N12095.D

Level: (low/med) LOW Date Received: 11/07/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: _____

Concentrated Extract Volume: 1 (uL) Date Analyzed: 11/17/98

Injection Volume: 500. (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	26.9	B
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	6.2	U

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-12-8-099

TO:	**M. SPERANZA**	**DATE:**	**DECEMBER 15, 1998**
FROM:	**GRETCHEN PHIPPS**	**COPIES:**	**DV FILE**

SUBJECT: **DATA VALIDATION – DISSOLVED IRON AND MANGANESE AND MISCELLANEOUS PARAMETERS**
CTO 051 - CECIL FIELD
SDG - 9811030

SAMPLES: 8/Aqueous/

CEF-16-GW-10S-02	CEF-16-GW-11DD-02	CEF-16-GW-21S-02
CEF-16-GW-22I-02	CEF-16-GW-43S-02	CEF-16-GW-44I-02
CEF-16-GW-45I-02	CEF-16-GW-9D-02	

Overview

The sample set for CTO 051, NAS Cecil Field, SDG 9811030, consists of eight (8) aqueous environmental samples.

All samples were analyzed for dissolved iron and manganese, alkalinity, biological oxygen demand (BOD), chemical oxygen demand (COD), chloride, dissolved sulfide, nitrate, nitrite, orthophosphate, sulfate and total organic carbon (TOC). A suffix, -F, was added to the sample ID's for the dissolved iron and manganese analyses. The samples were collected by Tetra Tech NUS on November 3-6, 1998 and analyzed by GP Environmental Services under Naval Facilities Engineering Service Center (NFESC) Quality Assurance / Quality Control criteria. Iron and manganese analyses were conducted using SW-846 method 6010B. BOD analyses were conducted using EPA method 405.1. COD analyses were conducted using EPA method 410.1. Chloride, Bromide, Nitrate, Nitrite, 0-Phosphate and Sulfate analyses were conducted using EPA method 300. Dissolved sulfide analyses were conducted using EPA method 376.1. Alkalinity analyses were conducted using EPA method 310.1. TOC analyses were conducted using SW 846 method 9060.

The data was evaluated based on the following parameters:

* • Data Completeness
- Holding Times
- Calibration Verifications
- Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Holding Times

The holding time for BOD affecting samples CEF-16-GW-21S-02, CEF-16-GW-22I-02, CEF-16-GW-9D-02 and CEF-16-GW-11DD-02 was exceeded. The nondetected results reported for BOD in the affected samples were qualified as estimated, "UJ".

The holding times for nitrite affecting samples CEF-16-GW-10S-02, CEF-16-GW-11DD-02 , CEF-16-GW-43S-02, CEF-16-GW-9D-02 and CEF-16GW-44I-02 were exceeded by thirteen (13) days. The nondetected results reported for nitrite in the affected samples were qualified as rejected, "UR".

Calibration Verification

The Initial Calibration Verification (ICV) for alkalinity affecting sample CEF-16-GW-45I-02 was >110% quality control limit. The nondetected result reported for alkalinity in the affected sample was qualified as estimated, "UJ".

The Continuing Calibration Verifications (CCVs) for chloride affecting all samples were both above and below the 90-110% quality control limit. The positive results reported for chloride were qualified as estimated, "J".

The ICV and CCVs for nitrate affecting samples CEF-16-GW-10S-02, CEF-16-GW-11DD-02, CEF-16-GW-43S-02, CEF-16-GW--02, and CEF-16-GW-9D-02 was <90% quality control limit. The nondetected results reported for nitrate in the affected samples were qualified as estimated, "UJ".

The ICV and CCVs for orthophosphate affecting all samples were <90% quality control limit. The nondetected results reported for orthophosphate were qualified as estimated, "UJ".

The CCVs for sulfate affecting all samples were both above and below the 90-110% quality control limit. The positive and nondetected results reported for sulfate were qualified as estimated, "J" and "UJ", respectively.

Laboratory Blank Analyses

The following contaminants were present in the laboratory method blanks at the following maximum concentrations:

Affected samples: All

Analyte	Maximum Concentration	Action Level(aqueous)
Chloride	0.232 mg/L	1.16 mg/L
Sulfate	0.574µg/L	2.87µg/L

An action level of 5X the maximum concentration has been used to evaluate the sample data for blank contamination. Positive results < the action level for chloride and sulfate were qualified, "U", as a result of blank contamination.

Notes

The ICV and CCVs for nitrate affecting sample CEF-16-GW-43S-02, CEF-16-GW-44I-02 and CEF-16-GW-10S-02 were >110% quality control limit. However, no validation action was required as all nitrate results reported for the affected samples were nondetects.

Executive Summary

Laboratory Performance: The holding times for BOD, nitrate and nitrite analyses were exceeded. Several ICVs and CCVs for alkalinity, chloride, nitrate, nitrite, o-phosphate and sulfate were outside the 90-110% quality control limit. Chloride and sulfate were present in the laboratory method blanks.

Other Factors Affecting Data Quality: The LCS %R for BOD analyses was <80% quality control limit.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitles "Navy Installation Restoration Laboratory Quality Assurance Guide." (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Gretchen A. Phipps

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Control Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Cecil Field
SDG 9811030

Table 1 - RECOMMENDATION SUMMARY

Iron			
Manganese			
Alkalinity		J^2	
BOD		J^1	
COD			
Chloride	A^1	J^2	
Dissolved Sulfide			
Nitrate		J^2	
Nitrite			R^1
Orthophosphate		J^2	
Sulfate	A^1	J^2	
TOC			

If the field is left blank, the qualifier is A - Accept data.

A^1 - Accept data, but qualify results less than the blank action level as nondetected, "U", as a result of laboratory blank contamination.

J^1 - Accept data, but qualify positive and nondetected results as estimated, "J" and "UJ", respectively, as a result of holding time exceedance.

J^2 - Accept data, but qualify positive and nondetected results as estimated, "J" and "UJ", respectively, as a result of calibration noncompliance.

R^1 - Reject data and qualify nondetected results as unusable, "UR", as a result of holding time exceedance.

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

GW-10S

Lab Name: GPL LABORATORIES LLLP Contract: NAS C.F.

Lab Code: GPL Case No.: CF511 SAS No.: CTO051 SDG No.: NUS160

Matrix (soil/water): WATER Lab Sample ID: 9811061-03

Level (low/med): LOW Date Received: 11/06/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg in dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	718			P
7439-92-1	Lead				
7439-95-4	Magnesium				
7439-96-5	Manganese	292			P
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				
7439-98-7	Molybdenum				

Color Before: Clarity Before: Texture:

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FORM I - IN

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ENVIROFORMS/INORGANIC CLP

SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

CEF11D

Lab Name: GPL LABORATORIES LLLP Contract: CECILFIELD

Lab Code: GPL Case No.: CTO51 SAS No.: NUSNAS SDG No.: NUS157

Matrix (soil/water):WATER Lab Sample ID: 9811078-02

Level (low/med): LOW Date Received: 11/07/98

% Solids: 0.0

Concentration Units(ug/L or mg/kg in dry weight):UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	367			P
7439-92-1	Lead				
7439-95-4	Magnesium				
7439-96-5	Manganese	43.5			P
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				
7439-98-7	Molybdenum				

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Color After: Clarity After: Artifacts:

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ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

CEF21S

Lab Name: GPL LABORATORIES LLLP Contract: CECILFIELD

Lab Code: GPL Case No.: CT051 SAS No.: NUSNAS SDG No.: NUS157

Matrix (soil/water): WATER Lab Sample ID: 9811033-01

Level (low/med): LOW Date Received: 11/05/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg in dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	105			P
7439-92-1	Lead				
7439-95-4	Magnesium				
7439-96-5	Manganese	9.0	B		P
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				
7439-98-7	Molybdenum				

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ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

CEF22I

Lab Name: GPL LABORATORIES LLLP Contract: CECILFIELD

Lab Code: GPL Case No.: CTO51 SAS No.: NUSNAS SDG No.: NUS157

Matrix (soil/water):WATER Lab Sample ID: 9811033-02

Level (low/med): LOW Date Received: 11/05/98

% Solids: 0.0

Concentration Units(ug/L or mg/kg in dry weight):UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	763			P
7439-92-1	Lead				
7439-95-4	Magnesium				
7439-96-5	Manganese	5.0	U		P
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				
7439-98-7	Molybdenum				

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FORM I - IN

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

GW-43S

Lab Name: GPL LABORATORIES LLLP Contract: NAS C.F.

Lab Code: GPL Case No.: CF511 SAS No.: CTO051 SDG No.: NUS160

Matrix (soil/water): WATER Lab Sample ID: 9811061-01

Level (low/med): LOW Date Received: 11/06/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg in dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	1260			P
7439-92-1	Lead				
7439-95-4	Magnesium				
7439-96-5	Manganese	10.6	B		P
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				
7439-98-7	Molybdenum				

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

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FORM I - IN

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

GW-44I

Lab Name: GPL LABORATORIES LLLP Contract: NAS C.F.

Lab Code: GPL Case No.: CF511 SAS No.: CTO051 SDG No.: NUS160

Matrix (soil/water):WATER Lab Sample ID: 9811061-02

Level (low/med): LOW Date Received: 11/06/98

% Solids: 0.0

Concentration Units(ug/L or mg/kg in dry weight):UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	612			P
7439-92-1	Lead				
7439-95-4	Magnesium				
7439-96-5	Manganese	44.3			P
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				
7439-98-7	Molybdenum				

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

CEF451

Lab Name: GPL LABORATORIES LLLP Contract: CECILFIELD

Lab Code: GPL Case No.: CT051 SAS No.: NUSNAS SDG No.: NUS157

Matrix (soil/water):WATER Lab Sample ID: 9811030-01

Level (low/med): LOW Date Received: 11/04/98

% Solids: 0.0

Concentration Units(ug/L or mg/kg in dry weight):UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	12200			P
7439-92-1	Lead				
7439-95-4	Magnesium				
7439-96-5	Manganese	88.4			P
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				
7439-98-7	Molybdenum				

Color Before: GREEN Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

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FORM I - IN

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

CEF-9D

Lab Name: GPL LABORATORIES LLLP Contract: CECILFIELD

Lab Code: GPL Case No.: CTO51 SAS No.: NUSNAS SDG No.: NUS157

Matrix (soil/water):WATER Lab Sample ID: 9811078-01

Level (low/med): LOW Date Received: 11/07/98

% Solids: 0.0

Concentration Units(ug/L or mg/kg in dry weight):UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	810			P
7439-92-1	Lead				
7439-95-4	Magnesium				
7439-96-5	Manganese	19.1			P
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				
7439-98-7	Molybdenum				

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

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FORM I - IN

RUN SUMMARY SHEET
NITRITE BY IC

DATA FILE: ICN0598
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 11/05/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	0		-0.003	-0.003	0.100	mg/L			
2	0.1 PPM	S1	5499		0.113	0.113	0.100	mg/L			
3	0.5 PPM	S2	24185		0.509	0.509	0.100	mg/L			
4	1.0 PPM	S3	49475		1.04	1.04	0.100	mg/L			
5	3.0 PPM	S4	140209		2.97	2.97	0.100	mg/L			
6	5.0 PPM	S5	236706		5.01	5.01	0.100	mg/L			
7	9811030-01	CEF-16-451-02	0		-0.003	-0.003	0.100	mg/L			
8	analyzed for other analytes										
9	ICV NITRITE	ICV NITRITE	156478		3.31	6.62	0.200	mg/L	96.0		
10	BLANK	ICB	0		-0.003	-0.003	0.100	mg/L			
11	9811030-01	CEF-16-451-02	0		-0.003	-0.003	0.100	mg/L			
12	9811030-01D	CEF-16-451-02D	0		-0.003	-0.003	0.100	mg/L		0.000	
13	9811030-01S	CEF-16-451-02S	177943		3.77	7.53	0.200	mg/L	301		
14	9811030-01	CEF-16-451-02	0		-0.003	-0.017	0.500	mg/L			
15	9811030-01D	CEF-16-451-02D	0		-0.003	-0.017	0.500	mg/L			
16	9811030-01S	CEF-16-451-02S	148215		3.14	31.4	1.00	mg/L	125		
17	9811030-01	CEF-16-451-02	0		-0.003	-0.067	2.00	mg/L			
18	analyzed for other analytes										
19	CCV NITRITE	CCV NITRITE	172315		3.65	7.29	0.200	mg/L	106		
20	CCB	CCB	0		-0.003	-0.003	0.100	mg/L			
21	9811033-01	CEF-16-GW-21S-0	0		-0.003	-0.003	0.100	mg/L			
22	9811033-02	CEF-16-GW-22I-0	0		-0.003	-0.003	0.100	mg/L			
23	analyzed for other analytes										
24	CCV2 NITRITE	CCV2 NITRITE	170436		3.61	7.21	0.200	mg/L	105		
25	CCB2	CCB2	0		-0.003	-0.003	0.100	mg/L			

NA ~~133~~ TW 12-10-98

VBF
Analyst / Date

Tracy Wardell 12-10-98
Lab Supervisor / Date

RUN SUMMARY SHEET
NITRITE BY IC

DATA FILE: IC_N2098
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 11/20/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	0		-0.028	-0.028	0.100	mg/L			
2	0.1 PPM	S1	5897		0.070	0.070	0.100	mg/L			
3	0.5 PPM	S2	29756		0.468	0.468	0.100	mg/L			
4	1.0 PPM	S3	62073		1.01	1.01	0.100	mg/L			
5	3.0 PPM	S4	196474		3.25	3.25	0.100	mg/L			
6	5.0 PPM	S5	291811		4.84	4.84	0.100	mg/L			
7	ICV x 100	ICV x 100	51942		0.838	83.8	10.0	mg/L	83.8		
8	ICV x 500	ICV x 500	10403		0.145	72.7	50.0	mg/L	72.7		
9	ICB	ICB	0		-0.028	-0.028	0.100	mg/L			
10	ICB	ICB	0		-0.028	-0.028	0.100	mg/L			
11	9811198-01	CEF-8-MW-4S-02	0		-0.028	-0.028	0.100	mg/L			
12	9811198-01D	CEF-8-MW-4S-02D	0		-0.028	-0.028	0.100	mg/L		133	
13	9811198-01S	CEF-8-MW-4S-02S	213637		3.53	7.07	0.200	mg/L	141		
14	9811198-03	CEF-8-MW-12S-02	0		-0.028	-0.028	0.100	mg/L			
15	9811198-01	CEF-8-MW-4S-02	0		-0.028	-0.140	0.500	mg/L			
16	9811198-01D	CEF-8-MW-4S-02D	0		-0.028	-0.140	0.500	mg/L		0.000	
17	9811198-01S	CEF-8-MW-4S-02S	210800		3.49	34.9	1.00	mg/L	139		
18	9811198-03	CEF-8-MW-12S-02	0		-0.028	-0.140	0.500	mg/L			
19	CCV1 x 100	CCV1 x 100	57448		0.930	93.0	10.0	mg/L	93.0		
20	CCV1 x 500	CCV1 x 500	11200		0.159	79.3	50.0	mg/L	79.3		
21	CCV1 3578 x 5	CCV1 3578 x 5	0		-0.028	-0.140	0.500	mg/L	-2.03		
22	CCB1	CCB1	0		-0.028	-0.028	0.100	mg/L			
23	9811123-02	E03-SD00-01-150	0		-0.028	-0.028	0.100	mg/L			
24	9811123-03	E03-SD00-01-149	0		-0.028	-0.028	0.100	mg/Kg			
25	9811123-03	E03-SD00-01-149	0		-0.028	-0.140	0.500	mg/Kg			
26	9811123-05	E03-SD03-01-147	0		-0.028	-0.028	0.100	mg/Kg			
27	9811123-05	E03-SD03-01-147	0		-0.028	-0.140	0.500	mg/Kg			
28	CCV x 100	CCV x 100	55868		0.903	90.3	10.0	mg/L	90.3		
29	CCV x 500	CCV x 500	10985		0.155	77.5	50.0	mg/L	77.5		
30	Not analyzed for nitrite										
31	CCB2	CCB2	0		-0.028	-0.028	0.100	mg/L			
32	9811030-01	CEF-16-451-02	0		-0.028	-0.280	1.00	mg/L			
33	9811033-01	CEF-16-GW-21S-0	0		-0.028	-0.280	1.00	mg/L			
34	9811033-02	CEF-16-GW-22I-0	0		-0.028	-0.056	0.200	mg/L			
35	9811061-01	CEF-16-GW-43S	0		-0.028	-0.280	1.00	mg/L			
36	9811061-01	CEF-16-GW-43S	0		-0.028	-0.056	0.200	mg/L			
37	9811061-02	CEF-16-GW-44I	0		-0.028	-0.056	0.200	mg/L			
38	9811061-03	CEF-16-GW-10S	0		-0.028	-0.280	1.00	mg/L			
39	9811061-03	CEF-16-GW-10S	0		-0.028	-0.056	0.200	mg/L			
40	9811078-01	CEF-16-GW-9D	0		-0.028	-0.028	0.100	mg/L			

