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BASELINE GROUNDWATER MONITORING REPORT FOR OPERABLE UNIT 3 (OU 3) SITE 8

NAS CECIL FIELD FL

11/1/1998

TETRA TECH NUS INC

Baseline Groundwater Monitoring Report
for
Operable Unit 3, Site 8

Naval Air Station Cecil Field
Jacksonville, Florida

Southern Division
Naval Facilities Engineering Command
Contract Number N62467-94-D-0888
Contract Task Order 039

November 1998

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BASELINE
GROUNDWATER MONITORING REPORT

FOR

OPERABLE UNIT 3, SITE 8
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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

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

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PREPARED BY:

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

APPROVED FOR SUBMITTAL BY:

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

TABLE OF CONTENTS

SECTION **PAGE NO.**

LIST OF ACRONYMS AND ABBREVIATIONS ..... **v**

1.0 INTRODUCTION **1-1**
1.1 HISTORY AND LOCATION OF WASTE DISPOSAL 1-1
1.2 SITE PHYSICAL AND GEOLOGICAL CONDITIONS 1-3
1.2.1 Topography 1-3
1.2.2 Site Lithology 1-7
1.2.3 Hydrologic Characteristics 1-7
1.3 SURFACE AND SUBSURFACE SOIL 1-8
1.4 SUMMARY OF THE RECORD OF DECISION 1-8

2.0 SITE CHEMICALS OF CONCERN **2-1**
2.1 VOCS 2-1
2.2 SVOCS 2-11
2.3 INORGANICS 2-11
2.4 CONTAMINANT FATE AND TRANSPORT 2-14
2.5 NATURAL ATTENUATION PARAMETERS 2-14
2.5.1 Dissolved Oxygen 2-14
2.5.2 Nitrite and Nitrate 2-14
2.5.3 Ferrous Iron 2-14
2.5.4 Sulfate and Sulfide 2-18
2.5.5 Methane, Ethane, and Ethene 2-18
2.5.6 Redox Potential 2-18
2.5.7 Dissolved Organic Carbon 2-18
2.5.8 Carbon Dioxide and Alkalinity 2-18
2.5.9 Chloride 2-19
2.5.10 pH and Temperature 2-19
2.5.11 Summary 2-19

3.0 ANALYTICAL RESULTS AND EVALUATION **3-1**
3.1 CHEMICAL OF CONCERN DISTRIBUTION 3-1
3.1.1 VOCs 3-7
3.1.2 SVOCs 3-8
3.1.3 Inorganics 3-8
3.2 NATURAL ATTENUATION PARAMETERS 3-8
3.2.1 Alkalinity 3-9
3.2.2 Dissolved Oxygen 3-9
3.2.3 Ferrous Iron/Total Iron 3-17
3.2.4 Hydrogen Sulfide and Sulfate 3-18
3.2.5 Methane 3-18
3.2.6 Carbon Dioxide 3-19
3.2.7 Chloride 3-19
3.2.8 Nitrite 3-20
3.2.9 Phosphate 3-20
3.2.10 Oxidation/Reduction Potential 3-21
3.2.11 Organic Carbon 3-22
3.2.12 pH 3-22
3.2.13 Specific Conductivity 3-22
3.2.14 Temperature 3-23

TABLE OF CONTENTS

SECTION **PAGE NO.**

3.3 GENERAL OBSERVATIONS 3-23
3.4 NATURAL ATTENUATION OVERVIEW 3-24
3.4.1 Natural Attenuation Pathways 3-24
3.4.2 Geochemical Behavior Of Chlorinated Plumes 3-26
3.5 NATURAL ATTENUATION EVALUATION – AUGUST/SEPTEMBER 1998 DATA . 3-26
3.5.1 Natural Attenuation Screening Matrix 3-26
3.5.2 Degradation Pathways 3-27

4.0 CONCLUSIONS AND RECOMMENDATIONS 4-1
4.1 CONCLUSIONS 4-1
4.2 RECOMMENDATIONS 4-1

REFERENCES R-1

APPENDICES

A SOIL BORING LOGS AND GROUNDWATER MONITORING WELL FORMS
B ANALYTICAL LABORATORY RESULTS

TABLES

NUMBER		PAGE NO.
1-1	Chemicals of Concern Cleanup Goals, Long-Term Groundwater Remediation Program	1-4
1-2	Groundwater Level and Elevation – August 1998	1-9
2-1	Organic Compounds Detected in Surficial Aquifer Groundwater, Remediation Investigation	2-5
2-2	Chemicals of Concern (1995-1998) in Surficial Groundwater	2-7
2-3	Summary of Inorganics Detected in Groundwater, Remedial Investigation	2-12
2-4	Natural Attenuation Parameters (1995-1998)	2-15
3-1	Frequency of Detection – Chemicals of Concern	3-2
3-2	Summary of Analytical Results – Chemicals of Concern	3-3
3-3	Frequency of Detection – Natural Attenuation Parameters	3-10
3-4	Summary of Analytical Results – Natural Attenuation Parameters	3-11
3-5	Analytical Parameters and Weighting for Preliminary Natural Attenuation Screening Monitoring Well CF8MW4S (Downgradient Well)	3-28
3-6	Analytical Parameters and Weighting for Preliminary Natural Attenuation Screening Monitoring Well CF8MW7S (Source Area Well)	3-29
3-7	Analytical Parameters and Weighting for Preliminary Natural Attenuation Screening Monitoring Well CF8MW10S (Source Area Well)	3-30

FIGURES

NUMBER		PAGE NO.
1-1	General Location Map	1-2
1-2	Site Location Map	1-5
1-3	Site Layout and Topography	1-6
2-1	Groundwater 1994 RI Analytical Results for Organic Compounds	2-3
2-2	Select Organics Detected in Groundwater Samples April 1995 and June 1997	2-10
3-1	Baseline Groundwater Analytical Results, Chemicals of Concern	3-5
3-2	Baseline Groundwater Analytical Results, Natural Attenuation Parameters	3-15

LIST OF ACRONYMS AND ABBREVIATIONS

ABB-ES	ABB Environmental Services
bls	below land surface
BRA	Baseline Risk Assessment
BTX	benzene, toluene, xylenes
°C	degree centigrade
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	chemical of concern
DCA	dichloroethane
DCE	dichloreoethene
DO	dissolved oxygen
DOC	dissolved organic carbon
ECLR	excess lifetime cancer risk
FAA	Federal Facility Agreement
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
HI	Hazard Index
mg/kg	milligram per kilogram
mg/L	milligram per liter
ml	milliliter
mV	millivolt
µg/L	microgram per liter
NAS	Naval Air Station
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
nM	nano molar
ORP	oxidation/reduction potential
OU	Operable Unit
PCB	polychlorinated biphenyl
PEL	probable effect level
RAO	remedial action objective
ROD	Record Of Decision
SARA	Superfund Reauthorization Act
SOUTHNAVFACENGCOM	Southern Division Naval Facilities Engineering Command

SVOC	semi-volatile organic compound
TRPHs	total recoverable petroleum hydrocarbons
VOA	volatile organic analyte
VOC	volatile organic compound
U.S. EPA	United States Environmental Protection Agency

1.0 INTRODUCTION

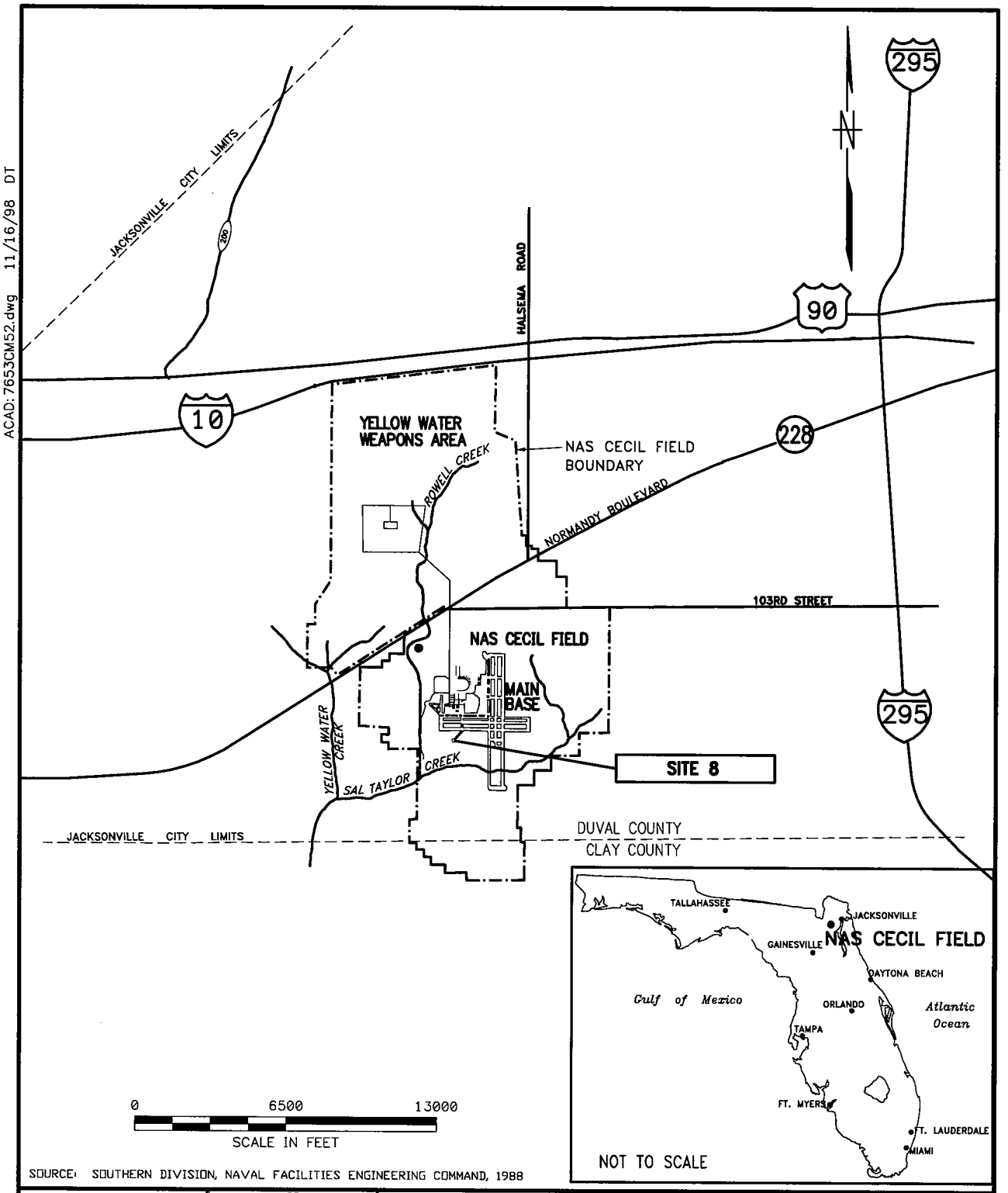
This Baseline Groundwater Monitoring Report has been prepared under Contract Task Order (CTO) 039 under the Comprehensive Long-Term Environmental Action Navy III (CLEAN) Contract No. N62467-94-D-0888 for the Southern Division, Naval Facilities Engineering Command. This report presents a summary of the work performed for the baseline groundwater monitoring event at Operable Unit (OU) 3, Site 8 at the Naval Air Station (NAS) Cecil Field, located in Jacksonville, Florida to evaluate and monitor the effectiveness of natural attenuation.

Tetra Tech NUS, Inc. (TtNUS) installed two new groundwater monitoring wells and collected and analyzed groundwater samples from a total of 15 monitoring wells for biodegradation natural attenuation parameters in accordance with the methodologies and procedures outlined in the Remedial Design Workplan (TtNUS, 1998). The purpose of this work is to obtain long-term data to assess the performance, progress, and effectiveness of biodegradation processes of natural attenuation. The data collected will be evaluated to support a decision to either continue biodegration natural attenuation at the site or to develop a contingency plan that will augment or replace the natural attenuation alternative. This report summarizes the results from the baseline groundwater monitoring event, provides an interpretation of the results, and presents recommendations for future actions. Groundwater samples were also collected in 1996 and 1997 and analyzed for natural attenuation parameters.

The report consists of four sections and two appendices. Section 1.0 discusses the purpose of the report and provides a brief history of Site 8. Section 2.0 summarizes the existing conditions at Site 8, including chemicals of concern. Section 3.0 presents the analytical results from the baseline groundwater sampling conducted in August 1998, along with a preliminary evaluation of the results. Section 4.0 presents conclusion and recommendations. Appendix A presents the soil boring log information, groundwater monitoring well construction forms, well development sheets, and groundwater sample log sheets for monitoring wells sampled during this sampling event. Appendix B presents a summary of the data validation effort.

1.1 HISTORY AND LOCATION OF WASTE DISPOSAL

Site 8 is part of OU 3 and is located at NAS Cecil Field near Jacksonville, Florida as illustrated in Figure 1-1. Site 8 was reportedly used as a boresite testing area for aircraft gunnery from 1970 to 1988. Aircraft would taxi to the concrete pad and "sight in" their guns by firing at targets in front of the backstop. Site 8 was also used as a firefighting training area from 1975 to 1988. Training activities took place in three bermed (but unlined) pits, two located adjacent and northwest of the concrete pad, one adjacent to and southwest of the concrete pad. As part of training aircraft frames were placed in the pits, doused with



SOURCE: SOUTHERN DIVISION, NAVAL FACILITIES ENGINEERING COMMAND, 1988

DRAWN BY MF DATE 3/27/98	DEPARTMENT OF THE NAVY SOUTHERN DIV FACILITIES ENGINEERING COMD	GENERAL LOCATION MAP OPERABLE UNIT 3, SITE 8 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NO. 7653
CHECKED BY DATE			APPROVED BY DATE
COST/SCHED-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1-1 / REV. 0

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flammable liquids, ignited, and extinguished. Site 8 was used for the storage of drummed hazardous waste from the late 1970's to 1980's. Drums were stored in the southern part of the open field between the concrete pad and boresite backstop. Reportedly, some of the drums were shot through and their contents spilled upon the ground.

The primary source of contamination at Site 8 was the liquid wastes, (e.g. waste solvents, paints and paint thinners, and fuel), used to ignite aircraft frames. Training activities have ceased and waste materials are no longer stored at Site 8; therefore, there is no current source for continued contamination. The groundwater chemicals of concern include 1,1-dichloroethene (1,1-DCE), benzene, toluene, xylenes, bis (2-ethylhexyl) phthalate, naphthalene, and aluminum. A list of groundwater chemicals of concern as identified in the Site 8 Remedial Investigation (RI) Report (ABB-ES, August 1997) with the cleanup goals is presented in Table 1-1. Contamination appears to be migrating toward the southeastern drainage ditch located approximately 100 feet south of Site 5. The direction of this migration is consistent with the anticipated groundwater flow direction. A detailed description of the nature and extent of contamination can be found in the RI Report for OU 3 (ABB-ES, August 1997)

1.2 SITE PHYSICAL AND GEOLOGICAL CONDITIONS

Site 8 is located approximately 1,600 feet south of the east-and-west flightline, 3,500 feet west of the north-and-south flightline, 700 feet north of Perimeter Road, and 1,000 feet north of Sal Taylor Creek. The site area of investigation covers approximately 13 acres. The site location is shown on Figure 1-2.

The main features of Site 8 are a taxiway which extends from the east-and-west flightline, a concrete pad at the end of that taxiway, the boresite backstop 600 feet southwest of the concrete pad, the open field between the concrete pad and the backstop, and an access road. The areas north and northwest of the site are open, grassy fields. The areas southwest, south, and east of the site are planted with pine trees. On either side of the boresite range are drainage ditches. Site topography is shown on Figure 1-3.

1.2.1 Topography

Most of Site 8 is located on a broad slope which dips gently to the south and southwest. The grade of the slope increases in the southern part of the site, from south of the boresite backstop to Perimeter Road, where the topographic relief is nearly flat. Site topography is shown on Figure 1-3.

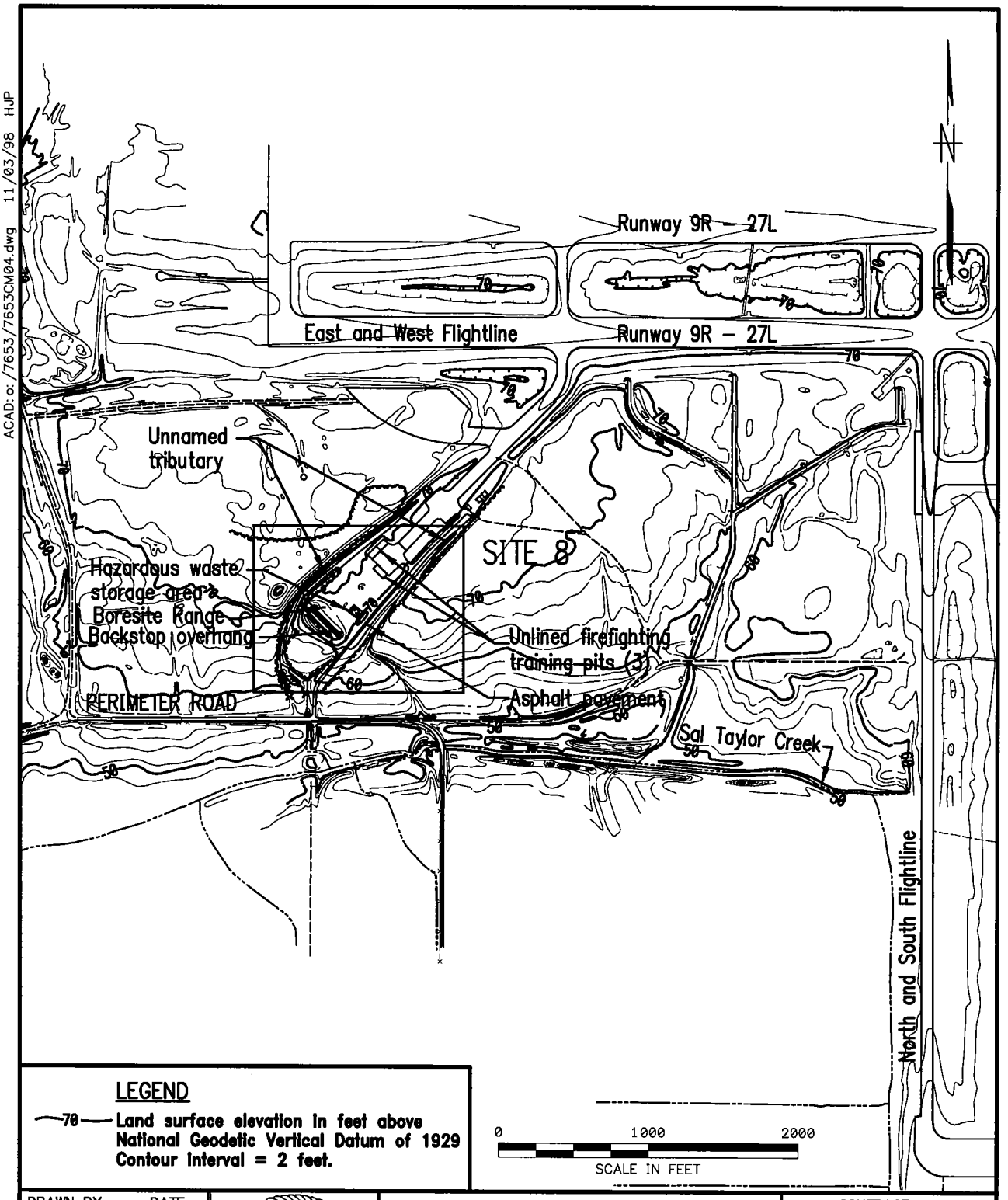
Elevations in the vicinity of Site 8 (the open field portion of the site) are approximately 70 feet above mean sea level (msl). The eastern and western side of the site slopes toward the drainage ditches, Sal Taylor Creek, and Perimeter Road. Elevations range from greater than 80 feet above msl at the backstop to less than 50 feet above msl south of the site.

TABLE 1-1

CHEMICALS OF CONCERN CLEANUP GOALS
LONG-TERM GROUNDWATER REMEDIATION PROGRAM
OPERABLE UNIT 3, SITE 8
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

Chemical	Cleanup Goal (μg/L)	Source
1,1-DCE	7.0	State of Florida Primary Drinking Water Standard[1]
Benzene	1.0	State of Florida Primary Drinking Water Standard[1]
Toluene	40.0	State of Florida Secondary Drinking Water Standard[2]
Xylenes	20.0	State of Florida Secondary Drinking Water Standard[2]
bis (2-ethylhexyl) phthalate	6.0	State of Florida Primary Drinking Water Standard[1]
Naphthalene	20	Florida Brownfield Cleanup Criteria Rule[3]
Aluminum	13,100	NAS Cecil Field Inorganic Background Data Set (HLA, 1998)

1 Chapter 62-550.310, F.A.C.
2 Chapter 62-550.320, F.A.C.
3 Chapter 62-785, F.A.C.



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—70— Land surface elevation in feet above National Geodetic Vertical Datum of 1929 Contour Interval = 2 feet.

DRAWN BY MF DATE 3/27/98	DEPARTMENT OF THE NAVY SOUTHERN DIV FACILITIES ENGINEERING COMD	SITE LOCATION MAP OPERABLE UNIT 3, SITE 8 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NO. 7653
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COST/SCHED–AREA			APPROVED BY DATE
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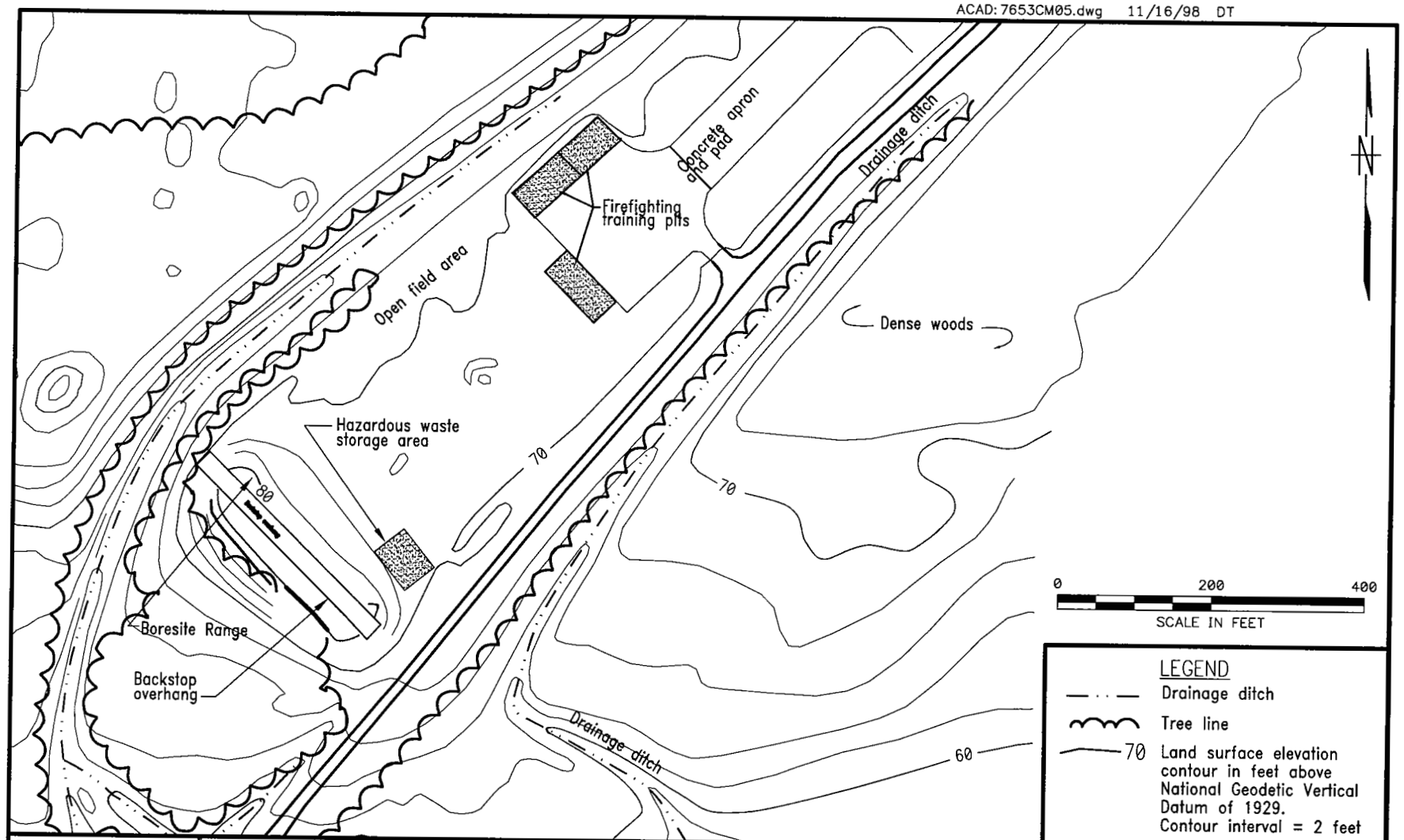

DRAWN BY MF DATE 3/27/98	SITE LAYOUT AND TOPOGRAPHY OPERABLE UNIT 3, SITE 8 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NO. 7653
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COST/SCHED-AREA		APPROVED BY DATE
SCALE AS NOTED		DRAWING NO. FIGURE 1-3 REV. 0

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1.2.2 Site Lithology

Site 8 is underlain by approximately 80 feet of fine- to medium-grained, poorly- to well-sorted quartz sands. In the northern part of the site, a sandy clay to clayey sand layer occurs between 4 and 14 feet below land surface (bls). This clayey layer is not continuous across the site and was only encountered in the vicinity of the firefighting training pits and in an area northwest of the concrete pad and taxiway.

Approximately 80 feet bls is a sandy clay unit with dolomite pebbles and stringers. The thickness of this sandy clay unit varies from 0 to 14 feet. Underlying this sandy clay unit is a dolomite layer that is at least 5 feet thick.

The soil observed by TtNUS during the installation of the two monitoring wells consisted of loose fine sand to a depth of approximately 24 feet bls; a sandy clay, silty sand, and clay lense from 24 to 35 feet bls; and a fine grained sand to a depth of 50 feet bls. The color of the soil was observed to be grey on the surface soil (0 to 5 feet bls) and deeper soil (greater than 25 feet) with a brown lense from 5 to 20-25 feet bls. The soil boring logs describing the field observations are included in Appendix A.

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, and 3) the Florida Aquifer. Between each formation is an aquitard, i.e., a less permeable unit. Only the surficial aquifer was investigated at Site 8.

The surficial aquifer is unconfined and composed of fine- to medium-grained sand with minor amounts of silt and clay stringers extending down to approximately 80 feet bls and underlain by sandy clay and dolomite. The surficial aquifer is considered to behave as one hydrological unit.

Monitoring wells were installed for the RI up to a maximum depth of 93 feet bls in the surficial aquifer system. The wells were installed at three levels (shallow, intermediate, and deep) within the surficial aquifer system.

Water table depths in the surficial aquifer are typically between 2 and 6 feet bls. Seasonally, groundwater may discharge to the drainage ditch in the southeastern part of the site. Groundwater flow is to the south toward Perimeter Road and Sal Taylor Creek, at an average rate of 55 feet per year. Water elevation data indicate that the vertical groundwater flow direction is downward at Site 8. However, during wet

periods of the year, vertical groundwater flow direction may be upward along the lower parts of the eastern drainage ditch.

Water-level measurements were obtained during the baseline groundwater sampling event from the new and existing monitoring wells sampled over several days. 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 August 1998 sampling are summarized on Table 1-2. The groundwater elevations range from 52.66 ft. msl to 69.11 ft. msl. The groundwater flow is in a southerly direction.

1.3 SURFACE AND SUBSURFACE SOIL

VOCs, SVOCs, total recoverable petroleum hydrocarbons (TRPHs) and inorganic compounds were detected in surface soil during the RI. TRPHs and beryllium were detected at concentrations (up to 3,100 mg/kg and up to 0.27 mg/kg) greater than their respective State of Florida guidance values for residential areas of 350 milligrams per kilogram (mg/kg) and 0.2 mg/kg.

TRPHs were detected in one subsurface soil sample in the southern firefighting training pit at a concentration (9,000 mg/kg) greater than the State of Florida guidance value for residential areas of 350 mg/kg.

1.4 SUMMARY OF THE RECORD OF DECISION

The Site 8 ROD (ABB-ES, 1997) was signed by the Navy, Florida Department of Environmental Protection (FDEP), and U.S. Environmental Protection Agency (USEPA) in March 1998. Intrinsic remediation, the selected groundwater remedy, was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (USEPA, 40 CFR 300). The process for remediating groundwater by natural attenuation, the chosen alternative stated in the ROD, will provide a method of observing the fate and any migration of the contaminant plume. The procedure to monitor the natural attenuation will include:

- Groundwater use from the surficial aquifer at Site 8 will be restricted thereby, providing immediate protection to human health.

- Monitor groundwater from the monitoring wells for 1,1-DCE and other contaminants over time.

- Monitor groundwater for processes/parameters which indicate that natural attenuation is occurring.

TABLE 1-2

GROUNDWATER LEVEL AND ELEVATION - AUGUST 1998
OPERABLE UNIT 3, SITE 8
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

Monitoring Well	CEF-08-	MW01S	MW02I	MW03D	MW04S	MW05S	MW06S	MW-07S	MW08I	MW09S	MW10S	MW12S	MW13S	MW17S	MW18S	MW23S	MW24I
Top of Casing		62.53	62.30	62.14	65.47	70.85	72.18	70.40	70.65	60.13	70.90	72.19	74.00	72.87	73.17	57.22	56.73
Ground Surface Elevation		60.2	60.1	59.9	63.2	68.6	69.8	68.6	68.6	57.7	68.7	70.3	71.8	70.8	71.0	54.1	54.1
Depth to Groundwater-bgs August 1998		2.78	0.00	0.00	4.07	8.26	6.25	4.10	6.21	3.02	4.53	5.96	4.19	3.91	4.06	4.56	0.00
Groundwater Elevation August 1998		59.75	62.30	62.14	61.40	62.59	65.93	66.30	64.44	57.11	66.37	66.23	69.81	68.96	69.11	52.66	56.73

- Model contaminant plume movement and behavior and contaminate degradation rates to verify that natural attenuation remediation is occurring.

- Review the status of the groundwater quality every 5 years for 30 years. During each review, site conditions will be reassessed and monitoring continued or other appropriate actions taken.

2.0 SITE CHEMICALS OF CONCERN

The results of the RI will be summarized in this section as well as present the conditions at the site prior to development of TtNUS' Remedial Design Workplan. During the RI, 21 monitoring wells were installed at the site for characterization Site 8. Thirteen of the wells were installed within the upper aquifer and completed with screen sections that intersect the water table for the majority of the year. Four of the 21 wells were installed in the intermediate level of the surficial aquifer and five of the 28 wells were installed in the deeper parts of the surficial aquifer system. A groundwater sampling event, including laboratory analysis and data validation, occurred in March 1994 to support the ROD.

Groundwater contamination was found to occur within the area of the fire fighting training pits and downgradient of the hazardous waste storage area and boresite range to the drainage ditch. Contamination was found in the groundwater samples within the upper 20 feet of the surficial aquifer. The chemicals of concern (COC), which are the chemicals with concentrations above the cleanup goals, were primarily VOC and SVOC and are listed in Table 1-1.

2.1 VOCS

Results of VOC analyses of groundwater samples collected during the 1994 investigation for the RI are presented on Figure 2-1 and in Table 2-1. Figure 2-1 also show the approximate contaminant plume based on the RI for the VOCs at the site. The COC for the VOCs identified were either petroleum based-related aromatic hydrocarbons (benzene, toluene, and xylenes) or solvent-type contaminates (DCE). Results of the VOC analyses of groundwater samples collected during the 1995 and 1997 sampling events are presented on Figure 2-2. Table 2-2 summarizes the results of several selected wells for all the sampling events.

During the RI, the petroleum based COCs were detected in samples from wells located adjacent to and downgradient of the fire fighting training area. Benzene was detected in two samples of the 22 samples collected at concentrations equal to the cleanup goals. The concentration of benzene was 1 J μg/L and 1 μg/L in wells that are downgradient of the fire fighting training pits. Toluene was detected in one groundwater sample above the cleanup goals at a concentration of 48 μg/L. This well was also located downgradient of the fire fighting training pits. Xylenes were detected in one groundwater sample above the cleanup goal at a concentration of 23 μg/L. This well was located adjacent to the fire fighting training pits.

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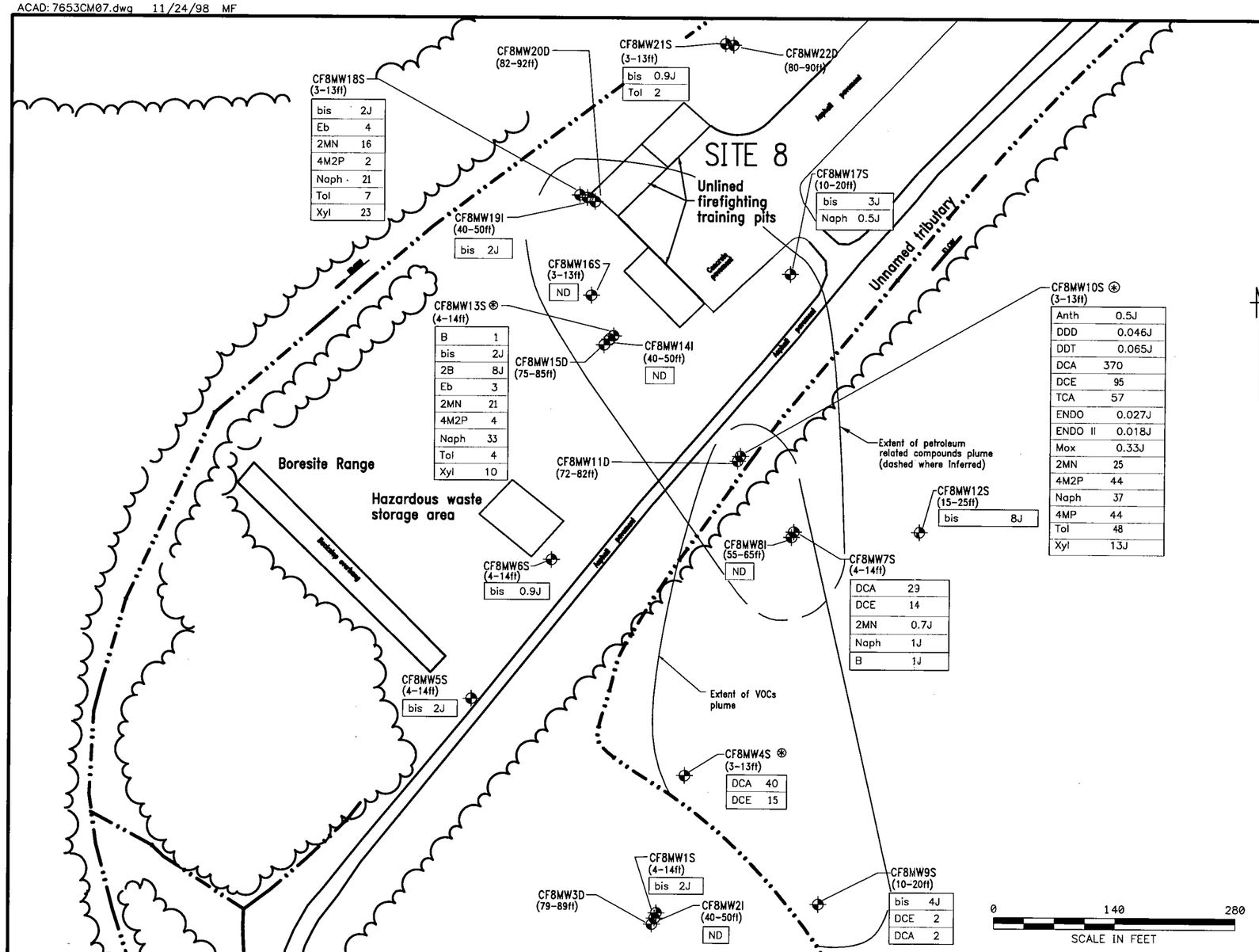

Florida Department of Environmental Protection
Groundwater Guidance Concentrations

Analytical Parameter		Regulatory value and type	
B	Benzene	1	PD
Eb	Ethylbenzene	700/30	PD/SD
Tol	Toluene	1,000/40	PD/SD
Xyl	Xylene	10,000/20	PD/SD
2B	2-Butanone	4,200	G
4M2P	4-Methyl-2-pentanone	350	G
DCA	1,1-Dichloroethane	700	G
DCE	1,1-Dichloroethene	7	PD
TCA	1,1,1-Trichloroethane	200	PD
Anth	Anthracene	2,100	G
2MN	2-methylnaphthalene	6.8 Total	G
Naph	Naphthalene	6.8 Total	G
bis	bis (2-Ethylhexyl) phthalate	6	PD
4MP	4 Methylphenol	35	G
P	Phenol	10	G
Ald	Aldrin	NG	
DDD	4,4'-Dichlorodiphenyldichloroethane	0.1	G
DDE	4,4'-Dichlorodiphenyldichloroethene	0.1	G
DDT	4,4-Dichlorodiphenyltrichloroethane	0.1	G
ENDO	Endosulfan sulfate	0.3	G
ENDO II	Endosulfan II	0.35	G
Mox	Methoxychlor	40	PD

NOTE:
All values reported in micrograms per liter.

PD	Primary drinking water standard
SD	Secondary drinking water standard
NG	No regulatory value given
J	Estimated value
G	Guidance value
ND	Not detected

LEGEND

CF8MW22D	Existing monitoring well with designation
	S = Shallow I = Intermediate D = Deep
	Drainage ditch
	Tree line
790	Value indicates a concentration equal to or greater than a State or Federal drinking water standard
⊛	Average of sample and duplicate
(10-20ft)	Monitoring well screen interval in feet below land surface

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY MF DATE 3/27/98
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

GROUNDWATER
1994 RI ANALYTIC RESULTS
FOR ORGANIC COMPOUNDS
OPERABLE UNIT 3, SITE 8
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 7653
APPROVED BY DATE
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DRAWING NO. FIGURE 2-1
REV. 0

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TABLE 2-1

ORGANIC COMPOUNDS DETECTED IN SURFICIAL AQUIFER GROUNDWATER
REMEDIAL INVESTIGATION
OPERABLE UNIT 3, SITE 8
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA
PAGE 1 OF 2

Analytical Parameter	Frequency of Detection[1]	Range of Lower Reporting Limits	Range of Detected Concentration	FDEP Regulatory Value[2]
SHALLOW AND INTERMEDIATE ZONE				
VOLATILE ORGANIC COMPOUNDS (µg/L)				
1,1-Dichloroethane	4/17	1 to 33	2 to 370*	700
1,1-Dichloroethene	**4/17**	**1 to 33**	**2 to 95***	**7**
1,1,1-Trichloroethane	1/17	1 to 33	57	200
2-Butanone	1/17	2 to 33	7.5*	4,200
4-Methyl-2-pentanone	2/17	2 to 33	2 to 3.5*	350
Benzene	2/17	1 to 17	1 J to 1*	1
Ethylbenzene	2/17	1 to 17	3* to 4	700/20
Toluene	**4/17**	**1 to 33**	**2 to 48***	**1,000/40**
Xylenes (total)	**3/17**	**1 to 33**	**10* to 23**	**10,000/20**
SEMIVOLATILE ORGANIC COMPOUNDS (µg/L)				
2-Methylnaphthalene	**4/17**	**10**	**0.7 J to 25***	**6.8 total**
4-Methylphenol	1/17	10	44*	350
Anthracene	1/17	10	0.5 J	2,100
Bis (2-ethylhexyl) phthalate	**10/17**	**10**	**0.9 J to 8 J**	**6**
Naphthalene	**5/17**	**10**	**0.5 J to 37***	**6.8 total**
PESTICIDES and PCBs (µg/l)				
4,4'-DDD	1/17	0.1 to 1,000	0.092 J	0.1
4,4'-DDT	**1/17**	**0.1 to 1,000**	**0.13 J**	**0.1**
Endosulfan II	1/17	0.1 to 1,000	0.037 J	0.35
Endosulfan sulfate	1/17	0.1 to 1,000	0.055 J	0.3
Methoxychlor	1/17	0.5 to 5,000	0.66 J	40
DEEP ZONE				
SEMIVOLATILE ORGANIC COMPOUNDS (µg/L)				
Bis (2-ethylhexyl) phthalate	**4/5**	**10**	**2 J to 12**	**6**
Phenol	1/5	10	0.6 J	10
PESTICIDES AND PCBS (µg/L)				
Aldrin	1/5	0.05	0.003 J	0.05

TABLE 2-1

ORGANIC COMPOUNDS DETECTED IN SURFICIAL AQUIFER GROUNDWATER
REMEDIAL INVESTIGATION
OPERABLE UNIT 3, SITE 8
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA
PAGE 2 OF 2

[1] Frequency of detection is the number in which the analyte was detected over the total number of samples analyzed (8MW1S, 8MW2I, 8MW4S, 8MW5S. 8MW6S, 8MW7S, 8MW8I, 8MW9S, 8MW10S, 8MW12S, 8MW13S, 8MW14I, 8MW16S, 8MW17S, 8MW18S, 8MW19I, and 8MW21S, including duplicates at 8MW4S, 8MW10S, and 8MW13S for surficial aquifer) (8MW3D, 8MW11D, 8MW15D, 8MW20D, and 8MW22D for intermediate aquifer).

[2] Regulatory values represent values for drinking water standards or guidance values from either State or Federal agencies.

Bold indicates parameter had concentration equal to or greater than the appropriate regulatory value.

Notes:

FDEP = Florida Department of Environmental Protection.
µg/l = micrograms per liter.
J = estimated concentration.
PCBs = polychlorinated biphenyls.
DDD = dichlorodiphenyldichloroethane.
DDT = dichlorodiphenyltrichloroethane.
* = average of a sample and its duplicate.

TABLE 2-2
CHEMICALS OF CONCERN (1995-1998) IN SURFICIAL GROUNDWATER
OPERABLE UNIT 3, SITE 8
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA
PAGE 1 OF 3

	CEF-8-4S					CEF-8-6S					CEF-8-7S					CEF-8-8I				
PARAMETER	1995	1996	1997	Feb-98	Aug-98	1995	1996	1997	Feb-98	Aug-98	1995	1996	1997	Feb-98	Aug-98	1995	1996	1997	Feb-98	Aug-98
LABORATORY ANALYSIS																				
Benzene (ug/L)	ND	ND	ND	6.9	1.9	ND	ND	ND	ND	ND	1J	ND	1.1	ND	0.9 J	ND	ND	ND	ND	ND
Toluene (ug/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene (ug/L)	ND	ND	ND	ND	1.4 J	ND	ND	ND	ND	ND	ND	ND	1.1	ND	0.6 J	ND	ND	ND	ND	ND
Xylenes (ug/L)	ND	ND	ND	ND	1.1 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCE (ug/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1 DCE (ug/L)	15	11	17	ND	28	ND	ND	ND	ND	ND	14	27	11	ND	14.1	ND	ND	ND	ND	ND
cis 1,2 DCE (ug/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans 1,2 DCE (ug/L)	ND	33.4	ND	ND	0.3 J	ND	ND	ND	ND	ND	ND	34.2	ND	ND	ND	ND	ND	ND	ND	ND
1,1 DCA (ug/L)	ND	ND	59	46	51.4	ND	ND	ND	ND	0.1 J	29	ND	23	14	16.9	ND	ND	ND	ND	ND
1,1,1 TCA (ug/L)	ND	ND	ND	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND
Vinyl Chloride (ug/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.1	ND	ND	ND
Naphthalene (ug/L)	NA	NA	NA	NA	1 J	NA	NA	NA	NA	ND	NA	NA	NA	NA	2 J	NA	NA	NA	NA	ND
2-Methylnaphthalene (ug/L)	NA	NA	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	2 J	NA	NA	NA	NA	ND
Methane (mg/L)	NA	ND	2.049	1.519	0.75	NA	ND	0.066	0.083	0.051 J	NA	1.8	0.805	0.747	0.335	NA	ND	0.01	0.016	NA
Ethane (mg/L)	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND
Ethene (mg/L)	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND

Notes:
NA=not analyzed
ND=not detected

TABLE 2-2
CHEMICALS OF CONCERN (1995-1998) IN SURFICIAL GROUNDWATER
OPERABLE UNIT 3, SITE 8
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA
PAGE 2 OF 3

	CEF-8-9S					CEF-8-10S					CEF-8-12S					CEF-8-13S				
PARAMETER	1995	1996	1997	Feb-98	Aug-98	1995	1996	1997	Feb-98	Aug-98	1995	1996	1997	Feb-98	Aug-98	1995	1996	1997	Feb-98	Aug-98
LABORATORY ANALYSIS																				
Benzene (ug/L)	ND	ND	ND	ND	ND	ND	15.9	ND	8.5	2.9	ND	ND	ND	NA	ND	1	1.17	1.1	ND	1 J
Toluene (ug/L)	ND	ND	ND	ND	ND	48	66.5	ND	15	10.2	ND	ND	ND	NA	ND	4	ND	2.6	9.3	2.3 J
Ethylbenzene (ug/L)	ND	ND	ND	ND	ND	ND	ND	ND	3	3 J	ND	ND	ND	NA	ND	3	ND	3.6	5.4	3.9 J
Xylenes (ug/L)	ND	ND	ND	ND	ND	13 J	ND	ND	15	7.5	ND	ND	ND	NA	ND	10	ND	15	22.9	10.5
PCE (ug/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND
1,1 DCE (ug/L)	2	4.5	1	ND	2.6 J	95	113	33	ND	44.7	ND	ND	ND	NA	0.3 J	ND	ND	ND	ND	ND
cis 1,2 DCE (ug/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.2 J	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND
trans 1,2 DCE (ug/L)	ND	4.7	ND	ND	ND	ND	318.8	ND	ND	0.2 J	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND
1,1 DCA (ug/L)	2	ND	1.3	2.6	1.5 J	370	ND	150	230	133	ND	ND	ND	NA	0.4 J	ND	ND	ND	ND	ND
1,1,1 TCA (ug/L)	ND	ND	ND	NA	ND	ND	ND	ND	NA	15.4	ND	ND	ND	NA	ND	ND	ND	ND	NA	ND
Vinyl Chloride (ug/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.7 J	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND
Naphthalene (ug/L)	NA	NA	NA	NA	ND	NA	NA	NA	NA	31	NA	NA	NA	NA	ND	NA	NA	NA	NA	69
2-Methylnaphthalene (ug/L)	NA	NA	NA	NA	ND	NA	NA	NA	NA	22	NA	NA	NA	NA	ND	NA	NA	NA	NA	65
Methane (mg/L)	NA	0.4	0.156	0.118	0.0851	NA	3.6	1.092	2.103	0.8945	NA	0.4	0.106	0.168	0.112	NA	7	3.791	5.6	1.92
Ethane (mg/L)	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND
Ethene (mg/L)	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND

Notes:
NA=not analyzed
ND=not detected

TABLE 2-2
CHEMICALS OF CONCERN (1995-1998) IN SURFICIAL GROUNDWATER
OPERABLE UNIT 3, SITE 8
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA
PAGE 3 OF 3

	CEF-8-17S					CEF-8-18S					CEF-8-21S				
PARAMETER	1995	1996	1997	Feb-98	Aug-98	1995	1996	1997	Feb-98	Aug-98	1995	1996	1997	Feb-98	Aug-98
LABORATORY ANALYSIS															
Benzene (ug/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
Toluene (ug/L)	ND	ND	ND	ND	ND	7	ND	ND	ND	ND	ND	ND	ND	ND	NA
Ethylbenzene (ug/L)	ND	ND	3	2.6	0.87 J	4	ND	ND	ND	ND	ND	ND	ND	ND	NA
Xylenes (ug/L)	ND	ND	1.7	1.2	ND	23	ND	3.2	ND	ND	ND	ND	ND	ND	NA
PCE (ug/L)	ND	18.5	ND	ND	ND	ND	27.9	ND	ND	ND	ND	ND	ND	ND	NA
1,1 DCE (ug/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
cis 1,2 DCE (ug/L)	ND	13.7	ND	ND	ND	ND	31.8	ND	ND	ND	ND	ND	ND	ND	NA
trans 1,2 DCE (ug/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
1,1 DCA (ug/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
1,1,1 TCA (ug/L)	ND	ND	ND	NA	ND	ND	ND	ND	NA	ND	NA	NA	NA	NA	NA
Vinyl Chloride (ug/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5	ND	ND	NA
Naphthalene (ug/L)	NA	NA	NA	NA	13	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA
2-Methylnaphthalene (ug/L)	NA	NA	NA	NA	6 J	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA
Methane (mg/L)	NA	1.2	0.797	0.931	0.346	NA	1.2	0.239	0.388	ND	NA	ND	ND	ND	NA
Ethane (mg/L)	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA	ND	ND	NA
Ethene (mg/L)	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA	ND	ND	NA

Notes:
NA=not analyzed
ND=not detected

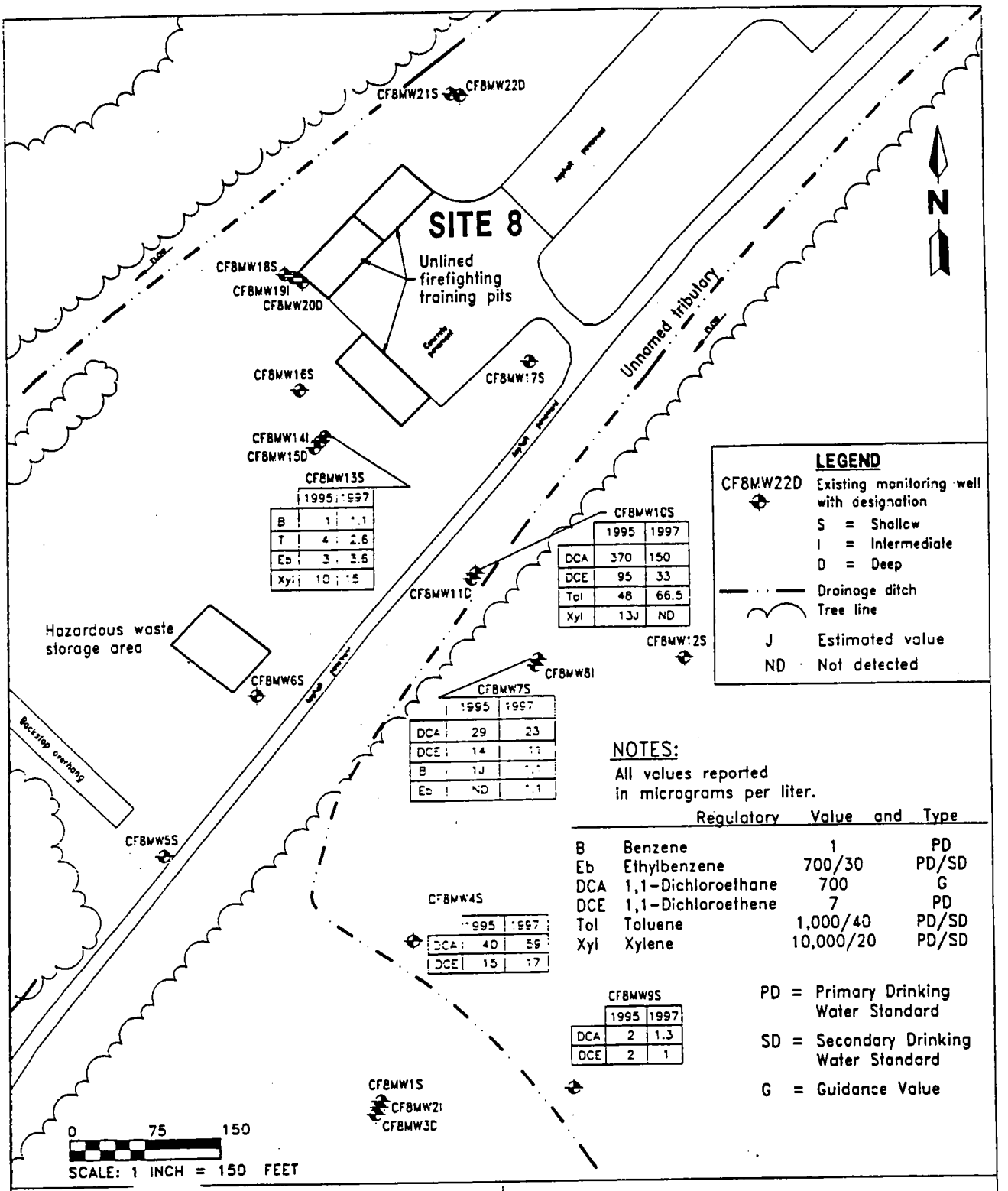


FIGURE 2-2
SELECT ORGANICS DETECTED IN GROUNDWATER SAMPLES APRIL 1995 AND JUNE 1997

NATURAL ATTENUATION SAMPLING REPORT

NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA

1,1-DCE was detected in three groundwater samples above the cleanup goal of 7 μg/L during the RI. The 1,1-DCE concentrations above the cleanup goal were 14 μg/L, 15 μg/L, and 95 μg/L in wells located downgradient of the fire fighting training pits and hazardous waste storage area. This area is located in the woods south and southeast of Site 8.

A comparison of 1995 and 1997 data indicates that DCE and DCA concentrations have decreased in monitoring wells that have a carbon source in the form of petroleum contamination (CF8MW10S and CF8MW7S). Downgradient wells CF8MW4S and CF8MW9S have no carbon source and chlorinated solvent concentrations have remained steady. In the petroleum plume CF8MW13S, CF8MW10S, and CF8MW7S showed no noticeable change in total BTEX concentrations. Based on the 1997 sampling event 1,1- DCE, benzene, and toluene were still present at concentrations that exceed regulatory values.

2.2 SVOCS

Results of SVOC analyses of groundwater samples collected during the 1994 investigation for the RI are also presented on Figure 2-1 and in Table 2-1. The COC for the SVOCs were bis (2-ethylhexyl) phthalate and naphthalene. Bis (2-ethylhexyl) phthalate was detected above the cleanup goal at values ranging from 0.9 J μg/L to 8 μg/L. Bis (2-ethylhexyl) phthalate was detected in 10 samples and distributed over much of the site. However, only one sample exceeded the cleanup goal and the sample was located in the sample from well CF8MW12S. Naphthalene was detected in five groundwater samples, however only three of these samples exceed the cleanup goal. The highest naphthalene concentration was 37 μg/L and the minimum detected concentration was 0.5 J μg/L. The naphthalene concentrations that exceeded the cleanup goal ranged from 21 μg/L to 37 μg/L. SVOCs were not analyzed in 1995 and 1997.

2.3 INORGANICS

The inorganic results from the RI for groundwater are presented in Table 2-3. Fifteen inorganics were detected in the groundwater samples collected. Aluminum and iron were detected in concentrations greater than their respective FDEP secondary drinking water standards of 200 μg/L and 300 μg/L. No other inorganic parameter was detected above its regulatory value. Aluminum and iron were also detected above the background screening concentrations.

The aluminum concentrations in seven groundwater samples were above the FDEP regulatory standard. The concentrations ranged from 362 μg/L to 15,300 J μg/L. Only three of these samples were above the background screening concentrations. Iron was detected in 17 groundwater samples, 16 of which were

TABLE 2-3

SUMMARY OF INORGANICS DETECTED IN GROUNDWATER
REMEDIAL INVESTIGATION
OPERABLE UNIT 3, SITE 8
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA
PAGE 1 OF 2

Analytical Parameter	Frequency of Detection[1]	Range of Lower Reporting Limits	Range of Detected Concentrations	Background Screening Concentrations[2]	Maximum Background Concentration	FDEP Regulatory Value
SHALLOW AND INTERMEDIATE ZONE						
Aluminum	**7/17**	**200 to 200**	**362 to 15,300 J**	**776**	**52,000**	**200**
Barium	12/17	200 to 200	17.6 to 42.4	41.2	47.6	2,000
Calcium	16/17	5,000 to 5,000	396 to 18,400	380	2.09	NG
Chromium	4/17	10 to 10	2.6* to 26.2	70	35.3	100
Copper	2/17	25 to 25	**6.6*** to 11.7	134	60.5	1,000
Iron	**17/17**	**100 to 100**	**228 to 3,270**	**450**	**14,400**	**300**
Magnesium	17/17	5,000 to 5,000	264 to 1,630	1,290	2,920	NG
Manganese	14/17	15 to 15	2.1 to 41	9.8	10.4	50
Nickel	3/17	40 to 40	3 to 5 J	32	16.8	100
Potassium	15/17	5,000 to 5,000	166 to 3,370*	1,580	788	NG
Selenium	3/17	5 to 5	4.2 to 4.9	ND	ND	50
Sodium	17/17	5,000 to 5,000	1,220 to 13,100	1,150	7,230	160,000
Vanadium	8/17	50 to 50	1.1 to 23.8	96	48.2	49
Zinc	2/17	20 to 20	44.5 to 96.2	4.8	25.6	5,000
Cyanide	3/17	10 to 10	2 J to 2 .1J	ND	ND	200
DEEP ZONE						
Arsenic	1/5	10 to 10	3.6	9.8	8.8	50
Barium	4/5	200 to 200	22.2 to 27.1	41.2	47.6	2,000
Calcium	5/5	5,000 to 5,000	31,500 to 52,000	380	2,090	NG
Chromium	1/5	10 to 10	3.7 J	70	35.3	100

TABLE 2-3

SUMMARY OF INORGANICS DETECTED IN GROUNDWATER
REMEDIAL INVESTIGATION
OPERABLE UNIT 3, SITE 8
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA
PAGE 2 OF 2

Analytical Parameter	Frequency of Detection[1]	Range of Lower Reporting Limits	Range of Detected Concentrations	Background Screening Concentrations[2]	Maximum Background Concentration	FDEP Regulatory Value
Iron	**5/5**	**100 to 100**	**222 J to 790**	**450**	**14,400**	**300**
Magnesium	5/5	5,000 to 5,000	6,930 to 12,800	1,290	2,920	NG
Manganese	5/5	15 to 15	33.5 to 48.7	9.8	10.4	50
Potassium	5/5	5,000 to 5,000	772 to 7,980	1,580	788	NG
Sodium	5/5	5,000 to 5,000	4,580 to 8,620	1,150	7,230	160,000

1 Frequency of detection is the number of samples in which the analyte was detected over the total number of samples analyzed (8MW1S, 8MW2I, 8MW4S, 8MW5S, 8MW7S, 8MW8I, 8MW9S, 8MW10S, 8MW12S, 8MW13S, 8MW14I, 8MW16S, 8MW17S, 8MW18S, 8MW19I, and 8MW21S, including duplicates at 8MW4SM, 8MW10S, and 8MW13S for surficial aquifer) (8MW3D, 8MW11D, 8MW20D, and 8MW22D for intermediate aquifer).

2 Twice the average of inorganics detected in background wells 16MW13S, 16MW14D,16MW15S, 16MW16D.

All concentrations are in µg/L.
Bold indicates the parameter was detected at a concentration equal to or greater than the appropriate regulatory value.

Notes:

FEDP = Florida Department of Environmental Protection
µg/L = micrograms per liter.
J = estimated concentration.
NG = no regulatory value given.
ND = not detected.
* = average of sample and its duplicate.

above the regulatory standard. The highest iron concentration was 2,810 μg/L. The samples with the high aluminum and iron concentrations were obtained from wells located downgradient from Site 8. The inorganic parameters were not analyzed in 1995 and 1997.

2.4 CONTAMINANT FATE AND TRANSPORT

The RI conducted a fate and transport analysis for the 1,1-DCE in groundwater at Site 8. Contaminants from the historical activities at the site have reached groundwater and have migrated approximately downgradient of the fire fighting training pits where groundwater discharges into a ditch. The transport process for volatile compounds include volatilization, dispersion, and biodegradation. Most of the 1,1-DCE will volatilize when the groundwater discharges to the ditch and is aerated during the stream flow. However, 1,1- DCE is relatively soluble in water and a residual amount will remain in the groundwater. The effect of dispersion on the 1,1-DCE will reduce the concentration to lower than the regulatory valve. This analysis did not consider biodegradation that could occur under anaerobic conditions with low levels of an electron donor or carbon source or under aerobic conditions through a cometabolic process stimulated by methanotrophic bacteria.

2.5 NATURAL ATTENUATION PARAMETERS

The groundwater samples obtained in 1995 and 1997 were analyzed for many biodegration natural attenuation parameters. A summary of the results for these parameters are presented on Table 2-4. The results of the analysis are discussed below.

2.5.1 Dissolved Oxygen

The system is anaerobic; dissolved oxygen was not detected within the areas of known contamination. Upgradient and perimeter monitoring wells had an average D.O. concentration of 0.23 mg/L. An anaerobic system is beneficial for reductive dechlorination but, is not conducive for biodegradation of the petroleum compounds in surficial monitoring wells within the plume.

2.5.2 Nitrite and Nitrate

There was no nitrite or nitrate found in 1997 samples. This indicates that nitrate reduction is not the predominant microbial process.

2.5.3 Ferrous Iron

Concentration of ferrous iron within the plume are less than 1 mg/L. This indicates that iron reduction is not the predominant microbial process.

TABLE 2-4
NATURAL ATTENUATION PARAMETERS (1995-1998)
OPERABLE UNIT 3, SITE 8
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA
PAGE 1 OF 3

	CEF-8-4S					CEF-8-6S					CEF-8-7S					CEF-8-8I				
PARAMETER	1995	1996	1997	Feb-98	Aug-98	1995	1996	1997	Feb-98	Aug-98	1995	1996	1997	Feb-98	Aug-98	1995	1996	1997	Feb-98	Aug-98
LABORATORY ANALYSIS																				
Nitrate (mg/L)	NA	0	ND	ND	NA	NA	0.11	ND	ND	NA	NA	0	ND	ND	NA	NA	0.12	ND	ND	NA
Nitrite (mg/L)	NA	ND	ND	ND	0.162	NA	ND	ND	ND	ND	NA	ND	ND	ND	0.43	NA	ND	ND	ND	NA
Iron (ug/L)	NA	NA	NA	NA	1200	NA	NA	NA	NA	181	NA	NA	NA	NA	853	NA	NA	NA	NA	467
Manganese (ug/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate (mg/L)	NA	8.32	7.8	4	12.8	NA	4.84	4.4	4	7.53	NA	7.03	16.1	5	40.2	NA	0.65	ND	3	NA
Dissolved Sulfide (mg/L)	NA	NA	0.73	ND	ND	NA	NA	ND	ND	6	NA	NA	0.9	ND	ND	NA	NA	ND	ND	NA
Methane (mg/L)	NA	ND	2.049	1.519	0.75	NA	ND	0.066	0.083	0.051 J	NA	1.8	0.805	0.747	0.335	NA	ND	0.01	0.016	NA
Ethane (mg/L)	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND
Ethene (mg/L)	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND
Alkalinity (mg/L)	NA	NA	NA	NA	22.9	NA	NA	NA	NA	27.1	NA	NA	NA	NA	45.8	NA	NA	NA	NA	NA
Chloride (mg/L)	NA	12.93	12.6	NA	12.8	NA	2.64	2.3	NA	4.54	NA	22.47	34.8	NA	53.5	NA	5.98	4.9	NA	NA
Dissolved Organic Carbon (mg/L)	NA	NA	19	15	29	NA	NA	10	7	5.45	NA	NA	10	14	15.5	NA	NA	ND	1	NA
Dissolved Inorganic Carbon (mg/L)	NA	77.3	12	NA	NA	NA	142.7	10	NA	NA	NA	212.4	13	NA	NA	NA	52.8	3	NA	NA
FIELD ANALYSIS																				
Redox Potential (millivolts)	NA	NA	-221	-40.3	-58	NA	NA	-139	48.6	114	NA	NA	-225	-76.9	-94	NA	NA	-110.3	82.8	37
pH	NA	5.65	5.71	6.09	5.19	NA	5.46	6.20	5.99	5.57	NA	5.12	5.43	7.55	5.61	NA	5.64	5.96	7.38	5.13
Temperature (Fahrenheit)	NA	NA	79.8	65.8	75.7	NA	NA	81.7	68.7	77.5	NA	NA	75.2	67.4	74.5	NA	NA	79.3	69.6	75.7
Conductivity (umhos/cm)	NA	NA	133	130.5	131	NA	NA	69	111.3	85	NA	NA	231	245	382	NA	NA	43	48.1	35
Turbidity (NTU)	NA	NA	2.14	2.18	0	NA	NA	4.83	4.79	8	NA	NA	2	3.17	1	NA	NA	1.33	0.96	9
HACH KIT ANALYSIS																				
Dissolved Oxygen (mg/L)	NA	0	0	2.3	0.78	NA	0	0.17	2.26	2.02	NA	0	0	0	0	NA	2.81	0.26	2.96	0.72
Ferrous Iron (Fe 2+) (mg/L)	NA	2.54	1.2	NC	1.1	NA	0.48	0.4	NC	0.6	NA	1.44	0.8	NC	0.8	NA	0.01	0.5	NC	0.6
Hydrogen Sulfide (mg/L)	NA	14.6	5	NC	NA	NA	0	2	NC	0	NA	11.9	5	NC	1	NA	0	0	NC	0
Carbon Dioxide (mg/L)	NA	NA	125	60	174	NA	NA	80	50	84	NA	NA	145	140	107.6	NA	NA	65	45	57.8
Chloride (mg/L)	NA	NA	25	20	NA	NA	NA	15	10	NA	NA	NA	60	30	NA	NA	NA	40	15	NA
Alkalinity (mg/L)	NA	NA	25	15	20	NA	NA	30	40	23.6	NA	NA	40	60	22.1	NA	NA	20	20	5

Notes:
NA=not analyzed
ND=not detected

TABLE 2-4
NATURAL ATTENUATION PARAMETERS (1995-1998)
OPERABLE UNIT 3, SITE 8
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA
PAGE 2 OF 3

	CEF-8-9S					CEF-8-10S					CEF-8-12S					CEF-8-13S				
PARAMETER	1995	1996	1997	Feb-98	Aug-98	1995	1996	1997	Feb-98	Aug-98	1995	1996	1997	Feb-98	Aug-98	1995	1996	1997	Feb-98	Aug-98
LABORATORY ANALYSIS																				
Nitrate (mg/L)	NA	0	ND	ND	NA	NA	0.02	ND	ND	NA	NA	0	ND	ND	NA	NA	0	ND	ND	NA
Nitrite (mg/L)	NA	ND	ND	ND	0.16	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	NA	ND	ND	ND	0.17
Iron (ug/L)	NA	NA	NA	NA	816	NA	NA	NA	NA	362	NA	NA	NA	NA	361	NA	NA	NA	NA	583
Manganese (ug/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate (mg/L)	NA	2.3	2.3	2	1.83 J	NA	0.77	2.9	6	9.18	NA	8.77	7.8	3	8.86	NA	1.99	1.3	26	2.96
Dissolved Sulfide (mg/L)	NA	NA	ND	ND	ND	NA	NA	2.4	ND	6	NA	NA	ND	ND	2	NA	NA	ND	ND	4
Methane (mg/L)	NA	0.4	0.156	0.118	0.0851	NA	3.6	1.092	2.103	0.8945	NA	0.4	0.106	0.168	0.112	NA	7	3.791	5.6	1.92
Ethane (mg/L)	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND
Ethene (mg/L)	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND
Alkalinity (mg/L)	NA	NA	NA	NA	37.5	NA	NA	NA	NA	27.1	NA	NA	NA	NA	20.8	NA	NA	NA	NA	52.1
Chloride (mg/L)	NA	5.7	4.5	NA	5.12	NA	5.84	3.8	NA	1.79	NA	8.76	6.5	NA	2.74 J	NA	4.07	2.7	NA	1.43
Dissolved Organic Carbon (mg/L)	NA	NA	2	3	4.23	NA	NA	19	23	21.3	NA	NA	6	7	4.09	NA	NA	42	55	59.3
Dissolved Inorganic Carbon (mg/L)	NA	249	11	NA	NA	NA	615.3	41	NA	NA	NA	357.8	33	NA	NA	NA	427.7	35	NA	NA
FIELD ANALYSIS																				
Redox Potential (millivolts)	NA	NA	-185	-34.6	-6	NA	NA	0	-144.7	-112	NA	NA	-138	-65.8	224	NA	NA	-171	-167.1	-109
pH	NA	5.15	5.60	6.08	5.01	NA	5.17	7.45	5.17	5.11	NA	5.33	6.31	5.52	5.00	NA	5.17	5.38	5.22	5.42
Temperature (Fahrenheit)	NA	NA	83.4	66.1	70.8	NA	NA	76.4	62.1	78.3	NA	NA	77.9	61.8	73.6	NA	NA	81.1	76.5	79.7
Conductivity (umhos/cm)	NA	NA	62	74.9	49	NA	NA	63	74.1	78	NA	NA	118	114	83	NA	NA	87	114.8	147
Turbidity (NTU)	NA	NA	1.01	1.25	NA	NA	NA	1.77	1.75	4	NA	NA	1.23	1.14	0	NA	NA	1.5	1.2	10
HACH KIT ANALYSIS																				
Dissolved Oxygen (mg/L)	NA	0	0	1.33	2.06	NA	0		4	0	NA	0	0	2	2.58	NA	0	0	0	0
Ferrous Iron (Fe 2+) (mg/L)	NA	2.49	1	NC	0.6	NA	0.55	0.4	0.4	0.4	NA	2.59	0.8	0.45	0.5	NA	0.47	0.6	NC	0.6
Hydrogen Sulfide (mg/L)	NA	5.4	5	NC	0.7	NA	56	50	NC	0.7	NA	2.5	5	NC	0.5	NA	30	5	NC	0.5
Carbon Dioxide (mg/L)	NA	NA	100	15	92.2	NA	NA	165	95	127.6	NA	NA	175	195	110.8	NA	NA	170	95	158.6
Chloride (mg/L)	NA	NA	15	10	NA	NA	NA	50	10	NA	NA	NA	20	10	NA	NA	NA	15	10	NA
Alkalinity (mg/L)	NA	NA	20	15	13.1	NA	NA	30	20	21.1	NA	NA	40	20	8.8	NA	NA	30	40	99.8