VBF
Analyst / Date

Lacey Wardell 10-16-98
Lab Supervisor / Date

15141

RUN SUMMARY SHEET
NITRITE BY IC

DATA FILE: IC_N2098
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 11/20/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
41	9811078-02	CEF-16-GW-11DD	0		-0.028	-0.028	0.100	mg/L			
42	CCV3 x 100	CCV3 x 100	53958		0.871	87.1	10.0	mg/L	87.1		
43	CCV3 x 500	CCV3 x 500	11560		0.165	82.3	50.0	mg/L	82.3		
44	not analzyed for nitrite										
45	CCB3	CCB3	0		-0.028	-0.028	0.100	mg/L			
46	9811061-01	CEF-16-GW-43S	0		-0.028	-0.028	0.100	mg/L			
47	9811061-02	CEF-16-GW-44I	0		-0.028	-0.028	0.100	mg/L			
48	9811061-03	CEF-16-GW-10S	0		-0.028	-0.028	0.100	mg/L			
49	CCV4 x 100	CCV4 x 100	52258		0.843	84.3	10.0	mg/L	8.43		
50	CCV4 x 500	CCV4 x 500	10286		0.143	71.7	50.0	mg/L	7.17		
51	not analyzed for nitrite										
52	CCB4	CCB4	0		-0.028	-0.028	0.100	mg/L			

VBF
Analyst / Date

Tracy Wardell 12-10-98
Lab Supervisor / Date

15142

RUN SUMMARY SHEET
Alkalinity

DATA FILE: ALKN1898
INSTRUMENT FILE: INSTRUMENT: WET_LAB ANALYZED: 11/18/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	BLANK	ICB	0		0.000	0.000	1.00	mg/L			
2	WC0218	ICV	218		218	218	1.00	mg/L	87.9		
3	9811033-01	CEF-16-GW-21S-0	0		0.000	0.000	1.00	mg/L			
4	9811033-02	CEF-16-GW-22I-0	1.83		1.83	1.83	1.00	mg/L			
5	9811061-01	CEF-16-GW-43S	19.24		19.2	19.2	1.00	mg/L			
6	9811061-02	CEF-16-GW-44I	2.75		2.75	2.75	1.00	mg/L			
7	9811061-03	CEF-16-GW-10S	274.8		275	275	1.00	mg/L			
8	9811078-01	CEF-16-GW-9D	35.72		35.7	35.7	1.00	mg/L			
9	9811078-02	CEF-16-GW-11DD	233.6		234	234	1.00	mg/L			
10	9811101-01	CEF-16-GW-38S-0	2.02		2.02	2.02	1.00	mg/L			
11	9811101-02	CEF-16-GW-35S-0	2.75		2.75	2.75	1.00	mg/L			
12	9811101-03	CEF-16-GW-32S-0	3.66		3.66	3.66	1.00	mg/L			
13	9811101-03D	CEF-16-GW-32S-0	3.66		3.66	3.66	1.00	mg/L		0.000	
14	9811092-01	CEF-16-GW-41S-0	2.20		2.20	2.20	1.00	mg/L			
15	9811092-02	CEF-16-GW-42I-0	1.28		1.28	1.28	1.00	mg/L			
16	9811092-03	CEF-16-GW-23D-0	228.6		229	229	1.00	mg/L			
17	9811092-05	CEF-16-DUP1-02	2.38		2.38	2.38	1.00	mg/L			
18	9811092-06	CEF-16-DUP2-02	1.65		1.65	1.65	1.00	mg/L			
19	3485	CV	148.4		148	148	1.00	mg/L	94.5		
20	BLANK	CB	0		0.000	0.000	1.00	mg/L			

SC
Analyst / Date

Chris Beaty 12-8-98
Lab Supervisor / Date

15012

RUN SUMMARY SHEET
Alkalinity

DATA FILE: ALKN1798
INSTRUMENT FILE: INSTRUMENT: WET_LAB ANALYZED: 11/17/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	BLANK	ICB	0		0.000	0.000	1.00	mg/L			
2	3485	ICV	151		151	151	1.00	mg/L	96.2		
3	9811030-01	CEF-16-451-02	0		0.000	0.000	1.00	mg/L			
4	9811030-01D	CEF-16-451-02D	0		0.000	0.000	1.00	mg/L		DIV BY	
5	3485	CV	151		151	151	1.00	mg/L	96.2		
6	BLANK	CB	0		0.000	0.000	1.00	mg/L			

Steve Chatterton SC 12-7-98
Analyst / Date

Chris Berg 12-7-98
Lab Supervisor / Date

RUN SUMMARY SHEET
Biological Oxygen Demand

DATA FILE: BODN0998
INSTRUMENT FILE: INSTRUMENT: WET_LAB ANALYZED: 11/09/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	UNSEEDED BLAN	UBLK	0.40	0.20	0.300	0.300	2.00	mg/L			47.1
2	SEEDED BLANK	SBLK	0.60	0.70	0.650	0.650	2.00	mg/L			10.9
3	WC0231	G/GA	116	140	128	128	2.00	mg/L	64.0		13.3
4	ERA 8067	LCSW	38.1	50.1	44.1	44.1	2.00	mg/L	53.2		19.2
5	9811030-01	CEF-16-451-02	53.7		53.7	53.7	2.00	mg/L			
6	9811030-01D	CEF-16-451-02D	54.5		54.5	54.5	2.00	mg/L		1.48	

11/5/98

A Salal AS 12-7-98
Analyst / Date

Tracy Wardell 12-8-98
Lab Supervisor / Date

15023

RUN SUMMARY SHEET
Biological Oxygen Demand

DATA FILE: BODN1198
INSTRUMENT FILE: INSTRUMENT: WET_LAB ANALYZED: 11/11/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	UNSEEDED BLAN	UBLK	1.20	1.10	1.15	1.15	2.00	mg/L			6.15
2	SEEDED BLANK	SBLK	0.90	0.70	0.800	0.800	2.00	mg/L			17.7
3	WC0231	G/GA	89.3	80.3	84.8	84.8	2.00	mg/L	42.4		7.50
4	ERA 8067	LCSW	40.22	42.62	41.4	41.4	2.00	mg/L	50.0		4.10
5	9811033-01	CEF-16-GW-21S-0	0		0.000	0.000	2.00	mg/L			
6	9811033-01D	CEF-16-GW-21S-0	0		0.000	0.000	2.00	mg/L		DIV BY	
7	9811033-02	CEF-16-GW-221-0	0		0.000	0.000	2.00	mg/L			
8	9811064-05	AD-7293	8.01		8.01	8.01	2.00	mg/L			
9	9811061-03	CEF-16-GW-10S	2.07		2.07	2.07	2.00	mg/L			
10	9811061-01	CEF-16-GW-43S	6.35		6.35	6.35	2.00	mg/L			
11	9811061-02	CEF-16-GW-44I	3.76		3.76	3.76	2.00	mg/L			

A Salal AS 12-7-98
Analyst / Date

Tracy Wardell 12-8-98
Lab Supervisor / Date

15028

RUN SUMMARY SHEET
Biological Oxygen Demand

DATA FILE: BODN1298
INSTRUMENT FILE: INSTRUMENT: WET_LAB ANALYZED: 11/12/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	UNSEEDED BLAN	UBLK	0.20	0.10	0.150	0.150	2.00	mg/L			47.1
2	SEEDED BLANK	SBLK	1.00	1.10	1.05	1.05	2.00	mg/L			6.73
3	WC0231	G/GA	207	195	201	201	2.00	mg/L	100		4.22
4	ERA 8067	LCSW	52.5	52.3	52.4	52.4	2.00	mg/L	63.2		0.27
5	9811078-01	CEF-16-GW-9D	0		0.000	0.000	2.00	mg/L			
6	9811078-01D	CEF-16-GW-9DD	0		0.000	0.000	2.00	mg/L		DIV BY	
7	9811078-02	CEF-16-GW-11DD	0		0.000	0.000	2.00	mg/L			

SN
Analyst / Date

Tracy Wardell 12-8-98
Lab Supervisor / Date

15035

RUN SUMMARY SHEET
Chemical Oxygen Demand

DATA FILE: CODN2398
INSTRUMENT FILE:
INSTRUMENT: WET_LAB
ANALYZED: 11/23/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	Prep Blank	PB	0		0.000	0.000	5.00	mg/L			
2	ERA 8067	ICV	65.06		65.1	130	10.0	mg/L			
3	9811030-01	CEF-16-451-02	121.93		122	122	5.00	mg/L			
4	9811033-01	CEF-16-GW-21S-0	40.96		41.0	41.0	5.00	mg/L			
5	9811033-02	CEF-16-GW-22I-0	16.87		16.9	16.9	5.00	mg/L			
6	9811061-01	CEF-16-GW-43S	79.52		79.5	79.5	5.00	mg/L			
7	9811061-02	CEF-16-GW-44I	31.33		31.3	31.3	5.00	mg/L			
8	9811061-03	CEF-16-GW-10S	60.24		60.2	60.2	5.00	mg/L			
9	9811078-01	CEF-16-GW-9D	3.37		3.37	3.37	5.00	mg/L			NA
10	9811078-01D	CEF-16-GW-9DD	4.81		4.81	4.81	5.00	mg/L			~~35.2~~
11	9811078-01S	CEF-16-GW-9DS	55.42		55.4	55.4	5.00	mg/L	111		
12	9811078-02	CEF-16-GW-11DL	7.23		7.23	7.23	5.00	mg/L			
13	9811092-01	CEF-16-GW-41S-0	37.11		37.1	37.1	5.00	mg/L			
14	9811092-02	CEF-16-GW-42I-0	3.37		3.37	3.37	5.00	mg/L			
15	9811092-03	CEF-16-GW-23D-0	7.23		7.23	7.23	5.00	mg/L			
16	9811092-05	CEF-16-DUP1-02	38.55		38.6	38.6	5.00	mg/L			
17	9811092-06	CEF-16-DUP2-02	8.19		8.19	8.19	5.00	mg/L			
18	9811101-01	CEF-16-GW-38S-0	11.08		11.1	11.1	5.00	mg/L			
19	9811101-02	CEF-16-GW-35S-0	22.65		22.6	22.6	5.00	mg/L			
20	9811101-03	CEF-16-GW-32S-0	16.88		16.9	16.9	5.00	mg/L			
21	9811115-01	CEF-16-GW-27I-0	7.23		7.23	7.23	5.00	mg/L			
22	9811136-01	CEF-8-GW-18S-02	57.83		57.8	57.8	5.00	mg/L			
23	9811136-01D	CEF-8-GW-18S-02	56.39		56.4	56.4	5.00	mg/L		2.52	
24	9811136-01S	CEF-8-GW-18S-02	108.43		108	108	5.00	mg/L	101		
25	9811136-03	CEF-8-GW-8I-02	2.41		2.41	2.41	5.00	mg/L			
26	9811136-05	CEF-8-GW-7S-02	33.73		33.7	33.7	5.00	mg/L			
27	9811145-01	YR-4	93.98		94.0	94.0	5.00	mg/L			
28	9811145-02	TRMK-1	13.01		13.0	13.0	5.00	mg/L			
29	9811149-01	CEF-8-GW-1S-02	40.0		40.0	40.0	5.00	mg/L			
30	9811149-03	CEF-8-GW-2I-02	2.41		2.41	2.41	5.00	mg/L			
31	LCS ERA8067	LCS ERA8067	66.02		66.0	132	10.0	mg/L	95.7		
32	BLANK	BLANK	0		0.000	0.000	5.00	mg/L			
33	9811149-05	CEF-8-GW-3D-02	6.27		6.27	6.27	5.00	mg/L			
34	9811150-01	CEF-16-GW-13S-0	4.82		4.82	4.82	5.00	mg/L			
35	9811150-02	CEF-16-GW-14D-0	1.45		1.45	1.45	5.00	mg/L			
36	9811167-01	CEF-8-GW-21S-02	1.45		1.45	1.45	5.00	mg/L			
37	9811167-03	CEF-8-GW-17S-02	7.23		7.23	7.23	5.00	mg/L			
38	9811176-01	CEF-8-MW-13S-02	141.20		141	141	5.00	mg/L			
39	9811176-03	CEF-8-MW-10S-02	89.16		89.2	89.2	5.00	mg/L			
40	9811176-05	CEF-8-MW-6S-02	13.01		13.0	13.0	5.00	mg/L			
41	9811176-05D	CEF-8-MW-6S-02D	12.04		12.0	12.0	5.00	mg/L		7.74	
42	9811176-05S	CEF-8-MW-6S-02S	63.61		63.6	63.6	5.00	mg/L	101		
43	9811176-07	CEF-8-MW-DUP1-0	132.53		133	133	5.00	mg/L			
44	9811176-09	CEF-8-MW-DUP2-0	89.16		89.2	89.2	5.00	mg/L			
45	9811198-01	CEF-8-MW-4S-02	45.78		45.8	45.8	5.00	mg/L			
46	9811198-03	CEF-8-MW-12S-02	9.64		9.64	9.64	5.00	mg/L			

Steve Chatterton SC 12-2-98
Analyst / Date

Tracy Wardell TW 12-2-98
Lab Supervisor / Date

15054

RUN SUMMARY SHEET
CHLORIDE BY IC METHOD 300

DATA FILE: IC_N2098
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 11/20/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	0		-0.030	-0.030	0.100	mg/L			
2	0.1 PPM	S1	34993		0.095	0.095	0.100	mg/L			
3	0.5 PPM	S2	138101		0.465	0.465	0.100	mg/L			
4	1.0 PPM	S3	292868		1.02	1.02	0.100	mg/L			
5	3.0 PPM	S4	885881		3.15	3.15	0.100	mg/L			
6	5.0 PPM	S5	1377220		4.91	4.91	0.100	mg/L			
7	ICV x 100	ICV x 100	6222580		22.3	2230	10.0	mg/L	111		
8	ICV x 500	ICV x 500	1127310		4.01	2010	50.0	mg/L	100		
9	ICB	ICB	0		-0.030	-0.030	0.100	mg/L			
10	ICB	ICB	45304		0.132	0.132	0.100	mg/L			
11	unknown interference										
12	unknown interference										
13	unknown interference										
14	unknown interference										
15	9811198-01	CEF-8-MW-4S-02	815664		2.89	14.5	0.500	mg/L			
16	9811198-01D	CEF-8-MW-4S-02D	827067		2.93	14.7	0.500	mg/L		1.40	
17	9811198-01S	CEF-8-MW-4S-02S	1310294		4.67	46.7	1.00	mg/L	129		
18	9811198-03	CEF-8-MW-12S-02	509780		1.80	8.98	0.500	mg/L			
19	CCV1 x 100	CCV1 x 100	6686904		23.9	2390	10.0	mg/L	120		
20	CCV1 x 500	CCV1 x 500	1137242		4.05	2020	50.0	mg/L	101		
21	CCV1 3578 x 5	CCV1 3578 x 5	1165870		4.15	20.7	0.500	mg/L	105		
22	CCB1	CCB1	51940		0.156	0.156	0.100	mg/L			
23	9811123-02	E03-SD00-01-150	615454		2.18	2.18	0.100	mg/L			
24	9811123-03	E03-SD00-01-149	2125557		7.59	7.59	0.100	mg/Kg			
25	9811123-03	E03-SD00-01-149	402154		1.41	7.06	0.500	mg/Kg			
26	9811123-05	E03-SD03-01-147	873985		3.10	3.10	0.100	mg/Kg			
27	9811123-05	E03-SD03-01-147	326684		1.14	5.70	0.500	mg/Kg			
28	CCV x 100	CCV x 100	6585529		23.6	2360	10.0	mg/L	118		
29	CCV x 500	CCV x 500	1107478		3.94	1970	50.0	mg/L	98.5		
30	CCV2 3578 x 5	CCV2 3578 x 5	1168058		4.16	20.8	0.500	mg/L	105		
31	CCB2	CCB2	52169		0.157	0.157	0.100	mg/L			
32	9811030-01	CEF-16-451-02	2226949		7.95	79.5	1.00	mg/L			
33	9811033-01	CEF-16-GW-21S-0	73368		0.233	2.33	1.00	mg/L			
34	9811033-02	CEF-16-GW-22I-0	660978		2.34	4.68	0.200	mg/L			
35	9811061-01	CEF-16-GW-43S	89049		0.289	2.89	1.00	mg/L			
36	9811061-01	CEF-16-GW-43S	467273		1.64	3.29	0.200	mg/L			
37	9811061-02	CEF-16-GW-44I	490189		1.73	3.45	0.200	mg/L			
38	9811061-03	CEF-16-GW-10S	189165		0.648	6.48	1.00	mg/L			
39	9811061-03	CEF-16-GW-10S	944783		3.36	6.71	0.200	mg/L			
40	9811078-01	CEF-16-GW-9D	3131817		11.2	11.2	0.100	mg/L			