Notes:
NA=not analyzed
ND=not detected

TABLE 2-4
NATURAL ATTENUATION PARAMETERS (1995-1998)
OPERABLE UNIT 3, SITE 8
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA
PAGE 3 OF 3

	CEF-8-17S					CEF-8-18S					CEF-8-21S				
PARAMETER	1995	1996	1997	Feb-98	Aug-98	1995	1996	1997	Feb-98	Aug-98	1995	1996	1997	Feb-98	Aug-98
LABORATORY ANALYSIS															
Nitrate (mg/L)	NA	0	ND	ND	NA	NA	0.03	ND	ND	NA	NA	0	ND	0.02	NA
Nitrite (mg/L)	NA	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA
Iron (ug/L)	NA	NA	NA	NA	182	NA	NA	NA	NA	104	NA	NA	NA	NA	NA
Manganese (ug/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate (mg/L)	NA	3.22	3.3	2	13.6	NA	6.57	7.6	5	4.97	NA	6.24	6.2	2	NA
Dissolved Sulfide (mg/L)	NA	NA	ND	ND	8	NA	NA	ND	ND	6	NA	NA	0.57	ND	NA
Methane (mg/L)	NA	1.2	0.797	0.931	0.346	NA	1.2	0.239	0.388	ND	NA	ND	ND	ND	NA
Ethane (mg/L)	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA	ND	ND	NA
Ethene (mg/L)	NA	NA	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA	ND	ND	NA
Alkalinity (mg/L)	NA	NA	NA	NA	ND	NA	NA	NA	NA	150	NA	NA	NA	NA	NA
Chloride (mg/L)	NA	3.87	2.6	NA	0.369	NA	3.12	3	NA	1.94	NA	11.01	10.2	NA	NA
Dissolved Organic Carbon (mg/L)	NA	NA	7	9	3.89	NA	NA	15	12	5.53	NA	NA	4	5	NA
Dissolved Inorganic Carbon (mg/L)	NA	160.3	13	NA	NA	NA	362.7	28	NA	NA	NA	118.6	7	NA	NA
FIELD ANALYSIS															
Redox Potential (millivolts)	NA	NA	-74.3	136	45	NA	NA	-139	15.1	124	NA	NA	211	264.4	NA
pH	NA	4.90	5.00	4.69	4.47	NA	5.61	6.41	6.60	6.26	NA	5.46	4.70	5.76	NA
Temperature (Fahrenheit)	NA	NA	81.1	73.6	77.4	NA	NA	81.6	72.7	79.5	NA	NA	84.5	66.6	NA
Conductivity (umhos/cm)	NA	NA	37	52.1	31	NA	NA	147	130.5	340	NA	NA	67	115	NA
Turbidity (NTU)	NA	NA	1.09	0.63	0	NA	NA	3.82	5.3	32	NA	NA	4.38	3.49	NA
HACH KIT ANALYSIS															
Dissolved Oxygen (mg/L)	NA	0	0	1.61	0.5	NA	0	0	0	1.34	NA	0	0.19	0.62	NA
Ferrous Iron (Fe 2+) (mg/L)	NA	0.24	0.4	NC	0.4	NA	0.9	0.6	NC	0	NA	0.75	0.4	NC	NA
Hydrogen Sulfide (mg/L)	NA	4.7	5	NC	0.5	NA	1.6	2	NC	0	NA	0	0	NC	NA
Carbon Dioxide (mg/L)	NA	NA	100	65	70.4	NA	NA	140	135	110.8	NA	NA	40	35	NA
Chloride (mg/L)	NA	NA	15	10	NA	NA	NA	20	5	NA	NA	NA	20	20	NA
Alkalinity (mg/L)	NA	NA	10	10	3.1	NA	NA	60	40	148	NA	NA	10	10	NA

Notes:
NA=not analyzed
ND=not detected

2.5.4 Sulfate and Sulfide

There was a decreasing trend of sulfate concentrations along the centerline of the petroleum plume. This indicated a sulfate-reducing environment. There was also a separate decreasing trend of sulfate concentrations along the centerline of the chlorinated solvent plume, again indicating a sulfate-reducing environment. The presence of sulfide in CF8MW10S at a concentration of 2.4 mg/L was another good indicator that a reductive pathway was possible. Sulfate reduction appeared to be a predominant microbial process in both plumes.

2.5.5 Methane, Ethane, and Ethene

The presence of methane is indicative of strongly reducing conditions. Concentrations of methane above background were found in monitoring wells within both plumes with the highest concentrations being in CF8MW13S, 10S, and 7S. The concentration of 2.0 mg/L in CF8MW4S was interesting as this appeared to be high for a well with no anthrogpogenic carbon source however, the dissolved organic carbon content in this well was above background. The data indicated that methanogenic conditions exist and that this was a predominant microbial process. Ethane and ethene were not detected in any monitoring well samples.

2.5.6 Redox Potential

Negative redox potentials (-171 mV to -225 mV) were measured along the centerlines of both plumes. The redox potentials measured were within the optimal range for reductive dechlorination.

2.5.7 Dissolved Organic Carbon

Elevated concentrations of DOC were detected in centerline wells within both plumes. Carbon acts as an energy source for dechlorination. This provides another line of evidence that reductive dechlorination is occurring in the chlorinated plume in 1997.

2.5.8 Carbon Dioxide and Alkalinity

Concentrations of CO_2 within both plumes were above background. This was an indication that biodegradation was occurring as CO_2 is an end product of both aerobic and anaerobic biodegradation. The alkalinity within the plume was higher than background which supports the CO_2 data.

2.5.9 Chloride

Chloride concentrations were elevated in monitoring wells CF8MW10S and CF8MW7S providing another line of evidence that reductive dechlorination is occurring.

2.5.10 pH and Temperature

The pH of the surficial aquifer ranged from 5.3 to 7.5. The temperature ranged from 75 to 83 degrees Fahrenheit. Both of these conditions were amenable to biodegradation.

2.5.11 Summary

The electron acceptor data and natural attenuation parameter data support the conclusion that natural attenuation was occurring in 1997. The data show that the predominant microbial processes at the site were methanogenesis in the source areas grading to sulfate-reduction in the fringe areas.

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 August 1998 sampling activities are presented in this section. Two groundwater monitoring wells, one shallow and one intermediate, were installed by TtNUS personnel in August 1998. Boring logs are provided in Appendix A. The shallow well was screened approximately 15 to 25 feet bls and the intermediate well was screened approximately 40 to 50 feet bls. The new wells are identified as CF5MW23S and CF8MW24I.

Groundwater samples were collected from the two new wells and thirteen existing monitoring wells and analyzed at a fixed-based laboratory for natural attenuation and chemical parameters as shown in Table 3-1 of the Workplan (TtNUS, 1998). The wells were sampled in accordance with TtNUS standard operating procedures and EPA Region 4's Environmental Investigation Standard Operating Procedures and Quality Assurance Manual for low-flow purging and sampling of monitoring wells. One field duplicate sample was collected from well CF8MW12S. GPL Laboratories in Gaithersburg, Maryland was used for analysis of the groundwater samples.

A network of 15 monitoring wells located upgradient, within, and immediately downgradient of the VOC and petroleum related compounds (TRPH) plume were used to measure the long-term plume migration and natural attenuation. The rationale for the location of the long term monitoring wells is as follows:

Monitoring Well	Rationale
CF8MW13S, CF8MW17S, CF8MW18S	Upgradient of VOC plume and within TRPH plume.
CF8MW12S	Upgradient/crossgradient of VOC and TRPH plumes.
CF8MW4S, CF8MW9S	Within VOC plume.
CF8MW7S, CF8MW8I, CF8MW10S	Within VOC and TRPH plumes.
CF8MW1S, CF8MW2I, CF8M2W3D, CF8MW23S, CF8MW24I	Downgradient of VOC plume.
CF8MW6S	Downgradient of TRPH plume.

3.1 CHEMICAL OF CONCERN DISTRIBUTION

The frequency of detection and range of positive values for all parameters is provided in Table 3-1. The target cleanup levels for site COCs are also included. Table 3-2 and Appendix B provides detailed positive analytical results for each well sampled. Figure 3-1 provides a tag map of the analytical results.

TABLE 3-1

FREQUENCY OF DETECTION - CHEMICALS OF CONCERN
OPERABLE UNIT 3, SITE 8, GROUNDWATER DATA
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

Parameter	Frequency of Detection	Range of Positive Detects	Range of Nondetects	Location of Maximum Positive Detect	Average of Positive Detects	Average of All
VOLATILES (µg/L)						
1,1,1-Trichloroethane	1/16	15.4	5	CF-8-MW-10S-01	15.4	3.30625
1,1-Dichloroethane	7/16	0.1 - 133	5	CF-8-MW-10S-01	29.1	14.1375
1,1-Dichloroethene	6/16	0.3 - 44.7	5	CF-8-MW-10S-01	15	7.1875
Benzene	4/16	0.9 - 2.9	1 - 5	CF-8-MW-10S-01	1.675	1.04375
Chloroethane	1/16	2.5	5	CF-8-MW-10S-01	2.5	2.5
Ethylbenzene	5/16	0.6 - 3.9	5	CF-8-MW-13S-01	1.94	2.325
Methane	11/12	51.2 - 1920	21	CF-8-MW-13S-01	494.345455	454.025
Toluene	3/16	1 - 10.2	5	CF-8-MW-10S-01	4.5	2.875
Trans-1,2-dichloroethene	2/16	0.2 - 0.3	5	CF-8-MW-04S-01	0.25	2.21875
Vinyl Chloride	1/16	0.7	1 - 5	CF-8-MW-10S-01	0.7	0.6375
Xylenes, Total	4/16	0.2 - 10.5	5	CF-8-MW-13S-01	4.825	3.08125
cis-1,2-dichloroethene	1/16	0.2	5	CF-8-MW-10S-01	0.2	2.35625
SEMIVOLATILES (µg/L)						
2-Methylnaphthalene	4/16	2 - 65	6 - 7	CF-8-MW-13S-01	23.75	8.28125
Naphthalene	5/16	1 - 69	6 - 7	CF-8-MW-13S-01	23.2	9.40625
INORGANICS (µg/L)						
Aluminum	10/16	255 - 12100	200	CF-8-MW-23S-01	1632.7	1057.9375
Calcium	15/16	1050 - 52700	1000	CF-8-MW-18S-01	17946.66667	16856.25
Iron	16/16	104 - 2280	0	CF-8-MW-23S-01	646.75	646.75
Magnesium	9/16	742 - 8850	450 - 602	CF-8-MW-03D-01	2229.333333	1370.375
Potassium	16/16	213 - 7790	0	CF-8-MW-18S-01	1696.25	1696.25
Sodium	16/16	1650 - 26000	0	CF-8-MW-07S-01	5726.875	5726.875
NATURAL ATTENUATION PARAMETERS (mg/L)						
Alkalinity	11/12	14.6 - 150	1	CF-8-MW-18S-01	43.181818	39.625
Ammonia	9/12	0.2 - 1.84	0.1	CF-8-MW-12S-01	0.908889	0.694167
Chloride	12/12	0.369 - 53.5	0	CF-8-MW-07S-01	8.154917	8.154917
Dissolved Organic Carbon	11/12	3.89 - 59.3	10	CF-8-MW-13S-01	16.668182	15.695833
Nitrite	5/12	0.16 - 0.54	0.1	CF-8-MW-12S-01-D	0.2924	0.151
Orthophosphate	2/12	0.25 - 0.75	0.1	CF-8-MW-23S-01	0.5	0.125
Sulfate	11/12	1.83 - 51.4	0.1	CF-8-MW-01S-01	14.750909	13.525833
Sulfide	8/12	2 - 8	2	CF-8-MW-17S-01	5.25	3.833333

TABLE 3-2

SUMMARY OF ANALYTICAL RESULTS – CHEMICALS OF CONCERN
OPERABLE UNIT 3, SITE 8 GROUNDWATER DATA
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA
PAGE 1 OF 2

Sample Number	CF-8-MW-01S-01	CF-8-MW-02I-01	CF-8-MW-03D-01	CF-8-MW-04S-01	CF-8-MW-06S-01	CF-8-MW-07S-01	CF-MW-08I-01	CF-8-MW-09S-01
Collection Date:	**08/21/98**	**08/21/98**	**08/21/98**	**08/21/98**	**08/19/87**	**08/19/98**	**08/19/98**	**08/21/98**
Location	**CF8MW1S**	**CF8MW2I**	**CF8MW3D**	**CF8MW4S**	**CF8MW6S**	**CF8MW7S**	**CF8MW8I**	**CF8MW9S**
VOLATILES (µg/L)								
1,1,1-Trichloroethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,1-Dichloroethane	5 U	5 U	5 U	51.4	0.1 J	16.9	5 U	1.5 J
1,1-Dichloroethene	5 U	5 U	5 U	**28**	5 U	**14.1**	5 U	2.6 J
Benzene	1 U	1 U	1 U	**1.9**	1 U	0.9 J	1 U	1 U
Chloroethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Cis-1,2-Dichloroethene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Ethylbenzene	5 U	5 U	5 U	1.4 J	5 U	0.6 J	5 U	5 U
Toluene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Trans-1,2-Dichloroethene	5 U	5 U	5 U	0.3 J	5 U	5 U	5 U	5 U
Vinyl Chloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylenes, Total	5 U	5 U	5 U	1.1 J	5 U	5 U	5 U	5 U
SEMIVOLATILES (µg/L)								
2-Methylnaphthalene	7 U	6 U	6 U	6 U	6 U	2 J	6 U	6 U
Naphthalene	7 U	6 U	6 U	1 J	6 U	2 J	6 U	6 U
INORGANICS (µg/L)								
Aluminum	630	200 U	200 U	865	483	200U	200 U	200 U
Calcium	30800	1050	40500	9740	12800	34300	1200	4030
Magnesium	450U	450U	8850	988	582U	850	465U	760
Potassium	1440	376	1030	698	803	229	678	856
Sodium	6720	2860	5010	8350	1650	26000	3520	3280

Bold and shade exceed clean-up goal in Table 1-1.

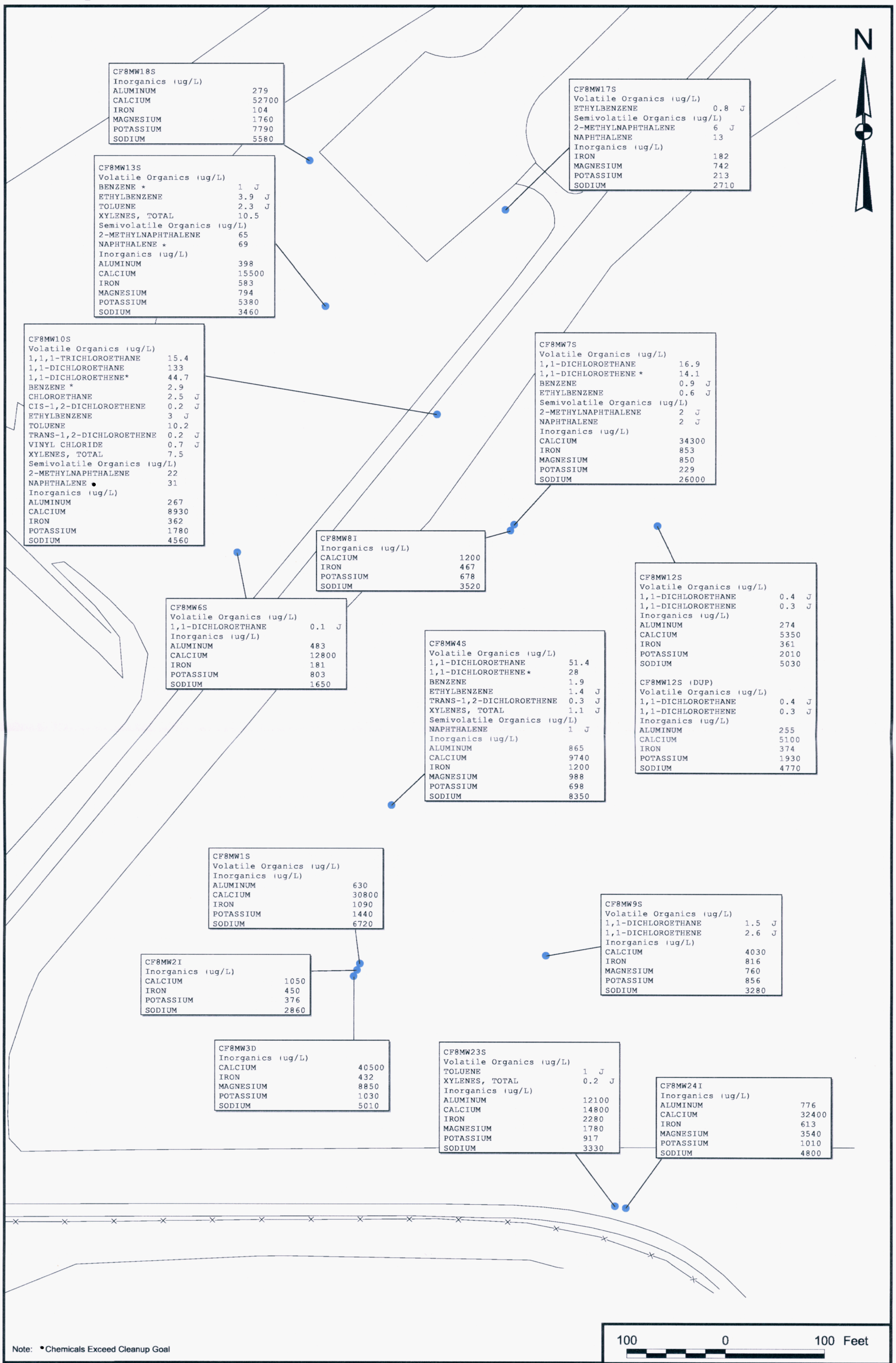
TABLE 3-2

SUMMARY OF ANALYTICAL RESULTS – CHEMICALS OF CONCERN
OPERABLE UNIT 3, SITE 8 GROUNDWATER DATA
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA
PAGE 2 OF 2

Sample Number Collection Date: Location	CF-8-MW-10S-01 08/19/98 CF8MW10S	CF-8-MW-12S-01 08/19/98 CF8MW12S	CF-8-DUP-01 08/19/98 CF8MW12S	CF-8-MW-13S-0 08/19/98 CF8MW13S	CF-8-MW-17S-01 08/19/98 CF8MW17S	CF-8-MW-18S-01 08/19/98 CF8MW18S	CF-8-MW-23S-01 08/18/98 CF8MW23S	CF-8-MW-24I-01 08/18/98 CF8MW24I
VOLATILES (µg/L)								
1,1,1-Trichloroethane	15.4	5 U	5 U	5 U	5 U	5U	5 U	5 U
1,1-Dichloroethane	133	0.4 J	0.4 J	5 U	5 U	5U	5 U	5 U
1,1-Dichloroethene	**44.7**	0.3 J	0.3 J	5 U	5 U	5U	5 U	5 U
Benzene	**2.9**	1 U	1 U	1 J	1 U	1U	5 U	5 U
Chloroethane	2.5 J	5 U	5 U	5 U	5 U	5U	5 U	5 U
Cis-1,2-Dichloroethene	0.2 J	5 U	5 U	5 U	5 U	5U	5 U	5 U
Ethylbenzene	3 J	5 U	5 U	3.9 J	0.8 J	5U	5 U	5 U
Toluene	10.2	5 U	5 U	2.3 J	5 U	5U	1 J	5 U
Trans-1,2-Dichloroethene	0.2 J	5 U	5 U	5 U	5 U	5U	5 U	5 U
Vinyl Chloride	0.7 J	1 U	1 U	1 U	1 U	1U	1 U	5 U
Xylenes, Total	7.5	5 U	5 U	10.5	5 U	5U	0.2 J	5 U
SEMIVOLATILES (µg/L)								
2-Methylnaphthalene	22	6 U	6 U	65	6 J	7U	7 U	6 U
Naphthalene	**31**	6 U	6 U	**69**	13	7U	7 U	6 U
INORGANICS (µg/L)								
Aluminum	267	274	255	398	200 U	279	12100	776
Calcium	8930	5350	5100	15500	1000 U	52700	14800	32400
Magnesium	602 U	580 U	595 U	794	742	1760	1780	3540
Potassium	1780	2010	1930	5380	213	7790	917	1010
Sodium	4560	5030	4770	3460	2710	5580	3330	4800

Bold and shade exceed clean-up goal in Table 1-1

P:\GIS\CECIL\SITE8_TAG.APR 17/11/98 YLI LAYOUT GW TAG NON NATURAL ATTENUATION



Note: • Chemicals Exceed Cleanup Goal

DRAWN BY YLI	DATE Nov. 17, 98	BASELINE GROUNDWATER ANALYTIC RESULTS CHEMICALS OF CONCERN OPERABLE UNIT 3, SITE 8 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY BD	DATE Nov. 17, 98		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. Figure 3-1 REV 0

Most of the chemicals of concern were detected at or below the target cleanup levels. The chemicals of concern that were detected above the target cleanup levels included 1-1 DCE, benzene, and naphthalene. The groundwater contamination in the upgradient area of the plume remained the same or decreased for most contaminates when compared to the results of the RI. The groundwater contamination in the center area of the plume increased when compared to the results of the RI and the groundwater contamination in the downgradient area of the plume remained approximately the same.

3.1.1 VOCs

1,1-DCE was detected in three wells (CF8MW10S, CF8MW7S, and CF8MW4S) above the target cleanup level at a concentration of 7 μg/L. These are the same wells where 1,1-DCE was detected during the RI. The maximum 1,1-DCE concentration has decreased at the site in monitoring well CF8MW10S from 95 μg/L in the RI to 44.7 μg/L during the baseline groundwater sampling event. The 1,1-DCE concentration in monitoring well CF8MW7S remained approximately the same at 14.I μg/L and the concentration in monitoring well CF8MW4S increased from 15 μg/L to 28 μg/L. The 1,1-DCE concentrations in the other wells were below the detection limit or the target cleanup level. Based on the sampling in the plume area, the 1,1-DCE contamination in the groundwater appears to have decreased by a factor of two in the upgradient area when compared to the groundwater values reported in RI. However, the 1,1-DCE contamination in the groundwater appears to have increased by a factor of 2 in the downgradient area of the plume.

Benzene was detected in three wells (CF8MW13S, CF8MW10S, and CF8MW4S) above the target cleanup level at a concentration of 1 μg/L. The concentration of benzene was detected at 1J μg/L in well CF8MW13S, the same concentration detected in the RI. Benzene was not detected in well CF8MW10S during the RI but was detected at a concentration of 2.9 μg/L during the baseline groundwater sampling event. Benzene was not detected in well CF8MW4S during the RI also but was detected at a concentration of 1.9 μg/L during the baseline groundwater sampling event. Based on the sampling in the plume area, the benzene contamination appears to have migrated downgradient and is found within the same area as the 1,1-DCE plume.

Toluene and xylene were detected in several wells at Site 8 but the detected concentrations were below the cleanup goals. The toluene and xylene concentrations decreased to not detected in well CF8MW18S and decreased significantly in well CF8MW10S. The concentration of toluene and xylene remained approximately the same in CF8MW13S.

Vinyl chloride, cis-1,2-dichloroethene, trans-1,2-dichloroethene, chloroethane, 1,1-dichloroethane and 1,1,1-trichloroethene were detected during the baseline groundwater sampling event. The concentrations

of the contaminants were below the cleanup goals established during the RI. The concentrations of these contaminants were less than 20 μg/L except for 1,1-dichloroethane which had a maximum concentration of 133 μg/L.

3.1.2 SVOCs

Naphthalene was detected in two downgradient wells CF8MW13S and CF8MW10S at concentrations of 69 μg/L and 31 μg/L, respectively. These detections are in excess of the cleanup level of 20 μg/L. The concentration of naphthalene doubled in well CF8MW13S and was approximately the same in well CF8MW10S when compared to the RI. The concentration of naphthalene decreased from 21 μg/L to not detected in well CF8MW18S, an upgradient well.

2-methylnaphthalene was detected four wells at concentrations ranging from 2 μg/L to 65 μg/L in wells CF8MW7S, CF8MW10S, CF8MW13S, and CF8MW17S. The highest concentration was detected in well CF8MW13S and the concentration decreased in the downgradient direction. The concentration of 2-methylnaphthalene has increased in well CF8MW13S by a factor of 3, increased in well CF8MW17S from not detected to 6 J μg/L, remained approximately the same in CF8MW7S and CF8MW10S, and decreased from 16 μg/L to not detected in well CF8MW18S.

3.1.3 Inorganics

Several inorganics were detected in the groundwater samples collected in this quarterly sampling event. Aluminum, a COC from the RI, was detected in ten of the samples ranging in concentration from 255 μg/L to 12,100 μg/L. The maximum concentration was detected in one of the new wells (CF8MW23S) installed for this workplan. The concentration of aluminum was below the cleanup goal of 13,100 μg/L.

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, ammonia, chloride, dissolved organic carbon, methane, ethane, ethene, nitrite, sulfate, sulfide, total iron, and total phosphate. Field analytical tests included pH, specific conductance, temperature, turbidity, dissolved oxygen, hydrogen sulfide, dissolved carbon dioxide, ferrous iron, oxidation-reduction potential, and alkalinity. This section presents the analytical results from the baseline groundwater sampling conducted in August 1998. Additional groundwater sampling and analysis is anticipated to occur 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 Tables 3-3 and 3-4. Figure 3-2 provides a tag map of the laboratory natural attenuation analytical results. The location of the wells is shown of Figure 3-1. A preliminary evaluation of the data is provided.

3.2.1 Alkalinity

Alkalinity is a measure of the buffering (neutralizing) capacity of acids in water, and is expressed as mg/L $CaCO_3$. Generally, alkalinity consists of three types, carbonate (CO_3), bicarbonate (HCO_3), and hydroxide (OH). Bicarbonate represent the major portion of natural groundwater alkalinity, however, carbonate and hydroxide may contribute to the total alkalinity in chemically treated or polluted groundwater. The alkalinity can give a general indication of the amount of CO_2 generated in a plume.

The alkalinity concentration from the laboratory testing ranges from not detected in monitoring well CF8MW17S to 150 mg/L in the upgradient well CF8MW18S. The alkalinity concentration, from field testing, ranges from 3.1 mg/L in well CF8MW17S to 148 mg/L in the upgradient well CF8MW18S. The alkalinity is decreasing in the downgradient direction indicating an overall increase in the hydroxide ion. This indicates that CO_2 is being generated in the plume because of either biological respiration by bacteria or as a degradation end product of hydrocarbons.

The alkalinity concentrations were approximately the same as the concentration found in the past sampling events except for monitoring wells CF8MW18S, CF8MW17S, CF8MW13S, and CF8MW12S. The concentration of alkalinity noticeably increased in monitoring wells CF8MW18S and CF8MW13S and decreased in monitoring wells CF8MW17S and CF8MW12S.

3.2.2 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 and is the single most efficient electron acceptor responsible for biodegradation of petroleum hydrocarbons. During aerobic respiration, oxygen is utilized as an electron acceptor to minerialize petroleum hydrocarbons into carbon dioxide and water. Dissolved oxygen at concentrations below background provides strong evidence of indigenous bacteria populations that are already established have utilized all available oxygen to degrade the petroleum hydrocarbons.

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

TABLE 3-3

FREQUENCY OF DETECTION-NATURAL ATTENUATION PARAMETERS
OPERABLE UNIT 3, SITE 8 GROUNDWATER DATA
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA

Parameter	1996			1997			1998		
	Range/ Detection Frequency	Location of Maximum	Average of Detects	Range/ Detection Frequency	Location of Maximum	Average of Detects	Range/ Detection Frequency	Location of Maximum	Average of Detects
Dissolved Oxygen	0-2.81 (3/18)	CF8MW8I	1.37	ND to 0.4 (8/18)	CF8MW22D	0.23	ND to 2.58	CF8MW12S	0.99
Nitrites	ND	--	ND	ND	--	ND	ND to 0.54	CF8MW12S	0.29
Nitrates	ND-0.12 (8/18)	CF8MW8I	0.058	ND	--	ND	NA	--	NA
Ferrous Iron	ND-2.59 (17/18)	CF8MW12S	0.909	0.1 to 1.2 (18/18)	CF8MW4S	0.61	ND to 1.2	CF8MW1S	0.6
Sulfates	0.34-9.95 (18/18)	CF8MW16S	3.67	ND to 16.1 (13/18)	CF8MW7S	5.4	ND to 51.4	CF8MW1S	14.75
Dissolved Sulfides	NA	--	NA	ND to 2.4 (6/18)	CF8MW10S	1.03	ND to 8	CF8MW17S	5.25
Methane	ND-7.0 (8/18)	CF8MW13S	2	ND to 3.79 (14/18)	CF8MW13S	0.681	ND to 1920	CF8MW13S	494
Ethane	NA	--	NA	ND	--	ND	NA	--	NA
Ethene	NA	--	NA	ND	--	ND	NA	--	NA
ORP (mV)	NA	--	NA	-224 to +211 (17/18)	CF8MW21S*	-97	-112 to 124	CF8MW18S	27
DOC	NA	--	NA	ND to 42 (12/18)	CF8MW13S	12.6	ND to 59.3	CF8MW13S	16.67
Carbon Dioxide	NA	--	NA	35 to 180 (18/18)	CF8MW16S	98.3	48 to 174	CF8MW4S	96.2
Alkalinity (as $CaCO_3$)	NA	-	NA	10 to 200 (18/18)	CF8MW15D	63.6	ND to 150	CF8MW18S	43.2
Chlorides	NA	--	NA	10 to 60 (18/18)	CF8MW7s	23.6	ND to 53.5	CF8MW7S	8.2

Notes:

NA: Not analyzed
ND: Not detected at the analytical method detection limit
--: No information because of NA or ND
* : Location of most reductive conditions (-224 mV)

TABLE 3-4

SUMMARY OF ANALYTICAL RESULTS - NATURAL ATTENUATION PARAMETERS
OPERABLE UNIT 3, SITE 8 GROUNDWATER DATA
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA
PAGE 1 OF 3

Sample Number:	CF-8-MW-01S-01	CF-8-MW-02I-01	CF-8-MW-03D-01	CF-8-MW-04S-01	CF-8-MW-06S-01	CF-8-MW-07S-01
Collection Date:	**8/21/98**	**8/21/98**	**8/21/98**	**8/21/98**	**8/19/98**	**8/19/98**
Location:	**CF8MW1S**	**CF8MW2I**	**CF8MW3D**	**CF8MW4S**	**CF8MW6S**	**CF8MW7S**
INORGANICS, UNFILTERED (ug/L)						
Iron	1090	450	432	1200	181	853
NATURAL ATTENUATION PARAMETERS (mg/L)						
Alkalinity	39.6	NA	NA	22.9	27.1	45.8
Ammonia	0.37	NA	NA	1.14	0.2	0.37
Chloride	3.81	NA	NA	12.8	4.54	53.5
Dissolved organic carbon	30.9	NA	NA	29	5.45	15.5
Methane	0.299	NA	NA	0.75	0.0512J	0.335
Nitrite	0.1 U	NA	NA	0.162	0.1 U	0.43
Orthophosphate	0.1 U	NA	NA	0.1 U	0.1 U	0.1 U
Sulfate	51.4 J	NA	NA	12.8 J	7.53	40.2
Sulfide	2 U	NA	NA	2 U	6	2 U
FIELD PARAMETERS						
pH (unitless)	5.49	4.09	6.87	5.19	5.57	5.61
Specific conductivity (ms/cm)	0.21	0.03	0.279	0.131	0.085	0. 382
Temperature (oc)	25.5	23.2	23	24.3	25.3	23.6
Oxidation-reduction potential	74	102	84	-58	114	-94
Turbidity (ntu)	0	NA	NA	0	8	1
Dissolved oxygen (mg/l)	1.14	1.46	2.08	0.78	2.02	0
Carbon dioxide (mg/l)	108.4	48	52.8	174	84	107.6
Hydrogen sulfide (mg/l)	NA	NA	NA	NA	0	1
Ferrous iron (mg/l)	1.2	0.6	0	1.1	0.6	0.8
Alkalinity (mg/l)	30.7	11	129.2	20	23.6	22.1

Notes: NA - Not Analyzed

TABLE 3-4

SUMMARY OF ANALYTICAL RESULTS - NATURAL ATTENUATION PARAMETERS
OPERABLE UNIT 3, SITE 8 GROUNDWATER DATA
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA
PAGE 2 OF 3

Sample Number:	CF-8-MW-08I-01	CF-8-MW-09S-01	CF-8-MW-10S-01	CF-8-MW-12S-01	CF-8-DUP-01	CF-8-MW-13S-01
Collection Date:	8/19/98	8/21/98	8/19/98	8/19/98	8/19/98	8/19/98
Location:	CF8MW8I	CF8MW9S	CF8MW10S	CF8MW12S	CF8MW12S	CF8MW13S
INORGANICS, UNFILTERED (ug/L)						
Iron	467	816	362	361	374	583
NATURAL ATTENUATION PARAMETERS (mg/L)						
Alkalinity	NA	37.5	27.1	20.8	14.6	52.1
Ammonia	NA	0.35	0.75	1.84	1.63	1.53
Chloride	NA	5.12	1.79	2.74 J	2.72 J	1.43
Dissolved organic carbon	NA	4.23	21.3	4.09	4.16	59.3
Methane	NA	0.0851	0.8945	0.112	0.105	1.920
Nitrite	NA	0.16	0.1U	0.1U	0.54	0.17
Orthophosphate	NA	0.25	0.1 U	0.1 U	0.1 U	0.1 U
Sulfate	NA	1.83 J	9.18	8.86	8.93	2.96
Sulfide	NA	2 U	6	2	6	4
FIELD PARAMETERS						
pH (unitless)	5.13	5.01	5.11	5	NA	5.42
Specific conductivity (ms/cm)	0.035	0.049	0.078	0.083	NA	0.147
Temperature (oc)	24.3	21.6	25.7	23.1	NA	26.5
Oxidation-reduction potential	37	-6	-112	224	NA	-109
Turbidity (ntu)	9	NA	4	0	NA	10
Dissolved oxygen (mg/l)	0.72	2.06	0	2.58	NA	0
Carbon dioxide (mg/l)	57.8	92.2	127.6	110.8	NA	158.6
Hydrogen sulfide (mg/l)	0	0.7	0.7	0.5	NA	0.5
Ferrous iron (mg/l)	0.6	0.6	0.4	0.5	NA	0.6
Alkalinity (mg/l)	5	13.1	21.1	8.8	NA	99.8

Notes: NA - Not Analyzed

TABLE 3-4

SUMMARY OF ANALYTICAL RESULTS - NATURAL ATTENUATION PARAMETERS
OPERABLE UNIT 3, SITE 8 GROUNDWATER DATA
NAVAL AIR STATION CECIL FIELD, JACKSONVILLE, FLORIDA
PAGE 3 OF 3

Sample Number:	CF-8-MW-17S-01	CF-8-MW-18S-01	CF-8-MW-23S-01	CF-8MW-24I-01
Collection Date:	8/19/98	8/19/98	8/18/98	8/18/98
Location:	CF8MW17S	CF8MW18S	CF8MW23S	CF8MW24I
INORGANICS, UNFILTERED (ug/L)				
Iron	182	104	2280	613
NATURAL ATTENUATION PARAMETERS (mg/L)				
Alkalinity	1 U	150	37.5	NA
Ammonia	0.1 U	0.1 U	0.1 U	NA
Chloride	0.369	1.94	7.1	NA
Dissolved organic carbon	3.89	5.53	10 U	NA
Methane	0.346	0.021U	0.540	NA
Nitrite	0.1U	0.1U	0.1U	NA
Orthophosphate	0.1 U	0.1 U	0.75	NA
Sulfate	13.6	4.97	0.1 U	NA
Sulfide	8	6	4	NA
FIELD PARAMETERS				
pH (unitless)	4.47	6.26	5.99	5.92
Specific conductivity (ms/cm)	0.031	0.34	0.092	0.201
Temperature (oc)	25.2	26.4	27.1	22.8
Oxidation-reduction potential	45	124	29	-52
Turbidity (ntu)	0	32	122	34
Dissolved oxygen (mg/l)	0.5	1.34	0.1	0.14
Carbon dioxide (mg/l)	70.4	110.8	26	114.6
Hydrogen sulfide (mg/l)	0.5	0	0.3	0.3
Ferrous iron (mg/l)	0.4	0	1	0.5
Alkalinity (mg/l)	3.1	148	28.5	73.8

Notes: NA - Not Analyzed

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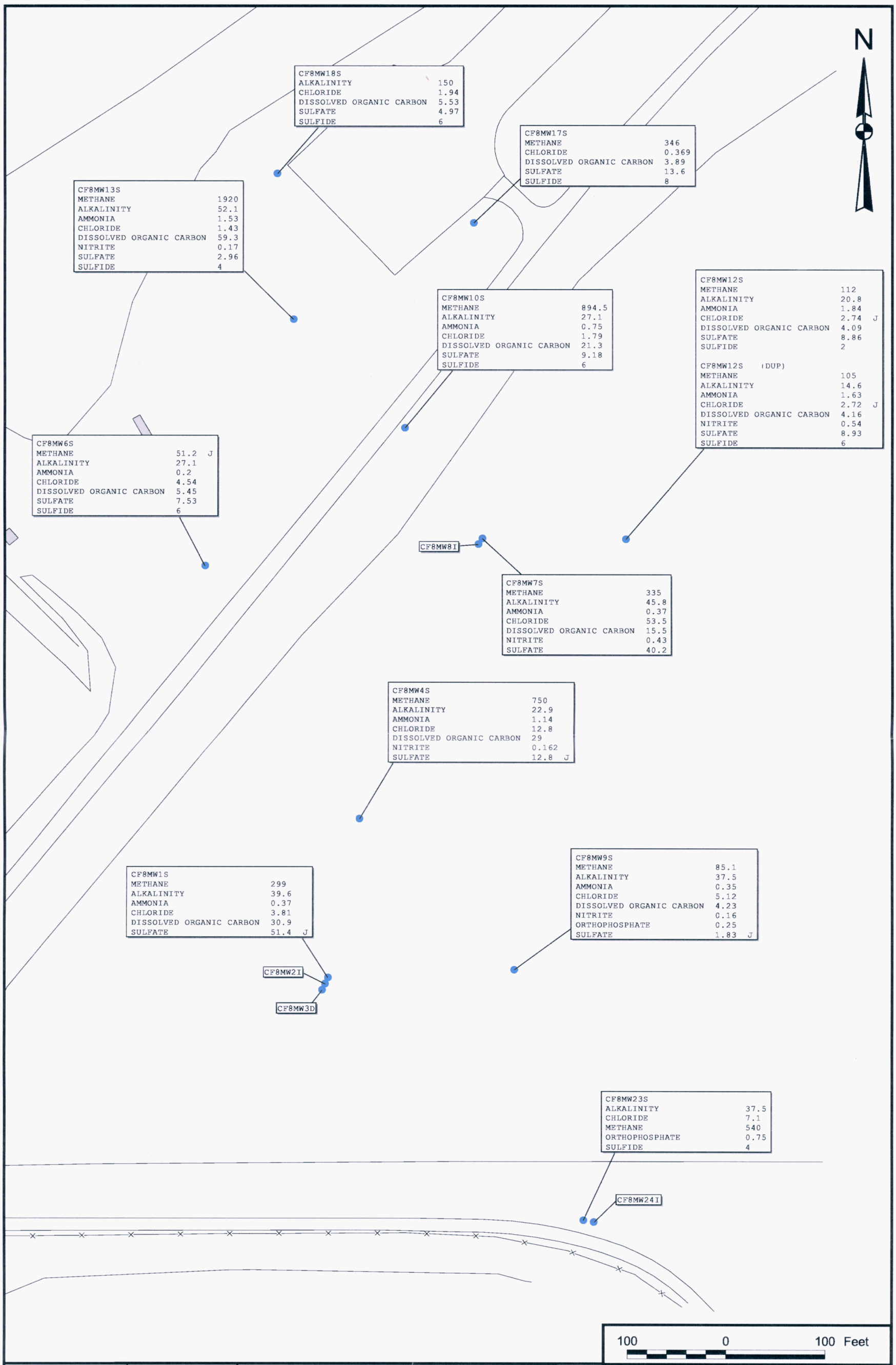

DRAWN BY YLI	DATE Nov. 17, 98	BASELINE GROUNDWATER ANALYTIC RESULTS NATURAL ATTENUATION PARAMETERS OPERABLE UNIT 3, SITE 8 NAVAL AIR STATION CECIL FIELD JACKSONVILLE, FLORIDA	CONTRACT NUMBER 7653
CHECKED BY BD	DATE Nov. 17, 98		APPROVED BY — DATE —
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mg/L, anaerobic conditions do not 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 1.5 mg/L) were observed in most of the wells that are within the plume at the site. The dissolved oxygen concentration in well CF8MW18S located on the upgradient side of the site near the fire fighting training pits was approximately 1.34 mg/L. The dissolved oxygen concentrations in the wells within the plume ranged from 0.0 mg/L to 0.78 mg/L. These dissolved oxygen concentrations indicate that active aerobic biodegradation is occurring along the aerobic fringes of the plume. These concentrations also indicate that anaerobic pathways may have developed to allow for reductive dechlorination to occur.

The dissolved oxygen concentrations has remained the same in four of the wells, decreased in three of the wells, and increased in two of the wells compared to previous sampling events. The decrease in oxygen occurs in the wells in the center of the plume as well as CF8MW17S and the increase in oxygen occurs in monitoring wells CF8MW18S and CF8MW9S.

3.2.3 Ferrous Iron/Total Iron

The ferrous iron concentration in groundwater was measured in the field using a low-range, field test kit (Hach® Model IR-18G). Under anaerobic conditions, ferric iron (iron III) can be used as an electron acceptor during the anaerobic biodegradation process. Ferric iron available to microorganisms cannot be measured since it is insoluble however, soluble ferrous iron can be used as an indicator. Elevated levels of ferrous iron and carbon dioxide within the plume area indicate that biodegradation by ferric iron reduction maybe occurring and that it maybe a predominant microbial process.

During this sampling event, ferrous iron ranged from 0.0 mg/L at well CF8MW18S to 1.2 mg/L at well CF8MW1S. The downgradient wells at the site (within the plume area) show elevated ferrous iron concentrations compared to well CF8MW18S indicating that ferric iron reduction is a likely anaerobic pathway for biodegradation of the petroleum hydrocarbon contamination.

Total iron concentrations range from 104 μg/L in the upgradient well CF8MW18S to 2,280 μg/L in well CF8MW23S. The iron increases by one order of magnitude in the downgradient direction and indicates a sufficient supply of iron as potential electron receptor.

The ferrous iron concentrations were approximately the same as the past sampling events.

3.2.4 Hydrogen Sulfide and Sulfate

Hydrogen sulfide in groundwater was measured in the field using a low-range test kit (Hach® Model HS-C). Sulfate in groundwater was analyzed by GPL Laboratories. Sulfate reduction occurs after the ferric iron electron acceptors have been exhausted. During sulfate reduction (an anaerobic biodegradation process) bacteria can use sulfate as an electron acceptor to degrade hydrocarbons. Sulfate reduction, along with methanogenesis, is one of the most important and frequently documented reduction pathways responsible for natural attenuation of chlorinated solvent plumes. 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 less than 20.0 mg/L in the contaminated zone. The process of sulfate reduction results in the generation of sulfide and carbon dioxide.

The hydrogen sulfide concentrations from the field testing in the downgradient wells (CF8MW17S, CF8MW13S, CF8MW10S, and CF8MW7S) were higher when compared to well CF8MW18S (0.0 mg/L). The concentration of hydrogen sulfide increased steadily in the dowgradient direction to a maximum concentration of 1 mg/L. The laboratory sulfide concentrations ranged from not detected to 8 mg/L and did not show a pattern of increasing in the downgradient direction. The hydrogen sulfide concentrations have decreased compared to the past sampling events.

The sulfate concentration in the groundwater samples ranged from 1.83 mg/L to 51.4 mg/L at the site. There is a decreasing trend in the sulfate concentrations from wells CF8MW17S and CF8MW18S to wells CF8MW10S, and CF8MW13, as well as a decreasing trend in sulfate concentration from well CF8MW7S to wells CF8MW4S, and CF8MW9S. The sulfate concentrations have increased in many of monitoring wells compared to the results of past sampling events.

A decreasing trend of sulfate concentrations, and an increasing trend in sulfide, in groundwater is noted with the groundwater flow direction. This is an indicator of a sulfate reducing environment.

3.2.5 Methane

Methane 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.

Methane was detected in eleven wells ranging in concentration from 51 μg/L to 1920 μg/L. Methane was not detected in the upgradient well CF8MW18S. Monitoring well CF8MW13S had the highest concentration of methane. The methane concentrations were elevated by two to three orders of magnitude compared to well CF8MW18S. The methane concentration increases significantly in the dowgradient direction, indicating methanogenic degradation of both of the plumes, the petroleum-related compound plume and the VOC plume.

The methane concentrations in the groundwater samples have decreased compared to the results from the past sampling events.

3.2.6 Carbon Dioxide

Carbon dioxide in the groundwater was measured in the field using a low-range test kit (Hach® Model CA-DT). Elevated carbon dioxide concentrations, an end-product of aerobic and anaerobic biodegradation, were measured in the downgradient wells when compared to the upgradient wells. The carbon dioxide concentration ranged from 26 mg/L to 174 mg/L. The elevated carbon dioxide concentration were approximately 1.4 to 1.6 times the concentrations in well CF8MW18S (110.8 mg/L), an indicator that aerobic 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 increased in the petroleum-related compound and VOC plume area and decreased along the outer fringes of the plumes compared to the February 1998 sampling event.

3.2.7 Chloride

Chloride concentrations are used for two primary purposes during the evaluation of natural attenuation. First, chloride is released into groundwater during dechlorination of a solvent plume. Therefore, an increase in chloride ion concentration in the downgradient direction is direct evidence of dechlorination. Secondly, because chloride ions neither affect, nor are affected by, oxidation-reduction reactions, solute complexes, or microbial reactions, and because they are not easily retarded by organic carbon in an aquifer, they can be used as conservative tracers for the estimation of biodegradation rates.

The chloride concentration in the samples from the monitoring wells ranged from 0.36 mg/L in well CF8MW17S to 53.5 mg/L in well CF8MW7S. The chloride concentration increased from 0.36 mg/L to 2 mg/L in the groundwater samples from the monitoring wells CF8MW18S, CF8MW17S, CF8MW13S, and CF8MW10S to 53.5 mg/L in the groundwater sample from well CF8MW7S. The chloride concentration decreased in the groundwater samples from the wells located downgradient of well CF8MW7S. In

general, chloride ion concentrations increase in the downgradient direction and may be a result of reductive dechlorination.

Chloride concentrations decreased or remained approximately the same in most of the monitoring wells compared to the past sampling events. The groundwater samples from monitoring wells CF8MW6S and CF8MW7S had chloride concentrations that increased from the past sampling events.

3.2.8 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 less than 1.0 mg/L in the contaminated zone.

Nitrite concentration ranged from not detected in upgradient well CF8MW18S to 0.43 mg/L in downgradient well CF8MW7S and 0.54 mg/L in upgradient/crossgradient well CF8MW12S. Normally, nitrate decreases consistently in the downgradient direction, indicating utilization of the relatively small amount of this electron acceptor during denitrification. These analytical results show an increase in the nitrite parameters in the downgradient direction.

The nitrite results are consistant with the past sampling results which did not detect nitrite in the groundwater samples. However, nitrite was detected in four samples within the plume from the August 1998.

3.2.9 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 but two of the wells (CF8MW9S and CF8MW23S) 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.

3.2.10 Oxidation/Reduction Potential

The oxidation/reduction potential (ORP) of groundwater (Eh) 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 Eh depends upon and influences the rates and types of biodegradation processes. Therefore, the measurement of Eh (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 Eh data since most natural waters are usually mixed potentials, which cannot be related to a single electron couple. Therefore, Eh should only be used as a qualitative indicator of the overall reduction/oxidation state.

The relative Eh measurement is proportional to the efficiency of the bioremediation pathway. For example, the most efficient bioremediation pathway for a petroleum hydrocarbon plume is aerobic respiration. During aerobic respiration, oxygen is utilized as the electron acceptor to mineralize petroleum hydrocarbons into CO_2 and water. The Eh value for such a reaction can theoretically be as high as +800 mV.

Following is a general comparison of common metabolic pathways and related Eh measurements, quantified under laboratory conditions:

Pathway	Electron Acceptor	Eh (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)

Eh values across the site ranged from –112 mV to 224 mV. There appears to be no trend in the Eh values collected at the site. The negative Eh values in the center area of the plume indicate an energy efficiency range associated with anaerobic biodegradation by means of iron reduction or sulfate reduction. The analysis of the ferrous iron, total iron, hydrogen sulfide, and sulfate parameters in the previous sections also indicate that iron reduction and sulfate reduction, along with 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, 1996).

3.2.11 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. Dissolved organic carbon (DOC) is a measure of the natural and anthropogenic carbon present in the aquifer.

DOC concentrations in the background well CF8MW18S and cross-gradient well CF8MW12S were measured 5.53 mg/L and 4.09 mg/L, respectively. DOC concentrations range from 3.89 mg/L in well CF8MW17S (upgradient) to 59.3 mg/L in CF8MW13S. Well CF8MW13S is downgradient of the fire fighting training pits near one of the source areas.

The background and cross-gradient well indicate that some organic carbon is present in the aquifer to act as the primary substrate for reductive dechlorination. However, the sulfate concentration in the groundwater in monitoring well CF8MW7S may compete with the chlorinated hydrocarbons as an electron acceptor, whereby causing competitive exclusion of dechlorination. Based in this sampling event, this is not occurring. The sulfate concentration is decreasing and organic carbon concentrations are increasing in the downgradient wells, indicating that the chlorinated hydrocarbons are not competing with the natural organic carbon as a primary substrate.

3.2.12 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 4.09 to 6.87 and generally decreased in the downgradient direction. This indicates a naturally neutral groundwater system with pH slowly decreasing (becoming more acidic) as the alkalinity decreases.

3.2.13 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 with 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.

Specific conductivity value was measured as 0.34 mS/cm in the upgradient well (CF8MW18S) and generally decreased in the downgradient direction. The minimum specific conductivity was measured as 0.030 in well CF8MW2I. This minor fluctuation indicates that all groundwater samples were from a consistent source.

3.2.14 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 23 ^{0}C to 27.1 ^{0}C across the site during the August 1998 sampling event. These temperatures are within the range of values acceptable for bioremediation to take place.

3.3 GENERAL OBSERVATIONS

The reduction in the VOCs concentration since the RI is the strongest line of evidence that natural attenuation is working at Site 8. The total VOC concentration decreased in seven of the ten wells that were sampled during the RI and this sampling event and the maximum 1,1-DCE concentration decreased from 95 μg/L to 44.7 μg/L.

There is an anomaly with the naphthalene and 2-methlynaphthalene - they both increased in concentration from approximately 40 μg/L in the RI to the mid to upper 60 μg/L in this sampling event.

The geochemical data also support bioegradation natural attenuation. The concentrations of by-product indicators (chloride, methane, and carbon dioxide) of biodegradation suggest that active biodegradation is occurring at the site. The specific anerobic biodegradation processes include iron reduction, sulfate-reduction, and methanogenesis. The primary/predominant microbial pathway appears to be sulfate reduction.

3.4 NATURAL ATTENUATION OVERVIEW

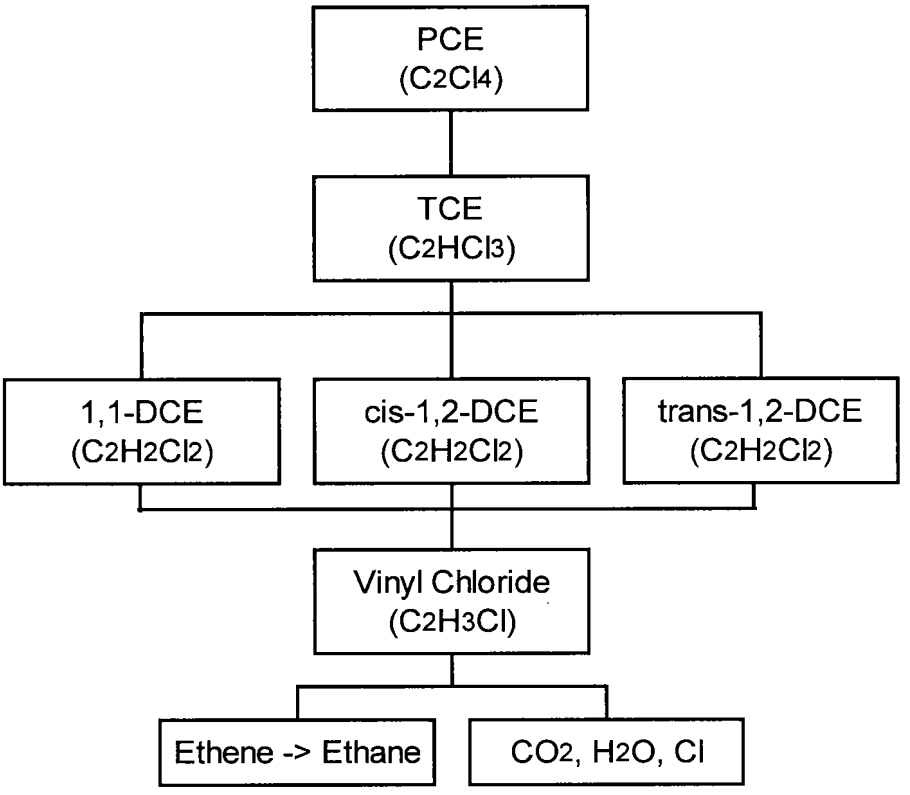
As stated in the Draft Region 4 Approach to Natural Attenuation of Chlorinated Solvents (USEPA, 1997), "Natural attenuation in ground-water systems results from the integration of several subsurface attenuation mechanisms that are classified as either destructive or nondestructive. Biodegradation is 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 (McCarty and Semprini, 1994). 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 – AUGUST/SEPTEMBER 1998 DATA

3.5.1 Natural Attenuation Screening Matrix

In accordance with the Draft Region 4 Approach to Natural Attenuation of Chlorinated Solvents (USEPA, 1997), 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 Region 4 screening approach is very similar to that presented in the AFCEE protocol (Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater; November 1996). There are minor differences in the number of points awarded for methane, pH, ethene/ethane, and several daughter products.

The screening matrix was used to evaluate the wells contaminated with 1,1-DCE; monitoring well CF8MW4S representing the downgradient shallow upper zone surficial aquifer and monitoring wells CF8MW7S and CF8MW10S representing the shallow zone surficial aquifer within the plume area. These contaminated wells were compared to monitoring well CF8MW12S, which is a cross-gradient well and monitoring well CF8MW18S, which was assumed as the background well. The scores for the screening matrices range in value from 13 to 19. The preliminary screening matrix for these contaminated wells are shown on Tables 3-5, 3-6, and 3-7. Comparing these scores to the above table, the scores indicate there is adequate evidence for the biodegradation of the chlorinated solvents at this site.

3.5.2 Degradation Pathways

The groundwater plume at the site is exhibiting mixed geochemical behaviors (Type 1, Type 2, and Type 3). BTEX was detected in monitoring well CF8MW10S which will provide conditions for the Type 1 geochemical behavior and some dissolved organic carbon was detected in the cross-gradient and background monitoring wells which will provide conditions for the Type 2 geochemical behavior. The dissolved oxygen concentration is increasing in the groundwater near monitoring well CF8MW4S indicating the conditions of the plume are changing to a Type 3 geochemical behavior.

Considering the lack of dissolved oxygen within the plume near monitoring wells CF8MW10S and CF8MW7S, and BTEX recalcitrance to anaerobic degradation, it would have been expected that the BTEX would have migrated downgradient over time. The BTEX, in the vicinity of CF8MW10S, is being used as the primary substrate to drive reductive dechlorination of the solvent (Type 1 behavior). However, the supply of BTEX decreases in the direction of groundwater flow over the area of the plume near CF8MW7S and CF8MW4S and the natural organic carbon is most likely being used as the primary substrate to drive reductive dechlorination (Type 2 behavior) in this area.

TABLE 3-5
Analytical Parameters and Weighting for Preliminary Natural Attenuation Screening
Monitoring Well CF8MW4S (Downgradient Well)
Operable Unit 3, Site 8
NAS Cecil Field, Jacksonville, Florida

Analyte	Units	Contaminanted Zone Concentration	OU 3, Site 8* Concentration	Available Points	Site Points	Intrepretation
ORP (Eh)	mV	<50		1		Reductive pathway possible
	mV	<-100	**-58**	2	**1**	Reductive pathway possible
Dissolved Oxygen	mg/L	<0.5		3		Tolerated; supresses reductive dechlorination at higher concentrations
	mg/L	>1	**0.78**	-3	**0**	Vinyl chloride may be oxidized aerobically, but reductive dechlorination will not occur
Nitrate	mg/L	<1	**NA**	2	**-**	May compete with reductive pathway at higher concentrations
Ferrous Iron (Fe2+)	mg/L	>1	**1.1**	3	**3**	Reductive pathway possible
Sulfate	mg/L	<20	**12.8**	2	**2**	May compete with reductive pathway at higher concentrations
Sulfide	mg/L	>1	**ND/NA**	3	**0**	Reductive pathway possible
Methane	mg/L	>0.1		2		Ultimate reductive daughter product
	mg/L	>1		3		Vinyl chloride accumulates
	mg/L	<0.1	**0.75**	0	**2**	Vinyl chloride oxidizes
Ethene/Ethane	mg/L	>0.01		2		Daughter product of vinyl chloride/ethene
	mg/L	>0.1	**ND**	3	**0**	Daughter product of vinyl chloride/ethene
Carbon Dioxide	mg/L	>2x BG (BG=110)	**174**	1	**1**	Ultimate oxidative daughter product
Chloride	mg/L	>2x BG (BG=2.3)	**12.6**	2	**2**	Daughter product of organic chlorine; compare chloride in plume to background conditions
Alkalinity	mg/L	>2x BG (BG=20/150)	**22.9/20**	1	**0**	Results from interaction of carbon dioxide with aquifer minerals
DOC	mg/L	>20	**29**	2	**2**	Carbon and energy source; drives dechlorination; can be natural or anthropogenic
pH	units	5<pH<9	**5.19**	-	**-**	Tolerated range for reductive pathway
Temperature	deg-C	>20	**24.3**	1	**1**	At T> 20EC, biochemical process is accelerated
Hydrogen	nM	>1		3		Reductive pathway possible; vinyl chloride may accumulate
	nM	<1	**NA**	0	**NA**	Vinyl chloride oxidized
Volatile Fatty Acids	mg/L	>0.1	**NA**	2	**NA**	Intermediates resulting from biodegradation of aromatic compounds; carbon and energy source
BTEX	ug/L	>0.1	**4.4**	2	**2**	Carbon and energy source; drives dechlorination
Perchloroethene	ug/L	-	**ND**	-	**0**	Material released
Trichloroethene	ug/L	-	**ND**	2 (b)	**0**	Material released or daughter product of perchloroethene
Dichloroethene	ug/L	-	**28**	2 (b)	**0**	Material released or 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
Vinyl Chloride	ug/L	-	**ND**	2 (b)	**0**	Material released or daughter product of dichloroethenes
Chloroethane	ug/L	-	**ND**	2 (b)	**0**	Daughter product of vinyl chloride under reducing conditions
1,1,1-Trichloroethane	ug/L	-	**ND**	-	**0**	Material released
1,1-dichloroethene	ug/L	-	**28**	-	**0**	Daughter product of TCE or chemical reaction of 1,1,1-trichloroethane
Total Score				33	**16**	

Reference: Draft Region 4 Approach to Natural Attenuation of Chlorinated Solvents

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

(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-16-35S which is cross-gradient from the plume

TABLE 3-6
Analytical Parameters and Weighting for Preliminary Natural Attenuation Screening
Monitoring Well CF8MW7S (Source Area Well)
Operable Unit 3, Site 8
NAS Cecil Field, Jacksonville, Florida

Analyte	Units	Contaminanted Zone Concentration	OU 3, Site 8* Concentration	Available Points	Site Points	Intrepretation
ORP (Eh)	mV	<50		1		Reductive pathway possible
	mV	<-100	**-94**	2	**1**	Reductive pathway possible
Dissolved Oxygen	mg/L	<0.5		3		Tolerated; supresses reductive dechlorination at higher concentrations
	mg/L	>1	**0**	-3	**3**	Vinyl chloride may be oxidized aerobically, but reductive dechlorination will not occur
Nitrate	mg/L	<1	**NA**	2	**-**	May compete with reductive pathway at higher concentrations
Ferrous Iron (Fe2+)	mg/L	>1	**0.8**	3	**0**	Reductive pathway possible
Sulfate	mg/L	<20	**40.2**	2	**0**	May compete with reductive pathway at higher concentrations
Sulfide	mg/L	>1	**ND/1**	3	**1**	Reductive pathway possible
Methane	mg/L	>0.1		2		Ultimate reductive daughter product
	mg/L	>1		3		Vinyl chloride accumulates
	mg/L	<0.1	**0.335**	0	**2**	Vinyl chloride oxidizes
Ethene/Ethane	mg/L	>0.01		2		Daughter product of vinyl chloride/ethene
	mg/L	>0.1	**ND**	3	**0**	Daughter product of vinyl chloride/ethene
Carbon Dioxide	mg/L	>2x BG (BG=110)	**107.6**	1	**0**	Ultimate oxidative daughter product
Chloride	mg/L	>2x BG (BG=2.3)	**53.5**	2	**2**	Daughter product of organic chlorine; compare chloride in plume to background conditions
Alkalinity	mg/L	>2x BG (BG=20/150)	**45.8/22.1**	1	**1**	Results from interaction of carbon dioxide with aquifer minerals
DOC	mg/L	>20	**15.5**	2	**0**	Carbon and energy source; drives dechlorination; can be natural or anthropogenic
pH	units	5<pH<9	**5.61**	-	**-**	Tolerated range for reductive pathway
Temperature	deg-C	>20	**23.6**	1	**1**	At T> 20EC, biochemical process is accelerated
Hydrogen	nM	>1		3		Reductive pathway possible; vinyl chloride may accumulate
	nM	<1	**NA**	0	**NA**	Vinyl chloride oxidized
Volatile Fatty Acids	mg/L	>0.1	**NA**	2	**NA**	Intermediates resulting from biodegradation of aromatic compounds; carbon and energy source
BTEX	ug/L	>0.1	**1.5**	2	**2**	Carbon and energy source; drives dechlorination
Perchloroethene	ug/L	-	**ND**	-	**0**	Material released
Trichloroethene	ug/L	-	**ND**	2 (b)	**0**	Material released or daughter product of perchloroethene
Dichloroethene	ug/L	-	**14.1**	2 (b)	**0**	Material released or 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
Vinyl Chloride	ug/L	-	**ND**	2 (b)	**0**	Material released or daughter product of dichloroethenes
Chloroethane	ug/L	-	**ND**	2 (b)	**0**	Daughter product of vinyl chloride under reducing conditions
1,1,1-Trichloroethane	ug/L	-	**ND**	-	**0**	Material released
1,1-dichloroethene	ug/L	-	**14.1**	-	**0**	Daughter product of TCE or chemical reaction of 1,1,1-trichloroethane
Total Score				33	**13**	

Reference: Draft Region 4 Approach to Natural Attenuation of Chlorinated Solvents

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

(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-16-35S which is cross-gradient from the plume

TABLE 3-7
Analytical Parameters and Weighting for Preliminary Natural Attenuation Screening
Monitoring Well CF8MW10S (Source Area Well)
Operable Unit 3, Site 8
NAS Cecil Field, Jacksonville, Florida

Analyte	Units	Contaminanted Zone Concentration	OU 3, Site 8* Concentration	Available Points	Site Points	Intrepretation
ORP (Eh)	mV	<50		1		Reductive pathway possible
	mV	<-100	-112	2	2	Reductive pathway possible
Dissolved Oxygen	mg/L	<0.5		3		Tolerated; supresses reductive dechlorination at higher concentrations
	mg/L	>1	0	-3	3	Vinyl chloride may be oxidized aerobically, but reductive dechlorination will not occur
Nitrate	mg/L	<1	NA	2	-	May compete with reductive pathway at higher concentrations
Ferrous Iron (Fe2+)	mg/L	>1	0.4	3	0	Reductive pathway possible
Sulfate	mg/L	<20	9.18	2	2	May compete with reductive pathway at higher concentrations
Sulfide	mg/L	>1	6/0.7	3	3	Reductive pathway possible
Methane	mg/L	>0.1		2		Ultimate reductive daughter product
	mg/L	>1		3		Vinyl chloride accumulates
	mg/L	<0.1	0.89	0	2	Vinyl chloride oxidizes
Ethene/Ethane	mg/L	>0.01		2		Daughter product of vinyl chloride/ethene
	mg/L	>0.1	ND	3	0	Daughter product of vinyl chloride/ethene
Carbon Dioxide	mg/L	>2x BG (BG=110)	127.6	1	0	Ultimate oxidative daughter product
Chloride	mg/L	>2x BG (BG=2.3)	1.79	2	0	Daughter product of organic chlorine; compare chloride in plume to background conditions
Alkalinity	mg/L	>2x BG (BG=20/150)	27.1/21.1	1	0	Results from interaction of carbon dioxide with aquifer minerals
DOC	mg/L	>20	21.3	2	2	Carbon and energy source; drives dechlorination; can be natural or anthropogenic
pH	units	5<pH<9	5.11	-	-	Tolerated range for reductive pathway
Temperature	deg-C	>20	25.7	1	1	At T> 20EC, biochemical process is accelerated
Hydrogen	nM	>1		3		Reductive pathway possible; vinyl chloride may accumulate
	nM	<1	NA	0	NA	Vinyl chloride oxidized
Volatile Fatty Acids	mg/L	>0.1	NA	2	NA	Intermediates resulting from biodegradation of aromatic compounds; carbon and energy source
BTEX	ug/L	>0.1	23.6	2	2	Carbon and energy source; drives dechlorination
Perchloroethene	ug/L	-	ND	-	0	Material released
Trichloroethene	ug/L	-	ND	2 (b)	0	Material released or daughter product of perchloroethene
Dichloroethene	ug/L	-	0.4 J	2 (b)	0	Material released or 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
Vinyl Chloride	ug/L	-	0.7 J	2 (b)	2	Material released or daughter product of dichloroethenes
Chloroethane	ug/L	-	ND	2 (b)	0	Daughter product of vinyl chloride under reducing conditions
1,1,1-Trichloroethane	ug/L	-	ND	-	0	Material released
1,1-dichloroethene	ug/L	-	44.7	-	0	Daughter product of TCE or chemical reaction of 1,1,1-trichloroethane
Total Score				33	19	

Reference: Draft Region 4 Approach to Natural Attenuation of Chlorinated Solvents

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

(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-16-35S which is cross-gradient from the plume

The major active reductive pathway appears to be sulfate reduction with methanogenesis as a minor pathway. Therefore, carbon dioxide and sulfate are being used as electron acceptors, resulting in the generation of methane, sulfide, chloride, and carbon dioxide. The 1,1-DCE is being reductively dechlorinated to vinyl chloride in the area of monitoring well CF8MW10S.