See next page

VBF
Analyst / Date

Tracy Wardell 12-10-98
Lab Supervisor / Date

15139

RUN SUMMARY SHEET
CHLORIDE BY IC METHOD 300

DATA FILE: IC_N2098
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 11/20/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
41	9811078-02	CEF-16-GW-11DD	2788740		9.97	9.97	0.100	mg/L			
42	CCV3 x 100	CCV3 x 100	6188654		22.2	2220	10.0	mg/L	111		
43	CCV3 x 500	CCV3 x 500	1046122		3.72	1860	50.0	mg/L	93.0		
44	CCV3 3578 x 5	CCV3 3578 x 5	1028987		3.66	18.3	0.500	mg/L	92.8		
45	CCB3	CCB3	47058		0.138	0.138	0.100	mg/L			
46	9811061-01	CEF-16-GW-43S	953877		3.39	3.39	0.100	mg/L			
47	9811061-02	CEF-16-GW-44I	113553		0.377	0.377	0.100	mg/L			
48	9811061-03	CEF-16-GW-10S	1663401		5.93	5.93	0.100	mg/L			
49	CCV4 x 100	CCV4 x 100	5452683		19.5	1950	10.0	mg/L	97.6		
50	CCV4 x 500	CCV4 x 500	929853		3.30	1650	50.0	mg/L	82.6		
51	CCV4 3578 x 5	CCV4 3578 x 5	492833		1.74	8.68	0.500	mg/L	44.1		
52	CCB4	CCB4	73171		0.232	0.232	0.100	mg/L			

VBF
Analyst / Date

Tracy Wardell 12-11-98
Lab Supervisor / Date

15140

RUN SUMMARY SHEET
Sulfide

DATA FILE: S2_N0698
INSTRUMENT FILE:
INSTRUMENT: WET_LAB
ANALYZED: 11/06/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	BLANK	ICB	0		0.000	0.000	2.00	mg/L			
2	~~9811030-01~~	CEF-16-451-02	0		0.000	0.000	2.00	mg/L			
3	9811033-01	CEF-16-GW-21S-0	0		0.000	0.000	2.00	mg/L			
4	9811033-02	CEF-16-GW-22I-0	2		2.00	2.00	2.00	mg/L			
5	9811033-02D	CEF-16-GW-22I-0	1		1.00	1.00	2.00	mg/L		66.7	
6	BLANK	CB	0		0.000	0.000	2.00	mg/L			

John N. Hatgi JH 12-01-98
Analyst / Date

Chris Beaty 12-1-98
Lab Supervisor / Date

15004

RUN SUMMARY SHEET
Sulfide

DATA FILE: S2_N1198
INSTRUMENT FILE:
INSTRUMENT: WET_LAB
ANALYZED: 11/11/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	BLANK	ICB	0		0.000	0.000	2.00	mg/L			
2	9811061-01	CEF-16-GW-43S	3		3.00	3.00	2.00	mg/L			
3	9811061-02	CEF-16-GW-44I	0		0.000	0.000	2.00	mg/L			
4	9811061-03	CEF-16-GW-10S	4		4.00	4.00	2.00	mg/L			
5	9811064-01	AD-7288	8		8.00	8.00	2.00	mg/L			
6	9811064-01D	AD-7288D	8		8.00	8.00	2.00	mg/L		0.000	
7	9811078-01	CEF-16-GW-9D	2		2.00	2.00	2.00	mg/L			
8	9811078-02	CEF-16-GW-11DD	4		4.00	4.00	2.00	mg/L			
9	9811092-01	CEF-16-GW-41S-0	0		0.000	0.000	2.00	mg/L			
10	9811092-02	CEF-16-GW-42I-0	2		2.00	2.00	2.00	mg/L			
11	9811092-03	CEF-16-GW-23D-0	8		8.00	8.00	2.00	mg/L			
12	BLANK	CCB	0		0.000	0.000	2.00	mg/L			
13	9811092-05	CEF-16-DUP1-02	5		5.00	5.00	2.00	mg/L			
14	9811092-06	CEF-16-DUP2-02	2		2.00	2.00	2.00	mg/L			
15	BLANK	CB	0		0.000	0.000	2.00	mg/L			

SN
Analyst / Date

Chris Beck 11-12-98
Lab Supervisor / Date

15008

RUN SUMMARY SHEET
O-Phosphate (as phosphorus)

DATA FILE: ICN0598
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 11/05/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	0		0.042	0.042	0.100	mg/L			
2	0.1 PPM	S1	392		0.169	0.169	0.100	mg/L			
3	0.5 PPM	S2	1206		0.435	0.435	0.100	mg/L			
4	1.0 PPM	S3	2741		0.935	0.935	0.100	mg/L			
5	3.0 PPM	S4	9108		3.01	3.01	0.100	mg/L			
6	5.0 PPM	S5	15236		5.01	5.01	0.100	mg/L			
7	9811030-01	CEF-16-451-02	0		0.042	0.042	0.100	mg/L			
8	ICV	ICV	3069		1.04	5.21	0.500	mg/L	86.8		
9	analyzed for nitrite only										
10	BLANK	ICB	0		0.042	0.042	0.100	mg/L			
11	9811030-01	CEF-16-451-02	0		0.042	0.042	0.100	mg/L			
12	9811030-01D	CEF-16-451-02D	0		0.042	0.042	0.100	mg/L		0.000	
13	9811030-01S	CEF-16-451-02S	2184		0.754	1.51	0.200	mg/L	60.3		
14	9811030-01	CEF-16-451-02	0		0.042	0.208	0.500	mg/L			
15	9811030-01D	CEF-16-451-02D	0		0.042	0.208	0.500	mg/L			
16	9811030-01S	CEF-16-451-02S	6097		2.03	20.3	1.00	mg/L	81.2		
17	9811030-01	CEF-16-451-02	0		0.042	0.830	2.00	mg/L			
18	CCV	CCV	2896		0.986	4.93	0.500	mg/L	82.1		
19	analyzed for nitrite only										
20	CCB	CCB	0		0.042	0.042	0.100	mg/L			
21	9811033-01	CEF-16-GW-21S-0	0		0.042	0.042	0.100	mg/L			
22	9811033-02	CEF-16-GW-22I-0	0		0.042	0.042	0.100	mg/L			
23	CCV2	CCV2	2911		0.991	4.95	0.500	mg/L	82.5		
24	analyzed for nitrite only										
25	CCB2	CCB2	0		0.042	0.042	0.100	mg/L			

~~133~~ NA - TW 12-10-98

VBF
Analyst / Date

Tracy Wardell 12-10-98
Lab Supervisor / Date

15061

RUN SUMMARY SHEET
O-Phosphate (as phosphorus)

DATA FILE: ICN0798
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 11/07/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	0		0.042	0.042	0.100	mg/L			
2	0.1 PPM	S1	392		0.169	0.169	0.100	mg/L			
3	0.5 PPM	S2	1206		0.435	0.435	0.100	mg/L			
4	1.0 PPM	S3	2741		0.935	0.935	0.100	mg/L			
5	3.0 PPM	S4	9108		3.01	3.01	0.100	mg/L			
6	5.0 PPM	S5	15236		5.01	5.01	0.100	mg/L			
7	ICV	ICV	2712		0.926	4.63	0.500	mg/L	77.1		
8	ICV	ICV	3182		1.08	5.39	0.500	mg/L	89.9		
9	analzyed for nitrite										
10	ICB	ICB	0		0.042	0.042	0.100	mg/L			
11	9811061-01	CEF-16-GW-43S	0		0.042	0.042	0.100	mg/L			
12	9811061-02	CEF-16-GW-44I	0		0.042	0.042	0.100	mg/L			
13	9811061-03	CEF-16-GW-10S	0		0.042	0.042	0.100	mg/L			
14	9811078-01	CEF-16-GW-9D	0		0.042	0.042	0.100	mg/L			
15	9811078-01D	CEF-16-GW-9DD	0		0.042	0.042	0.100	mg/L		0.000	
16	9811078-01S	CEF-16-GW-9DS	4292		1.44	2.88	0.200	mg/L	57.6		
17	9811078-02	CEF-16-GW-11DD	0		0.042	0.042	0.100	mg/L			
18	CCV	CCV	3373		1.14	5.71	0.500	mg/L	95.1		
19	analyzed for nitrite only										
20	CCB	CCB	0		0.042	0.042	0.100	mg/L			

VBF
Analyst / Date

Tracy Wardell 12-10-98
Lab Supervisor / Date

15103

RUN SUMMARY SHEET
SULFATE BY IC METHOD 300

DATA FILE: IC_N2098
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 11/20/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	0		0.574	0.574	0.100	mg/L			
2	0.1 PPM	S1	21775		0.678	0.678	0.100	mg/L			
3	0.5 PPM	S2	93644		1.02	1.02	0.100	mg/L			
4	1.0 PPM	S3	200084		1.52	1.52	0.100	mg/L			
5	3.0 PPM	S4	57854		0.849	0.849	0.100	mg/L			
6	5.0 PPM	S5	922351		4.95	4.95	0.100	mg/L			
7	ICV x 100	ICV x 100	3685790		18.1	1810	10.0	mg/L	90.4		
8	ICV x 500	ICV x 500	770799		4.24	2120	50.0	mg/L	106		
9	ICB	ICB	0		0.574	0.574	0.100	mg/L			
10	ICB	ICB	0		0.574	0.574	0.100	mg/L			
11	9811198-01	CEF-8-MW-4S-02	2250759		11.3	11.3	0.100	mg/L			
12	9811198-01D	CEF-8-MW-4S-02D	2250759		11.3	11.3	0.100	mg/L		16.3	
13	9811198-01S	CEF-8-MW-4S-02S	1623280		8.28	16.6	0.200	mg/L	66.1		
14	9811198-03	CEF-8-MW-12S-02	1553027		7.95	7.95	0.100	mg/L			
15	9811198-01	CEF-8-MW-4S-02	437565		2.65	13.3	0.500	mg/L			
16	9811198-01D	CEF-8-MW-4S-02D	449947		2.71	13.6	0.500	mg/L		2.19	
17	9811198-01S	CEF-8-MW-4S-02S	729866		4.04	40.4	1.00	mg/L	109		
18	9811198-03	CEF-8-MW-12S-02	307686		2.04	10.2	0.500	mg/L			
19	CCV1 x 100	CCV1 x 100	4141977		20.2	2020	10.0	mg/L	101		
20	CCV1 x 500	CCV1 x 500	3184		0.590	295	50.0	mg/L	14.7		
21	CCV1 3578 x 5	CCV1 3578 x 5	389110		2.42	12.1	0.500	mg/L	120		
22	CCB1	CCB1	0		0.574	0.574	0.100	mg/L			
23	9811123-02	E03-SD00-01-150	0		0.574	0.574	0.100	mg/L			
24	9811123-03	E03-SD00-01-149	17352		0.657	0.657	0.100	mg/Kg			
25	9811123-03	E03-SD00-01-149	0		0.574	2.87	0.500	mg/Kg			
26	9811123-05	E03-SD03-01-147	439771		2.66	2.66	0.100	mg/Kg			
27	9811123-05	E03-SD03-01-147	90358		1.00	5.02	0.500	mg/Kg			
28	CCV x 100	CCV x 100	4064980		19.9	1990	10.0	mg/L	99.4		
29	CCV x 500	CCV x 500	781154		4.28	2140	50.0	mg/L	107		
30	CCV2 3578 x 5	CCV2 3578 x 5	390571		2.43	12.1	0.500	mg/L	120		
31	CCB2	CCB2	0		0.574	0.574	0.100	mg/L			
32	9811030-01	CEF-16-451-02	221209		1.62	16.2	1.00	mg/L			
33	9811033-01	CEF-16-GW-21S-0	276139		1.89	18.9	1.00	mg/L			
34	9811033-02	CEF-16-GW-22I-0	570071		3.28	6.56	0.200	mg/L			
35	9811061-01	CEF-16-GW-43S	131472		1.20	12.0	1.00	mg/L			
36	9811061-01	CEF-16-GW-43S	659492		3.71	7.41	0.200	mg/L			
37	9811061-02	CEF-16-GW-44I	176605		1.41	2.83	0.200	mg/L			
38	9811061-03	CEF-16-GW-10S	267737		1.85	18.5	1.00	mg/L			
39	9811061-03	CEF-16-GW-10S	1341872		6.95	13.9	0.200	mg/L			
40	9811078-01	CEF-16-GW-9D	38894		0.759	0.759	0.100	mg/L			

VBF
Analyst / Date

Gracy Wardell 12-10-98
Lab Supervisor / Date

15147

RUN SUMMARY SHEET
SULFATE BY IC METHOD 300

DATA FILE: IC_N2098
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 11/20/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
41	9811078-02	CEF-16-GW-11DD	36104		0.746	0.746	0.100	mg/L			
42	CCV3 x 100	CCV3 x 100	3667119		18.0	1800	10.0	mg/L	89.9		
43	CCV3 x 500	CCV3 x 500	698624		3.89	1950	50.0	mg/L	97.3		
44	CCV3 3578 x 5	CCV3 3578 x 5	329768		2.14	10.7	0.500	mg/L	106		
45	CCB3	CCB3	0		0.574	0.574	0.100	mg/L			
46	9811061-01	CEF-16-GW-43S	1299370		6.75	6.75	0.100	mg/L			
47	9811061-02	CEF-16-GW-44I	402865		2.49	2.49	0.100	mg/L			
48	9811061-03	CEF-16-GW-10S	2684234		13.3	13.3	0.100	mg/L			
49	CCV4 x 100	CCV4 x 100	3369574		16.6	1660	10.0	mg/L	82.9		
50	CCV4 x 500	CCV4 x 500	674669		3.78	1890	50.0	mg/L	94.5		
51	CCV4 3578 x 5	CCV4 3578 x 5	163019		1.35	6.74	0.500	mg/L	66.8		
52	CCB4	CCB4	0		0.574	0.574	0.100	mg/L			

VBF
Analyst / Date

Tracy Wardell 12-10 98
Lab Supervisor / Date

15148

RUN SUMMARY SHEET
Total Organic Carbon

DATA FILE: TOCN0598
INSTRUMENT FILE:
INSTRUMENT: DOHRMAN
ANALYZED: 11/05/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	WC0149	ICV	53.26		53.3	53.3	1.00	mg/L	98.8		
2	BLANK	ICB	1.170		1.17	1.17	1.00	mg/L			
3	9811030-01	CEF-16-451-02	23.35		23.4	23.4	1.00	mg/L			
4	9811030-01D	CEF-16-451-02D	23.51		23.5	23.5	1.00	mg/L		0.683	
5	9811030-01S	CEF-16-451-02S	15.87		15.9	31.7	2.00	mg/L	83.9		
6	CCV	CCV	57.35		57.4	57.4	1.00	mg/L	106		
7	CCB	CCB	0		0.000	0.000	1.00	mg/L			

VBF
Analyst / Date

Chris Beery 12-1-98
Lab Supervisor / Date

15045

RUN SUMMARY SHEET
Total Organic Carbon

DATA FILE: TOCN2998
INSTRUMENT FILE: INSTRUMENT: DOHRMAN ANALYZED: 11/29/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	WC0149	ICV	48.58		48.6	48.6	1.00	mg/L	90.1		
2	BLANK	ICB	0		0.000	0.000	1.00	mg/L			
3	9811145-01	YR-4	23.78		23.8	23.8	1.00	mg/L			
4	9811033-01	CEF-16-GW-21S-0	19.29		19.3	19.3	1.00	mg/L			
5	9811033-02	CEF-16-GW-22I-0	7.28		7.28	7.28	1.00	mg/L			
6	9811078-01	CEF-16-GW-9D	5.11		5.11	5.11	1.00	mg/L			
7	9811078-02	CEF-16-GW-11DD	2.88		2.88	2.88	1.00	mg/L			
8	9811061-01	CEF-16-GW-43S	28.26		28.3	28.3	1.00	mg/L			
9	9811061-02	CEF-16-GW-44I	10.04		10.0	10.0	1.00	mg/L			
10	9811061-03	CEF-16-GW-10S	30.65		30.6	30.6	1.00	mg/L			
11	9811061-03	CEF-16-GW-10S	24.17		24.2	24.2	1.00	mg/L			
12	9811061-03D	CEF-16-GW-10SD	24.04		24.0	24.0	1.00	mg/L		0.539	
13	WC0149	CCV	49.36		49.4	49.4	1.00	mg/L	91.6		
14	BLANK	CCB	0		0.000	0.000	1.00	mg/L			
15	9811061-03S	CEF-16-GW-10SS	22.07		22.1	44.1	2.00	mg/L	99.8		
16	WC0149	CV	48.61		48.6	48.6	1.00	mg/L	90.2		
17	BLANK	CB	0		0.000	0.000	1.00	mg/L			

VBF 11/30/98
Analyst / Date

Chris Bean 11-30-98
Lab Supervisor Date

15040

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-12-8-123

TO:	**M. SPERANZA**	**DATE:**	**DECEMBER 18, 1998**
FROM:	**GRETCHEN PHIPPS**	**COPIES:**	**DV FILE**

SUBJECT: **DATA VALIDATION – DISSOLVED IRON AND MANGANESE AND MISCELLANEOUS PARAMETERS**
CTO 051 - CECIL FIELD
SDG - 9811092

SAMPLES: 11/Aqueous/

CEF-16-DUP1-02	CEF-16-DUP2-02	CEF-16-GW-13S-02
CEF-16-GW-14D-02	CEF-16-GW-23D-02	CEF-16-GW-27I-02
CEF-16-GW-32S-02	CEF-16-GW-35S-02	CEF-16-GW-38S-02
CEF-16-GW-41S-02	CEF-16-GW-42I-02	

Overview

The sample set for CTO 051, NAS Cecil Field, SDG 9811092, consists of eleven (11) aqueous environmental samples. Two field duplicate pairs were included within this SDG.