Both Type 1 and Type 2 behaviors are relatively efficient natural processes for the dechlorination of DCE. Although vinyl chloride can be reduced anaerobically into ethene and further to ethane, this process occurs much more slowly than the dechlorination of DCE. Therefore, it would be expected that vinyl chloride might accumulate in the area of plume near monitoring wells CF8MW7S and CF8MW10S. Under Type 3 behavior, vinyl chloride can be oxidized into carbon dioxide, water, and chloride under aerobic conditions. The geochemical conditions near monitoring well CF8MW4S are approaching a Type 3 behavior with the increasing dissolved oxygen concentrations and are more amenable to vinyl chloride biodegradation. Vinyl chloride may also be simultaneously being reduced via cometabolism at a sufficient rate that it is not accumulating in monitoring well CF8MW10S and is not being detected in the monitoring wells CF8MW7S and CF8MW4S. 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 downgradient portions of the plume. However, ethane and ethene were not detected in the downgradient wells.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 CONCLUSIONS

Based upon the past and current plume configuration, and the results of geochemical testing, it is apparent that natural attenuation processes are occurring at Site 8. The chlorinated groundwater plume at monitoring wells CF8MW10S, CF8MW7S, and CF8MW4S is exhibiting mixed geochemical behavior (Type 1, Type 2, and Type 3). BTEX, in the vicinity of CF8MW10S, is being used as the primary substrate to drive reductive dechlorination of the solvent mass (Type 1 behavior). Natural organic carbon is most likely being used as the primary substrate to drive reductive dechlorination (Type 2 behavior) in the area of monitoring wells CF8MW7S and CF8MW4S. Sulfate reduction appear to be the most active reductive pathways at the site. Iron reduction and methanogenesis are minor reductive pathways being used for reductive chlorination also. Carbon dioxide and sulfate are being used as electron acceptors, resulting in the production of methane, sulfide, chloride, and carbon dioxide. The apparent source material, 1,1-DCE is being anaerobically degraded to vinyl chloride. Vinyl chloride appears to be oxidized into carbon dioxide, water, and chloride, under aerobic (Type 3) conditions, near monitoring well CF8MW4S. Vinyl chloride may also be simultaneously being reduced via cometabolism at a sufficient rate that it is not accumulating in monitoring well CF8MW10S and is not being detected in the downgradient monitoring wells.

4.2 RECOMMENDATIONS

Long-term monitoring of the well network should be performed quarterly for one year in order to determine if there are significant temporal changes as a result of seasonal variation. If the data collected during the first year support natural attenuation, semi-annual or annual monitoring should be performed until it can be documented that the plume is either in a steady-state condition or declining. The long-term groundwater monitoring should include all those well recently sampled plus monitoring well CF8MW21S. Monitoring well CF8MW21S should be analyzed during the first year of sampling as the background well.

As part of the long-term sampling, all wells should be analyzed for a specific suite of chemical and geochemical parameters. This should include low-concentration VOCs, dissolved inorganic carbon/alkalinity, dissolved oxygen, carbon dioxide, chloride, dissolved iron and manganese, nitrate, nitrite, sulfate, sulfide, hydrogen sulfide, orthophosphate, ORP, TOC, BOD, COD, pH, temperature, specific conductivity, methane, and ethane/ethene. Ethane/ethene concentrations will help to confirm the methanogenic and sulfate reducing conditions identified at the site, and determine if competitive exclusion of dechlorination is occurring as a result of natural sulfate.

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 BCT 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

SOIL BORING LOGS AND GROUNDWATER MONITORING WELL FORMS

APPENDIX A

TABLE OF CONTENTS

SOIL BORING LOGS
MONITORING WELL CONSTRUCTION FORMS
WELL DEVELOPMENT SHEETS
GROUNDWATER SAMPLE LOG SHEET

BORING LOG

PROJECT NAME: NAS Cecil Field
PROJECT NUMBER: ~~7878~~ 7653
DRILLING COMPANY: GULF ATLANTIC
DRILLING RIG: Deep Rock RAM 10
BORING NUMBER: CF8MW23S
DATE: 8-12-98
GEOLOGIST: Tom Nicotera
DRILLER: Butch

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
		NA/NA	NA		Loose	Grey	Fine Grain Sand		Auger hole to				
	2	NA/NA	NA	2' ▽					4' BLS.	0	0	0	0
		NA/NA	NA						WATER TABLE @ 2' BLS				
	4	NA/NA	NA		Loose	Grey				0	0	0	0
		5/5	6/6										
	6	6/9	6/4		Loose	Brown	Fine Grain Sand		moist		0	0	0
		5/5	6/6										
	8	2/2	6/6	8'	Loose	Brown			moist		0	0	0
		3/4	6/6										
	10	1/8	6/6	10'	Loose	Brown	Fine Grain Sand + wood		moist		0	0	0
		3/3	6/6										
	12	3/3	6/6		Loose	Brown	Fine Grain Sand		moist		0	0	0
		2/6	6/6										
	14	8/8	6/6	14'	Loose	Brown			moist		0	0	0
		5/7	6/6										
	16	11/12	6/6		Loose	Grey/Brown	Fine Grain Sand with some wood		moist		0	0	0
		6/7	6/6										
	18	9/4	6/6		Loose	Brown	Fine Grain Sand		moist		0	0	0
		3/4	6/6										
	20	4/4	6/6	20'	Loose	Brown			moist				
		3/4	6/6			Dark							
	22	5/4	6/6		Loose	Grey	Fine Grain Sand		moist		0	0	0
		2/4	6/6										
	24	4/4	6/3	24'	Loose	Dark Grey	Fine Grain Sand		moist		0	0	0
	25	3/2	6/6			Dark Grey	Sandy Clay		moist				

26'

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks:

Converted to Well: Yes ✓ No ____ Well I.D. #: CF8MW23S

BORING LOG

PROJECT NAME: NAS CECIL - SITE 8
PROJECT NUMBER: 7653
DRILLING COMPANY:
DRILLING RIG:

BORING NUMBER: CF8MW235
DATE:
GEOLOGIST:
DRILLER:

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	26	2/2	6/6	26'		~~Dark~~ Grey	Sandy CLAY		moist	0	0	0	0

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm):

Remarks:

Converted to Well: Yes ____ No ____ Well I.D. #:

BORING LOG

PROJECT NAME: NAS Cecil Field
PROJECT NUMBER: ~~7898~~ 7653
DRILLING COMPANY: Gulf Atlantic
DRILLING RIG: Deep Rock Rig 10

BORING NUMBER: CF8MW24I
DATE: 8.12.98
GEOLOGIST: Tom Nicotera
DRILLER: Butch

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
		NA			Loose	Gray	Fine Grain Sand		Post hole to		0	0	0
	2			2' ▽					4' BLS.				
									Water Table @ 2' BLS.				
	4					Gray	Fine Grain Sand						
	6				Loose	Brown	Fine Grain Sand		moist				
	8												
	10										0	0	0
	12								moist				
	14												
	16												
	18										0	0	0
	20								moist				
	22												
	24			24'									
						Gray	Sandy clay		moist		0	0	0

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks:

Converted to Well: Yes ✓ No _____ Well I.D. #: _____

BORING LOG

PROJECT NAME: NAS Cecil Field
PROJECT NUMBER: ~~7894~~ 7653
DRILLING COMPANY: GULF ATLANTIC
DRILLING RIG: deep/Hock Bam Rock/c

BORING NUMBER: CF8 MW24I
DATE: 8-12-98
GEOLOGIST: Tom Nicotra
DRILLER: Butch

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	26	NA / NA	NA			dark Grey	Sandy clay						
		2 / 2	6 / 6										
	28	3 / 5	4 / 2			dark Grey	sandy clay						
		3 / 2	6 / 6										
	30	2 / 2	6 / 6			dark Grey	silty sand			0	0	0	0
		1 / 2	6 / 6										
	32	1 / 2	6 / 6			dark Grey	clay						
		2 / 2	6 / 6										
	34	2 / 3	6 / 6			dark Grey	silty sand + clay mix						
		3 / 5	6 / 6										
	36	8 / 11	6 / 6			dark Grey	Fine grain sand						
		12 / 16	6 / 6										
	38	34 / 26	6 / 6			dark Grey	Fine grain sand						
		8 / 12	6 / 6										
	40	14 / 19	6 / 6			dark Grey	Fine grain sand			0	0	0	0
		9 / 13	6 / 6										
	42	12 / 15	6 / 6			dark Grey	Fine grain sand						
		10 / 12	6 / 6										
	44	14 / 11	6 / 6			dark Grey	Fine grain sand						
		8 / 12	6 / 6										
	46	14 / 15	6 / 6			dark Grey	Fine grain sand						
		11 / 12	6 / 6										
	48	10 / 10	6 / 6			dark Grey	Fine grain sand						
		5 / 9	6 / 6										
	50	11 / 14	6 / 6			dark Grey	Fine grain sand			0	0	0	0

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0 ppm

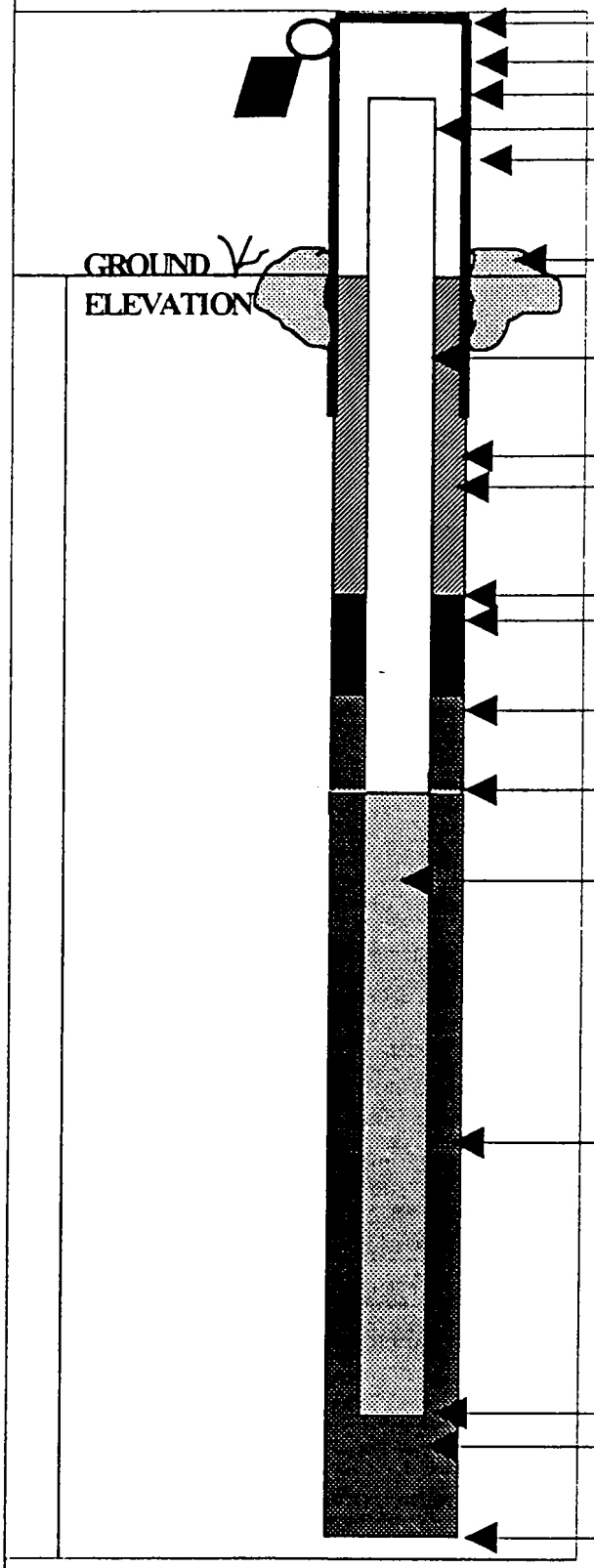
Remarks:

Converted to Well: Yes ✓ No ____ Well I.D. #: ____

BORING NO. CF8MW235

OVERBURDEN MONITORING WELL SHEET

PROJECT NAS Cecil Field	LOCATION: SITE 8	DRILLER Gulf Atlantic
PROJECT NO. 7653	BORING	METHOD: ~~DPT~~ Hollow Stem
ELEVATION	DATE	DRILLING
FIELD GEOLOGIST Tom Nicotera		DEVELOPMENT: NA



ELEVATION OF TOP OF SURFACE CASING:

ELEVATION OF TOP OF RISER PIPE:

STICK-UP TOP OF SURFACE CASING: 3'

STICK-UP RISER PIPE: 2'8"

I.D. OF SURFACE CASING: 6"

TYPE OF SURFACE CASING: Steel

TYPE OF SURFACE SEAL: Neat Cement Grout

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 8 1/4"

TYPE OF SEAL: Neat Cement Grout

ELEVATION / DEPTH OF SEAL: 112.0'

TYPE OS SEAL: Bentonite

DEPTH TOP OF SAND PACK: 113.0'

ELEVATION / DEPTH TOP OF SCREEN: 115.0'

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 0.10

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: 20/30 Sand

ELEVATION / DEPTHBOTTOM OF SCREEN: 125.0'

ELEVATION / DEPTH BOTTOM OF SAND PACK: 125.5'

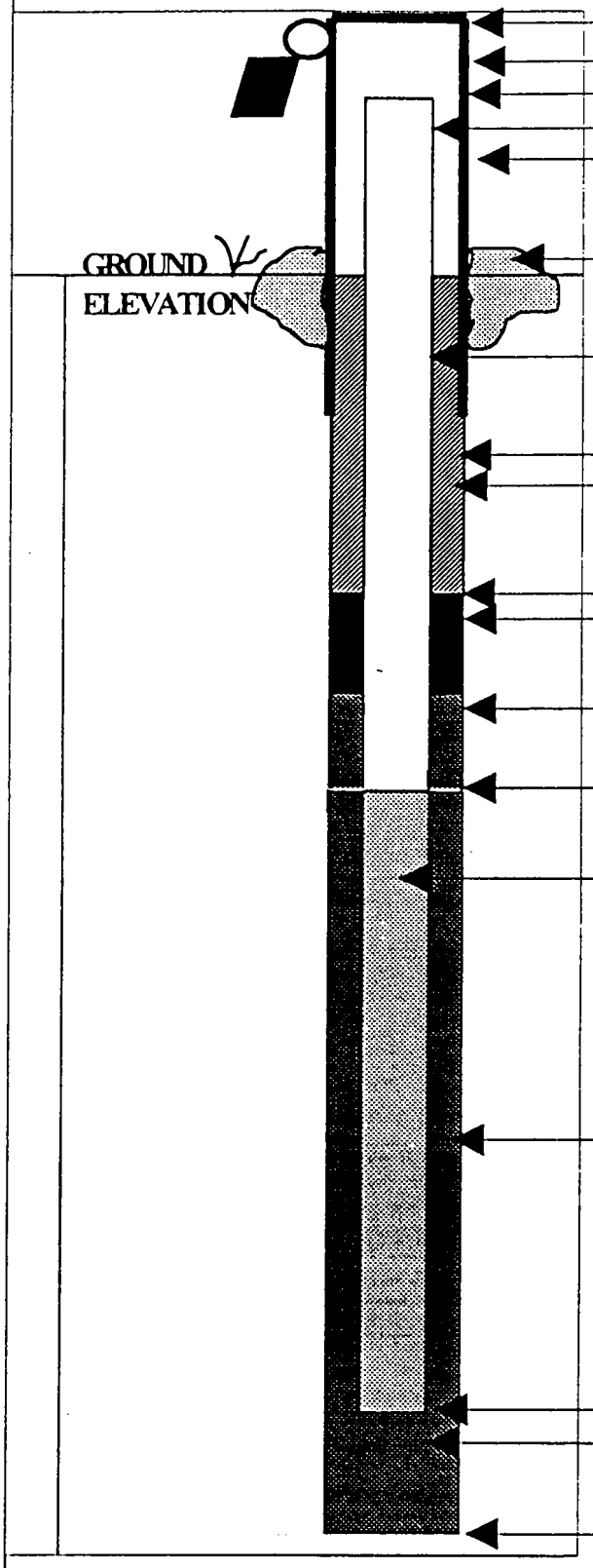
TYPE OF BACKFILL BELOW OBSERVATION WELL: 20/30 Sand.

ELEVATION / DEPTH OF HOLE: 125.5'

BORING NO. CF8MW24I

OVERBURDEN MONITORING WELL SHEET

PROJECT	NAS Cecil Field	LOCATION:	Site 8	DRILLER	Gulf Atlantic
PROJECT NO.	7653	BORING		METHOD:	~~DPT~~ mud Rotary
ELEVATION		DATE		DRILLING	
FIELD GEOLOGIST	Tom Nicotera			DEVELOPMENT: NA	



ELEVATION OF TOP OF SURFACE CASING:

ELEVATION OF TOP OF RISER PIPE:

STICK-UP TOP OF SURFACE CASING: 3'

STICK-UP RISER PIPE: 2.84'

I.D. OF SURFACE CASING: 6"

TYPE OF SURFACE CASING: Steel

TYPE OF SURFACE SEAL: Neat cement Grout

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 8¼"

TYPE OF SEAL: Neat cement Grout

ELEVATION / DEPTH OF SEAL: 137.0'

TYPE OS SEAL: Bentonite

DEPTH TOP OF SAND PACK: 138.0'

ELEVATION / DEPTH TOP OF SCREEN: 140.0'

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 0.10

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: 20/30 Sand

ELEVATION / DEPTHBOTTOM OF SCREEN: 150.0'

ELEVATION / DEPTH BOTTOM OF SAND PACK: 150.5'

TYPE OF BACKFILL BELOW OBSERVATION WELL:

ELEVATION / DEPTH OF HOLE: 150.5'

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: NAS Cecil Field
SITE/LOCATION: Site 8
PROJECT NUMBER: 7653
WELL ID.: CF8MW235
WEATHER: Cloudy
DATE: 8-13-98
STATIC WATER LEVEL:
PERSONNEL: Tom Nicotera
TOTAL WELL DEPTH:
WELL TYPE: (PVC), (S.S.), or OTHER
ONE CASING VOLUME:
START TIME: 09:15
MEASURING DEVICE:
END TIME: 10:10
ADJUSTMENT FACTOR:

( ) DOMESTIC WELL, (✓) MONITORING WELL, ( ) OTHER

METHOD & REMARKS: Sub-pump. Well is very turbid due to natural soil media in area

Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
20 gal	09:30	chocolate	6.42	.118	999	0.46	23.1	0.00
40 gal.	09:40	chocolate	6.00	.099	999	0.32	23.0	0.00
60 gal.	09:50	chocolate	5.91	.095	999	0.53	23.0	0.00
100 gal	10:10	chocolate	5.95	.094	999	0.40	23.5	0.00

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted.

ADDITIONAL COMMENTS: After 100 gal. ~~2.5~~ purged. Well was still turbid. All other readings were stable.

SIGNATURE(s): Tom Nicotera

PAGE 1 OF 1

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: NAS cecil Field
PROJECT NUMBER: ~~7848~~ 7653
WEATHER: Cloudy
STATIC WATER LEVEL:
TOTAL WELL DEPTH:
ONE CASING VOLUME:
START TIME: 10:35
END TIME: 12:05

SITE/LOCATION: 5/7/58
WELL ID.: CF8MW24I
DATE: 8-14-98
PERSONNEL: Tom Nicoteria
WELL TYPE: (PVC), (S.S.), or OTHER
MEASURING DEVICE: HORIBA 4-10
ADJUSTMENT FACTOR:

( ) DOMESTIC WELL, (X) MONITORING WELL, ( ) OTHER

METHOD & REMARKS: Used Sub. pump to develop well into (2) 55 gal. drums pumping @ 2 gal/min.

Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
50 gal.	11:00	Grey	6.18	.220	999	0.45	23.0°	0.00
100 gal	11:25	Grey	6.16	.212	999	0.44	22.6°	0.00
150 gal	11:45	Grey	6.17	.211	999	0.43	22.8°	0.00
200 gal.	12:05	Grey	6.15	.215	999	0.44	22.6°	0.00

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted.

ADDITIONAL COMMENTS: Purged LAST 100 gal. out to Ground down Gradient of well AS per work order.
* NOTE: well is ART (Free flowing)

SIGNATURE(s): Tom Nicoteria

PAGE 1 OF 1

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Cecil Field - SITE 8
Project No.: ~~7858~~ 7653

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

Sample ID No.: CF-8-MW-015-01
Sample Location:
Sampled By:
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8-21-98	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO (mg/L) Meter	DO (mg/L) Titration	CO_2	H_2S	Fe +2
Time: 12 45										
Method:	Clear	5.49	.210	25.5	0	0.44	1.14	108.4	—	1.2

PURGE DATA

Date: 8-21-98	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity		ALK	ORP
Method:	Initial	5.30	.243	24.6	0	1.33	0.00		30.7	74
Monitor Reading (ppm): 0 ppm	1	5.34	.245	24.9	0	0.61	0.00			
Well Casing Diameter: 2"	2	5.46	.226	25.0	0	0.65	0.00			
Well Casing Material: PVC.	3	5.49	.210	25.5	0	0.44	0.00			
Total Well Depth (TD): 16.82										
Static Water Level (WL): 2.78										
One Casing Volume(gal/L): 2.29										
Start Purge (hrs): 09:35										
End Purge (hrs): 12:30										
Total Purge Time (min):										
Total Vol. Purged (gal/L): 6.87										

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS CECIL - SITE 8
Project No.: 7653

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

Sample ID No.: [illegible]-MW-02I-01
Sample Location:
Sampled By:
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8-21-98 / Time: 15:15	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO (mg/L) Meter	DO (mg/L) Titration	CO_2	H_2S	Fe +2
Method:						[illegible]	1.46	[illegible]	—	0.6

PURGE DATA

Date: 8-21-98	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity		[illegible]	
Method:	Initial	5.00	0.032	23.5	-10	0.70	0.00		[illegible]	102
Monitor Reading (ppm):	1	4.99	0.031	23.0	-10	0.37	0.00			
Well Casing Diameter:	2	4.97	0.030	22.8	-10	0.70	0.00			
Well Casing Material:	3	4.90	0.030	23.2	-10	0.48	0.00			
Total Well Depth (TD): 53.10										
Static Water Level (WL): 0.00										
One Casing Volume(gal/L): 8.66										
Start Purge (hrs): 1320										
End Purge (hrs): 1515										
Total Purge Time (min):										
Total Vol. Purged (gal/L): 25.97										

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES

Circle If Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS CECIL - SITE 8
Project No.: 7653

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

Sample ID No.: CF-8-MW-03D-01
Sample Location:
Sampled By:
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 08-21-98 / Time: 13:00	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO (mg/L) Meter	DO (mg/L) Titration	CO_2	H_2S	Fe +2
Method:	clear	6.87	0.279	23.0	-10	0.68	2.08	52.8	—	0.00

PURGE DATA

Date: 08-21-98	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity		MK	ORP
Method:	Initial	6.60	0.276	22.5	-10	0.71	0.01		129.2	984
Monitor Reading (ppm):	1	6.86	0.277	22.4	-10	0.74	0.01			
Well Casing Diameter:	2	6.91	0.277	22.8	-10	0.78	0.01			
Well Casing Material:	3	6.87	0.279	23.0	-10	0.68	0.01			
Total Well Depth (TD): 90.80										
Static Water Level (WL): 0.00										
One Casing Volume(gal/L): 14.8										
Start Purge (hrs): 09:35										
End Purge (hrs): 1240										
Total Purge Time (min):										
Total Vol. Purged (gal/L): 44.6										

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES

Circle If Applicable:

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

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS CECIL - SITE 8
Project No.: 7653

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

Sample ID No.: CF-8-MW-045-01
Sample Location:
Sampled By:
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8-21-98	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO (mg/L) Meter	DO (mg/L) Titration	CO_2	H_2S	Fe +2
Time: 14:30										
Method:	CLEAR	5.19	.131	24.3	0	0.55	0.78	174	—	1.1

PURGE DATA

Date: 8-21-98	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity		ALK	ORP
Method:	Initial	5.64	.208	24.7	0	0.74	0.00		20	-58
Monitor Reading (ppm): 0 ppm	1	5.34	.160	24.5	0	0.91	0.00			
Well Casing Diameter: 2"	2	5.28	.138	24.3	0	0.47	0.00			
Well Casing Material: PVC	3	5.19	.131	24.3	0	0.55	0.00			
Total Well Depth (TD): 15.80										
Static Water Level (WL): 4.07										
One Casing Volume(gal/L): .191										
Start Purge (hrs): 13:50										
End Purge (hrs): 14:25										
Total Purge Time (min):										
Total Vol. Purged (gal/L): 5.74										

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS CECIL - SITE 8
Project No.: 7653

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

Sample ID No.: CF-8-MW-065-01
Sample Location: SITE 8
Sampled By: GC
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 08/19/98	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO (mg/L) Meter	DO (mg/L) Titration	CO_2	H_2S	Fe +2
Time: 11:00										
Method: SUB. TEFLON TUBE	CLEAR	5.57	.085	25.3	8	1.46	2.02	84	0	.06

ALK 23
FCR 114

PURGE DATA

Date: 08/19/98	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity		ALK	REDOX
Method: PERISTALTIC PUMP	Initial	5.83	.109	26.0	20	1.75	0			
Monitor Reading (ppm): 1	1	5.63	.093	25.5	14	1.24	0			
Well Casing Diameter: 2"	2	5.61	.088	25.5	9	1.28	0			
Well Casing Material: PVC	3	5.57	.085	25.3	8	1.46	0			
Total Well Depth (TD): 16.70										
Static Water Level (WL): 6.25										
One Casing Volume(gal/L): 1.7										
Start Purge (hrs): 10:29										
End Purge (hrs): 10:55										
Total Purge Time (min): 24										
Total Vol. Purged (gal/L): 5.3										

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES

Circle If Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAC Cecil Field - SITE 8
Project No.: ~~7898~~ 7653

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

Sample ID No.: CF-8-MW-025-01
Sample Location:
Sampled By:
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO (mg/L) Meter	DO (mg/L) Titration	CO_2	H_2S	Fe +2
Date: 8-20-98										
Time: 1300										
Method:		5.61	0.382	23.6	1	0.55	0.00	107.6	1.0	0.8

PURGE DATA

Date: 8-20-98	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity		ALK	ORP
Method:	Initial	5.80	.627	24.2	9	0.66	0.02		22.1	-094
Monitor Reading (ppm): 0 ppm	1	5.79	.627	24.1	7	0.66	0.02			
Well Casing Diameter: 2"	2	5.65	.404	23.9	1	0.51	0.01			
Well Casing Material: PVC	3	5.61	.382	23.6	1	0.55	0.01			
Total Well Depth (TD): 16.50										
Static Water Level (WL): 4.10										
One Casing Volume(gal/L): 2.02										
Start Purge (hrs): 12:20										
End Purge (hrs):										
Total Purge Time (min):										
Total Vol. Purged (gal/L): 6.06										

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES

Circle If Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Cecil Field - SITE 8
Project No.: ~~7898~~ 7653

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

Sample ID No.: CF-8-MW-08I-01
Sample Location: Site 8
Sampled By: Tom Nicotera
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8-20-98	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO (mg/L) Meter	DO (mg/L) Titration	CO_2	H_2S	Fe +2
Time: 1600										
Method:	clear	5.73	0.035	24.3	9	0.46	0.72	57.8	0.00	0.6

PURGE DATA

Date: 8-20-98	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity		ALK	ORP
Method:	Initial	5.62	.036	22.7	15	0.59	0.00		5.00	037
Monitor Reading (ppm): 0 ppm	1	5.19	0.033	22.8	12	0.47	0.00			
Well Casing Diameter: 2"	2	5.16	0.033	25.2	11	1.05	0.00			
Well Casing Material: PVC	3	5.13	0.035	24.3	9	0.46	0.00			
Total Well Depth (TD): 66.40										
Static Water Level (WL): 6.21										
One Casing Volume(gal/L): 9.81										
Start Purge (hrs): 13:20										
End Purge (hrs): 15:50										
Total Purge Time (min):										
Total Vol. Purged (gal/L):										

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOC	HCl	40 mL vials	8-20-98
SVOC	~~HCl~~	1 Liter glass amber	↓
metals	HNO_3	500 mL plastic	↓

OBSERVATIONS / NOTES

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS CECIL - SITE 8
Project No.: ~~2888~~ 7653

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

Sample ID No.: CF-8-MW-09/01-01
Sample Location: SITE 8
Sampled By: ALBY WILCOX
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 08-21-98	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO (mg/L) Meter	DO (mg/L) Titration	CO_2	H_2S	Fe +2
Time: 08:45										
Method:	clear	5.01	0.049	21.6	40	0.46	2.06	92.2	0.7	0.6

PURGE DATA

Date: 08-21-98	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity		ALK	ORP
Method:	Initial	5.07	0.060	21.9	<10	0.51	0.00		13.1	-006
Monitor Reading (ppm): ppm	1	5.06	0.049	22.0	<10	0.62	0.00			
Well Casing Diameter: 2"	2	4.99	0.049	21.6	<10	0.96	0.00			
Well Casing Material: PVC	3	5.01	0.049	21.6	<10	0.46	0.00			
Total Well Depth (TD): 22.61						0.46	AW			
Static Water Level (WL): 3.02										
One Casing Volume(gal/L): 3.19										
Start Purge (hrs): 08:10										
End Purge (hrs): 08:35										
Total Purge Time (min): 25										
Total Vol. Purged (gal/L): 9.58										

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES

Circle If Applicable:

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

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Cecil Field - SITE 8
Project No.: ~~7898~~ 7653

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

Sample ID No.: CF-8-MW-10S-01
Sample Location: SITE 8
Sampled By:
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 08·19·98	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO (mg/L) Meter	DO (mg/L) Titration	CO_2	H_2S	Fe +2
Time: 09:15										
Method: SUB. TEFLON TUBE	CLEAR	5.11	0.078	25.7	4	0.91	0.00	127.6	0.7	0.4

PURGE DATA

Date: 08·19·98	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity			
Method: PERISTALTIC PUMP	Initial	5.26	.109	26.4	2	0.82	0			
Monitor Reading (ppm): 1	1	5.29	.101	26.1	10	0.81	0			
Well Casing Diameter: 2"	2	5.22	.087	25.7	6	0.92	0			
Well Casing Material: PVC	3	5.11	.078	25.7	4	0.91	0			
Total Well Depth (TD): 15.07										
Static Water Level (WL): 4.53										
One Casing Volume(gal/L): 1.72										
Start Purge (hrs): 08:45										
End Purge (hrs): 09:10										
Total Purge Time (min): 25										
Total Vol. Purged (gal/L): 5.4										

AK 2/4 VRI -1/4

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES

SET TEFLON TUBING @ 4.99' FLOWRATE = 450ml/min

Circle if Applicable:

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

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Cecil Field - SITE 8
Project No.: 7653

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

Sample ID No.: CF-8-MW-125-01
Sample Location:
Sampled By: Tom Nicotera
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8-20-98 / Time: 11:15	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO (mg/L) Meter	DO (mg/L) Titration	CO_2	H_2S	Fe +2
Method: Peristaltic pump	clear	5.00	0.083	23.1	0	0.79	2.58	110.8	0.5	0.5

PURGE DATA

Date: 8-20-98	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity		ALK	ORP
Method: Peristaltic pump	Initial	4.85	0.070	24.2	0	0.62	0.00		8.8	224
Monitor Reading (ppm): 0 ppm	1	5.03	0.084	22.9	13	0.66	0.00			
Well Casing Diameter: 2"	2	5.00	.086	22.8	3	0.57	0.00			
Well Casing Material: PVC	3	5.00	0.083	23.1	0	0.79	0.00			
Total Well Depth (TD): 27.47										
Static Water Level (WL): 5.96										
One Casing Volume(gal/L): 3.54	3									
Start Purge (hrs): 1010										
End Purge (hrs): 1100										
Total Purge Time (min):										
Total Vol. Purged (gal/L):	10.62									

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES

Circle if Applicable:

MS/MSD	Duplicate ID No.: CF-8-dup-01

Signature(s):

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS CECIL - SITE 8
Project No.: 7653

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

Sample ID No.: CF-8-MW-135-01
Sample Location: SITE 8
Sampled By: GC
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 08 1998	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO (mg/L) Meter	DO (mg/L) Titration	CO_2	H_2S	Fe +2
Time: 14:00										
Method: SUB TEFLON TUBING	CLEAR	5.42	.147	26.5	10	0.80	0.00	158.6	0.5	0.6

AIR 99.8 ORI -10

PURGE DATA

Date: 08 1998	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity			
Method: PERISTALTIC PUMP	Initial	5.59	.223	27.9	11	0.63	0		ALK	REDOX
Monitor Reading (ppm): N/D	1	5.37	.150	26.4	5	0.77	0			
Well Casing Diameter: 2"	2	5.36	.148	26.2	11	0.47	0			
Well Casing Material: PVC	3	5.42	.147	26.5	10	0.80	0			
Total Well Depth (TD): 16.90										
Static Water Level (WL): 4.19										
One Casing Volume(~~gal/L~~): 2.07										
Start Purge (hrs): 13:30										
End Purge (hrs): 13:55										
Total Purge Time (min): 25										
Total Vol. Purged (gal/L): 6.4										

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES

Circle if Applicable:

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

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Cecil Field - SITE 8
Project No.: ~~7588~~ 7653

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

Sample ID No.: CF-8-MW-175-01
Sample Location: Site 8
Sampled By: Abby Wilcox
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8-19-98	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO (mg/L) Meter	DO (mg/L) Titration	CO_2	H_2S	Fe +2
Time:										
Method: peristaltic pump	clear	4.47	0.031	25.2	0	0.77	0.5	70.4	0.5	0.4

ORP 042
ALK 3.

PURGE DATA

Date: 8-19-98	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity			
Method: peristaltic pump	Initial	4.42	0.032	25.0	0	0.73	0.00			
Monitor Reading (ppm): 0 ppm	1	4.59	0.031	24.9	0	0.51	0.00			
Well Casing Diameter: 2"	2	4.57	0.031	25.0	0	1.24	0.00			
Well Casing Material: PVC	3	4.47	0.031	25.2	0	0.77	0.00			
Total Well Depth (TD): 22.40'										
Static Water Level (WL): 3.91										
One Casing Volume(gal/L): 3.01										
Start Purge (hrs): 0900										
End Purge (hrs): 0955										
Total Purge Time (min): 55										
Total Vol. Purged (gal/L): 9.04										

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES

Circle if Applicable:

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

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Cecil Field - SITE 8
Project No.: ~~2498~~ 7653

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

Sample ID No.: CF-8-MW-18S
Sample Location: Site 8
Sampled By: ABBY WILCOX
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8/19/98	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO (mg/L) Meter	DO (mg/L) Titration	CO_2	H_2S	Fe +2
Time: 12:20										
Method:	clear	6.26	0.34	26.4	32	0.62	1.34	110.8	0	0.0

PURGE DATA

Date: 8-19-98	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity		ALK	ORP
Method:	Initial	6.42	0.306	28.4	171	2.02	0.00			
Monitor Reading (ppm): 0 ppm	1	6.40	0.316	26.6	157	1.73	0.00			
Well Casing Diameter: 2"	2	6.28	0.319	26.6	66	0.66	0.00			
Well Casing Material: PVC	3	6.26	0.324	26.4	32	0.62	0.01			
Total Well Depth (TD):	15.35									
Static Water Level (WL):	4.06									
One Casing Volume(gal/L):	1.84									
Start Purge (hrs):	1135									
End Purge (hrs):	1210									
Total Purge Time (min):										
Total Vol. Purged (gal/L):										

All
148
OPC
12

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES

Circle if Applicable:

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

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS CECIL FIELD
Project No.: ~~7848~~ 7653 SITE 8

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

Sample ID No.: CF-8-MW-23-S-01
Sample Location: SITE 8
Sampled By: GKC
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 8-18-98 / Time: 12:30	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO (mg/L) Meter	DO (mg/L) Titration	CO_2	H_2S	Fe +2
Method: Peristaltic pump	TAN	5.99	0.92	27.1	122	1.57	0.10	26	0.3	1.0

PURGE DATA

Date: 8-18-98	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	~~Alk~~	Alk	ORP
Method: PERISTALTIC PUMP	Initial	6.04	.097	26.7	31	3.57	0		28.5	29
Monitor Reading (ppm): 2 PPM	1	5.94	.099	26.2	69	2.48	0			
Well Casing Diameter: 2"	2	5.98	.095	26.5	76	1.22	0			
Well Casing Material: PVC	3	5.99	.092	27.1	122	1.57	0			
Total Well Depth (TD): 25.00										
Static Water Level (WL): 4.56										
One Casing Volume(gal/L): 3.35										
Start Purge (hrs): 9:34										
End Purge (hrs): ~~12:15~~ 12:15										
Total Purge Time (min):										
Total Vol. Purged (gal/L):										

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NAS Cecil Field - Site 8
Project No.: ~~7898~~ 7653

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

Sample ID No.: CF-8-MW-24-I
Sample Location: Site 8
Sampled By: Tom Nicotra
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 08 18 98 / Time: 1140	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO (mg/L) Meter	DO (mg/L) Titration	CO_2	H_2S	Fe +2
Method: Peristaltic pump	clear	5.92	0.201	22.8	34	0.67	0.14	114.6	0.3	0.5

PURGE DATA

Date: 08 18 98	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity		Alk	ORP
Method: Peristaltic pump	Initial	5.93	0.208	22.0	470	0.85	0.00		73.8	-052
Monitor Reading (ppm): 0 ppm	1	5.95	0.205	22.3	101	0.63	0.00			
Well Casing Diameter: 1/2"	2	5.90	0.205	22.6	46	0.66	0.00			
Well Casing Material: PVC	3	5.92	0.201	22.8	34	0.67	0.00			
Total Well Depth (TD): 50.00'										
Static Water Level (WL): 0.00										
One Casing Volume(gal/L): 8.15										
Start Purge (hrs): 09:20										
End Purge (hrs): 11:30										
Total Purge Time (min):										
Total Vol. Purged (gal/L): 24.45										

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
VOAs	HCl	40 ml Glass	1140
Gasses	HCl	40 ml Glass	1
SVOAs		1 L amber glass	1140
DOC		100 ml amber glass	
DIC		100 ml amber glass	
NH_3 / NO_2 + NO_3	H_2SO_4	500 ml plastic	
Cl / Br / PO_4 / SO_4		500 ml plastic	
Ca, Mg, Na, K	HNO_3	250 ml plastic	
Sulfide	NaOH/ZnAc	250 ml plastic	
Alkalinity		500 ml plastic	
Metals	HNO_3	500 ml plastic	1140

OBSERVATIONS / NOTES

Circle if Applicable:

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

APPENDIX B

ANALYTICAL LABORATORY RESULTS

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-10-8-160

TO: [redacted] DATE: OCTOBER 22, 1998

FROM: JUSTIN ORBICH CC: DV FILE

SUBJECT: ORGANIC DATA VALIDATION – VOA/SVOA/METHANE/ETHANE/ETHENE
CTO 039 – CECIL FIELDS, FLORIDA
SDG 9808174

SAMPLES: 5/Aqueous

CF-8-MW-06S-01	CF-8-MW-10S-01
CF-8-MW-13S-01	CF-8-MW-17S-01
CF-8-MW-18S-01	

OVERVIEW

The sample set for CTO 039, SDG 9808174, Cecil Field, Florida consists of five (5) aqueous environmental samples. The samples were analyzed for Target Compound List (TCL) volatiles, selected semivolatile compounds, which includes 2-methylnaphthalene and naphthalene, and selected dissolved gases, which includes methane, ethane, and ethene.

The samples was collected by Tetra Tech, NUS on August 19, 1998, and analyzed by GP Environmental Services. All analyses were performed in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The volatiles, semivolatiles, and dissolved gasses were analyzed according to SW-846 Method 8260B and 8270C and RSK SOPs 175 & 147, respectively. The data in this SDG was validated with regard to the following parameters:

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

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 table summarizes the maximum concentrations of volatile organic compounds found in the method/field quality control blanks.

Compound	Concentration	Aqueous Action Level
Methylene Chloride	0.8ug/L	8.0ug/L
Chloroform	0.3ug/L	1.5ug/L
Trichloroethene	0.2ug/L	1.0ug/L

Blank Contamination

- 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.

Dilution factors and sample aliquot were taken into consideration during the application of all action levels. The positive results reported for these compounds in the affected samples were qualified in the manner indicated by the blank action table. The positive results for methylene chloride and trichloroethene were qualified as nondetected, (U), as a result of blank contamination.

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

SEMIVOLATILE FRACTION

A semivolatile sample contained positive results for a compound below the contract required quantitation limits (CRQL). These results were qualified as estimated (J).

DISSOLVED GASES

The following table summarizes the maximum concentration of a dissolved gas organic compound found in the method/field quality control blank.

Compound	Concentration	Aqueous Action Level
Methane	2.4ug/L	12.0ug/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.

Dilution factors and sample aliquot were taken into consideration during the application of all action levels. The positive results reported for this compound in the affected samples were qualified in the manner indicated by the blank action table. The positive results for methane were qualified as nondetected, (U), as a result of blank contamination.

ADDITIONAL COMMENTS

In the volatile fraction, sample CF-8-MW-10S-01 was diluted 10X due to the exceedance of 1,1-dichloroethane above the instruments linear calibration range. Results from the dilution were transposed over the undiluted sample results and used for validation purposes.

In the dissolved gas fraction, sample CF-8-MW-06S-01, CF-8-MW-10S-01, CF-8-MW-13S-01, and CF-8-MW-17S-01 were diluted 5X, 50X, 200X, and 20X, respectively, due to the exceedance of methane above the instruments linear calibration range. Results from the dilution were transposed over the undiluted sample results and used for validation purposes.

MEMO TO: MARK SPERANZA
DATE: OCTOBER 22, 1998 – PAGE 4

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (2/94), 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 was 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: MARK SPERANZA
DATE: OCTOBER 22, 1998 – PAGE 5

NAS CECIL FIELD
SDG 9808174
TABLE 1 - RECOMMENDATION SUMMARY

Sample No.	VOA	SVOA	GAS
CF-8-MW-06S-01	J^1		J^2
CF-8-MW-10S-01	$A^{1,2}$ J^1		J^2
CF-8-MW-13S-01	A^2 J^1		J^2
CF-8-MW-17S-01	A^1 J^1	J^1	J^2
CF-8-MW-18S-01	A^1		A^3

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

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

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

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

J^1 - Accept data, but qualify positive results below the contract required quantitation limit (CRQL) as estimated (J).

J^2 - Accept data, but qualify positive results as estimated, (J), due to the exceedance of the instruments linear calibration range for methane.

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-06S-01

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808174-03A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B14446.D

Level: (low/med) LOW Date Received: 08/20/98

% Moisture: not dec. _____ Date Analyzed: 08/28/98

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	2.0	JB
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	0.1	J
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
71-43-2	Benzene	1.0	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
108-88-3	Toluene	5.0	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
100-41-4	Ethylbenzene	5.0	U
108-38-3	m,p-xylene	5.0	U
95-47-6	o-xylene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-10S-01

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808174-02A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B14445.D

Level: (low/med) LOW Date Received: 08/20/98

% Moisture: not dec. _____ Date Analyzed: 08/28/98

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	0.7	J
75-00-3	Chloroethane	2.5	J
75-35-4	1,1-Dichloroethene	44.7	
75-09-2	Methylene chloride	1.1	JB
156-60-5	Trans-1,2-dichloroethene	0.2	J
75-34-3	1,1-Dichloroethane	100.6	E
156-59-2	Cis-1,2-dichloroethene	0.2	J
67-66-3	Chloroform	5.0	U
71-55-6	1,1,1-Trichloroethane	15.4	
56-23-5	Carbon tetrachloride	3.0	U
71-43-2	Benzene	2.9	
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	0.2	J
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
108-88-3	Toluene	10.2	
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
100-41-4	Ethylbenzene	3.0	J
108-38-3	m,p-xylene	3.6	J
95-47-6	o-xylene	3.9	J
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-1~~1~~0S-01DL

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: SAS No.: SDG No.:

MP 9.22.98

Matrix: (soil/water) WATER Lab Sample ID: 9808174-02BDL

Sample wt/vol: 2.5 (g/ml) ML Lab File ID: B14852.D

Level: (low/med) LOW Date Received: 08/20/98

% Moisture: not dec. Date Analyzed: 09/17/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 10.0

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	20.0	U
75-01-4	Vinyl chloride	10.0	U
75-00-3	Chloroethane	50.0	U
75-35-4	1,1-Dichloroethene	35.9	JD
75-09-2	Methylene chloride	14.8	JBD
156-60-5	Trans-1,2-dichloroethene	50.0	U
75-34-3	1,1-Dichloroethane	132.6	D ✓
156-59-2	Cis-1,2-dichloroethene	1.9	JD
67-66-3	Chloroform	50.0	U
71-55-6	1,1,1-Trichloroethane	15.0	JD
56-23-5	Carbon tetrachloride	30.0	U
71-43-2	Benzene	3.1	JD
107-06-2	1,2-Dichloroethane	30.0	U
79-01-6	Trichloroethene	30.0	U
78-87-5	1,2-Dichloropropane	50.0	U
10061-01-5	Cis-1,3-dichloropropene	2.0	U
108-88-3	Toluene	12.7	JD
10061-02-6	Trans-1,3-dichloropropene	2.0	U
79-00-5	1,1,2-Trichloroethane	50.0	U
127-18-4	Tetrachloroethene	30.0	U
108-90-7	Chlorobenzene	50.0	U
100-41-4	Ethylbenzene	2.7	JD
108-38-3	m,p-xylene	3.3	JD
95-47-6	o-xylene	4.1	JD
79-34-5	1,1,2,2-Tetrachloroethane	2.0	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-13S-01

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808174-05B

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B14853.D

Level: (low/med) LOW Date Received: 08/20/98

% Moisture: not dec. _____ Date Analyzed: 09/17/98

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	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
71-43-2	Benzene	1.0	J
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
108-88-3	Toluene	2.3	J
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
100-41-4	Ethylbenzene	3.9	J
108-38-3	m,p-xylene	4.3	J
95-47-6	o-xylene	6.2	
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-13S-01DL

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808174-05ADL

Sample wt/vol: 2.5 (g/ml) ML Lab File ID: B14448.D

Level: (low/med) LOW Date Received: 08/20/98

% Moisture: not dec. _____ Date Analyzed: 08/28/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 10.0

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	20.0	U
75-01-4	Vinyl chloride	10.0	U
75-00-3	Chloroethane	50.0	U
75-35-4	1,1-Dichloroethene	50.0	U
75-09-2	Methylene chloride	23.8	JBD
156-60-5	Trans-1,2-dichloroethene	50.0	U
75-34-3	1,1-Dichloroethane	50.0	U
156-59-2	Cis-1,2-dichloroethene	50.0	U
67-66-3	Chloroform	50.0	U
71-55-6	1,1,1-Trichloroethane	50.0	U
56-23-5	Carbon tetrachloride	30.0	U
71-43-2	Benzene	2.2	JD
107-06-2	1,2-Dichloroethane	30.0	U
79-01-6	Trichloroethene	30.0	U
78-87-5	1,2-Dichloropropane	50.0	U
10061-01-5	Cis-1,3-dichloropropene	2.0	U
108-88-3	Toluene	4.3	JD
10061-02-6	Trans-1,3-dichloropropene	2.0	U
79-00-5	1,1,2-Trichloroethane	50.0	U
127-18-4	Tetrachloroethene	30.0	U
108-90-7	Chlorobenzene	50.0	U
100-41-4	Ethylbenzene	5.6	JD
108-38-3	m,p-xylene	6.2	JD
95-47-6	o-xylene	8.3	JD
79-34-5	1,1,2,2-Tetrachloroethane	2.0	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-17S-01

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808174-01A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B14444.D

Level: (low/med) LOW Date Received: 08/20/98

% Moisture: not dec. _____ Date Analyzed: 08/28/98

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	1.7	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
71-43-2	Benzene	1.0	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
108-88-3	Toluene	5.0	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
100-41-4	Ethylbenzene	0.8	J
108-38-3	m,p-xylene	5.0	U
95-47-6	o-xylene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-18S-01

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808174-04A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B14447.D

Level: (low/med) LOW Date Received: 08/20/98

% Moisture: not dec. _____ Date Analyzed: 08/28/98

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	5.0	U
71-55-6	1,1,1-Trichloroethane	5.0	U
56-23-5	Carbon tetrachloride	3.0	U
71-43-2	Benzene	1.0	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
108-88-3	Toluene	5.0	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
100-41-4	Ethylbenzene	5.0	U
108-38-3	m,p-xylene	5.0	U
95-47-6	o-xylene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF8MW06S01

Lab Name: GP_ENVIRONMENTAL Contract: NUS_SOUT

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

Matrix: (soil/water) WATER Lab Sample ID: 9808174-03G

Sample wt/vol: 930 (g/ml) ML Lab File ID: D12644.D

Level: (low/med) LOW Date Received: 08/20/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 08/25/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 09/01/98

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
91-20-3	Naphthalene	6	U
91-57-6	2-Methylnaphthalene	6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF8MW10S01

Lab Name: GP_ENVIRONMENTAL Contract: NUS_SOUT

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

Matrix: (soil/water) WATER Lab Sample ID: 9808174-02G

Sample wt/vol: 960 (g/ml) ML Lab File ID: D12643.D

Level: (low/med) LOW Date Received: 08/20/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 08/25/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 09/01/98

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
91-20-3	Naphthalene	31	
91-57-6	2-Methylnaphthalene	22	

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF8MW13S01

Lab Name: GP_ENVIRONMENTAL Contract: NUS_SOUT

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

Matrix: (soil/water) WATER Lab Sample ID: 9808174-05G

Sample wt/vol: 900 (g/ml) ML Lab File ID: D12876.D

Level: (low/med) LOW Date Received: 08/20/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 08/25/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 09/17/98

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
91-20-3	Naphthalene	69	
91-57-6	2-Methylnaphthalene	65	

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF8MW17S01

Lab Name: GP_ENVIRONMENTAL Contract: NUS_SOUT

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

Matrix: (soil/water) WATER Lab Sample ID: 9808174-01G

Sample wt/vol: 880 (g/ml) ML Lab File ID: D12642.D

Level: (low/med) LOW Date Received: 08/20/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 08/25/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 09/01/98

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
91-20-3	Naphthalene	13	
91-57-6	2-Methylnaphthalene	6	J

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF8MW18S01

Lab Name: GP_ENVIRONMENTAL Contract: NUS_SOUT

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

Matrix: (soil/water) WATER Lab Sample ID: 9808174-04G

Sample wt/vol: 840 (g/ml) ML Lab File ID: D12645.D

Level: (low/med) LOW Date Received: 08/20/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 08/25/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 09/01/98

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
91-20-3	Naphthalene	7	U
91-57-6	2-Methylnaphthalene	7	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-06S-01

Lab Name: GPL Laboratories Contract: NUS

Lab Code: GPL Case No.: 9808174 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808174-03D

Sample wt/vol: 10 (g/ml) ML Lab File ID: N10777.D

Level: (low/med) LOW Date Received: _____

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

Concentrated Extract Volume: 1 (uL) Date Analyzed: 09/01/98

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	51.2	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-8-MW-06S-01 DL

Lab Name: GPL Laboratories Contract: NUS

Lab Code: GPL Case No.: 9808174 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808174-03D 5X

Sample wt/vol: 10 (g/ml) ML Lab File ID: N10783.D

Level: (low/med) LOW Date Received: _____

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

Concentrated Extract Volume: 1 (uL) Date Analyzed: 09/01/98

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	46.6	BD
74-84-0	Ethane	29.0	U
74-85-1	Ethylene	31.2	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-10S-01

Lab Name: GPL Laboratories Contract: NUS

Lab Code: GPL Case No.: 9808174 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808174-02D

Sample wt/vol: 10 (g/ml) ML Lab File ID: N10776.D

Level: (low/med) LOW Date Received: _____

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

Concentrated Extract Volume: 1 (uL) Date Analyzed: 09/01/98

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	784.7 ~~840.2~~	EB
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	6.2	U

MP 9-22-98

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-10S-01 DL

Lab Name: GPL Laboratories Contract: NUS

Lab Code: GPL Case No.: 9808174 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808174-02D 50X

Sample wt/vol: 10 (g/ml) ML Lab File ID: N10782.D

Level: (low/med) LOW Date Received: _____

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

Concentrated Extract Volume: 1 (uL) Date Analyzed: 09/01/98

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	894.5	D
74-84-0	Ethane	290.0	U
74-85-1	Ethylene	312.0	U
~~74-82-8~~	~~Methane~~	~~909.5~~	~~D~~
~~74-84-0~~	~~Ethane~~	~~290.0~~	~~U~~
~~74-85-1~~	~~Ethylene~~	~~312.0~~	~~U~~

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-13S-01

Lab Name: GPL Laboratories Contract: NUS

Lab Code: GPL Case No.: 9808174 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808174-05D

Sample wt/vol: 10 (g/ml) ML Lab File ID: N10780.D

Level: (low/med) LOW Date Received: _____

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

Concentrated Extract Volume: 1 (uL) Date Analyzed: 09/01/98

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	2578.1	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-8-MW-~~185~~ 135-01 DL

Lab Name: GPL Laboratories Contract: NUS

Lab Code: GPL Case No.: 9808174 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808174-05D 200X

Sample wt/vol: 10 (g/ml) ML Lab File ID: N10784.D

Level: (low/med) LOW Date Received: _____

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

Concentrated Extract Volume: 1 (uL) Date Analyzed: 09/01/98

Injection Volume: 500. (uL) Dilution Factor: 200.0

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

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	1920.0	BD
74-84-0	Ethane	1160.0	U
74-85-1	Ethylene	1248.0	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-17S-01

Lab Name: GPL Laboratories Contract: NUS

Lab Code: GPL Case No.: 9808174 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808174-01D

Sample wt/vol: 10 (g/ml) ML Lab File ID: N10775.D

Level: (low/med) LOW Date Received: _____

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

Concentrated Extract Volume: 1 (uL) Date Analyzed: 09/01/98

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	321.3	EB
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	6.2	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-17S-01 DL

Lab Name: GPL Laboratories Contract: NUS

Lab Code: GPL Case No.: 9808174 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808174-01D 20X

Sample wt/vol: 10 (g/ml) ML Lab File ID: N10781.D

Level: (low/med) LOW Date Received: _____

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

Concentrated Extract Volume: 1 (uL) Date Analyzed: 09/01/98

Injection Volume: 500. (uL) Dilution Factor: 20.0

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

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	346.0	BD
74-84-0	Ethane	116.0	U
74-85-1	Ethylene	124.8	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-18S-01

Lab Name: GPL Laboratories Contract: NUS

Lab Code: GPL Case No.: 9808174 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808174-04D

Sample wt/vol: 10 (g/ml) ML Lab File ID: N10779.D

Level: (low/med) LOW Date Received: _____

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

Concentrated Extract Volume: 1 (uL) Date Analyzed: 09/01/98

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	21.0	B
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	6.2	U
~~74-82-8~~	~~Methane~~	~~22.2~~	~~B~~
~~74-84-0~~	~~Ethane~~	~~5.8~~	~~U~~
~~74-85-1~~	~~Ethylene~~	~~6.2~~	~~U~~

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-10-8-166

TO: [redacted] DATE: OCTOBER 23, 1998

FROM: JUSTIN ORBICH CC: DV FILE

SUBJECT: ORGANIC DATA VALIDATION – VOA/SVOA/DISSOLVED GAS
CTO 039 – CECIL FIELDS, FLORIDA
SDG 9808191

SAMPLES: 5/Aqueous

CF-8-MW-01S-01
CF-8-MW-03D-01
CF-8-MW-09S-01
CF-8-MW-02I-01
CF-8-MW-04S-01

OVERVIEW

The sample set for CTO 039, SDG 9808191, Cecil Field, Florida consists of five (5) aqueous environmental samples. The samples were analyzed for selected Target Compound List (TCL) volatiles and selected semivolatile compounds, which includes 2-methylnaphthalene and naphthalene. Samples CF-8-MW-01S-01, CF-8-MW-04S-01, and CF-8-MW-09S-01 were analyzed for selected dissolved gases, which include methane, ethane, and ethene.

The samples was collected by Tetra Tech, NUS on August 21, 1998, and analyzed by GP Environmental Services. All analyses were performed in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The volatiles, semivolatiles, and dissolved gasses were analyzed according to SW-846 Method 8260B and 8270C and RSK SOPs 175 & 147, respectively. The data in this SDG was validated with regard to the following parameters:

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

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 table summarizes the maximum concentrations of volatile organic compounds found in the method/field quality control blanks.

Compound	Concentration	Aqueous Action Level
Methylene Chloride	0.8µg/L	8.0µg/L
Chloroform	0.2µg/L	1.0µg/L
Trichloroethene	0.2µg/L	1.0µg/L

Blank Contamination

- 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.

Dilution factors and sample aliquot were taken into consideration during the application of all action levels. The positive results reported for these compounds in the affected samples were qualified in the manner indicated by the blank action table. The positive results for methylene chloride and trichloroethene were qualified as nondetected, (U), as a result of blank contamination.

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

SEMIVOLATILE FRACTION

A semivolatile sample contained positive results for a compound below the contract required quantitation limits (CRQL). These results were qualified as estimated (J).

DISSOLVED GASES

The following table summarizes the maximum concentration of a dissolved gas organic compound found in the method/field quality control blank.

Compound	Concentration	Aqueous Action Level
Methane	1.8µg/L	9.0µg/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.

Dilution factors and sample aliquot were taken into consideration during the application of all action levels. No action was warranted due to the results being greater than the action level.

ADDITIONAL COMMENTS

In the semivolatile fraction, the laboratory did not include the complete field identification number on the Form Is. The data reviewer amended the affected forms.

In the dissolved gas fraction, samples, CF-8-MW-01S-01, CF-8-MW-04S-01, CF-8-MW-09S-01 were diluted 20X, 50X, and 5X, respectively, due to the exceedance of methane above the instruments linear calibration range. Results from the dilution were transposed over the undiluted sample results and used for validation purposes.

MEMO TO: **MARK SPERANZA**
DATE: **OCTOBER 23, 1998 – PAGE 3**

EXECUTIVE SUMMARY

Laboratory Performance Issues: In the volatile fraction, methylene chloride, chloroform, and trichloroethene were detected as blank contaminants. In the dissolved gas fraction, methane was detected as a blank contaminant. In the semivolatile fraction, the laboratory incorrectly labeled the EPA field identification on the Form s. In the dissolved gas fraction, samples, CF-8-MW-01S-01, CF-8-MW-04S-01, and CF-8-MW-09S-01 were diluted due to the exceedance of the instruments linear calibration range.

Other Issues Affecting Data Quality: None

MEMO TO: MARK SPERANZA
DATE: OCTOBER 23, 1998 – PAGE 4

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (2/94), 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 was 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: MARK SPERANZA
DATE: OCTOBER 23, 1998 – PAGE 5

NAS CECIL FIELD
SDG 9808191
TABLE 1 - RECOMMENDATION SUMMARY

Sample No.	VOA	SVOA	GAS
CF-8-MW-01S-01	A^1		
CF-8-MW-02I-01	A^1		
CF-8-MW-03D-01	A^1		
CF-8-MW-04S-01	$A^{1,2}$ J^1	J^1	
CF-8-MW-09S-01	A^1 J^1		

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

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

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

J^1 - Accept data, but qualify positive results below the contract required quantitation limit (CRQL) as estimated (J).

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-01S-01

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808191-02A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B14582.D

Level: (low/med) LOW Date Received: 08/22/98

% Moisture: not dec. _____ Date Analyzed: 09/04/98

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	0.8	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
71-43-2	Benzene	1.0	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
108-88-3	Toluene	5.0	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
100-41-4	Ethylbenzene	5.0	U
108-38-3	m,p-xylene	5.0	U
95-47-6	o-xylene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-02I-01

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808191-05A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B14585.D

Level: (low/med) LOW Date Received: 08/22/98

% Moisture: not dec. _____ Date Analyzed: 09/04/98

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	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
71-43-2	Benzene	1.0	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
108-88-3	Toluene	5.0	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
100-41-4	Ethylbenzene	5.0	U
108-38-3	m,p-xylene	5.0	U
95-47-6	o-xylene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-03D-01

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808191-03A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B14583.D

Level: (low/med) LOW Date Received: 08/22/98

% Moisture: not dec. _____ Date Analyzed: 09/04/98

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	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
71-43-2	Benzene	1.0	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
108-88-3	Toluene	5.0	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
100-41-4	Ethylbenzene	5.0	U
108-38-3	m,p-xylene	5.0	U
95-47-6	o-xylene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-O3D-01RE

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808191-03BRE

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B14855.D

Level: (low/med) LOW Date Received: 08/22/98

% Moisture: not dec. _____ Date Analyzed: 09/17/98

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	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
71-43-2	Benzene	1.0	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
108-88-3	Toluene	5.0	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
100-41-4	Ethylbenzene	5.0	U
108-38-3	m,p-xylene	5.0	U
95-47-6	o-xylene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-04S-01

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808191-04A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B14584.D

Level: (low/med) LOW Date Received: 08/22/98

% Moisture: not dec. _____ Date Analyzed: 09/04/98

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	27.9	
75-09-2	Methylene chloride	0.6	JB
156-60-5	Trans-1,2-dichloroethene	0.3	J
75-34-3	1,1-Dichloroethane	51.4	
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
71-43-2	Benzene	1.9	
107-06-2	1,2-Dichloroethane	3.0	U
79-01-6	Trichloroethene	0.1	J
78-87-5	1,2-Dichloropropane	5.0	U
10061-01-5	Cis-1,3-dichloropropene	0.2	U
108-88-3	Toluene	5.0	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
100-41-4	Ethylbenzene	1.4	J
108-38-3	m,p-xylene	0.2	J
95-47-6	o-xylene	0.9	J
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-04S-01DL

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808191-04BDL

Sample wt/vol: 12.5 (g/ml) ML Lab File ID: B14856.D

Level: (low/med) LOW Date Received: 08/22/98

% Moisture: not dec. _____ Date Analyzed: 09/17/98

GC Column: RTXVOA ID: 0.53 (mm) Dilution Factor: 2.0

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	4.0	U
75-01-4	Vinyl chloride	2.0	U
75-00-3	Chloroethane	10.0	U
75-35-4	1,1-Dichloroethene	20.2	D
75-09-2	Methylene chloride	1.8	JBD
156-60-5	Trans-1,2-dichloroethene	10.0	U
75-34-3	1,1-Dichloroethane	48.7	D
156-59-2	Cis-1,2-dichloroethene	15.7	D
67-66-3	Chloroform	0.2	JBD
71-55-6	1,1,1-Trichloroethane	0.5	JD
56-23-5	Carbon tetrachloride	6.0	U
71-43-2	Benzene	1.3	JD
107-06-2	1,2-Dichloroethane	6.0	U
79-01-6	Trichloroethene	1.9	JBD
78-87-5	1,2-Dichloropropane	10.0	U
10061-01-5	Cis-1,3-dichloropropene	0.4	U
108-88-3	Toluene	10.0	U
10061-02-6	Trans-1,3-dichloropropene	0.4	U
79-00-5	1,1,2-Trichloroethane	10.0	U
127-18-4	Tetrachloroethene	6.0	U
108-90-7	Chlorobenzene	10.0	U
100-41-4	Ethylbenzene	0.9	JD
108-38-3	m,p-xylene	10.0	U
95-47-6	o-xylene	0.6	JD
79-34-5	1,1,2,2-Tetrachloroethane	0.4	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-09S-01

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808191-01A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B14581.D

Level: (low/med) LOW Date Received: 08/22/98

% Moisture: not dec. _____ Date Analyzed: 09/04/98

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	2.6	J
75-09-2	Methylene chloride	0.8	JB
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	1.5	J
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
71-43-2	Benzene	1.0	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
108-88-3	Toluene	5.0	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
100-41-4	Ethylbenzene	5.0	U
108-38-3	m,p-xylene	5.0	U
95-47-6	o-xylene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-09S-01RE

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808191-01BRE

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B14854.D

Level: (low/med) LOW Date Received: 08/22/98

% Moisture: not dec. _____ Date Analyzed: 09/17/98

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	1.6	J
75-09-2	Methylene chloride	0.7	JB
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	1.7	J
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
71-43-2	Benzene	1.0	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
108-88-3	Toluene	5.0	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
100-41-4	Ethylbenzene	5.0	U
108-38-3	m,p-xylene	5.0	U
95-47-6	o-xylene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-015-01 ~~MW01S01~~ 10 10/25/98

Lab Name: GPL_LABORATORIES Contract: NUS_SOUT

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

Matrix: (soil/water) WATER Lab Sample ID: 9808191-02G

Sample wt/vol: 900 (g/ml) ML Lab File ID: C16600.D

Level: (low/med) LOW Date Received: 08/22/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 08/28/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 09/02/98

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
91-20-3	Naphthalene	7	U
91-57-6	2-Methylnaphthalene	7	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-021-01 ~~JMW02104~~ JO 10/23/98

Lab Name: GPL_LABORATORIES Contract: NUS_SOUT

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

Matrix: (soil/water) WATER Lab Sample ID: 9808191-05D

Sample wt/vol: 990 (g/ml) ML Lab File ID: C16603.D

Level: (low/med) LOW Date Received: 08/22/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 08/28/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 09/02/98

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
91-20-3	Naphthalene	6	U
91-57-6	2-Methylnaphthalene	6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-03D-01 ~~MW03D01~~ 10/23/98

Lab Name: GPL_LABORATORIES Contract: NUS_SOUT

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

Matrix: (soil/water) WATER Lab Sample ID: 9808191-03D

Sample wt/vol: 1000 (g/ml) ML Lab File ID: C16601.D

Level: (low/med) LOW Date Received: 08/22/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 08/28/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 09/02/98

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
91-20-3	Naphthalene	6	U
91-57-6	2-Methylnaphthalene	6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-045-01
~~MW04SUT~~ 10
10/23/98

Lab Name: GPL_LABORATORIES Contract: NUS_SOUT

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

Matrix: (soil/water) WATER Lab Sample ID: 9808191-04G

Sample wt/vol: 980 (g/ml) ML Lab File ID: C16602.D

Level: (low/med) LOW Date Received: 08/22/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 08/28/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 09/02/98

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
91-20-3	Naphthalene	1	J
91-57-6	2-Methylnaphthalene	6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-095-01 ~~MW09S04~~ 10/23/98

Lab Name: GPL_LABORATORIES Contract: NUS_SOUT

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

Matrix: (soil/water) WATER Lab Sample ID: 9808191-01G

Sample wt/vol: 950 (g/ml) ML Lab File ID: C16599.D

Level: (low/med) LOW Date Received: 08/22/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 08/28/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 09/02/98

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
91-20-3	Naphthalene	6	U
91-57-6	2-Methylnaphthalene	6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-01S-01

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPES Case No.: 9808191 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 9808191-02D

Sample wt/vol: 10 (g/ml) ML Lab File ID: N10790.D

Level: (low/med) LOW Date Received: 08/22/98

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

Concentrated Extract Volume: 1 (uL) Date Analyzed: 09/02/98

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	268.6	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-8-MW-01S-01 DL

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPES Case No.: 9808191 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 9808191-02D 20X

Sample wt/vol: 10 (g/ml) ML Lab File ID: N10793.D

Level: (low/med) LOW Date Received: 08/22/98

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

Concentrated Extract Volume: 1 (uL) Date Analyzed: 09/02/98

Injection Volume: 500. (uL) Dilution Factor: 20.0

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

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	299.0	BD
74-84-0	Ethane	116.0	U
74-85-1	Ethylene	124.8	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-04S-01

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPES Case No.: 9808191 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 9808191-04D

Sample wt/vol: 10 (g/ml) ML Lab File ID: N10791.D

Level: (low/med) LOW Date Received: 08/22/98

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

Concentrated Extract Volume: 1 (uL) Date Analyzed: 09/02/98

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	609.8	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-8-MW-04S-01 DL

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPES Case No.: 9808191 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 9808191-04D50X

Sample wt/vol: 10 (g/ml) ML Lab File ID: N10794.D

Level: (low/med) LOW Date Received: 08/22/98

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

Concentrated Extract Volume: 1 (uL) Date Analyzed: 09/02/98

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	750.5	BD
74-84-0	Ethane	290.0	U
74-85-1	Ethylene	312.0	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-09S-01

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPES Case No.: 9808191 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 9808191-01D

Sample wt/vol: 10 (g/ml) ML Lab File ID: N10789.D

Level: (low/med) LOW Date Received: 08/22/98

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

Concentrated Extract Volume: 1 (uL) Date Analyzed: 09/02/98

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	57.6	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-8-MW-09S-01 DL

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPES Case No.: 9808191 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 9808191-01D 5X

Sample wt/vol: 10 (g/ml) ML Lab File ID: N10792.D

Level: (low/med) LOW Date Received: 08/22/98

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

Concentrated Extract Volume: 1 (uL) Date Analyzed: 09/02/98

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	85.1 ~~90.4~~	BD
74-84-0	Ethane	29.0	U
74-85-1	Ethylene	31.2	U

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-10-8-153

TO:	M. SPERANZA	DATE:	OCTOBER 22, 1998
FROM:	GRETCHEN PHIPPS	COPIES:	DV FILE

SUBJECT: DATA VALIDATION-VOLATILES, SEMIVOLATILES, METALS AND MISCELLANSEOUS
CTO 039 - CECIL FIELD
SDG - 9808167

SAMPLES: 2/Aqueous/

CF-8-MW-23S-01 CF-8-MW-241-01

Overview

The sample set for CTO 039, NAS Cecil Field, SDG 9808167, consists of two (2) aqueous environmental samples.