All samples were analyzed for dissolved iron and manganese, alkalinity, biological oxygen demand (BOD), chemical oxygen demand (COD), chloride, dissolved sulfide, nitrate, nitrite, orthophosphate, sulfate and total organic carbon (TOC). A suffix, -F, was added to the sample ID's for the dissolved iron and manganese analyses. The samples were collected by Tetra Tech NUS on November 9, 10, 11 and 13, 1998 and analyzed by GP Environmental Services under Naval Facilities Engineering Service Center (NFESC) Quality Assurance / Quality Control criteria. Iron and manganese analyses were conducted using SW-846 method 6010B. BOD analyses were conducted using EPA method 405.1. COD analyses were conducted using EPA method 410.1. Chloride, Nitrate, Nitrite, 0-Phosphate and Sulfate analyses were conducted using EPA method 300. Dissolved sulfide analyses were conducted using EPA method 376.1. Alkalinity analyses were conducted using EPA method 310.1. TOC analyses were conducted using SW 846 method 9060.

The data was evaluated based on the following parameters:

- Data Completeness
- Holding Times
- Calibration Verifications
- * Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Holding Times

The holding time for BOD affecting samples CEF-16-DUP1-02, CEF-16-DUP2-02, CEF-16-GW-23D-02, CEF-16-GW-27I-02, CEF-16-GW-14S-02 and CEF-16-GW-42I-02 was marginally exceeded. The nondetected results reported for BOD were qualified as estimated, "UJ".

The holding time for chloride analysis affecting samples CEF-16-GW-23D-02 and CEF-16-GW-13S-02 was exceeded by 2 days. The positive results reported for chloride in the affected samples were qualified as estimated, "J".

The holding time for sulfate analysis affecting samples CEF-16-GW-41S-02, CEF-16-GW-32S-02 and CEF-16-GW-38S-02 was exceeded by 1 to 2 days. The positive results reported for sulfate in the affected samples were qualified as estimated, "J".

Calibration Verification

The Initial Calibration Verification (ICV) for alkalinity affecting samples CEF-16-GW-38S-02, CEF-16-GW-35S-02, CEF-16-GW-32S-02, CEF-16-GW-41S-02, CEF-16-GW-23D-02, CEF-16-GW-DUP1-02, CEF-16-GW-DUP2-02 and CEF-16-GW-42I-02 was <90% quality control limit. The positive results reported for alkalinity in the affected samples were qualified as estimated, "J".

The ICV for chloride affecting sample CEF-16-GW-23D-02 was >110% quality control limit. The positive results reported for chloride in the affected sample was qualified as estimated, "J".

The Continuing Calibration Verifications (CCVs) for chloride affecting samples CEF-16-GW-38S-02, CEF-16-GW-35S-02, CEF-16-GW-32S-02, CEF-16-GW-41S-02, CEF-16-GW-23D-02, CEF-16-GW-DUP1-02, CEF-16-GW-DUP2-02 and CEF-16-GW-42I-02 were>110% quality control limit. The positive result reported for chloride in the affected samples were qualified as estimated, "J".

The ICV for nitrate affecting samples CEF-16-GW-14D-02 and CEF-16-GW-13S-02 was <90% quality control limit. The positive and nondetected results reported for nitrate in the affected samples were qualified as estimated, "J" and "UJ", respectively.

The ICV and CCVs for nitrate affecting samples CEF-16-GW-38S-02, CEF-16-GW-35S-02, CEF-16-GW-32S-02, CEF-16-GW-41S-02, CEF-16-GW-23D-02, CEF-16-GW-DUP1-02, CEF-16-GW-DUP2-02 and CEF-16-GW-42I-02 were >110% quality control limit. The positive results reported for nitrate in the affected samples were qualified as estimated, "J".

The ICV and CCVs for orthophosphate affecting samples CEF-16-GW-27I-02, CEF-16-GW-14D-02 and CEF-16-GW-13S-02 were <90% quality control limit. The positive results reported for orthophosphate in the affected samples were qualified as estimated, "J".

The CCVs for sulfate affecting samples CEF-16-GW-35S-02, CEF-16-GW-23D-02, CEF-16-GW-DUP1-02, CEF-16-GW-DUP2-02 and CEF-16-GW-42I-02 were >110% quality control limit. The positive results reported for sulfate were qualified as estimated, "J".

The ICV for sulfate affecting sample CEF-16-GW-14D-02 and CEF-16-GW-13S-02 was <90% quality control limit. The positive and nondetected results reported for sulfate were qualified as estimated, "J" and "UJ".

Notes

The ICV and CCVs for nitrite affecting sample CEF-16-GW-38S-02, CEF-16-GW-35S-02, CEF-16-GW-32S-02, CEF-16-GW-41S-02, CEF-16-GW-23D-02, CEF-16-GW-DUP1-02, CEF-16-GW-DUP2-02 and CEF-16-GW-42I-02 were >110% quality control limit. However, no validation action was required as all nitrate results reported for the affected samples were nondetects.

The ICV and CCVs for orthophosphate affecting sample CEF-16-GW-38S-02, CEF-16-GW-35S-02, CEF-16-GW-32S-02, CEF-16-GW-41S-02, CEF-16-GW-23D-02, CEF-16-GW-DUP1-02, CEF-16-GW-DUP2-02 and CEF-16-GW-42I-02 were >110% quality control limit. However, no validation action was required as all orthophosphate results reported for the affected samples were nondetects.

The data for BOD and COD analyses for samples CEF-16-GW-13S-02 and CEF-16-GW-14D-02 was not included in the data package. The laboratory was notified and provided the requested data.

Executive Summary

Laboratory Performance: The holding times for BOD, chloride and sulfate analyses were exceeded. Several ICVs and CCVs for alkalinity, chloride, nitrate, nitrite, o-phosphate and sulfate were outside the 90-110% quality control limit.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitles "Navy Installation Restoration Laboratory Quality Assurance Guide." (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Gretchen A Phipps

Tetra Tech NUS
Gretchen A. Phipps

Gretchen A Phipps for Joe Samchuck

Tetra Tech NUS
Joseph A. Samchuck
Quality Control Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Cecil Field
SDG 9811092

Table 1 - RECOMMENDATION SUMMARY

Iron	
Manganese	
Alkalinity	J^2
BOD	J^1
COD	
Chloride	$J^{1,2}$
Dissolved Sulfide	
Nitrate	J^2
Nitrite	J^2
Orthophosphate	J^2
Sulfate	$J^{1,2}$
TOC	

If the field is left blank, the qualifier is A - Accept data.

J^1 - Accept data, but qualify positive and nondetected results as estimated, "J" and "UJ", respectively, as a result of holding time exceedance.

J^2 - Accept data, but qualify positive and nondetected results as estimated, "J" and "UJ", respectively, as a result of calibration noncompliance.

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

DUP102

Lab Name: GPL LABORATORIES LLLP Contract: CECILFIELD

Lab Code: GPL Case No.: CF512 SAS No.: CTO051 SDG No.: NUS158

Matrix (soil/water): WATER Lab Sample ID: 9811092-05

Level (low/med): LOW Date Received: 11/10/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg in dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	1090			P
7439-92-1	Lead				
7439-95-4	Magnesium				
7439-96-5	Manganese	16.6			P
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				
7439-98-7	Molybdenum				

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

DUP202

Lab Name: GPL LABORATORIES LLLP Contract: CECILFIELD

Lab Code: GPL Case No.: CF512 SAS No.: CTO051 SDG No.: NUS158

Matrix (soil/water): WATER Lab Sample ID: 9811092-06

Level (low/med): LOW Date Received: 11/10/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg in dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	608			P
7439-92-1	Lead				
7439-95-4	Magnesium				
7439-96-5	Manganese	11.2	B		P
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				
7439-98-7	Molybdenum				

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

GW-13S

Lab Name: GPL LABORATORIES LLLP Contract: CECILFIELD

Lab Code: GPL Case No.: CF512 SAS No.: CTO051 SDG No.: NUS158

Matrix (soil/water): WATER Lab Sample ID: 9811150-01

Level (low/med): LOW Date Received: 11/14/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg in dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	567			P
7439-92-1	Lead				
7439-95-4	Magnesium				
7439-96-5	Manganese	20.0			P
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				
7439-98-7	Molybdenum				

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

GW-14D

Lab Name: GPL LABORATORIES LLLP Contract: CECILFIELD

Lab Code: GPL Case No.: CF512 SAS No.: CTO051 SDG No.: NUS158

Matrix (soil/water): WATER Lab Sample ID: 9811150-02

Level (low/med): LOW Date Received: 11/14/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg in dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	144			P
7439-92-1	Lead				
7439-95-4	Magnesium				
7439-96-5	Manganese	5.0	U		P
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				
7439-98-7	Molybdenum				

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

GW-23D

Lab Name: GPL LABORATORIES LLLP Contract: CECILFIELD

Lab Code: GPL Case No.: CF512 SAS No.: CTO051 SDG No.: NUS158

Matrix (soil/water): WATER Lab Sample ID: 9811092-03

Level (low/med): LOW Date Received: 11/10/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg in dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	474			P
7439-92-1	Lead				
7439-95-4	Magnesium				
7439-96-5	Manganese	51.8			P
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				
7439-98-7	Molybdenum				

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

GW-27I

Lab Name: GPL LABORATORIES LLLP Contract: CECILFIELD

Lab Code: GPL Case No.: CF512 SAS No.: CTO051 SDG No.: NUS158

Matrix (soil/water): WATER Lab Sample ID: 9811115-01

Level (low/med): LOW Date Received: 11/12/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg in dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	1590			P
7439-92-1	Lead				
7439-95-4	Magnesium				
7439-96-5	Manganese	5.0	U		P
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				
7439-98-7	Molybdenum				

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

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ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

GW-32S

Lab Name: GPL LABORATORIES LLLP Contract: CECILFIELD

Lab Code: GPL Case No.: CF512 SAS No.: CTO051 SDG No.: NUS158

Matrix (soil/water): WATER Lab Sample ID: 9811101-03

Level (low/med): LOW Date Received: 11/11/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg in dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	195			P
7439-92-1	Lead				
7439-95-4	Magnesium				
7439-96-5	Manganese	5.0	U		P
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				
7439-98-7	Molybdenum				

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

GW-35S

Lab Name: GPL LABORATORIES LLLP Contract: CECILFIELD

Lab Code: GPL Case No.: CF512 SAS No.: CTO051 SDG No.: NUS158

Matrix (soil/water): WATER Lab Sample ID: 9811101-02

Level (low/med): LOW Date Received: 11/11/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg in dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	294			P
7439-92-1	Lead				
7439-95-4	Magnesium				
7439-96-5	Manganese	5.0	U		P
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				
7439-98-7	Molybdenum				

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

GW-38S

Lab Name: GPL LABORATORIES LLLP Contract: CECILFIELD

Lab Code: GPL Case No.: CF512 SAS No.: CTO051 SDG No.: NUS158

Matrix (soil/water): WATER Lab Sample ID: 9811101-01

Level (low/med): LOW Date Received: 11/11/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg in dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	110			P
7439-92-1	Lead				
7439-95-4	Magnesium				
7439-96-5	Manganese	5.0	U		P
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				
7439-98-7	Molybdenum				

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

GW-41S

Lab Name: GPL LABORATORIES LLLP Contract: CECILFIELD

Lab Code: GPL Case No.: CF512 SAS No.: CTO051 SDG No.: NUS158

Matrix (soil/water): WATER Lab Sample ID: 9811092-01

Level (low/med): LOW Date Received: 11/10/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg in dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	1120			P
7439-92-1	Lead				
7439-95-4	Magnesium				
7439-96-5	Manganese	17.0			P
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				
7439-98-7	Molybdenum				

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

GW-42I

Lab Name: GPL LABORATORIES LLLP Contract: CECILFIELD

Lab Code: GPL Case No.: CF512 SAS No.: CTO051 SDG No.: NUS158

Matrix (soil/water): WATER Lab Sample ID: 9811092-02

Level (low/med): LOW Date Received: 11/10/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg in dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	511			P
7439-92-1	Lead				
7439-95-4	Magnesium				
7439-96-5	Manganese	9.5	B		P
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				
7439-98-7	Molybdenum				

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

RUN SUMMARY SHEET
Biological Oxygen Demand

DATA FILE: BODN1698
INSTRUMENT FILE: INSTRUMENT: WET_LAB ANALYZED: 11/16/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	UNSEEDED BLAN	UBLK	0.10	0.20	0.150	0.150	2.00	mg/L			47.1
2	SEEDED BLANK	SBLK	0.60	0.20	0.400	0.400	2.00	mg/L			70.7
3	WC0231	G/GA	80.88	104.9	92.9	92.9	2.00	mg/L	~~46.4~~		18.3
4	ERA 8067	LCSW	26.3	35.9	31.1	31.1	2.00	mg/L	37.5		21.8
5	9811092-01	CEF-16-GW-41S-0	0		0.000	0.000	2.00	mg/L			
6	9811092-02	CEF-16-GW-42I-0	0		0.000	0.000	2.00	mg/L			
7	9811092-03	CEF-16-GW-23D-0	0		0.000	0.000	2.00	mg/L			
8	9811092-03D	CEF-16-GW-23D-0	0		0.000	0.000	2.00	mg/L		DIV BY	
9	9811092-05	CEF-16-DUP1-02	0		0.000	0.000	2.00	mg/L			
10	9811092-06	CEF-16-DUP2-02	0		0.000	0.000	2.00	mg/L			
11	9811101-01	CEF-16-GW-38S-0	0		0.000	0.000	2.00	mg/L			
12	9811101-02	CEF-16-GW-35S-0	0		0.000	0.000	2.00	mg/L			
13	9811101-03	CEF-16-GW-32S-0	0		0.000	0.000	2.00	mg/L			

CB
Analyst / Date

Gracy Wardell 12-8-98
Lab Supervisor / Date

25262

RUN SUMMARY SHEET
Biological Oxygen Demand

DATA FILE: BODN1898
INSTRUMENT FILE:
INSTRUMENT: WET_LAB
ANALYZED: 11/18/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	UNSEEDED BLAN	UBLK	0.20	0.70	0.450	0.450	2.00	mg/L			78.6
2	SEEDED BLANK	SBLK	0.60	0.40	0.500	0.500	2.00	mg/L			28.3
3	WC0231	G/GA	144	189	166	166	2.00	mg/L	83.2		19.1
4	ERA 8067	LCSW	74.3	74.3	74.3	74.3	2.00	mg/L	89.6		0.00
5	9811115-01	CEF-16-GW-27I-0	0		0.000	0.000	2.00	mg/L			
6	9811136-01	CEF-8-GW-18S-02	0		0.000	0.000	2.00	mg/L			
7	9811136-03	CEF-8-GW-8I-02	0		0.000	0.000	2.00	mg/L			
8	9811136-05	CEF-8-GW-7S-02	0		0.000	0.000	2.00	mg/L			
9	9811136-05D	CEF-8-GW-7S-02D	0		0.000	0.000	2.00	mg/L		DIV BY	

SN
Analyst / Date

Tracy Wardell 12-8-98
Lab Supervisor / Date

25271

RUN SUMMARY SHEET
Biological Oxygen Demand

ATA FILE: BODN1998
ISTRUMENT FILE: INSTRUMENT: WET_LAB ANALYZED: 11/19/1998

:q	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	CRDL	Units	%Recovery	%RPD	%RSD
1	UNSEEDED BLAN	UBLK	0.20	0.50	0.350	0.350	2.00	mg/L			60.6
2	SEEDED BLANK	SBLK	0.30	0.50	0.400	0.400	2.00	mg/L			35.4
3	WC0231	G/GA	103.1	118.1	111	111	2.00	mg/L	55.3		9.59
4	ERA 8067	LCSW	51.3	53.7	52.5	52.5	2.00	mg/L	63.3		3.23
5	9811150-02	CEF-16-GW-14D-0	0		0.000	0.000	2.00	mg/L			
6	9811150-01	CEF-16-GW-13S-0	0		0.000	0.000	2.00	mg/L			
7	9811149-05	CEF-8-GW-3D-02	0		0.000	0.000	2.00	mg/L			
8	9811149-03	CEF-8-GW-2I-02	0		0.000	0.000	2.00	mg/L			
9	9811149-01	CEF-8-GW-1S-02	0		0.000	0.000	2.00	mg/L			
10	9811149-01D	CEF-8-GW-1S-02D			0.000	0.000	2.00	mg/L		DIV BY	

SN
Analyst / Date

Tracy Warde 12-8-98
Lab Supervisor / Date

RUN SUMMARY SHEET
Alkalinity

DATA FILE: ALKN1898
INSTRUMENT FILE: INSTRUMENT: WET_LAB ANALYZED: 11/18/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	BLANK	ICB	0		0.000	0.000	1.00	mg/L			
2	WC0218	ICV	218		218	218	1.00	mg/L	87.9		
3	9811033-01	CEF-16-GW-21S-0	0		0.000	0.000	1.00	mg/L			
4	9811033-02	CEF-16-GW-22I-0	1.83		1.83	1.83	1.00	mg/L			
5	9811061-01	CEF-16-GW-43S	19.24		19.2	19.2	1.00	mg/L			
6	9811061-02	CEF-16-GW-44I	2.75		2.75	2.75	1.00	mg/L			
7	9811061-03	CEF-16-GW-10S	274.8		275	275	1.00	mg/L			
8	9811078-01	CEF-16-GW-9D	35.72		35.7	35.7	1.00	mg/L			
9	9811078-02	CEF-16-GW-11DD	233.6		234	234	1.00	mg/L			
10	9811101-01	CEF-16-GW-38S-0	2.02		2.02	2.02	1.00	mg/L			
11	9811101-02	CEF-16-GW-35S-0	2.75		2.75	2.75	1.00	mg/L			
12	9811101-03	CEF-16-GW-32S-0	3.66		3.66	3.66	1.00	mg/L			
13	9811101-03D	CEF-16-GW-32S-0	3.66		3.66	3.66	1.00	mg/L		0.000	
14	9811092-01	CEF-16-GW-41S-0	2.20		2.20	2.20	1.00	mg/L			
15	9811092-02	CEF-16-GW-42I-0	1.28		1.28	1.28	1.00	mg/L			
16	9811092-03	CEF-16-GW-23D-0	228.6		229	229	1.00	mg/L			
17	9811092-05	CEF-16-DUP1-02	2.38		2.38	2.38	1.00	mg/L			
18	9811092-06	CEF-16-DUP2-02	1.65		1.65	1.65	1.00	mg/L			
19	3485	CV	148.4		148	148	1.00	mg/L	94.5		
20	BLANK	CB	0		0.000	0.000	1.00	mg/L			

SC
Analyst / Date

Chris Brown 12-8-98
Lab Supervisor / Date

25225

RUN SUMMARY SHEET
Alkalinity

DATA FILE: ALKD0198
INSTRUMENT FILE: INSTRUMENT: WET_LAB ANALYZED: 12/01/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	BLANK	ICB	0		0.000	0.000	1.00	mg/L			
2	3485	ICV	150.2		150	150	1.00	mg/L	95.7		
3	9811213-01	CEF-8-MW-24I-02	96.55		96.6	96.6	1.00	mg/L			
4	9811213-03	CEF-8-MW-23S-02	33.97		34.0	34.0	1.00	mg/L			
5	9811213-05	CEF-8-MW-9S-02	10.73		10.7	10.7	1.00	mg/L			
6	9811176-01	CEF-8-MW-13S-02	17.88		17.9	17.9	1.00	mg/L			
7	9811176-03	CEF-8-MW-10S-02	24.67		24.7	24.7	1.00	mg/L			
8	9811176-05	CEF-8-MW-6S-02	28.61		28.6	28.6	1.00	mg/L			
9	9811176-07	CEF-8-MW-DUP1-0	17.88		17.9	17.9	1.00	mg/L			
10	9811176-09	CEF-8-MW-DUP2-0	3.58		3.58	3.58	1.00	mg/L			
11	9811167-01	CEF-8-GW-21S-02	12.52		12.5	12.5	1.00	mg/L			
12	9811167-03	CEF-8-GW-17S-02	0		0.000	0.000	1.00	mg/L			
13	9811167-03D	CEF-8-GW-17S-02	0		0.000	0.000	1.00	mg/L		DIV BY	
14	9811136-01	CEF-8-GW-18S-02	16.09		16.1	16.1	1.00	mg/L			
15	9811136-03	CEF-8-GW-8I-02	6.26		6.26	6.26	1.00	mg/L			
16	9811136-05	CEF-8-GW-7S-02	15.20		15.2	15.2	1.00	mg/L			
17	9811149-01	CEF-8-GW-1S-02	56.86		56.9	56.9	1.00	mg/L			
18	9811149-03	CEF-8-GW-2I-02	7.87		7.87	7.87	1.00	mg/L			
19	9811149-05	CEF-8-GW-3D-02	157.34		157	157	1.00	mg/L			
20	9811150-01	CEF-16-GW-13S-0	45.06		45.1	45.1	1.00	mg/L			
21	9811150-02	CEF-16-GW-14D-0	22.35		22.4	22.4	1.00	mg/L			
22	9811228-03	OU9-Q1-W1	21.46		21.5	21.5	1.00	mg/L			
23	9811228-04	OU9-Q1-W2	28.61		28.6	28.6	1.00	mg/L			
24	9811228-04D	OU9-Q1-W2D	28.97		29.0	29.0	1.00	mg/L		1.25	
25	3485	CCV	143.9		144	144	1.00	mg/L	91.7		
26	9811115-01	CEF-16-GW-27I-0	3.22		3.22	3.22	1.00	mg/L			
27	9811198-01	CEF-8-MW-4S-02	8.22		8.22	8.22	1.00	mg/L			
28	9811198-03	CEF-8-MW-12S-02	15.38		15.4	15.4	1.00	mg/L			
29	9811123-01	E03-SD00-01-151	0		0.000	0.000	1.00	mg/L			
30	9811123-02	E03-SD00-01-150	0		0.000	0.000	1.00	mg/L			
31	9811123-03	E03-SD00-01-149	168.07		168	491	2.92	mg/Kg			
32	9811123-04	E03-SD00-01-148	148.40		148	425	2.87	mg/Kg			
33	9811123-05	E03-SD03-01-147	228.15		228	407	1.78	mg/Kg			
34	9811123-07	E03-SD03-01-146	510.65		511	790	1.55	mg/Kg			
35	9811123-08	E03-SD03-01-145	141.25		141	747	5.29	mg/Kg			
36	3485	CV	143.9		144	144	1.00	mg/L	91.7		
37	BLANK	CB	0		0.000	0.000	1.00	mg/L			

Steve Clatterbuck SC 12-10-98
Analyst / Date

Chris Beaty 12-10-98
Lab Supervisor / Date

25231

RUN SUMMARY SHEET
Chemical Oxygen Demand

DATA FILE: CODN2398
INSTRUMENT FILE: INSTRUMENT: WET_LAB ANALYZED: 11/23/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	Prep Blank	PB	0		0.000	0.000	5.00	mg/L			
2	ERA 8067	ICV	65.06		65.1	130	10.0	mg/L			
3	9811030-01	CEF-16-451-02	121.93		122	122	5.00	mg/L			
4	9811033-01	CEF-16-GW-21S-0	40.96		41.0	41.0	5.00	mg/L			
5	9811033-02	CEF-16-GW-22I-0	16.87		16.9	16.9	5.00	mg/L			
6	9811061-01	CEF-16-GW-43S	79.52		79.5	79.5	5.00	mg/L			
7	9811061-02	CEF-16-GW-44I	31.33		31.3	31.3	5.00	mg/L			
8	9811061-03	CEF-16-GW-10S	60.24		60.2	60.2	5.00	mg/L			
9	9811078-01	CEF-16-GW-9D	3.37		3.37	3.37	5.00	mg/L			NA
10	9811078-01D	CEF-16-GW-9DD	4.81		4.81	4.81	5.00	mg/L			~~35.2~~
11	9811078-01S	CEF-16-GW-9DS	55.42		55.4	55.4	5.00	mg/L	111		
12	9811078-02	CEF-16-GW-11DD	7.23		7.23	7.23	5.00	mg/L			
13	9811092-01	CEF-16-GW-41S-0	37.11		37.1	37.1	5.00	mg/L			
14	9811092-02	CEF-16-GW-42I-0	3.37		3.37	3.37	5.00	mg/L			
15	9811092-03	CEF-16-GW-23D-0	7.23		7.23	7.23	5.00	mg/L			
16	9811092-05	CEF-16-DUP1-02	38.55		38.6	38.6	5.00	mg/L			
17	9811092-06	CEF-16-DUP2-02	8.19		8.19	8.19	5.00	mg/L			
18	9811101-01	CEF-16-GW-38S-0	11.08		11.1	11.1	5.00	mg/L			
19	9811101-02	CEF-16-GW-35S-0	22.65		22.6	22.6	5.00	mg/L			
20	9811101-03	CEF-16-GW-32S-0	16.88		16.9	16.9	5.00	mg/L			
21	9811115-01	CEF-16-GW-27I-0	7.23		7.23	7.23	5.00	mg/L			
22	9811136-01	CEF-8-GW-18S-02	57.83		57.8	57.8	5.00	mg/L			
23	9811136-01D	CEF-8-GW-18S-02	56.39		56.4	56.4	5.00	mg/L		2.52	
24	9811136-01S	CEF-8-GW-18S-02	108.43		108	108	5.00	mg/L	101		
25	9811136-03	CEF-8-GW-8I-02	2.41		2.41	2.41	5.00	mg/L			
26	9811136-05	CEF-8-GW-7S-02	33.73		33.7	33.7	5.00	mg/L			
27	9811145-01	YR-4	93.98		94.0	94.0	5.00	mg/L			
28	9811145-02	TRMK-1	13.01		13.0	13.0	5.00	mg/L			
29	9811149-01	CEF-8-GW-1S-02	40.0		40.0	40.0	5.00	mg/L			
30	9811149-03	CEF-8-GW-2I-02	2.41		2.41	2.41	5.00	mg/L			
31	LCS ERA8067	LCS ERA8067	66.02		66.0	132	10.0	mg/L	95.7		
32	BLANK	BLANK	0		0.000	0.000	5.00	mg/L			
33	9811149-05	CEF-8-GW-3D-02	6.27		6.27	6.27	5.00	mg/L			
34	9811150-01	CEF-16-GW-13S-0	4.82		4.82	4.82	5.00	mg/L			
35	9811150-02	CEF-16-GW-14D-0	1.45		1.45	1.45	5.00	mg/L			
36	9811167-01	CEF-8-GW-21S-02	1.45		1.45	1.45	5.00	mg/L			
37	9811167-03	CEF-8-GW-17S-02	7.23		7.23	7.23	5.00	mg/L			
38	9811176-01	CEF-8-MW-13S-02	141.20		141	141	5.00	mg/L			
39	9811176-03	CEF-8-MW-10S-02	89.16		89.2	89.2	5.00	mg/L			
40	9811176-05	CEF-8-MW-6S-02	13.01		13.0	13.0	5.00	mg/L			
41	9811176-05D	CEF-8-MW-6S-02D	12.04		12.0	12.0	5.00	mg/L		7.74	
42	9811176-05S	CEF-8-MW-6S-02S	63.61		63.6	63.6	5.00	mg/L	101		
43	9811176-07	CEF-8-MW-DUP1-0	132.53		133	133	5.00	mg/L			
44	9811176-09	CEF-8-MW-DUP2-0	89.16		89.2	89.2	5.00	mg/L			
45	9811198-01	CEF-8-MW-4S-02	45.78		45.8	45.8	5.00	mg/L			
46	9811198-03	CEF-8-MW-12S-02	9.64		9.64	9.64	5.00	mg/L			

Steve Chatterton SC 12-2-98
Analyst / Date

Tracy Wardell TW 12-2-98
Lab Supervisor / Date

25252

RUN SUMMARY SHEET
Chemical Oxygen Demand

A FILE: CODN2398
TRUMENT FILE: INSTRUMENT: WET_LAB ANALYZED: 11/23/1998

ı Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1 Prep Blank	PB	0		0.000	0.000	5.00	mg/L			
2 ERA 8067	ICV	65.06		65.1	130	10.0	mg/L			
3 9811030-01	CEF-16-451-02	121.93		122	122	5.00	mg/L			
4 9811033-01	CEF-16-GW-21S-0	40.96		41.0	41.0	5.00	mg/L			
5 9811033-02	CEF-16-GW-22I-0	16.87		16.9	16.9	5.00	mg/L			
6 9811061-01	CEF-16-GW-43S	79.52		79.5	79.5	5.00	mg/L			
7 9811061-02	CEF-16-GW-44I	31.33		31.3	31.3	5.00	mg/L			
8 9811061-03	CEF-16-GW-10S	60.24		60.2	60.2	5.00	mg/L			
9 9811078-01	CEF-16-GW-9D	3.37		3.37	3.37	5.00	mg/L			NA
10 9811078-01D	CEF-16-GW-9DD	4.81		4.81	4.81	5.00	mg/L			35.2
11 9811078-01S	CEF-16-GW-9DS	55.42		55.4	55.4	5.00	mg/L	111		
12 9811078-02	CEF-16-GW-11DD	7.23		7.23	7.23	5.00	mg/L			
13 9811092-01	CEF-16-GW-41S-0	37.11		37.1	37.1	5.00	mg/L			
14 9811092-02	CEF-16-GW-42I-0	3.37		3.37	3.37	5.00	mg/L			
15 9811092-03	CEF-16-GW-23D-0	7.23		7.23	7.23	5.00	mg/L			
16 9811092-05	CEF-16-DUP1-02	38.55		38.6	38.6	5.00	mg/L			
17 9811092-06	CEF-16-DUP2-02	8.19		8.19	8.19	5.00	mg/L			
18 9811101-01	CEF-16-GW-38S-0	11.08		11.1	11.1	5.00	mg/L			
19 9811101-02	CEF-16-GW-35S-0	22.65		22.6	22.6	5.00	mg/L			
20 9811101-03	CEF-16-GW-32S-0	16.88		16.9	16.9	5.00	mg/L			
21 9811115-01	CEF-16-GW-27I-0	7.23		7.23	7.23	5.00	mg/L			
22 9811136-01	CEF-8-GW-18S-02	57.83		57.8	57.8	5.00	mg/L			
23 9811136-01D	CEF-8-GW-18S-02	56.39		56.4	56.4	5.00	mg/L		2.52	
24 9811136-01S	CEF-8-GW-18S-02	108.43		108	108	5.00	mg/L	101		
25 9811136-03	CEF-8-GW-8I-02	2.41		2.41	2.41	5.00	mg/L			
26 9811136-05	CEF-8-GW-7S-02	33.73		33.7	33.7	5.00	mg/L			
27 9811145-01	YR-4	93.98		94.0	94.0	5.00	mg/L			
28 9811145-02	TRMK-1	13.01		13.0	13.0	5.00	mg/L			
29 9811149-01	CEF-8-GW-1S-02	40.0		40.0	40.0	5.00	mg/L			
30 9811149-03	CEF-8-GW-2I-02	2.41		2.41	2.41	5.00	mg/L			
31 LCS ERA8067	LCS ERA8067	66.02		66.0	132	10.0	mg/L	95.7		
32 BLANK	BLANK	0		0.000	0.000	5.00	mg/L			
33 9811149-05	CEF-8-GW-3D-02	6.27		6.27	6.27	5.00	mg/L			
34 9811150-01	CEF-16-GW-13S-0	4.82		4.82	4.82	5.00	mg/L			
35 9811150-02	CEF-16-GW-14D-0	1.45		1.45	1.45	5.00	mg/L			
36 9811167-01	CEF-8-GW-21S-02	1.45		1.45	1.45	5.00	mg/L			
37 9811167-03	CEF-8-GW-17S-02	7.23		7.23	7.23	5.00	mg/L			
38 9811176-01	CEF-8-MW-13S-02	141.20		141	141	5.00	mg/L			
39 9811176-03	CEF-8-MW-10S-02	89.16		89.2	89.2	5.00	mg/L			
40 9811176-05	CEF-8-MW-6S-02	13.01		13.0	13.0	5.00	mg/L			
41 9811176-05D	CEF-8-MW-6S-02D	12.04		12.0	12.0	5.00	mg/L		7.74	
42 9811176-05S	CEF-8-MW-6S-02S	63.61		63.6	63.6	5.00	mg/L	101		
43 9811176-07	CEF-8-MW-DUP1-0	132.53		133	133	5.00	mg/L			
44 9811176-09	CEF-8-MW-DUP2-0	89.16		89.2	89.2	5.00	mg/L			
45 9811198-01	CEF-8-MW-4S-02	45.78		45.8	45.8	5.00	mg/L			
46 9811198-03	CEF-8-MW-12S-02	9.64		9.64	9.64	5.00	mg/L			