Sample CF-8-MW-23S-01 was analyzed for select metals, select volatiles, dissolved methane, ethane, and ethene, select semivolatiles, anions, dissolved organic carbon, dissolved sulfide, alkalinity and ammonia. Sample CF-8-MW-241-01 was analyzed for select metals, volatiles and semivolatiles. The samples were collected by Tetra Tech NUS on August 18, 1998 and analyzed by GP Environmental Services.

Select metals analyses were conducted using SW-846 method 6010B. Select volatiles analyses were conducted using SW-846 method 5030B/8260B. Dissolved methane, ethane, and ethene analyses were conducted using RSK SOP's 175/147. Select semivolatiles analyses were conducted using SW-846 method 8270C. Anions analyses were conducted using EPA method 300. Dissolved organic carbon analyses were conducted using SM method A5310C. Reactive sulfide analyses were conducted using RPA method 376.1. Alkalinity analyses were conducted using EPA method 310.1. Ammonia analyses were conducted using EPA method 350.1.

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 Tables 1 and 2 summarizes the validation recommendations which were based on the following information:

INORGANIC

Laboratory Blank Analyses

Affected samples: All

Analyte	Maximum Concentration	Action Level(aqueous)
Magnesium	87.6µg/L	438µg/L

An action level of 5X the maximum concentration has been used to evaluate the sample data for blank contamination. No action was taken since the results for magnesium were greater than the action level.

ORGANIC

Affected samples: All

Analyte	Maximum Concentration	Action Level(aqueous)
Methylene Chloride	7.3µg/L	73.0µg/L
Methane	2.4µg/L	12.0µg/L

An action level of 5X the maximum concentration for methane and an action level of 10X the maximum concentration for methylene chloride have been used to evaluate the sample data for blank contamination. Positive results < the action level for methylene chloride were qualified, "U", as a result of blank contamination. No action was taken for methane since all results reported for methane were greater than the action level.

Executive Summary

Laboratory Performance: Magnesium, methylene chloride and methane were present in the laboratory preparation blanks.

Other Factors Affecting Data Quality: None.

The Data for these analyses were reviewed with reference to the "National Functional Guidelines for Organic and 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

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

23S-01

Lab Name: GP ENVIRONMENTAL Contract:

Lab Code: GP Case No.: SAS No.: SDG No.: NUS167

Matrix (soil/water): WATER Lab Sample ID: 9808167-02

Level (low/med): LOW Date Received: 08/19/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	12100		*	P
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium	14800			P
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	2280			P
7439-92-1	Lead				
7439-95-4	Magnesium	1780	B		P
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium	917	B		P
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	3330	B		P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				

Color Before: BROWN Clarity Before: CLOUDY Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

24I-01

Lab Name: GP ENVIRONMENTAL Contract:

Lab Code: GP Case No.: SAS No.: SDG No.: NUS167

Matrix (soil/water): WATER Lab Sample ID: 9808167-01

Level (low/med): LOW Date Received: 08/19/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	776		*	P
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium	32400			P
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	613			P
7439-92-1	Lead				
7439-95-4	Magnesium	3540	B		P
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium	1010	B		P
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	4800	B		P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				

Color Before: WHITE Clarity Before: CLOUDY Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

RUN SUMMARY SHEET
Ammonia

DATA FILE: NH390298
INSTRUMENT FILE: INSTRUMENT: WET_LAB ANALYZED: 09/03/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	WC0222	WC0222	0.71		0.710	3.55	0.500	mg/L	88.8		
2	BLANK	ICB	0		0.000	0.000	0.100	mg/L			
3	9808167-02	CF-8-MW-23S-01	0		0.000	0.000	0.100	mg/L			
4	9808173-01	149-S11-073	0.15		0.150	0.150	0.100	mg/L			
5	9808173-02	149-S11-068	0.11		0.110	0.110	0.100	mg/L			
6	9808173-03	149-S11-067	0.19		0.190	0.190	0.100	mg/L			
7	9808173-04	149-S11-069	0.41		0.410	0.410	0.100	mg/L			
8	9808173-05	149-S11-070	0		0.000	0.000	0.100	mg/L			
9	9808173-06	149-S11-071	2.79		2.79	2.79	0.100	mg/L			
10	9808173-07	149-S11-072	0		0.000	0.000	0.100	mg/L			
11	9808173-08	149-S11-059	0		0.000	0.000	0.100	mg/L			
12	9808173-10	149-S06-024	0.11		0.110	0.110	0.100	mg/L			
13	WC0222	WC0222	0.71		0.710	3.55	0.500	mg/L	88.8		
14	BLANK	BLANK	0		0.000	0.000	0.100	mg/L			
15	9808173-11	149-S06-025	4.49		4.49	4.49	0.100	mg/L			
16	9808173-12	149-S06-026	1.45		1.45	1.45	0.100	mg/L			
17	9808173-13	149-S06-027	0.13		0.130	0.130	0.100	mg/L			
18	9808174-01	CF-8-MW-17S-01	0		0.000	0.000	0.100	mg/L			
19	9808174-02	CF-8-MW-10S-01	0.75		0.750	0.750	0.100	mg/L			
20	9808174-03	CF-8-MW-06S-01	0.20		0.200	0.200	0.100	mg/L			
21	9808174-04	CF-8-MW-18S-01	0		0.000	0.000	0.100	mg/L			
22	9808174-05	CF-8-MW-13S-01	1.53		1.53	1.53	0.100	mg/L			
23	9808184-01	CF-8-MW-12S-01	1.84		1.84	1.84	0.100	mg/L			
24	9808184-01D	CF-8-MW-12S-01D	1.84		1.84	1.84	0.100	mg/L		0.000	
25	WC0222	WC0222	0.75		0.750	3.75	0.500	mg/L	93.8		
26	BLANK	BLANK	0		0.000	0.000	0.100	mg/L			
27	9808184-01S	CF-8-MW-12S-01S	3.76		3.76	3.76	0.100	mg/L	76.8		
28	9808184-02	CF-8-MW-07S-01	0.37		0.370	0.370	0.100	mg/L			
29	9808184-04	CF-8-DUP-01	1.63		1.63	1.63	0.100	mg/L			
30	9808185-01	149-S11-054	0.26		0.260	0.260	0.100	mg/L			
31	9808185-02	149-S11-055	0		0.000	0.000	0.100	mg/L			
32	9808185-03	149-S11-056	0		0.000	0.000	0.100	mg/L			
33	9808185-04	149-S11-057	0		0.000	0.000	0.100	mg/L			
34	9808185-05	149-S11-060	0		0.000	0.000	0.100	mg/L			
35	9808185-05D	149-S11-060D	0		0.000	0.000	0.100	mg/L		DIV BY	
36	9808185-05S	149-S11-060S	2.79		2.79	2.79	0.100	mg/L	112		
37	WC0222	WC0222	0.71		0.710	3.55	0.500	mg/L	88.8		
38	BLANK	BLANK	0		0.000	0.000	0.100	mg/L			

LM LM 9/3/98
Analyst / Date

Tracy E Wardell 9-11-98
Lab Supervisor / Date

RUN SUMMARY SHEET
NITRITE BY IC

DATA FILE: IC-81998
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 08/19/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	S0	S0	0		-0.023	-0.023	0.100	mg/L			
2	S1	S1	26349		0.073	0.073	0.100	mg/L			
3	S2	S2	71695		0.239	0.239	0.100	mg/L			
4	S3	S3	161979		0.568	0.568	0.100	mg/L			
5	S4	S4	282475		1.01	1.01	0.100	mg/L			
6	S5	S5	825708		2.99	2.99	0.100	mg/L			
7	FOR OTHER ANIONS ONLY										
8	WC0207	WC0207	282923		1.01	5.04	0.500	mg/L	73.1		
9	BLANK	ICB	0		-0.023	-0.023	0.100	mg/L			
10	9808167-02	CF-8-MW-23S-01	0		-0.023	-0.023	0.100	mg/L			
11	9808167-02D	CF-8-MW-23S-01D	0		-0.023	-0.023	0.100	mg/L		0.000	
12	9808167-02S	CF-8-MW-23S-01S	694389		2.51	5.02	0.200	mg/L	167		
13	9808167-02	CF-8-MW-23S-01	0		-0.023	-0.453	2.00	mg/L			
14	9808167-02D	CF-8-MW-23S-01D	0		-0.023	-0.453	2.00	mg/L		0.000	
15	9808167-02S	CF-8-MW-23S-01S	462416		1.66	66.5	4.00	mg/L	111		
16	FOR OTHER ANIONS ONLY										
17	CCV1B	CCV1B	LOST DATA		-0.023	-0.113	0.500	mg/L	~~-1.64~~		
18	CCB1	CCB1	0		-0.023	-0.023	0.100	mg/L			

See case narrative
CP 10-22

Tracy E Wardell TW 10-5-98
Analyst / Date

Lab Supervisor / Date

RUN SUMMARY SHEET
ORTHOPHOSPHATE

ATA FILE: IC-81998
NSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 08/19/1998

eq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	S0	S0	0		0.009	0.009	0.100	mg/L			
2	S1	S1	3381		0.100	0.100	0.100	mg/L			
3	S2	S2	8804		0.247	0.247	0.100	mg/L			
4	S3	S3	17928		0.493	0.493	0.100	mg/L			
5	NOT REPORTING THIS POINT										
6	S5	S5	110689		3.00	3.00	0.100	mg/L			
7	ERA981#804	ICV	89491		2.43	12.1	0.500	mg/L	105		
8	REPORTED FOR NO2 ONLY										
9	BLANK	ICB	0		0.009	0.009	0.100	mg/L			
10	9808167-02	CF-8-MW-23S-01	27314		0.747	0.747	0.100	mg/L			
11	9808167-02D	CF-8-MW-23S-01D	27061		0.740	~~0.740~~	0.100	mg/L		0.920	
12	9808167-02S	CF-8-MW-23S-01S	72551		1.97	3.94	0.200	mg/L	106		
13	9808167-02	CF-8-MW-23S-01	0		0.009	0.172	2.00	mg/L			
14	9808167-02D	CF-8-MW-23S-01D	0		0.009	0.172	2.00	mg/L		0.000	
15	9808167-02S	CF-8-MW-23S-01S	58464		1.59	63.6	4.00	mg/L	106		
16	CCV1A	CCV1A	35857		0.978	4.89	0.500	mg/L	~~42.2~~		
17	REPORTED FOR NO2 ONLY										
18	CCB1	CCB1	0		0.009	0.009	0.100	mg/L			

See case narrative GP 10-22

Tracy E Wardlaw 10-5-98
Analyst / Date

Lab Supervisor / Date

RUN SUMMARY SHEET
BROMIDE BY IC METHOD 300

DATA FILE: IC-81998
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 08/19/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	S0	S0	0		-0.011	-0.011	0.100	mg/L			
2	S1	S1	3281		0.048	0.048	0.100	mg/L			
3	S2	S2	16616		0.289	0.289	0.100	mg/L			
4	S3	S3	28016		0.494	0.494	0.100	mg/L			
5	S4	S4	58755		1.05	1.05	0.100	mg/L			
6	S5	S5	165792		2.98	2.98	0.100	mg/L			
7	ERA981#804	ICV	131451		2.36	11.8	0.500	mg/L	93.7		
8	REPORTING NO2 ONLY										
9	BLANK	ICB	0		-0.011	-0.011	0.100	mg/L			
10	9808167-02	CF-8-MW-23S-01	0		-0.011	-0.011	0.100	mg/L			
11	9808167-02D	CF-8-MW-23S-01D	0		-0.011	-0.011	0.100	mg/L		0.000	
12	9808167-02S	CF-8-MW-23S-01S	101043		1.81	3.62	0.200	mg/L	60.4		
13	9808167-02	CF-8-MW-23S-01	0		-0.011	-0.222	2.00	mg/L			
14	9808167-02D	CF-8-MW-23S-01D	0		-0.011	-0.222	2.00	mg/L		0.000	
15	9808167-02S	CF-8-MW-23S-01S	84833		1.52	60.8	4.00	mg/L	1010		
16	CCV1A	CCV1A	84833		1.52	7.60	0.500	mg/L	60.3		
17	REPORTING NO2 ONLY										
18	CCB1	CCB1	0		-0.011	-0.011	0.100	mg/L			

See Case narrative

Tracy E Wardell TW 10-5-98
Analyst / Date

Lab Supervisor / Date

RUN SUMMARY SHEET
CHLORIDE BY IC METHOD 300

ATA FILE: IC-81998
NSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 08/19/1998

;eq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	S0	S0	0		-0.016	-0.016	0.100	mg/L			
2	S1	S1	11853		0.089	0.089	0.100	mg/L			
3	S2	S2	56330		0.479	0.479	0.100	mg/L			
4	S3	S3	126877		1.10	1.10	0.100	mg/L			
5	S4	S4	223324		1.95	1.95	0.100	mg/L			
6	S5	S5	400254		3.50	3.50	0.100	mg/L			
7	ERA981#804	ICV	281987		2.46	12.3	0.500	mg/L	115		
8	REPORTING FOR NO2 ONLY										
9	BLANK	ICB	0		-0.016	-0.016	0.100	mg/L			
10	REPORTING DILUTED SAMPLE										
11	REPORTING DILUTED SAMPLE										
12	REPORTING DILUTED SAMPLE										
13	9808167-02	CF-8-MW-23S-01	41944		0.353	7.06	2.00	mg/L			
14	9808167-02D	CF-8-MW-23S-01D	43027		0.363	7.25	2.00	mg/L		2.66	
15	9808167-02S	CF-8-MW-23S-01S	274341		2.40	95.8	4.00	mg/L	127		
16	CCV1A	CCV1A	185304		1.61	8.06	0.500	mg/L	~~75.4~~		
17	REPORTING FOR NO2 ONLY										
18	CCB1	CCB1	0		-0.016	-0.016	0.100	mg/L			

See case narrative

Tracy E Wardell 10-5-98
Analyst / Date

Lab Supervisor / Date

RUN SUMMARY SHEET
SULFATE BY IC METHOD 300

DATA FILE: S0481998
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 08/19/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	ERA981#804	ICV	1.150		1.15	5.75	0.500	mg/L	94.3		
2	BLANK	ICB	-0.0306		-0.031	-0.031	0.100	mg/L			
3	9808167-02	CF-8-MW-23S-01	....		0.000	0.000	0.100	mg/L			
4	9808167-02D	CF-8-MW-23S-01D	....		0.000	0.000	0.100	mg/L		200	
5	9808167-02S	CF-8-MW-23S-01S	....		0.000	0.000	0.200	mg/L	-114		
6	9808167-02	CF-8-MW-23S-01	0.3428		0.343	6.86	2.00	mg/L			
7	9808167-02D	CF-8-MW-23S-01D	0.3505		0.350	7.01	2.00	mg/L		2.22	
8	9808167-02S	CF-8-MW-23S-01S	1.8131		1.81	72.5	4.00	mg/L	109		
9	CCV1A	CCV1A	0.5426		0.543	2.71	0.500	mg/L	~~44.5~~		
10	CCB1	CCB1	-0.0306		-0.031	-0.031	0.100	mg/L			

See case narrative GP 10-22

Tracy E Ward IW 10-5-98
Analyst / Date

Lab Supervisor / Date

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-23S-01

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808167-02A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B14438.D

Level: (low/med) LOW Date Received: 08/19/98

% Moisture: not dec. _____ Date Analyzed: 08/28/98

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	0.5	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
71-43-2	Benzene	1.0	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
108-88-3	Toluene	1.0	J
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
100-41-4	Ethylbenzene	5.0	U
108-38-3	m,p-xylene	0.2	J
95-47-6	o-xylene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-24I-01

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808167-01A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B14437.D

Level: (low/med) LOW Date Received: 08/19/98

% Moisture: not dec. _____ Date Analyzed: 08/28/98

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	0.5	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
71-43-2	Benzene	1.0	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
108-88-3	Toluene	5.0	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
100-41-4	Ethylbenzene	5.0	U
108-38-3	m,p-xylene	5.0	U
95-47-6	o-xylene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-23S-01 DL

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPES Case No.: 9808167 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 9808167-02D 25X

Sample wt/vol: 10 (g/ml) ML Lab File ID: N10657.D

Level: (low/med) LOW Date Received: 08/19/98

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

Concentrated Extract Volume: 1 (uL) Date Analyzed: 08/28/98

Injection Volume: 500. (uL) Dilution Factor: 25.0

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

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

CAS NO.	COMPOUND		Q
74-82-8	Methane	539.8	BD
74-84-0	Ethane	145.0	U
74-85-1	Ethylene	156.0	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF8MW24I01

Lab Name: GP_ENVIRONMENTAL Contract: NUS_SOUT

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

Matrix: (soil/water) WATER Lab Sample ID: 9808167-01D

Sample wt/vol: 940 (g/ml) ML Lab File ID: D12640.D

Level: (low/med) LOW Date Received: 08/19/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 08/25/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 09/01/98

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
91-20-3	Naphthalene	6	U
91-57-6	2-Methylnaphthalene	6	U

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-10-8-156

TO:	**M. SPERANZA**	**DATE:**	**OCTOBER 22, 1998**
FROM:	**GRETCHEN PHIPPS**	**COPIES:**	**DV FILE**

SUBJECT: **DATA VALIDATION-VOLATILES, SEMI-VOLATILES, METALS AND MISCELLANEOUS**
CTO 039 - CECIL FIELD
SDG - 9808184

SAMPLES: 4/Aqueous/

CF-8-DUP-01 CF-8-MW-07S-01 CF-8-MW-08I-01
CF-8-MW-12S-01

Overview

The sample set for CTO 039, NAS Cecil Field, SDG 9808184, consists of four (4) aqueous environmental samples. One (1) field duplicate pair (CF-8-MW-12S-01 / CF-8-DUP-01) is included within this SDG.

All samples were analyzed for select metals, select semivolatiles, and select volatiles. Samples CF-8-DUP-01, CF-8-MW-07S-01 and CF-8-MW-12S-01 were also analyzed for dissolved ethane, ethene and methane, anions, dissolved organic carbon, dissolved sulfide, alkalinity and ammonia. The samples were collected by Tetra Tech NUS on August 20, 1998 and analyzed by GP Environmental Services.

Select metals analyses were conducted using SW-846 method 6010B. Select volatiles analyses were conducted using SW-846 method 5030B/8260B. Dissolved methane, ethane, and ethene analyses were conducted using RSK SOP's 175/147. Select semivolatiles analyses were conducted using SW-846 method 8270C. Anions analyses were conducted using EPA method 300. Dissolved organic carbon analyses were conducted using SM method A5310C. Dissolved sulfide analyses were conducted using RPA method 376.1. Alkalinity analyses were conducted using EPA method 310.1. Ammonia analyses were conducted using EPA method 350.1.

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 Tables 1 and 2 summarize the validation recommendations which were based on the following information:

INORGANIC

Calibration Verification

The Continuing Calibration Verification (CCV) for Chloride analyses was >110% quality control limit. This CCV affected samples CF-8-DUP-01 and CF-8-MW-12S-01. The positive results reported for Chloride in the affected samples were qualified as estimated, "J".

Laboratory Blank Analyses

Affected samples: All

Analyte	Maximum Concentration	Action Level(aqueous)
Chloride	0.106µg/L	0.53µg/L
Magnesium	143µg/L	715µg/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 magnesium were qualified, "U", as a result of blank contamination. No action was taken for Chloride since all results reported for chloride were greater than the action level.

ORGANIC

Laboratory Blank Analyses

Affected samples: All

Analyte	Maximum Concentration	Action Level(aqueous)
Methylene Chloride	0.5µg/L	5.0µg/L
Methane	2.4µg/L	12.0µg/L

An action level of 5X the maximum concentration for methane and an action level of 10X the maximum concentration for methylene chloride have been used to evaluate the sample data for blank contamination. Positive results < the action level for methylene chloride were qualified, "U", as a result of blank contamination. No action was taken for methane since all results reported for methane were greater than the action level.

Executive Summary

Laboratory Performance: The Continuing Calibration Verification (CCV) for Chloride analyses was >110% quality control limit. Chloride, magnesium, methylene chloride and methane were present in the laboratory preparation blanks.

Other Factors Affecting Data Quality: None.

The Data for these analyses were reviewed with reference to the "National Functional Guidelines for Organic and 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

RUN SUMMARY SHEET
Sulfide

DATA FILE: S2R82498
INSTRUMENT FILE: INSTRUMENT: WET_LAB ANALYZED: 08/24/1998

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	9808167-02	CF-8-MW-23S-01	4		4.00	4.00	2.00	mg/L			
3	9808173-01	149-S11-073	0		0.000	0.000	2.00	mg/L			
4	9808173-01D	149-S11-073D	0		0.000	0.000	2.00	mg/L		DIV BY	
5	9808173-02	149-S11-068	0		0.000	0.000	2.00	mg/L			
6	9808173-03	149-S11-067	0		0.000	0.000	2.00	mg/L			
7	9808173-04	149-S11-069	0		0.000	0.000	2.00	mg/L			
8	9808173-05	149-S11-070	0		0.000	0.000	2.00	mg/L			
9	9808173-06	149-S11-071	4		4.00	4.00	2.00	mg/L			
10	9808173-07	149-S11-072	0		0.000	0.000	2.00	mg/L			
11	9808173-08	149-S11-059	0		0.000	0.000	2.00	mg/L			
12	BLANK	BLANK	0		0.000	0.000	2.00	mg/L			
13	9808173-10	149-S06-024	2		2.00	2.00	2.00	mg/L			
14	9808173-11	149-S06-025	2		2.00	2.00	2.00	mg/L			
15	9808173-12	149-S06-026	0		0.000	0.000	2.00	mg/L			
16	9808173-13	149-S06-027	8		8.00	8.00	2.00	mg/L			
17	9808174-01	CF-8-MW-17S-01	8		8.00	8.00	2.00	mg/L			
18	9808174-02	CF-8-MW-10S-01	6		6.00	6.00	2.00	mg/L			
19	9808174-03	CF-8-MW-06S-01	6		6.00	6.00	2.00	mg/L			
20	9808174-04	CF-8-MW-18S-01	6		6.00	6.00	2.00	mg/L			
21	9808174-05	CF-8-MW-13S-01	4		4.00	4.00	2.00	mg/L			
22	BLANK	BLANK	0		0.000	0.000	2.00	mg/L			
23	9808184-01	CF-8-MW-12S-01	2		2.00	2.00	2.00	mg/L			
24	9808184-02	CF-8-MW-07S-01	0		0.000	0.000	2.00	mg/L			
25	9808184-04	CF-8-DUP-01	6		6.00	6.00	2.00	mg/L			
26	9808184-04D	CF-8-DUP-01D	6		6.00	6.00	2.00	mg/L		0.000	
27	9808185-01	149-S11-054	12		12.0	12.0	2.00	mg/L			
28	9808185-02	149-S11-055	18		18.0	18.0	2.00	mg/L			
29	9808185-03	149-S11-056	18		18.0	18.0	2.00	mg/L			
30	9808185-04	149-S11-057	0		0.000	0.000	2.00	mg/L			
31	9808185-05	149-S11-060	0		0.000	0.000	2.00	mg/L			
32	9808185-06	149-S11-061	2		2.00	2.00	2.00	mg/L			
33	BLANK	BLANK	0		0.000	0.000	2.00	mg/L			
34	9808185-07	149-S11-063	0		0.000	0.000	2.00	mg/L			
35	9808185-08	149-S11-064	0		0.000	0.000	2.00	mg/L			
36	9808185-09	149-S11-065	0		0.000	0.000	2.00	mg/L			
37	9808185-10	149-S11-066	0		0.000	0.000	2.00	mg/L			
38	9808185-12	149-S06-023	6		6.00	6.00	2.00	mg/L			
39	9808185-13	149-S06-028	2		2.00	2.00	2.00	mg/L			
40	9808185-14	149-S06-029	2		2.00	2.00	2.00	mg/L			

LM LM 8/24/98
Analyst / Date

Lab Supervisor / Date

RUN SUMMARY SHEET
SULFATE BY IC METHOD 300

ATA FILE: NUS91398
NSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 09/13/1998

eq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	0		0.032	0.032	0.100	mg/L			
2	0.1 PPM	S1	34663		0.174	0.174	0.100	mg/L			
3	0.5 PPM	S2	124758		0.544	0.544	0.100	mg/L			
4	1.0 PPM	S3	199023		0.848	0.848	0.100	mg/L			
5	3.0 PPM	S4	713964		2.96	2.96	0.100	mg/L			
6	5.0 PPM	S5	1220339		5.04	5.04	0.100	mg/L			
7	ERA981#804	ERA981#804	282788		1.19	5.96	0.500	mg/L	97.7		
8	BLANK	ICB	0		0.032	0.032	0.100	mg/L			
9	9808184-01	CF-B-MW-12S-01	2151519		8.86	8.86	0.100	mg/L			
10	9808184-01D	CF-B-MW-12S-01D	2153326		8.87	8.87	0.100	mg/L		0.084	
11	9808184-01S	CF-B-MW-12S-01S	1664054		6.86	13.7	0.200	mg/L	9.72		
12	9808184-02	CF-B-MW-07S-01	9787948		40.2	40.2	0.100	mg/L			
13	9808184-04	CF-B-DUP-01	2167146		8.93	8.93	0.100	mg/L			
14	9808191-01	CF-B-MW-09S-01	582295		2.42	2.42	0.100	mg/L			
15	CCV1	CCV1	273754		1.16	5.78	0.500	mg/L	94.7		
16	CCB1	CCB1	2410		0.041	0.041	0.100	mg/L			
17	9808191-02	CF-B-MW-01S-01	12508356		51.4	51.4	0.100	mg/L			
18	9808191-04	CF-B-MW-04S-01	3098770		12.8	12.8	0.100	mg/L			
19	CCV2	CCV2	276438		1.17	5.83	0.500	mg/L	95.6		
20	CCB2	CCB2	0		0.032	0.032	0.100	mg/L			

YWardell TW 10-12-98
Analyst / Date

Lab Supervisor / Date

RUN SUMMARY SHEET
CHLORIDE BY IC METHOD 300

FILE: IC-82198
RUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 08/21/1998

Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
S0	S0	0		-0.016	-0.016	0.100	mg/L			
S1	S1	11853		0.089	0.089	0.100	mg/L			
S2	S2	56330		0.479	0.479	0.100	mg/L			
S3	S3	126877		1.10	1.10	0.100	mg/L			
S4	S4	223324		1.95	1.95	0.100	mg/L			
S5	S5	400254		3.50	3.50	0.100	mg/L			
ERA981#804	ICV	246992		2.15	10.8	0.500	mg/L	101		
WC0207	WC0207	0		-0.016	-0.156	1.00	mg/L	-1.45		
BLANK	ICB	0		-0.016	-0.016	0.100	mg/L			
9808174-01	CF-8-MW-17S-01	792144		6.94	6.94	0.100	mg/L			
9808174-01D	CF-8-MW-17S-01D	736798		6.46	6.46	0.100	mg/L		7.26	
9808174-01S	CF-8-MW-17S-01S	832029		7.30	14.6	0.200	mg/L	218		
9808174-02	CF-8-MW-10S-01	206029		1.79	1.79	0.100	mg/L			
9808174-03	CF-8-MW-06S-01	952984		8.36	8.36	0.100	mg/L			
9808174-04	CF-8-MW-18S-01	497200		4.35	4.35	0.100	mg/L			
9808174-05	CF-8-MW-13S-01	164493		1.43	1.43	0.100	mg/L			
ERA981#804	ERA981#804	243933		2.13	10.6	0.500	mg/L	99.4		
WC0207	WC0207	0		-0.016	-0.156	1.00	mg/L	-1.45		
BLANK	BLANK	0		-0.016	-0.016	0.100	mg/L			
9808184-01	CF-8-MW-12S-01	313575		2.74	2.74	0.100	mg/L			
9808184-02	CF-8-MW-07S-01	over cal.		-0.016	-0.016	0.100	mg/L			
9808184-04	CF-8-DUP-01	311843		2.72	2.72	0.100	mg/L			
9808191-01	CF-8-MW-09S-01	714669		6.26	6.26	0.100	mg/L			
9808191-02	CF-8-MW-01S-01	612584		5.37	5.37	0.100	mg/L			
9808191-04	CF-8-MW-04S-01	528477		4.63	4.63	0.100	mg/L			
ERA981#804	ERA981#804	296784		2.59	13.0	0.500	mg/L	121		
WC0207	WC0207	0		-0.016	-0.156	1.00	mg/L	-1.45		
BLANK	BLANK	0		-0.016	-0.016	0.100	mg/L			

Y Wardell TW 10-6-98
Analyst / Date

Lab Supervisor / Date

RUN SUMMARY SHEET
CHLORIDE BY IC METHOD 300

TA FILE: NUS91398
STRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 09/13/1998

g	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	3979		-0.017	-0.017	0.100	mg/L			
2	0.1 PPM	S1	122608		0.297	0.297	0.100	mg/L			
3	0.5 PPM	S2	173544		0.433	0.433	0.100	mg/L			
4	1.0 PPM	S3	354496		0.913	0.913	0.100	mg/L			
5	3.0 PPM	S4	1110108		2.92	2.92	0.100	mg/L			
6	5.0 PPM	S5	1917233		5.06	5.06	0.100	mg/L			
7	ERA981#804	ERA981#804	714546		1.87	9.34	0.500	mg/L	87.3		
8	BLANK	ICB	50435		0.106	0.106	0.100	mg/L			
9	9808184-01	CF-8-MW-12S-01	2599530		6.87	6.87	0.100	mg/L			
10	9808184-01D	CF-8-MW-12S-01D	2597545		6.86	6.86	0.100	mg/L		0.077	
11	9808184-01S	CF-8-MW-12S-01S	2162285		5.71	11.4	0.200	mg/L	9.10		
12	9808184-02	CF-8-MW-07S-01	20192509		53.5	53.5	0.100	mg/L			
13	9808184-04	CF-8-DUP-01	2608783		6.89	6.89	0.100	mg/L			
14	9808191-01	CF-8-MW-09S-01	1940739		5.12	5.12	0.100	mg/L			
15	CCV1	CCV1	851424		2.23	11.2	0.500	mg/L	104		
16	CCB1	CCB1	7991		-0.007	-0.007	0.100	mg/L			
17	9808191-02	CF-8-MW-01S-01	1448339		3.81	3.81	0.100	mg/L			
18	9808191-04	CF-8-MW-04S-01	4832434		12.8	12.8	0.100	mg/L			
19	CCV2	CCV2	858284		2.25	11.2	0.500	mg/L	105		
20	CCB2	CCB2	0		-0.028	-0.028	0.100	mg/L			

J Wardell TW 10-15-98
Analyst / Date

Lab Supervisor / Date

RUN SUMMARY SHEET
BROMIDE BY IC METHOD 300

ATA FILE: IC-82198
NSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 08/21/1998

eq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	S0	S0	0		-0.026	-0.026	0.100	mg/L			
2	S1	S1	6281		0.089	0.089	0.100	mg/L			
3	S2	S2	16616		0.276	0.276	0.100	mg/L			
4	S3	S3	28016		0.483	0.483	0.100	mg/L			
5	S4	S4	58755		1.04	1.04	0.100	mg/L			
6	S5	S5	165792		2.99	2.99	0.100	mg/L			
7	ERA981#804	ICV	125960		2.26	11.3	0.500	mg/L	89.8		
8	for nitrite only										
9	BLANK	ICB	0		-0.026	-0.026	0.100	mg/L			
10	9808174-01	CF-8-MW-17S-01	0		-0.026	-0.026	0.100	mg/L			
11	9808174-01D	CF-8-MW-17S-01D	0		-0.026	-0.026	0.100	mg/L		0.000	
12	9808174-01S	CF-8-MW-17S-01S	116309		2.09	4.17	0.200	mg/L	139		
13	9808174-02	CF-8-MW-10S-01	0		-0.026	-0.026	0.100	mg/L			
14	9808174-03	CF-8-MW-06S-01	0		-0.026	-0.026	0.100	mg/L			
15	9808174-04	CF-8-MW-18S-01	0		-0.026	-0.026	0.100	mg/L			
16	9808174-05	CF-8-MW-13S-01	0		-0.026	-0.026	0.100	mg/L			
17	ERA981#804	ERA981#804	126577		2.27	11.4	0.500	mg/L	90.2		
18	for nitrite only										
19	BLANK	BLANK	0		-0.026	-0.026	0.100	mg/L			
20	9808184-01	CF-8-MW-12S-01	0		-0.026	-0.026	0.100	mg/L			
21	9808184-02	CF-8-MW-07S-01	0		-0.026	-0.026	0.100	mg/L			
22	9808184-04	CF-8-DUP-01	0		-0.026	-0.026	0.100	mg/L			
23	9808191-01	CF-8-MW-09S-01	0		-0.026	-0.026	0.100	mg/L			
24	9808191-02	CF-8-MW-01S-01	0		-0.026	-0.026	0.100	mg/L			
25	9808191-04	CF-8-MW-04S-01	0		-0.026	-0.026	0.100	mg/L			
26	ERA981#804	ERA981#804	123276		2.21	11.1	0.500	mg/L	87.8		
27	for nitrite only										
28	BLANK	BLANK	0		-0.026	-0.026	0.100	mg/L			