Steve Chatterton SC 12-2-98
Analyst / Date

Tracy Wardell TW 12-2-98
Lab Supervisor / Date

RUN SUMMARY SHEET
CHLORIDE BY IC METHOD 300

DATA FILE: IC111198
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 11/11/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	0		-0.056	-0.056	0.100	mg/L			
2	0.1 PPM	S1	87577		0.260	0.260	0.100	mg/L			
3	0.5 PPM	S2	131168		0.417	0.417	0.100	mg/L			
4	1.0 PPM	S3	250669		0.848	0.848	0.100	mg/L			
5	3.0 PPM	S4	948256		3.36	3.36	0.100	mg/L			
6	5.0 PPM	S5	1337350		4.77	4.77	0.100	mg/L			
7	ICV	ICV	1067348		3.79	19.0	0.500	mg/L	96.3		
8	ANALYZED FOR NO2 ONLY										
9	ICB	ICB	0		-0.056	-0.056	0.100	mg/L			
10	9811092-01	CEF-16-GW-41S-0	1253872		4.47	4.47	0.100	mg/L			
11	9811092-02	CEF-16-GW-42I-0	1008660		3.58	3.58	0.100	mg/L			
12	9811092-03	CEF-16-GW-23D-0	2992048		10.7	10.7	0.100	mg/L			
13	9811092-05	CEF-16-DUP1-02	1189037		4.23	4.23	0.100	mg/L			
14	9811092-06	CEF-16-DUP2-02	1160840		4.13	4.13	0.100	mg/L			
15	9811092-06D	CEF-16-DUP2-02D	1203071		4.28	4.28	0.100	mg/L		3.62	
16	9811092-06S	CEF-16-DUP2-02S	1388418		4.95	9.90	0.200	mg/L	115		
17	9811101-01	CEF-16-GW-38S-0	600792		2.11	2.11	0.100	mg/L			
18	9811101-02	CEF-16-GW-35S-0	871230		3.09	3.09	0.100	mg/L			
19	9811101-03	CEF-16-GW-32S-0	239544		0.808	0.808	0.100	mg/L			
20	CCV1	CCV1	1246020		4.44	22.2	0.500	mg/L	113		
21	ANALYZED FOR NO2 ONLY										
22	CCB1	CCB1	0		-0.056	-0.056	0.100	mg/L			

VF
Analyst / Date

Tracy Wardell 12-13-98
Lab Supervisor / Date

25003

RUN SUMMARY SHEET
CHLORIDE BY IC METHOD 300

DATA FILE: IC-N1398
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 11/13/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	CRDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	0		-0.030	-0.030	0.100	mg/L			
2	0.1 PPM	S1	34993		0.095	0.095	0.100	mg/L			
3	0.5 PPM	S2	138101		0.465	0.465	0.100	mg/L			
4	1.0 PPM	S3	292868		1.02	1.02	0.100	mg/L			
5	3.0 PPM	S4	885881		3.15	3.15	0.100	mg/L			
6	5.0 PPM	S5	1377220		4.91	4.91	0.100	mg/L			
7	ICV 3579	ICV 3579	1051982		3.74	18.7	0.500	mg/L	94.9		
8	ANALYZED FOR NO2 ONLY										
9	ICB 3669	ICB 3669	0		-0.030	-0.030	0.100	mg/L			
10	9811115-01	CEF-16-GW-27I-0	1003525		3.57	3.57	0.100	mg/L			
11	9811136-05	CEF-8-GW-7S-02	3162786		11.3	11.3	0.100	mg/L			
12	9811136-01	CEF-8-GW-18S-02	266045		0.923	0.923	0.100	mg/L			
13	9811136-03	CEF-8-GW-8I-02	1746119		6.23	6.23	0.100	mg/L			
14	CCV1 3579	CCV1 3579	1062220		3.78	18.9	0.500	mg/L	95.9		
15	ANALYZED FOR NO2 ONLY										
16	CCB1 3669	CCB1 3669	0		-0.030	-0.030	0.100	mg/L			

VF
Analyst / Date

Tracy Wardell 12-14-98
Lab Supervisor / Date

25044

RUN SUMMARY SHEET
CHLORIDE BY IC METHOD 300

DATA FILE: IC-N1498
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 11/14/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	CRDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	0		-0.030	-0.030	0.100	mg/L			
2	0.1 PPM	S1	34993		0.095	0.095	0.100	mg/L			
3	0.5 PPM	S2	138101		0.465	0.465	0.100	mg/L			
4	1.0 PPM	S3	292868		1.02	1.02	0.100	mg/L			
5	3.0 PPM	S4	885881		3.15	3.15	0.100	mg/L			
6	5.0 PPM	S5	1377220		4.91	4.91	0.100	mg/L			
7	ICV 3579	ICV 3579	1027512		3.65	18.3	0.500	mg/L	92.7		
8	ANALYZED FOR NO2 ONLY										
9	ICB 3669	ICB 3669	0		-0.030	-0.030	0.100	mg/L			
10	9811136-05	CEF-8-GW-7S-02	2829271		10.1	20.2	0.200	mg/L			
11	9811136-03	CEF-8-GW-8I-02	763475		2.71	5.41	0.200	mg/L			
12	9811136-01	CEF-8-GW-18S-02	89173		0.289	2.89	1.00	mg/L			
13	9811150-02	CEF-16-GW-14D-0	1323104		4.71	4.71	0.100	mg/L			
14	9811150-01	CEF-16-GW-13S-0	2260788		8.07	8.07	0.100	mg/L			
15	9811149-05	CEF-8-GW-3D-02	1892694		6.75	6.75	0.100	mg/L			
16	9811149-03	CEF-8-GW-2I-02	1485103		5.29	5.29	0.100	mg/L			
17	9811149-03D	CEF-8-GW-2I-02D	1457468		5.19	5.19	0.100	mg/L		1.89	
18	9811149-03S	CEF-8-GW-2I-02S	1490026		5.31	10.6	0.200	mg/L	107		
19	9811149-01	CEF-8-GW-1S-02	495665		1.75	1.75	0.100	mg/L			
20	CCV1 3579	CCV1 3579	1044199		3.71	18.6	0.500	mg/L	105		
21	ANALYZED FOR NO2 ONLY										
22	CCB1 3669	CCB1 3669	0		-0.030	-0.030	0.100	mg/L			

VF
Analyst / Date

Tracy Wardell 12-14-98
Lab Supervisor / Date

25083

RUN SUMMARY SHEET
CHLORIDE BY IC METHOD 300

DATA FILE: IC120998
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 12/09/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	CRDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	12362		-0.059	-0.059	0.100	mg/L			
2	0.1 PPM	S1	54349		0.109	0.109	0.100	mg/L			
3	0.5 PPM	S2	153617		0.506	0.506	0.100	mg/L			
4	1.0 PPM	S3	291547		1.06	1.06	0.100	mg/L			
5	NOT USED										
6	5.0 PPM	S5	1272440		4.99	4.99	0.100	mg/L			
7	ICV 806	ICV 806	1146518		4.48	22.4	0.500	mg/L	114		
8	ANALYZED FOR NO2 ONLY										
9	ICB	ICB	0		-0.109	-0.109	0.100	mg/L			
10	9811092-01	CEF-16-GW-41S-0	148395		0.485	4.85	1.00	mg/L			
11	9811092-03	CEF-16-GW-23D-0	1192514		4.67	9.33	0.200	mg/L			
12	9811092-05	CEF-16-DUP1-02	149974		0.492	4.92	1.00	mg/L			
13	9811101-01	CEF-16-GW-38S-0	881832		3.42	6.84	0.200	mg/L			
14	9811101-02	CEF-16-GW-35S-0	1287983		5.05	10.1	0.200	mg/L			
15	9811101-03	CEF-16-GW-32S-0	632896		2.43	4.85	0.200	mg/L			
16	9811101-01	CEF-16-GW-38S-0	185911		0.635	6.35	1.00	mg/L			
17	9811101-01D	CEF-16-GW-38S-0	178001		0.604	6.04	1.00	mg/L		5.11	
18	9811101-01S	CEF-16-GW-38S-0	806035		3.12	62.4	2.00	mg/L	112		
19	9812053-01	CEF-3-8S-01	2357379		9.33	9.33	0.100	mg/L			
20	CCV1 806	CCV1 806	1142205		4.46	4.46	0.100	mg/L			
21	ANALYZED FOR NO2 ONLY										
22	CCB1	CCB1	0		-0.109	-0.218	0.200	mg/L			
23	9812053-02	CEF-3-9I-01	1351083		5.30	5.30	0.100	mg/L			
24	9812065-01	CEF-3-25S-01	2299604		9.10	9.10	0.100	mg/L			
25	9812065-02	CEF-3-DUP1-01	2345835		9.28	9.28	0.100	mg/L			
26	9812065-02D	CEF-3-DUP1-01D	2385790		9.44	9.44	0.100	mg/L		1.71	
27	9812065-02S	CEF-3-DUP1-01S	1554251		6.11	12.2	0.200	mg/L	118		
28	9812053-01	CEF-3-8S-01	611339		2.34	11.7	0.500	mg/L			
29	9812053-02	CEF-3-9I-01	490850		1.86	3.71	0.200	mg/L			
30	9812065-01	CEF-3-25S-01	608000		2.33	11.6	0.500	mg/L			
31	9812065-02	CEF-3-DUP1-01	514514		1.95	9.76	0.500	mg/L			
32	9812065-02D	CEF-3-DUP1-01D	580941		2.22	11.1	0.500	mg/L		12.8	
33	CCV2 806	CCV2 806	975188		3.80	19.0	0.500	mg/L	96.3		
34	ANALYZED FOR NO2 ONLY										
35	CCB2	CCB2	0		-0.109	-0.109	0.100	mg/L			
36	9812065-02S	CEF-3-DUP1-01S	287212		1.04	10.4	1.00	mg/L	2.62		
37	CCV3 806	CCV3 806	947843		3.69	18.4	0.500	mg/L	93.6		
38	ANALYZED FOR NO2 ONLY										
39	CCB3	CCB3	0		-0.109	-0.109	0.100	mg/L			

VF
Analyst / Date

Gary Wardell 12-14-98
Lab Supervisor / Date

25127

RUN SUMMARY SHEET
CHLORIDE BY IC METHOD 300

DATA FILE: IC-D1398
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 12/13/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	CRDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	12362		-0.059	-0.059	0.100	mg/L			
2	0.1 PPM	S1	54349		0.109	0.109	0.100	mg/L			
3	0.5 PPM	S2	153617		0.506	0.506	0.100	mg/L			
4	1.0 PPM	S3	291547		1.06	1.06	0.100	mg/L			
5	NOT USED										
6	5.0 PPM	S5	1272440		4.99	4.99	0.100	mg/L			
7	ICV 3893	ICV 3893	925156		3.60	18.0	0.500	mg/L	91.3		
8	ANALYZED FOR NO2 ONLY										
9	ICB 3889	ICB 3889	0		-0.109	-0.109	0.100	mg/L			
10	9811150-01	CEF-16-GW-13S-0	994172		3.87	7.74	0.200	mg/L			
11	9811136-01	CEF-8-GW-18S-02	105929		0.315	1.58	0.500	mg/L			
12	9811136-03	CEF-8-GW-8I-02	557359		2.12	4.25	0.200	mg/L			
13	9811136-05	CEF-8-GW-7S-02	806594		3.12	15.6	0.500	mg/L			
14	9811149-01	CEF-8-GW-1S-02	535825		2.04	4.07	0.200	mg/L			
15	9811149-03	CEF-8-GW-2I-02	515735		1.96	3.91	0.200	mg/L			
16	9811149-03D	CEF-8-GW-2I-02D	510923		1.94	3.87	0.200	mg/L		0.990	
17	9811149-03S	CEF-8-GW-2I-02S	786680		3.04	12.2	0.400	mg/L	82.5		
18	9811149-05	CEF-8-GW-3D-02	735680		2.84	5.67	0.200	mg/L			
19	CCV1 3893	CCV1 3893	903826		3.51	17.6	0.500	mg/L	89.1		
20	ANALYZED FOR NO2 ONLY										
21	CCB1 3889	CCB1 3889	0		-0.109	-0.109	0.100	mg/L			
22	9811167-01	CEF-8-GW-21S-02	251632		0.899	4.49	0.500	mg/L			
23	9811167-01D	CEF-8-GW-21S-02	258792		0.927	4.64	0.500	mg/L		3.14	
24	9811167-01S	CEF-8-GW-21S-02	701815		2.70	27.0	1.00	mg/L	90.1		
25	CCV2 3893	CCV2 3893	957887		3.73	18.6	0.500	mg/L	94.6		
26	ANALYZED FOR NO2 ONLY										
27	CCB2 3889	CCB2 3889	0		-0.109	-0.109	0.100	mg/L			

TW
Analyst / Date

Tracy Wardell 12-14-98
Lab Supervisor / Date

25182

RUN SUMMARY SHEET
Sulfide

DATA FILE: S2_N1198
INSTRUMENT FILE: INSTRUMENT: WET_LAB ANALYZED: 11/11/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	BLANK	ICB	0		0.000	0.000	2.00	mg/L			
2	9811061-01	CEF-16-GW-43S	3		3.00	3.00	2.00	mg/L			
3	9811061-02	CEF-16-GW-44I	0		0.000	0.000	2.00	mg/L			
4	9811061-03	CEF-16-GW-10S	4		4.00	4.00	2.00	mg/L			
5	9811064-01	AD-7288	8		8.00	8.00	2.00	mg/L			
6	9811064-01D	AD-7288D	8		8.00	8.00	2.00	mg/L		0.000	
7	9811078-01	CEF-16-GW-9D	2		2.00	2.00	2.00	mg/L			
8	9811078-02	CEF-16-GW-11DD	4		4.00	4.00	2.00	mg/L			
9	9811092-01	CEF-16-GW-41S-0	0		0.000	0.000	2.00	mg/L			
10	9811092-02	CEF-16-GW-42I-0	2		2.00	2.00	2.00	mg/L			
11	9811092-03	CEF-16-GW-23D-0	8		8.00	8.00	2.00	mg/L			
12	BLANK	CCB	0		0.000	0.000	2.00	mg/L			
13	9811092-05	CEF-16-DUP1-02	5		5.00	5.00	2.00	mg/L			
14	9811092-06	CEF-16-DUP2-02	2		2.00	2.00	2.00	mg/L			
15	BLANK	CB	0		0.000	0.000	2.00	mg/L			

SN
Analyst / Date

Chris Beery 11-12-98
Lab Supervisor / Date

25238

RUN SUMMARY SHEET
Sulfide

DATA FILE: S2_N1698
INSTRUMENT FILE: INSTRUMENT: WET_LAB ANALYZED: 11/16/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	BLANK	ICB	0		0.000	0.000	2.00	mg/L			
2	9811101-01	CEF-16-GW-38S-0	0		0.000	0.000	2.00	mg/L			
3	9811101-02	CEF-16-GW-35S-0	0		0.000	0.000	2.00	mg/L			
4	9811101-03	CEF-16-GW-32S-0	0		0.000	0.000	2.00	mg/L			
5	9811101-03D	CEF-16-GW-32S-0	0		0.000	0.000	2.00	mg/L		DIV BY	
6	BLANK	CB	0		0.000	0.000	2.00	mg/L			

JH
Analyst / Date

Chris Beaty 12-9-98
Lab Supervisor / Date

25242

RUN SUMMARY SHEET
Sulfide

DATA FILE: S2_N1898
INSTRUMENT FILE: INSTRUMENT: WET_LAB ANALYZED: 11/18/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	BLANK	ICB	0		0.000	0.000	2.00	mg/L			
2	9811136-01	CEF-8-GW-18S-02	0		0.000	0.000	2.00	mg/L			
3	9811136-03	CEF-8-GW-8I-02	0		0.000	0.000	2.00	mg/L			
4	9811136-05	CEF-8-GW-7S-02	3.92		3.92	3.92	2.00	mg/L			
5	9811149-01	CEF-8-GW-1S-02	3.92		3.92	3.92	2.00	mg/L			
6	9811149-03	CEF-8-GW-2I-02	0		0.000	0.000	2.00	mg/L			
7	9811149-05	CEF-8-GW-3D-02	0		0.000	0.000	2.00	mg/L			
8	9811167-01	CEF-8-GW-21S-02	4.90		4.90	4.90	2.00	mg/L			
9	9811167-03	CEF-8-GW-17S-02	3.92		3.92	3.92	2.00	mg/L			
10	9811176-01	CEF-8-MW-13S-02	6.27		6.27	6.27	2.00	mg/L			
11	9811176-03	CEF-8-MW-10S-02	9.80		9.80	9.80	2.00	mg/L			
12	9811176-03D	CEF-8-MW-10S-02	9.80		9.80	9.80	2.00	mg/L		0.000	
13	9811176-05	CEF-8-MW-6S-02	5.29		5.29	5.29	2.00	mg/L			
14	BLANK	CCB	0		0.000	0.000	2.00	mg/L			
15	9811176-07	CEF-8-MW-DUP1-0	7.84		7.84	7.84	2.00	mg/L			
16	9811176-09	CEF-8-MW-DUP2-0	8.82		8.82	8.82	2.00	mg/L			
17	9811150-01	CEF-16-GW-13S-0	3.92		3.92	3.92	2.00	mg/L			
18	9811150-02	CEF-16-GW-14D-0	3.92		3.92	3.92	2.00	mg/L			
19	9811115-01	CEF-16-GW-27I-0	3.92		3.92	3.92	2.00	mg/L			
20	9811123-01	E03-SD00-01-151	5.88		5.88	5.88	2.00	mg/L			
21	9811123-02	E03-SD00-01-150	4.31		4.31	4.31	2.00	mg/L			
22	9811123-03	E03-SD00-01-149	31.37		31.4	1860	118	mg/Kg			
23	BLANK	CCB	0		0.000	0.000	2.00	mg/L			
24	9811123-03D	E03-SD00-01-149	29.41		29.4	2170	148	mg/Kg		15.6	
25	9811123-04	E03-SD00-01-148	31.37		31.4	2050	131	mg/Kg			
26	9811123-05	E03-SD03-01-147	27.45		27.4	1160	84.5	mg/Kg			
27	9811123-07	E03-SD03-01-146	26.47		26.5	776	58.6	mg/Kg			
28	9811123-08	E03-SD03-01-145	39.22		39.2	3990	204	mg/Kg			
29	BLANK	CB	0		0.000	0.000	2.00	mg/L			

Steve Chatterton SC 12-9-98
Analyst / Date

Chris Bergh 12-9-98
Lab Supervisor / Date

25246

RUN SUMMARY SHEET
NITRATE BY IC

DATA FILE: IC111198
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 11/11/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	CRDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	0		-0.036	-0.036	0.100	mg/L			
2	0.1 PPM	S1	4140		0.111	0.111	0.100	mg/L			
3	0.5 PPM	S2	16528		0.553	0.553	0.100	mg/L			
4	1.0 PPM	S3	30689		1.06	1.06	0.100	mg/L			
5	3.0 PPM	S4	80788		2.84	2.84	0.100	mg/L			
6	5.0 PPM	S5	143151		5.07	5.07	0.100	mg/L			
7	ICV	ICV	95870		3.38	16.9	0.500	mg/L	131		
8	ANALYZED FOR NO2 ONLY										
9	ICB	ICB	0		-0.036	-0.036	0.100	mg/L			
10	9811092-01	CEF-16-GW-41S-0	2049		0.037	0.037	0.100	mg/L			
11	9811092-02	CEF-16-GW-42I-0	893		-0.004	-0.004	0.100	mg/L			
12	9811092-03	CEF-16-GW-23D-0	523		-0.018	-0.018	0.100	mg/L			
13	9811092-05	CEF-16-DUP1-02	1338		0.012	0.012	0.100	mg/L			
14	9811092-06	CEF-16-DUP2-02	2774		0.063	0.063	0.100	mg/L			
15	9811092-06D	CEF-16-DUP2-02D	2539		0.054	0.054	0.100	mg/L		14.3	
16	9811092-06S	CEF-16-DUP2-02S	108098		3.82	7.64	0.200	mg/L	153		
17	9811101-01	CEF-16-GW-38S-0	1545		0.019	0.019	0.100	mg/L			
18	9811101-02	CEF-16-GW-35S-0	2644		0.058	0.058	0.100	mg/L			
19	9811101-03	CEF-16-GW-32S-0	23759		0.811	0.811	0.100	mg/L			
20	CCV1	CCV1	112695		3.98	19.9	0.500	mg/L	154		
21	ANALYZED FOR NO2 ONLY										
22	CCB1	CCB1	0		-0.036	-0.036	0.100	mg/L			

VF
Analyst / Date

Tracy Wardell 12-13-98
Lab Supervisor / Date

25004

RUN SUMMARY SHEET
NITRATE BY IC

DATA FILE: IC-N1498
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 11/14/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	CRDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	0		-0.036	-0.036	0.100	mg/L			
2	0.1 PPM	S1	4491		0.082	0.082	0.100	mg/L			
3	0.5 PPM	S2	21017		0.515	0.515	0.100	mg/L			
4	1.0 PPM	S3	41302		1.05	1.05	0.100	mg/L			
5	3.0 PPM	S4	116401		3.01	3.01	0.100	mg/L			
6	5.0 PPM	S5	191581		4.98	4.98	0.100	mg/L			
7	ICV 3579	ICV 3579	85385		2.20	11.0	0.500	mg/L	85.3		
8	ANALYZED FOR NO2 ONLY										
9	ICB 3669	ICB 3669	0		-0.036	-0.036	0.100	mg/L			
10	9811136-05	CEF-8-GW-7S-02	363		-0.026	-0.053	0.200	mg/L			
11	9811136-03	CEF-8-GW-8I-02	187		-0.031	-0.062	0.200	mg/L			
12	9811136-01	CEF-8-GW-18S-02	0		-0.036	-0.359	1.00	mg/L			
13	9811150-02	CEF-16-GW-14D-0	150261		3.90	3.90	0.100	mg/L			
14	9811150-01	CEF-16-GW-13S-0	410		-0.025	-0.025	0.100	mg/L			
15	9811149-05	CEF-8-GW-3D-02	280		-0.029	-0.029	0.100	mg/L			
16	9811149-03	CEF-8-GW-2I-02	267		-0.029	-0.029	0.100	mg/L			
17	9811149-03D	CEF-8-GW-2I-02D	258		-0.029	-0.029	0.100	mg/L		0.812	
18	9811149-03S	CEF-8-GW-2I-02S	99930		2.58	5.16	0.200	mg/L	103		
19	9811149-01	CEF-8-GW-1S-02	1121		-0.007	-0.007	0.100	mg/L			
20	CCV1 3579	CCV1 3579	92849		2.40	12.0	0.500	mg/L	92.9		
21	ANALYZED FOR NO2 ONLY										
22	CCB1 3669	CCB1 3669	0		-0.036	-0.036	0.100	mg/L			

VF
Analyst / Date

Tracy Wardell 12-14-98
Lab Supervisor / Date

25084

RUN SUMMARY SHEET
NITRATE BY IC

DATA FILE: IC-N1398

INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 11/13/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	CRDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	0		-0.036	-0.036	0.100	mg/L			
2	0.1 PPM	S1	4491		0.082	0.082	0.100	mg/L			
3	0.5 PPM	S2	21017		0.515	0.515	0.100	mg/L			
4	1.0 PPM	S3	41302		1.05	1.05	0.100	mg/L			
5	3.0 PPM	S4	116401		3.01	3.01	0.100	mg/L			
6	5.0 PPM	S5	191581		4.98	4.98	0.100	mg/L			
7	ICV 3579	ICV 3579	91691		2.37	11.8	0.500	mg/L	91.7		
8	ANALYZED FOR NO2 ONLY										
9	ICB 3669	ICB 3669	0		-0.036	-0.036	0.100	mg/L			
10	9811115-01	CEF-16-GW-27I-0	590		-0.020	-0.020	0.100	mg/L			
11	9811136-05	CEF-8-GW-7S-02	793		-0.015	-0.015	0.100	mg/L			
12	9811136-01	CEF-8-GW-18S-02	386		-0.026	-0.026	0.100	mg/L			
13	9811136-03	CEF-8-GW-8I-02	0		-0.036	-0.036	0.100	mg/L			
14	CCV1 3579	CCV1 3579	93172		2.40	12.0	0.500	mg/L	93.2		
15	ANALYZED FOR NO2 ONLY										
16	CCB1 3669	CCB1 3669	0		-0.036	-0.036	0.100	mg/L			

VF

Analyst / Date

Tracy Wardell 12-14-98

Lab Supervisor / Date

25045

RUN SUMMARY SHEET
NITRITE BY IC

DATA FILE: IC111198
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 11/11/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	0		-0.015	-0.015	0.100	mg/L			
2	0.1 PPM	S1	5499		0.102	0.102	0.100	mg/L			
3	0.5 PPM	S2	24185		0.499	0.499	0.100	mg/L			
4	1.0 PPM	S3	49475		1.04	1.04	0.100	mg/L			
5	3.0 PPM	S4	140209		2.96	2.96	0.100	mg/L			
6	5.0 PPM	S5	236706		5.01	5.01	0.100	mg/L			
7	NO2 NOT IN STANDARD										
8	ICV NO2	ICV NO2	203349		4.31	8.61	0.200	mg/L	125		
9	ICB	ICB	0		-0.015	-0.015	0.100	mg/L			
10	9811092-01	CEF-16-GW-41S-0	0		-0.015	-0.015	0.100	mg/L			
11	9811092-02	CEF-16-GW-42I-0	0		-0.015	-0.015	0.100	mg/L			
12	9811092-03	CEF-16-GW-23D-0	0		-0.015	-0.015	0.100	mg/L			
13	9811092-05	CEF-16-DUP1-02	0		-0.015	-0.015	0.100	mg/L			
14	9811092-06	CEF-16-DUP2-02	0		-0.015	-0.015	0.100	mg/L			
15	9811092-06D	CEF-16-DUP2-02D	0		-0.015	-0.015	0.100	mg/L		0.000	
16	9811092-06S	CEF-16-DUP2-02S	191929		4.06	8.13	0.200	mg/L	163		
17	9811101-01	CEF-16-GW-38S-0	0		-0.015	-0.015	0.100	mg/L			
18	9811101-02	CEF-16-GW-35S-0	0		-0.015	-0.015	0.100	mg/L			
19	9811101-03	CEF-16-GW-32S-0	0		-0.015	-0.015	0.100	mg/L			
20	NO2 NOT IN STANDARD										
21	CCV1 NO2	CCV1 NO2	224861		4.76	9.52	0.200	mg/L	138		
22	CCB1	CCB1	0		-0.015	-0.015	0.100	mg/L			

VF
Analyst / Date

Tracy Wardell 12-13-98
Lab Supervisor / Date

25005

RUN SUMMARY SHEET
NITRITE BY IC

DATA FILE: IC-N1398
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 11/13/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	CRDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	0		-0.013	-0.013	0.100	mg/L			
2	0.1 PPM	S1	2897		0.035	0.035	0.100	mg/L			
3	0.5 PPM	S2	29756		0.481	0.481	0.100	mg/L			
4	1.0 PPM	S3	62073		1.02	1.02	0.100	mg/L			
5	3.0 PPM	S4	196474		3.25	3.25	0.100	mg/L			
6	5.0 PPM	S5	291811		4.83	4.83	0.100	mg/L			
7	NO2 NOT IN STANDARD										
8	ICV 3626	ICV 3626	208956		3.46	6.91	0.200	mg/L	100		
9	ICB 3669	ICB 3669	0		-0.013	-0.013	0.100	mg/L			
10	9811115-01	CEF-16-GW-27I-0	0		-0.013	-0.013	0.100	mg/L			
11	9811136-05	CEF-8-GW-7S-02	0		-0.013	-0.013	0.100	mg/L			
12	9811136-01	CEF-8-GW-18S-02	0		-0.013	-0.013	0.100	mg/L			
13	9811136-03	CEF-8-GW-8I-02	0		-0.013	-0.013	0.100	mg/L			
14	NO2 NOT IN STANDARD										
15	CCV1 3626	CCV1 3626	211909		3.50	7.01	0.200	mg/L	102		
16	CCB1 3669	CCB1 3669	0		-0.013	-0.013	0.100	mg/L			

VF
Analyst / Date

Tracy Wardell 12-14-98
Lab Supervisor / Date

25046

RUN SUMMARY SHEET
NITRITE BY IC

DATA FILE: IC-N1498
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 11/14/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	CRDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	0		-0.013	-0.013	0.100	mg/L			
2	0.1 PPM	S1	2897		0.035	0.035	0.100	mg/L			
3	0.5 PPM	S2	29756		0.481	0.481	0.100	mg/L			
4	1.0 PPM	S3	62073		1.02	1.02	0.100	mg/L			
5	3.0 PPM	S4	196474		3.25	3.25	0.100	mg/L			
6	5.0 PPM	S5	291811		4.83	4.83	0.100	mg/L			
7	NO2 NOT IN STANDARD										
8	ICV 3626	ICV 3626	203148		3.36	6.72	0.200	mg/L	97.4		
9	ICB 3669	ICB 3669	0		-0.013	-0.013	0.100	mg/L			
10	9811136-05	CEF-8-GW-7S-02	0		-0.013	-0.026	0.200	mg/L			
11	9811136-03	CEF-8-GW-8I-02	0		-0.013	-0.026	0.200	mg/L			
12	9811136-01	CEF-8-GW-18S-02	0		-0.013	-0.132	1.00	mg/L			
13	9811150-02	CEF-16-GW-14D-0	0		-0.013	-0.013	0.100	mg/L			
14	9811150-01	CEF-16-GW-13S-0	0		-0.013	-0.013	0.100	mg/L			
15	9811149-05	CEF-8-GW-3D-02	0		-0.013	-0.013	0.100	mg/L			
16	9811149-03	CEF-8-GW-2I-02	0		-0.013	-0.013	0.100	mg/L			
17	9811149-03D	CEF-8-GW-2I-02D	0		-0.013	-0.013	0.100	mg/L		0.000	
18	9811149-03S	CEF-8-GW-2I-02S	197337		3.26	6.53	0.200	mg/L	131		
19	9811149-01	CEF-8-GW-1S-02	0		-0.013	-0.013	0.100	mg/L			
20	NO2 NOT IN STANDARD										
21	CCV1 3626	CCV1 3626	214231		3.54	7.09	0.200	mg/L	103		
22	CCB1 3669	CCB1 3669	0		-0.013	-0.013	0.100	mg/L			

VF
Analyst / Date

Tracy Wardell 12-14-98
Lab Supervisor / Date

25085

RUN SUMMARY SHEET
O-Phosphate (as phosphorus)

DATA FILE: IC111198
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 11/11/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	0		0.042	0.042	0.100	mg/L			
2	0.1 PPM	S1	392		0.169	0.169	0.100	mg/L			
3	0.5 PPM	S2	1206		0.435	0.435	0.100	mg/L			
4	1.0 PPM	S3	2741		0.935	0.935	0.100	mg/L			
5	3.0 PPM	S4	9108		3.01	3.01	0.100	mg/L			
6	5.0 PPM	S5	15236		5.01	5.01	0.100	mg/L			
7	ICV	ICV	4736		1.59	7.93	0.500	mg/L	132		
8	ANALYZED FOR NO2 ONLY										
9	ICB	ICB	0		0.042	0.042	0.100	mg/L			
10	9811092-01	CEF-16-GW-41S-0	0		0.042	0.042	0.100	mg/L			
11	9811092-02	CEF-16-GW-42I-0	0		0.042	0.042	0.100	mg/L			
12	9811092-03	CEF-16-GW-23D-0	0		0.042	0.042	0.100	mg/L			
13	9811092-05	CEF-16-DUP1-02	0		0.042	0.042	0.100	mg/L			
14	9811092-06	CEF-16-DUP2-02	0		0.042	0.042	0.100	mg/L			
15	9811092-06D	CEF-16-DUP2-02D	0		0.042	0.042	0.100	mg/L		0.000	
16	9811092-06S	CEF-16-DUP2-02S	12261		4.04	8.08	0.200	mg/L	162		
17	9811101-01	CEF-16-GW-38S-0	0		0.042	0.042	0.100	mg/L			
18	9811101-02	CEF-16-GW-35S-0	0		0.042	0.042	0.100	mg/L			
19	9811101-03	CEF-16-GW-32S-0	0		0.042	0.042	0.100	mg/L			
20	CCV1	CCV1	5662		1.89	9.44	0.500	mg/L	157		
21	ANALYZED FOR NO2 ONLY										
22	CCB1	CCB1	0		0.042	0.042	0.100	mg/L			

VF
Analyst / Date

Tracy Wardell 12-13-98
Lab Supervisor / Date

25006

RUN SUMMARY SHEET
O-Phosphate (as phosphorus)

DATA FILE: IC-N1398
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 11/13/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	CRDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	0		-0.009	-0.009	0.100	mg/L			
2	0.1 PPM	S1	363		0.080	0.080	0.100	mg/L			
3	0.5 PPM	S2	1745		0.422	0.422	0.100	mg/L			
4	1.0 PPM	S3	4271		1.05	1.05	0.100	mg/L			
5	3.0 PPM	S4	12925		3.18	3.18	0.100	mg/L			
6	5.0 PPM	S5	19769		4.88	4.88	0.100	mg/L			
7	ICV 3579	ICV 3579	4276		1.05	5.24	0.500	mg/L	87.3		
8	ANALYZED FOR NO2 ONLY										
9	ICB 3669	ICB 3669	0		-0.009	-0.009	0.100	mg/L			
10	9811115-01	CEF-16-GW-27I-0	0		-0.009	-0.009	0.100	mg/L			
11	9811136-05	CEF-8-GW-7S-02	0		-0.009	-0.009	0.100	mg/L			
12	9811136-01	CEF-8-GW-18S-02	769		0.181	0.181	0.100	mg/L			
13	9811136-03	CEF-8-GW-8I-02	0		-0.009	-0.009	0.100	mg/L			
14	CCV1 3579	CCV1 3579	4250		1.04	5.20	0.500	mg/L	86.7		
15	ANALYZED FOR NO2 ONLY										
16	CCB1 3669	CCB1 3669	0		-0.009	-0.009	0.100	mg/L			

VF
Analyst / Date

Gracy Wardell 12-14-98
Lab Supervisor / Date

25047

RUN SUMMARY SHEET
O-Phosphate (as phosphorus)

DATA FILE: IC-N1498
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 11/14/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	CRDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	0		-0.009	-0.009	0.100	mg/L			
2	0.1 PPM	S1	363		0.080	0.080	0.100	mg/L			
3	0.5 PPM	S2	1745		0.422	0.422	0.100	mg/L			
4	1.0 PPM	S3	4271		1.05	1.05	0.100	mg/L			
5	3.0 PPM	S4	12925		3.18	3.18	0.100	mg/L			
6	5.0 PPM	S5	19769		4.88	4.88	0.100	mg/L			
7	ICV 3579	ICV 3579	3635		0.889	4.44	0.500	mg/L	74.1		
8	ANALYZED FOR NO2 ONLY										
9	ICB 3669	ICB 3669	0		-0.009	-0.009	0.100	mg/L			
10	9811136-05	CEF-8-GW-7S-02	0		-0.009	-0.019	0.200	mg/L			
11	9811136-03	CEF-8-GW-8I-02	0		-0.009	-0.019	0.200	mg/L			
12	9811136-01	CEF-8-GW-18S-02	0		-0.009	-0.095	1.00	mg/L			
13	9811150-02	CEF-16-GW-14D-0	0		-0.009	-0.009	0.100	mg/L			
14	9811150-01	CEF-16-GW-13S-0	0		-0.009	-0.009	0.100	mg/L			
15	9811149-05	CEF-8-GW-3D-02	0		-0.009	-0.009	0.100	mg/L			
16	9811149-03	CEF-8-GW-2I-02	0		-0.009	-0.009	0.100	mg/L			
17	9811149-03D	CEF-8-GW-2I-02D	0		-0.009	-0.009	0.100	mg/L		0.000	
18	9811149-03S	CEF-8-GW-2I-02S	8441		2.08	4.15	0.200	mg/L	83.1		
19	9811149-01	CEF-8-GW-1S-02	0		-0.009	-0.009	0.100	mg/L			
20	CCV1 3579	CCV1 3579	3936		0.963	4.82	0.500	mg/L	80.3		
21	ANALYZED FOR NO2 ONLY										
22	CCB1 3669	CCB1 3669	0		-0.009	-0.009	0.100	mg/L			

VF
Analyst / Date

Tracy Wardell 12-14-98
Lab Supervisor / Date

25086

RUN SUMMARY SHEET
SULFATE BY IC METHOD 300

DATA FILE: IC111198
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 11/11/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	0		0.035	0.035	0.100	mg/L			
2	0.1 PPM	S1	19842		0.149	0.149	0.100	mg/L			
3	0.5 PPM	S2	63133		0.397	0.397	0.100	mg/L			
4	1.0 PPM	S3	156717		0.933	0.933	0.100	mg/L			
5	3.0 PPM	S4	550780		3.19	3.19	0.100	mg/L			
6	5.0 PPM	S5	848306		4.90	4.90	0.100	mg/L			
7	ICV	ICV	368556		2.15	10.7	0.500	mg/L	106		
8	ANALYZED FOR NO2 ONLY										
9	ICB	ICB	0		0.035	0.035	0.100	mg/L			
10	9811092-01	CEF-16-GW-41S-0	2247062		12.9	12.9	0.100	mg/L			
11	9811092-02	CEF-16-GW-42I-0	793944		4.58	4.58	0.100	mg/L			
12	9811092-03	CEF-16-GW-23D-0	10319		0.094	0.094	0.100	mg/L			
13	9811092-05	CEF-16-DUP1-02	2233090		12.8	12.8	0.100	mg/L			
14	9811092-06	CEF-16-DUP2-02	797541		4.60	4.60	0.100	mg/L			
15	9811092-06D	CEF-16-DUP2-02D	810786		4.68	4.68	0.100	mg/L		1.63	
16	9811092-06S	CEF-16-DUP2-02S	945309		5.45	10.9	0.200	mg/L	126		
17	9811101-01	CEF-16-GW-38S-0	1003724		5.79	5.79	0.100	mg/L			
18	9811101-02	CEF-16-GW-35S-0	849783		4.90	4.90	0.100	mg/L			
19	9811101-03	CEF-16-GW-32S-0	2874445		16.5	16.5	0.100	mg/L			
20	CCV1	CCV1	428655		2.49	12.5	0.500	mg/L	123		
21	ANALYZED FOR NO2 ONLY										
22	CCB1	CCB1	0		0.035	0.035	0.100	mg/L			

VF
Analyst / Date

Gary Wardell 12-13-98
Lab Supervisor / Date

25007

RUN SUMMARY SHEET
SULFATE BY IC METHOD 300

DATA FILE: IC-N1398
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 11/13/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	CRDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	0		-0.031	-0.031	0.100	mg/L			
2	0.1 PPM	S1	21775		0.086	0.086	0.100	mg/L			
3	0.5 PPM	S2	93644		0.473	0.473	0.100	mg/L			
4	1.0 PPM	S3	200084		1.05	1.05	0.100	mg/L			
5	3.0 PPM	S4	578547		3.09	3.09	0.100	mg/L			
6	5.0 PPM	S5	922351		4.94	4.94	0.100	mg/L			
7	ICV 3579	ICV 3579	351092		1.86	9.30	0.500	mg/L	92.1		
8	ANALYZED FOR NO2 ONLY										
9	ICB 3669	ICB 3669	0		-0.031	-0.031	0.100	mg/L			
10	9811115-01	CEF-16-GW-271-0	575850		3.07	3.07	0.100	mg/L			
11	9811136-05	CEF-8-GW-7S-02	2371785		12.7	12.7	0.100	mg/L			
12	9811136-01	CEF-8-GW-18S-02	7541227		40.6	40.6	0.100	mg/L			
13	9811136-03	CEF-8-GW-8I-02	261227		1.38	1.38	0.100	mg/L			
14	CCV1 3579	CCV1 3579	363531		1.93	9.64	0.500	mg/L	95.4		
15	ANALYZED FOR NO2 ONLY										
16	CCB1 3669	CCB1 3669	0		-0.031	-0.031	0.100	mg/L			

VF
Analyst / Date

Tracy Wardell 12-14-98
Lab Supervisor / Date

25048

RUN SUMMARY SHEET
SULFATE BY IC METHOD 300

DATA FILE: IC-N1498
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 11/14/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	CRDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	0		-0.031	-0.031	0.100	mg/L			
2	0.1 PPM	S1	21775		0.086	0.086	0.100	mg/L			
3	0.5 PPM	S2	93644		0.473	0.473	0.100	mg/L			
4	1.0 PPM	S3	200084		1.05	1.05	0.100	mg/L			
5	3.0 PPM	S4	578547		3.09	3.09	0.100	mg/L			
6	5.0 PPM	S5	922351		4.94	4.94	0.100	mg/L			
7	ICV 3579	ICV 3579	335892		1.78	8.89	0.500	mg/L	88.1		
8	ANALYZED FOR NO2 ONLY										
9	ICB 3669	ICB 3669	0		-0.031	-0.031	0.100	mg/L			
10	9811136-05	CEF-8-GW-7S-02	1070214		5.74	11.5	0.200	mg/L			
11	9811136-03	CEF-8-GW-8I-02	105004		0.535	1.07	0.200	mg/L			
12	9811136-01	CEF-8-GW-18S-02	198001		1.04	10.4	1.00	mg/L			
13	9811150-02	CEF-16-GW-14D-0	757892		4.05	4.05	0.100	mg/L			
14	9811150-01	CEF-16-GW-13S-0	10733		0.027	0.027	0.100	mg/L			
15	9811149-05	CEF-8-GW-3D-02	0		-0.031	-0.031	0.100	mg/L			
16	9811149-03	CEF-8-GW-2I-02	59564		0.290	0.290	0.100	mg/L			
17	9811149-03D	CEF-8-GW-2I-02D	55540		0.268	0.268	0.100	mg/L		7.78	
18	9811149-03S	CEF-8-GW-2I-02S	474117		2.52	5.05	0.200	mg/L	95.1		
19	9811149-01	CEF-8-GW-1S-02	1045803		5.60	5.60	0.100	mg/L			
20	CCV1 3579	CCV1 3579	348692		1.85	9.24	0.500	mg/L	91.5		
21	ANALYZED FOR NO2 ONLY										
22	CCB1 3669	CCB1 3669	0		-0.031	-0.031	0.100	mg/L			

VF

Analyst / Date

Lab Supervisor / Date

25087

RUN SUMMARY SHEET
SULFATE BY IC METHOD 300

DATA FILE: IC120998
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 12/09/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	CRDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	8772		0.012	0.012	0.100	mg/L			
2	0.1 PPM	S1	17172		0.061	0.061	0.100	mg/L			
3	0.5 PPM	S2	97870		0.534	0.534	0.100	mg/L			
4	1.0 PPM	S3	178086		1.00	1.00	0.100	mg/L			
5	3.0 PPM	S4	515037		2.98	2.98	0.100	mg/L			
6	5.0 PPM	S5	860751		5.01	5.01	0.100	mg/L			
7	ICV 806	ICV 806	334712		1.92	9.62	0.500	mg/L	95.2		
8	ANALYZED FOR NO2 ONLY										
9	ICB	ICB	0		-0.040	-0.040	0.100	mg/L			
10	9811092-01	CEF-16-GW-41S-0	206122		1.17	11.7	1.00	mg/L			
11	9811092-03	CEF-16-GW-23D-0	0		-0.040	-0.079	0.200	mg/L			
12	9811092-05	CEF-16-DUP1-02	219404		1.25	12.5	1.00	mg/L			
13	9811101-01	CEF-16-GW-38S-0	1214803		7.08	14.2	0.200	mg/L			
14	9811101-02	CEF-16-GW-35S-0	434725		2.51	5.02	0.200	mg/L			
15	9811101-03	CEF-16-GW-32S-0	439165		2.54	5.07	0.200	mg/L			
16	9811101-01	CEF-16-GW-38S-0	260839		1.49	14.9	1.00	mg/L			
17	9811101-01D	CEF-16-GW-38S-0	264893		1.51	15.1	1.00	mg/L		1.58	
18	9811101-01S	CEF-16-GW-38S-0	573889		3.33	66.5	2.00	mg/L	103		
19	9812053-01	CEF-3-8S-01	1188527		6.93	6.93	0.100	mg/L			
20	CCV1 806	CCV1 806	342051		1.97	1.97	0.100	mg/L			
21	ANALYZED FOR NO2 ONLY										
22	CCB1	CCB1	0		-0.040	-0.079	0.200	mg/L			
23	9812053-02	CEF-3-9I-01	613511		3.56	3.56	0.100	mg/L			
24	9812065-01	CEF-3-25S-01	273519		1.56	1.56	0.100	mg/L			
25	9812065-02	CEF-3-DUP1-01	252759		1.44	1.44	0.100	mg/L			
26	9812065-02D	CEF-3-DUP1-01D	257384		1.47	1.47	0.100	mg/L		1.86	
27	9812065-02S	CEF-3-DUP1-01S	123061		0.682	1.36	0.200	mg/L	-3.14		
28	9812053-01	CEF-3-8S-01	243464		1.39	6.94	0.500	mg/L			
29	9812053-02	CEF-3-9I-01	91736		0.498	0.997	0.200	mg/L			
30	9812065-01	CEF-3-25S-01	53117		0.272	1.36	0.500	mg/L			
31	9812065-02	CEF-3-DUP1-01	57093		0.295	1.48	0.500	mg/L			
32	9812065-02D	CEF-3-DUP1-01D	62244		0.325	1.63	0.500	mg/L		9.73	
33	CCV2 806	CCV2 806	310815		1.78	8.91	0.500	mg/L	88.3		
34	ANALYZED FOR NO2 ONLY										
35	CCB2	CCB2	0		-0.040	-0.040	0.100	mg/L			
36	9812065-02S	CEF-3-DUP1-01S	187105		1.06	10.6	1.00	mg/L	364		
37	CCV3 806	CCV3 806	305794		1.75	8.77	0.500	mg/L	86.8		
38	ANALYZED FOR NO2 ONLY										
39	CCB3	CCB3	0		-0.040	-0.040	0.100	mg/L			

VF
Analyst / Date

Tracy Wardell 12-14-98
Lab Supervisor / Date

25128

RUN SUMMARY SHEET
Total Organic Carbon

DATA FILE: TOCD0798
INSTRUMENT FILE: INSTRUMENT: DOHRMAN ANALYZED: 12/07/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	WC0149	ICV	50.479		50.5	50.5	1.00	mg/L	93.7		
2	BLANK	ICB	-0.129		-0.129	-0.129	1.00	mg/L			
3	9811092-01	CEF-16-GW-41S-0	13.977		14.0	14.0	1.00	mg/L			
4	9811092-02	CEF-16-GW-42I-0	3.609		3.61	3.61	1.00	mg/L			
5	9811092-03	CEF-16-GW-23D-0	1.773		1.77	1.77	1.00	mg/L			
6	9811092-05	CEF-16-DUP1-02	13.535		13.5	13.5	1.00	mg/L			
7	9811092-06	CEF-16-DUP2-02	1.891		1.89	1.89	1.00	mg/L			
8	9811101-01	CEF-16-GW-38S-0	6.090		6.09	6.09	1.00	mg/L			
9	9811101-02	CEF-16-GW-35S-0	7.369		7.37	7.37	1.00	mg/L			
10	9811101-03	CEF-16-GW-32S-0	4.305		4.30	4.30	1.00	mg/L			
11	9811115-01	CEF-16-GW-27I-0	2.320		2.32	2.32	1.00	mg/L			
12	9811136-01	CEF-8-GW-18S-02	17.646		17.6	17.6	1.00	mg/L			
13	WC0149	WC0149	51.715		51.7	51.7	1.00	mg/L	95.9		
14	BLANK	BLANK	0.036		0.036	0.036	1.00	mg/L			
15	9811136-03	CEF-8-GW-8I-02	0.471		0.471	0.471	1.00	mg/L			
16	9811136-03D	CEF-8-GW-8I-02D	0.516		0.516	0.516	1.00	mg/L		9.12	
17	9811136-03S	CEF-8-GW-8I-02S	9.614		9.61	9.61	1.00	mg/L	96.1		
18	9811136-05	CEF-8-GW-7S-02	9.058		9.06	9.06	1.00	mg/L			
19	9811149-01	CEF-8-GW-1S-02	13.749		13.7	13.7	1.00	mg/L			
20	9811149-03	CEF-8-GW-2I-02	0.171		0.171	0.171	1.00	mg/L			
21	9811149-05	CEF-8-GW-3D-02	0.454		0.454	0.454	1.00	mg/L			
22	9811150-01	CEF-16-GW-13S-0	2.360		2.36	2.36	1.00	mg/L			
23	9811150-02	CEF-16-GW-14D-0	1.111		1.11	1.11	1.00	mg/L			
24	WC0149	WC0149	56.947		56.9	56.9	1.00	mg/L	106		
25	BLANK	BLANK	-0.291		-0.291	-0.291	1.00	mg/L			

Sue Chatterton SC 12-7-98
Analyst / Date

Tracy Wardell 12-10-98
Lab Supervisor / Date

25257