L Wardell TW 10-6-98
Analyst / Date

Lab Supervisor / Date

5023

RUN SUMMARY SHEET
NITRATE BY IC

TA FILE: IC-82198
STRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 08/21/1998

q	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	S0	S0	0		0.034	0.034	0.100	mg/L			
2	S1	S1	22496		0.104	0.104	0.100	mg/L			
3	S2	S2	63119		0.232	0.232	0.100	mg/L			
4	S3	S3	140325		0.475	0.475	0.100	mg/L			
5	not using this point										
6	S5	S5	944510		3.00	3.00	0.100	mg/L			
7	ERA981#804	ICV	619664		1.98	9.91	0.500	mg/L	91.8		
8	WC0207	WC0207	0		0.034	0.336	1.00	mg/L	3.11		
9	BLANK	ICB	0		0.034	0.034	0.100	mg/L			
0	9808174-01	CF-8-MW-17S-01	0		0.034	0.034	0.100	mg/L			
1	9808174-01D	CF-8-MW-17S-01D	0		0.034	0.034	0.100	mg/L		0.000	
2	9808174-01S	CF-8-MW-17S-01S	581232		1.86	3.72	0.200	mg/L	124		
3	9808174-02	CF-8-MW-10S-01	3875		0.046	0.046	0.100	mg/L			
4	9808174-03	CF-8-MW-06S-01	17115		0.087	0.087	0.100	mg/L			
5	9808174-04	CF-8-MW-18S-01	0		0.034	0.034	0.100	mg/L			
6	9808174-05	CF-8-MW-13S-01	4093		0.046	0.046	0.100	mg/L			
7	ERA981#804	ERA981#804	619676		1.98	9.91	0.500	mg/L	91.8		
8	WC0207	WC0207	0		0.034	0.336	1.00	mg/L	3.11		
9	BLANK	BLANK	0		0.034	0.034	0.100	mg/L			
0	9808184-01	CF-8-MW-12S-01	4532		0.048	0.048	0.100	mg/L			
1	9808184-02	CF-8-MW-07S-01	4482		0.048	0.048	0.100	mg/L			
2	9808184-04	CF-8-DUP-01	3638		0.045	0.045	0.100	mg/L			
3	9808191-01	CF-8-MW-09S-01	0		0.034	0.034	0.100	mg/L			
4	9808191-02	CF-8-MW-01S-01	4168		0.047	0.047	0.100	mg/L			
5	9808191-04	CF-8-MW-04S-01	7803		0.058	0.058	0.100	mg/L			
6	ERA981#804	ERA981#804	647776		2.07	10.4	0.500	mg/L	95.9		
7	WC0207	WC0207	0		0.034	0.336	1.00	mg/L	3.11		
8	BLANK	BLANK	0		0.034	0.034	0.100	mg/L			

LWardell TW 10-6-98
Analyst / Date

Lab Supervisor / Date

RUN SUMMARY SHEET
ORTHOPHOSPHATE

ATA FILE: IC-82198
NSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 08/21/1998

eq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	S0	S0	0		0.009	0.009	0.100	mg/L			
2	S1	S1	3381		0.100	0.100	0.100	mg/L			
3	S2	S2	8804		0.247	0.247	0.100	mg/L			
4	S3	S3	17928		0.493	0.493	0.100	mg/L			
5	not using in calibration										
6	S5	S5	110689		3.00	3.00	0.100	mg/L			
7	ERA981#804	ICV	86997		2.36	11.8	0.500	mg/L	102		
8	WC0207	WC0207	0		0.009	0.086	1.00	mg/L	0.743		
9	BLANK	ICB	0		0.009	0.009	0.100	mg/L			
10	9808174-01	CF-8-MW-17S-01	0		0.009	0.009	0.100	mg/L			
11	9808174-01D	CF-8-MW-17S-01D	0		0.009	0.009	0.100	mg/L		0.000	
12	9808174-01S	CF-8-MW-17S-01S	61019		1.66	3.32	0.200	mg/L	111		
13	9808174-02	CF-8-MW-10S-01	1811		0.058	0.058	0.100	mg/L			
14	9808174-03	CF-8-MW-06S-01	0		0.009	0.009	0.100	mg/L			
15	9808174-04	CF-8-MW-18S-01	2225		0.069	0.069	0.100	mg/L			
16	9808174-05	CF-8-MW-13S-01	1761		0.056	0.056	0.100	mg/L			
17	ERA981#804	ERA981#804	85109		2.31	11.5	0.500	mg/L	99.6		
18	WC0207	WC0207	0		0.009	0.086	1.00	mg/L	0.743		
19	BLANK	BLANK	0		0.009	0.009	0.100	mg/L			
20	9808184-01	CF-8-MW-12S-01	0		0.009	0.009	0.100	mg/L			
21	9808184-02	CF-8-MW-07S-01	0		0.009	0.009	0.100	mg/L			
22	9808184-04	CF-8-DUP-01	0		0.009	0.009	0.100	mg/L			
23	9808191-01	CF-8-MW-09S-01	8955		0.251	0.251	0.100	mg/L			
24	9808191-02	CF-8-MW-01S-01	0		0.009	0.009	0.100	mg/L			
25	9808191-04	CF-8-MW-04S-01	0		0.009	0.009	0.100	mg/L			
26	ERA981#804	ERA981#804	85132		2.31	11.6	0.500	mg/L	99.6		
27	WC0207	WC0207	0		0.009	0.086	1.00	mg/L	0.743		
28	BLANK	BLANK	0		0.009	0.009	0.100	mg/L			

L Wardell TW 10-6-98
Analyst / Date

Lab Supervisor / Date

RUN SUMMARY SHEET
Dissolved Organic Carbon

ATA FILE: DOC82698
NSTRUMENT FILE: INSTRUMENT: DOHRMAN ANALYZED: 08/26/1998

eq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	WC0149	ICV	55.40		55.4	55.4	1.00	mg/L	103		
2	BLANK	ICB	0		0.000	0.000	1.00	mg/L			
3	9808167-02	CF-8-MW-23S-01	0.274		0.274	2.74	10.0	mg/L			
4	9808174-01	CF-8-MW-17S-01	3.889		3.89	3.89	1.00	mg/L			
5	9808174-02	CF-8-MW-10S-01	21.251		21.3	21.3	1.00	mg/L			
6	9808174-03	CF-8-MW-06S-01	5.4491		5.45	5.45	1.00	mg/L			
7	9808174-04	CF-8-MW-18S-01	5.532		5.53	5.53	1.00	mg/L			
8	9808174-05	CF-8-MW-13S-01	59.277		59.3	59.3	1.00	mg/L			
9	9808174-05D	CF-8-MW-13S-01D	59.503		59.5	59.5	1.00	mg/L		0.381	
10	9808174-05S	CF-8-MW-13S-01S	68.104		68.1	68.1	1.00	mg/L	88.3		
11	9808184-01	CF-8-MW-12S-01	4.094		4.09	4.09	1.00	mg/L			
12	9808184-02	CF-8-MW-07S-01	15.462		15.5	15.5	1.00	mg/L			
13	WC0149	CCV	58.931		58.9	58.9	1.00	mg/L	109		
14	BLANK	CCB	0		0.000	0.000	1.00	mg/L			
15	9808184-04	CF-8-DUP-01	4.156		4.16	4.16	1.00	mg/L			
16	9808191-01	CF-8-MW-09S-01	4.233		4.23	4.23	1.00	mg/L			
17	9808191-02	CF-8-MW-01S-01	30.919		30.9	30.9	1.00	mg/L			
18	9808191-04	CF-8-MW-04S-01	28.964		29.0	29.0	1.00	mg/L			
19	WC0149	CV	58.360		58.4	58.4	1.00	mg/L	108		
20	BLANK	CB	0		0.000	0.000	1.00	mg/L			

Chris Beck DCB 8-26-98
Analyst Date

Lab Supervisor Date

5116

RUN SUMMARY SHEET
NITRITE BY IC

ATA FILE: IC-82198
ISTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 08/21/1998

eq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	S0	S0	0		-0.023	-0.023	0.100	mg/L			
2	S1	S1	26349		0.073	0.073	0.100	mg/L			
3	S2	S2	71695		0.239	0.239	0.100	mg/L			
4	S3	S3	161979		0.568	0.568	0.100	mg/L			
5	S4	S4	282475		1.01	1.01	0.100	mg/L			
6	S5	S5	825708		2.99	2.99	0.100	mg/L			
7	ccv for other analytes										
8	WC0207	WC0207	201920		0.713	7.13	1.00	mg/L	103		
9	BLANK	ICB	0		-0.023	-0.023	0.100	mg/L			
10	9808174-01	CF-8-MW-17S-01	0		-0.023	-0.023	0.100	mg/L			
11	9808174-01D	CF-8-MW-17S-01D	0		-0.023	-0.023	0.100	mg/L		0.000	
12	9808174-01S	CF-8-MW-17S-01S	695349		2.51	5.02	0.200	mg/L	72.8		
13	9808174-02	CF-8-MW-10S-01	21397		0.055	0.055	0.100	mg/L			
14	9808174-03	CF-8-MW-06S-01	15576		0.034	0.034	0.100	mg/L			
15	9808174-04	CF-8-MW-18S-01	14248		0.029	0.029	0.100	mg/L			
16	9808174-05	CF-8-MW-13S-01	53808		0.173	0.173	0.100	mg/L			
17	ccv for other analytes										
18	WC0207	WC0207	201164		0.710	7.10	1.00	mg/L	103		
19	BLANK	BLANK	0		-0.023	-0.023	0.100	mg/L			
20	9808184-01	CF-8-MW-12S-01	26693		0.075	0.075	0.100	mg/L			
21	9808184-02	CF-8-MW-07S-01	124316		0.430	0.430	0.100	mg/L			
22	9808184-04	CF-8-DUP-01	154357		0.540	0.540	0.100	mg/L			
23	9808191-01	CF-8-MW-09S-01	49843		0.159	0.159	0.100	mg/L			
24	9808191-02	CF-8-MW-01S-01	31139		0.091	0.091	0.100	mg/L			
25	9808191-04	CF-8-MW-04S-01	50539		0.162	0.162	0.100	mg/L			
26	ccv for other analytes										
27	WC0207	WC0207	208051		0.736	7.36	1.00	mg/L	107		
28	BLANK	BLANK	0		-0.023	-0.023	0.100	mg/L			

Y Warden TW 10-6-98
Analyst / Date

Lab Supervisor / Date

5025

RUN SUMMARY SHEET
Alkalinity

ATA FILE: ALK82898
NSTRUMENT FILE: INSTRUMENT: WET_LAB ANALYZED: 08/29/1998

eq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	WC0217	WC0217	220.8		221	221	1.00	mg/L	94.0		
2	BLANK	ICB	0		0.000	0.000	1.00	mg/L			
3	9808167-02	CF-8-MW-23S-01	37.5		37.5	37.5	1.00	mg/L			
4	9808174-01	CF-8-MW-17S-01	0		0.000	0.000	1.00	mg/L			
5	9808174-02	CF-8-MW-10S-01	27.1		27.1	27.1	1.00	mg/L			
6	9808174-03	CF-8-MW-06S-01	27.1		27.1	27.1	1.00	mg/L			
7	9808174-04	CF-8-MW-18S-01	150		150	150	1.00	mg/L			
8	9808174-05	CF-8-MW-13S-01	52.1		52.1	52.1	1.00	mg/L			
9	9808184-01	CF-8-MW-12S-01	20.8		20.8	20.8	1.00	mg/L			
10	9808184-02	CF-8-MW-07S-01	45.8		45.8	45.8	1.00	mg/L			
11	9808184-04	CF-8-DUP-01	14.6		14.6	14.6	1.00	mg/L			
12	9808191-01	CF-8-MW-09S-01	37.5		37.5	37.5	1.00	mg/L			
13	WC0217	WC0217	220.8		221	221	1.00	mg/L	94.0		
14	BLANK	BLANK	0		0.000	0.000	1.00	mg/L			
15	9808191-02	CF-8-MW-01S-01	39.6		39.6	39.6	1.00	mg/L			
16	9808191-04	CF-8-MW-04S-01	22.9		22.9	22.9	1.00	mg/L			
17	9808191-04D	CF-8-MW-04S-01D	22.9		22.9	22.9	1.00	mg/L		0.000	
18	WC0217	WC0217	233.3		233	233	1.00	mg/L	99.3		
19	BLANK	BLANK	0		0.000	0.000	1.00	mg/L			

LM
Analyst / Date

Lab Supervisor / Date

Calibration Report
MCAWW 300.0

DATA FILE: IC-82198
INSTRUMENT FILE:

ANALYST: TW
INSTRUMENT: DIONEX

METHOD FILE: 300
ANALYZED: 08/21/1998

Analyte	Corr.	Slope	Intrcpt.
BROMIDE BY IC METHOD 300	0.9997	0.0000	-0.0256
CHLORIDE BY IC METHOD 300	0.9993	0.0000	-0.0156
NITRATE BY IC	0.9998	0.0000	0.0336
NITRITE BY IC	0.9995	0.0000	-0.0226
ORTHOPHOSPHATE	1.0000	0.0000	0.0086

COMMENTS:

METHOD TITLE: ANIONS BY ION CHROMATAGRAPHY
METHOD REFERENCE: 300.0

INSTRUMENT: DIONEX DX500

L Wardell TW 10-6-98
Analyst / Date

Lab Supervisor / Date

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

DUP-01

Lab Name: GP ENVIRONMENTAL Contract:

Lab Code: GP Case No.: SAS No.: SDG No.: NUS184

Matrix (soil/water): WATER Lab Sample ID: 9808184-04

Level (low/med): LOW Date Received: 08/21/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	255			P
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium	5100			P
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	374			P
7439-92-1	Lead				
7439-95-4	Magnesium	595	B		P
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium	1930	B		P
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	4770	B		P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

FORM I - IN

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

07S-01

Lab Name: GP ENVIRONMENTAL Contract:

Lab Code: GP Case No.: SAS No.: SDG No.: NUS184

Matrix (soil/water): WATER Lab Sample ID: 9808184-02

Level (low/med): LOW Date Received: 08/21/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	200	U		P
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium	34300			P
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	853			P
7439-92-1	Lead				
7439-95-4	Magnesium	850	B		P
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium	229	B		P
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	26000			P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

FORM I - IN

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

08I-01

Lab Name: GP ENVIRONMENTAL Contract:

Lab Code: GP Case No.: SAS No.: SDG No.: NUS184

Matrix (soil/water): WATER Lab Sample ID: 9808184-03

Level (low/med): LOW Date Received: 08/21/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	200	U		P
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium	1200	B		P
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	467			P
7439-92-1	Lead				
7439-95-4	Magnesium	465	B		P
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium	678	B		P
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	3520	B		P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

FORM I - IN

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

12S-01

Lab Name: GP ENVIRONMENTAL Contract:

Lab Code: GP Case No.: SAS No.: SDG No.: NUS184

Matrix (soil/water): WATER Lab Sample ID: 9808184-01

Level (low/med): LOW Date Received: 08/21/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	274			P
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium	5350			P
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	361			P
7439-92-1	Lead				
7439-95-4	Magnesium	580	B		P
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium	2010	B		P
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	5030			P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

FORM I - IN

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF8DUP01

Lab Name: GP_ENVIRONMENTAL Contract: NUS_SOUT

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

Matrix: (soil/water) WATER Lab Sample ID: 9808184-04G

Sample wt/vol: 980 (g/ml) ML Lab File ID: D12657.D

Level: (low/med) LOW Date Received: 08/21/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 08/25/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 09/02/98

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
91-20-3	Naphthalene	6	U
91-57-6	2-Methylnaphthalene	6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF8MW07S01

Lab Name: GP_ENVIRONMENTAL Contract: NUS_SOUT

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

Matrix: (soil/water) WATER Lab Sample ID: 9808184-02F

Sample wt/vol: 980 (g/ml) ML Lab File ID: D12656.D

Level: (low/med) LOW Date Received: 08/21/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 08/25/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 09/02/98

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
91-20-3	Naphthalene	2	J
91-57-6	2-Methylnaphthalene	2	J

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF8MW08I01

Lab Name: GP_ENVIRONMENTAL Contract: NUS_SOUT

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

Matrix: (soil/water) WATER Lab Sample ID: 9808184-03D

Sample wt/vol: 990 (g/ml) ML Lab File ID: D12654.D

Level: (low/med) LOW Date Received: 08/21/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 08/25/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 09/02/98

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
91-20-3	Naphthalene	6	U
91-57-6	2-Methylnaphthalene	6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF8MW12S01

Lab Name: GP_ENVIRONMENTAL Contract: NUS_SOUT

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

Matrix: (soil/water) WATER Lab Sample ID: 9808184-01G

Sample wt/vol: 980 (g/ml) ML Lab File ID: D12655.D

Level: (low/med) LOW Date Received: 08/21/98

% Moisture: _____ decanted:(Y/N) N Date Extracted: 08/25/98

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 09/02/98

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
91-20-3	Naphthalene	6	U
91-57-6	2-Methylnaphthalene	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-DUP-01

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808184-04A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B14452.D

Level: (low/med) LOW Date Received: 08/21/98

% Moisture: not dec. _____ Date Analyzed: 08/28/98

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	0.3	J
75-09-2	Methylene chloride	1.4	JB
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	0.4	J
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
71-43-2	Benzene	1.0	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
108-88-3	Toluene	5.0	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
100-41-4	Ethylbenzene	5.0	U
108-38-3	m,p-xylene	5.0	U
95-47-6	o-xylene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-07S-01

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808184-02A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B14450.D

Level: (low/med) LOW Date Received: 08/21/98

% Moisture: not dec. _____ Date Analyzed: 08/28/98

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	14.1	
75-09-2	Methylene chloride	1.5	JB
156-60-5	Trans-1,2-dichloroethene	5.0	U
75-34-3	1,1-Dichloroethane	16.9	
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
71-43-2	Benzene	0.9	J
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
108-88-3	Toluene	5.0	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
100-41-4	Ethylbenzene	0.6	J
108-38-3	m,p-xylene	5.0	U
95-47-6	o-xylene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-08IS-01

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808184-03A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B14451.D

Level: (low/med) LOW Date Received: 08/21/98

% Moisture: not dec. _____ Date Analyzed: 08/28/98

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	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
71-43-2	Benzene	1.0	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
108-88-3	Toluene	5.0	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
100-41-4	Ethylbenzene	5.0	U
108-38-3	m,p-xylene	5.0	U
95-47-6	o-xylene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-12S-01

Lab Name: GP ENVIRONMENTAL Contract: NUS_SOUT

Lab Code: GPES Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 9808184-01A

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: B14449.D

Level: (low/med) LOW Date Received: 08/21/98

% Moisture: not dec. _____ Date Analyzed: 08/28/98

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	0.3	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	0.4	J
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
71-43-2	Benzene	1.0	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
108-88-3	Toluene	5.0	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
100-41-4	Ethylbenzene	5.0	U
108-38-3	m,p-xylene	5.0	U
95-47-6	o-xylene	5.0	U
79-34-5	1,1,2,2-Tetrachloroethane	0.2	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-DUP-01

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPES Case No.: 9808125 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 9808184-04C

Sample wt/vol: 10 (g/ml) ML Lab File ID: N10771.D

Level: (low/med) LOW Date Received: 08/21/98

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

Concentrated Extract Volume: 1 (uL) Date Analyzed: 09/01/98

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	100.8	EB
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	6.2	U
~~74-82-8~~	~~Methane~~	~~107.0~~	~~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-8-DUP-01 DL

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPES Case No.: 9808125 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 9808184-04C 5X

Sample wt/vol: 10 (g/ml) ML Lab File ID: N10772.D

Level: (low/med) LOW Date Received: 08/21/98

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

Concentrated Extract Volume: 1 (uL) Date Analyzed: 09/01/98

Injection Volume: 100. (uL) Dilution Factor: ~~10~~ 5

GPC Cleanup: (Y/N) N pH: _____ mp 9-18-98

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	105.3	B
74-84-0	Ethane	29.0	U
74-85-1	Ethylene	31.2	U
~~74-82-8~~	~~Methane~~	~~111.9~~	~~B~~
~~74-84-0~~	~~Ethane~~	~~29.0~~	~~U~~
~~74-85-1~~	~~Ethylene~~	~~31.2~~	~~U~~

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-07S-01

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPES Case No.: 9808125 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 9808184-02C

Sample wt/vol: 10 (g/ml) ML Lab File ID: N10770.D

Level: (low/med) LOW Date Received: 08/21/98

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

Concentrated Extract Volume: 1 (uL) Date Analyzed: 09/01/98

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	279.3	EB
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	6.2	U
~~74-82-8~~	~~Methane~~	~~290.7~~	~~EB~~
~~74-84-0~~	~~Ethane~~	~~5.8~~	~~U~~
74-85-1	Ethylene	~~6.2~~	~~U~~

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-07S-01 DL

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPES Case No.: 9808184 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 9808184-02C 20X

Sample wt/vol: 10 (g/ml) ML Lab File ID: N10774.D

Level: (low/med) LOW Date Received: 08/21/98

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

Concentrated Extract Volume: 1 (uL) Date Analyzed: 09/01/98

Injection Volume: 25.0 (uL) Dilution Factor: ~~10~~ 20

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

mp 9-18-98

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-82-8	Methane	335.0	B
74-84-0	Ethane	116.0	U
74-85-1	Ethylene	124.8	U
~~74-82-8~~	~~Methane~~	~~356.0~~	~~B~~
~~74-84-0~~	~~Ethane~~	~~116.0~~	~~U~~
~~74-85-1~~	~~Ethylene~~	~~124.8~~	~~U~~

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

CF-8-MW-12S-01

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPES Case No.: 9808125 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 9808184-01C

Sample wt/vol: 10 (g/ml) ML Lab File ID: N10769.D

Level: (low/med) LOW Date Received: 08/21/98

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

Concentrated Extract Volume: 1 (uL) Date Analyzed: 09/01/98

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	81.6	EB
74-84-0	Ethane	5.8	U
74-85-1	Ethylene	6.2	U
~~74-82-8~~	~~Methane~~	~~86.8~~	~~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-8-MW-12S-01 DL

Lab Name: GPL LABORATORIES Contract: NUS_SOUT

Lab Code: GPES Case No.: 9808125 SAS No.: N/A SDG No.: N/A

Matrix: (soil/water) WATER Lab Sample ID: 9808184-01C 5X

Sample wt/vol: 10 (g/ml) ML Lab File ID: N10773.D

Level: (low/med) LOW Date Received: 08/21/98

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

Concentrated Extract Volume: 1 (uL) Date Analyzed: 09/01/98

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	112.0	BD
74-84-0	Ethane	29.0	U
74-85-1	Ethylene	31.2	U
~~74-82-8~~	~~Methane~~	~~118.6~~	~~BD~~
~~74-84-0~~	~~Ethane~~	~~29.0~~	~~U~~
~~74-85-1~~	~~Ethylene~~	~~31.2~~	~~U~~

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-10-8-159

TO: [redacted] **DATE:** **OCTOBER 22, 1998**

FROM: **GRETCHEN PHIPPS** **COPIES:** **DV FILE**

SUBJECT: **DATA VALIDATION – METALS AND MISCELLANEOUS**
CTO 039 - CECIL FIELD
SDG - 9809191

SAMPLES: 5/Aqueous/

CF-8-MW-01S-01	CF-8-MW-02I-01	CF-8-MW-03D-01
CF-8-MW-04S-01	CF-8-MW-09S-01	

Overview

The sample set for CTO 039, NAS Cecil Field, SDG 9809191, consists of five (5) aqueous environmental samples.

All samples were analyzed for select metals. Samples CF-8-MW-01S-01, CF-8-MW-04S-01 and CF-8-MW-09S-01 were also analyzed for anions, dissolved organic carbon, dissolved sulfide, alkalinity and ammonia. The samples were collected by Tetra Tech NUS on August 21, 1998 and analyzed by GP Environmental Services.

Select metals analyses were conducted using SW-846 method 6010B. Anions analyses were conducted using EPA method 300. Dissolved organic carbon analyses were conducted using SM method A5310C. Reactive sulfide analyses were conducted using RPA method 376.1. Alkalinity analyses were conducted using EPA method 310.1. Ammonia analyses were conducted using EPA method 350.1.

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:

Calibration Verification

The Continuing Calibration Verification (CCV) for Sulfate analyses was >110% quality control limit. The positive results reported for Sulfate in the affected samples were qualified as estimated, "J".

Laboratory Blank Analyses

Affected samples: All

Analyte	Maximum Concentration	Action Level(aqueous)
Chloride	0.106µg/L	0.53µg/L
Magnesium	143µg/L	715µg/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 magnesium were qualified, "U", as a result of blank contamination. No action was taken for Chloride since all results reported for chloride were greater than the action level.

Executive Summary

Laboratory Performance: The Continuing Calibration Verification (CCV) for Sulfate analyses was >110% quality control limit. Chloride and magnesium were present in the laboratory preparation blanks.

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)."

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Control Officer

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

01S-01

Lab Name: GP ENVIRONMENTAL Contract:

Lab Code: GP Case No.: SAS No.: SDG No.: NUS191

Matrix (soil/water): WATER Lab Sample ID: 9808191-02

Level (low/med): LOW Date Received: 08/22/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	630			P
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium	30800			P
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	450	B		P
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium	1440	B		P
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	6720			P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				

Color Before: BROWN Clarity Before: CLOUDY Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

FORM I - IN

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

02I-01

Lab Name: GP ENVIRONMENTAL Contract:

Lab Code: GP Case No.: SAS No.: SDG No.: NUS191

Matrix (soil/water): WATER Lab Sample ID: 9808191-05

Level (low/med): LOW Date Received: 08/22/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	200	U		P
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium	1050	B		P
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	450			P
7439-92-1	Lead				
7439-95-4	Magnesium	450	B		P
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium	376	B		P
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	2860	B		P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

FORM I - IN

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

03D-01

Lab Name: GP ENVIRONMENTAL Contract:

Lab Code: GP Case No.: SAS No.: SDG No.: NUS191

Matrix (soil/water): WATER Lab Sample ID: 9808191-03

Level (low/med): LOW Date Received: 08/22/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	200	U		P
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium	40500			P
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	432			P
7439-92-1	Lead				
7439-95-4	Magnesium	8850			P
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium	1030	B		P
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	5010			P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

FORM I - IN

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

04S-01

Lab Name: GP ENVIRONMENTAL Contract:

Lab Code: GP Case No.: SAS No.: SDG No.: NUS191

Matrix (soil/water): WATER Lab Sample ID: 9808191-04

Level (low/med): LOW Date Received: 08/22/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	865			P
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium	9740			P
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	1200			P
7439-92-1	Lead				
7439-95-4	Magnesium	988	B		P
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium	698	B		P
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	8350			P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

FORM I - IN

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

09S-01

Lab Name: GP ENVIRONMENTAL Contract:

Lab Code: GP Case No.: SAS No.: SDG No.: NUS191

Matrix (soil/water): WATER Lab Sample ID: 9808191-01

Level (low/med): LOW Date Received: 08/22/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	200	U		P
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium	4030	B		P
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	816			P
7439-92-1	Lead				
7439-95-4	Magnesium	760	B		P
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium	856	B		P
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	3280	B		P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

FORM I - IN

RUN SUMMARY SHEET
Dissolved Organic Carbon

ATA FILE: DOC82698
NSTRUMENT FILE: INSTRUMENT: DOHRMAN ANALYZED: 08/26/1998

eq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	WC0149	ICV	55.40		55.4	55.4	1.00	mg/L	103		
2	BLANK	ICB	0		0.000	0.000	1.00	mg/L			
3	9808167-02	CF-8-MW-23S-01	0.274		0.274	2.74	10.0	mg/L			
4	9808174-01	CF-8-MW-17S-01	3.889		3.89	3.89	1.00	mg/L			
5	9808174-02	CF-8-MW-10S-01	21.251		21.3	21.3	1.00	mg/L			
6	9808174-03	CF-8-MW-06S-01	5.4491		5.45	5.45	1.00	mg/L			
7	9808174-04	CF-8-MW-18S-01	5.532		5.53	5.53	1.00	mg/L			
8	9808174-05	CF-8-MW-13S-01	59.277		59.3	59.3	1.00	mg/L			
9	9808174-05D	CF-8-MW-13S-01D	59.503		59.5	59.5	1.00	mg/L		0.381	
10	9808174-05S	CF-8-MW-13S-01S	68.104		68.1	68.1	1.00	mg/L	88.3		
11	9808184-01	CF-8-MW-12S-01	4.094		4.09	4.09	1.00	mg/L			
12	9808184-02	CF-8-MW-07S-01	15.462		15.5	15.5	1.00	mg/L			
13	WC0149	CCV	58.931		58.9	58.9	1.00	mg/L	109		
14	BLANK	CCB	0		0.000	0.000	1.00	mg/L			
15	9808184-04	CF-8-DUP-01	4.156		4.16	4.16	1.00	mg/L			
16	9808191-01	CF-8-MW-09S-01	4.233		4.23	4.23	1.00	mg/L			
17	9808191-02	CF-8-MW-01S-01	30.919		30.9	30.9	1.00	mg/L			
18	9808191-04	CF-8-MW-04S-01	28.964		29.0	29.0	1.00	mg/L			
19	WC0149	CV	58.360		58.4	58.4	1.00	mg/L	108		
20	BLANK	CB	0		0.000	0.000	1.00	mg/L			

Chris Berg DCB 8-26-98
Analyst / Date

Lab Supervisor / Date

RUN SUMMARY SHEET
Alkalinity

ATA FILE: ALK82898
NSTRUMENT FILE: INSTRUMENT: WET_LAB ANALYZED: 08/29/1998

eq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	WC0217	WC0217	220.8		221	221	1.00	mg/L	94.0		
2	BLANK	ICB	0		0.000	0.000	1.00	mg/L			
3	9808167-02	CF-8-MW-23S-01	37.5		37.5	37.5	1.00	mg/L			
4	9808174-01	CF-8-MW-17S-01	0		0.000	0.000	1.00	mg/L			
5	9808174-02	CF-8-MW-10S-01	27.1		27.1	27.1	1.00	mg/L			
6	9808174-03	CF-8-MW-06S-01	27.1		27.1	27.1	1.00	mg/L			
7	9808174-04	CF-8-MW-18S-01	150		150	150	1.00	mg/L			
8	9808174-05	CF-8-MW-13S-01	52.1		52.1	52.1	1.00	mg/L			
9	9808184-01	CF-8-MW-12S-01	20.8		20.8	20.8	1.00	mg/L			
10	9808184-02	CF-8-MW-07S-01	45.8		45.8	45.8	1.00	mg/L			
11	9808184-04	CF-8-DUP-01	14.6		14.6	14.6	1.00	mg/L			
12	9808191-01	CF-8-MW-09S-01	37.5		37.5	37.5	1.00	mg/L			
13	WC0217	WC0217	220.8		221	221	1.00	mg/L	94.0		
14	BLANK	BLANK	0		0.000	0.000	1.00	mg/L			
15	9808191-02	CF-8-MW-01S-01	39.6		39.6	39.6	1.00	mg/L			
16	9808191-04	CF-8-MW-04S-01	22.9		22.9	22.9	1.00	mg/L			
17	9808191-04D	CF-8-MW-04S-01D	22.9		22.9	22.9	1.00	mg/L		0.000	
18	WC0217	WC0217	233.3		233	233	1.00	mg/L	99.3		
19	BLANK	BLANK	0		0.000	0.000	1.00	mg/L			

LM

Analyst / Date

Lab Supervisor / Date

RUN SUMMARY SHEET
Sulfide

ATA FILE: S2R82498
NSTRUMENT FILE: INSTRUMENT: WET_LAB ANALYZED: 08/24/1998

eq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
41	9808185-15	149-S01-032	0		0.000	0.000	2.00	mg/L			
42	9808185-16	149-S01-033	0		0.000	0.000	2.00	mg/L			
43	9808185-17	149-S01-034	2		2.00	2.00	2.00	mg/L			
44	BLANK	BLANK	0		0.000	0.000	2.00	mg/L			
45	9808185-18	149-S01-035	0		0.000	0.000	2.00	mg/L			
46	9808186-01	149-S24-081	0		0.000	0.000	2.00	mg/L			
47	9808186-02	149-S24-082	0		0.000	0.000	2.00	mg/L			
48	9808186-03	149-S01-036	0		0.000	0.000	2.00	mg/L			
49	9808186-04	149-S01-037	10		10.0	10.0	2.00	mg/L			
50	9808186-05	149-S01-039	6		6.00	6.00	2.00	mg/L			
51	9808186-06	149-S09-016	0		0.000	0.000	2.00	mg/L			
52	9808186-07	149-S09-017	0		0.000	0.000	2.00	mg/L			
53	9808186-08	149-S09-018	0		0.000	0.000	2.00	mg/L			
54	9808186-09	149-S09-019	0		0.000	0.000	2.00	mg/L			
55	BLANK	BLANK	0		0.000	0.000	2.00	mg/L			
56	9808186-11	149-S09-020	4		4.00	4.00	2.00	mg/L			
57	9808186-11D	149-S09-020D	4		4.00	4.00	2.00	mg/L		0.000	
58	9808191-01	CF-8-MW-09S-01	0		0.000	0.000	2.00	mg/L			
59	9808191-02	CF-8-MW-01S-01	0		0.000	0.000	2.00	mg/L			
60	9808191-04	CF-8-MW-04S-01	0		0.000	0.000	2.00	mg/L			
61	BLANK	BLANK	0		0.000	0.000	2.00	mg/L			

LM LM 8/24/98
Analyst / Date

Lab Supervisor / Date

RUN SUMMARY SHEET
Ammonia

TA FILE: NH390298
STRUMENT FILE: INSTRUMENT: WET_LAB ANALYZED: 09/03/1998

q	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
9	9808185-06	149-S11-061	0		0.000	0.000	0.100	mg/L			
0	9808185-07	149-S11-063	0		0.000	0.000	0.100	mg/L			
1	9808185-08	149-S11-064	0		0.000	0.000	0.100	mg/L			
2	9808185-09	149-S11-065	0		0.000	0.000	0.100	mg/L			
3	9808185-10	149-S11-066	0		0.000	0.000	0.100	mg/L			
4	9808185-12	149-S06-023	1.73		1.73	1.73	0.100	mg/L			
5	9808185-13	149-S06-028	0.13		0.130	0.130	0.100	mg/L			
6	9808185-14	149-S06-029	0		0.000	0.000	0.100	mg/L			
7	9808185-15	149-S01-032	0		0.000	0.000	0.100	mg/L			
8	9808185-16	149-S01-033	0		0.000	0.000	0.100	mg/L			
9	WC0222	WC0222	0.71		0.710	3.55	0.500	mg/L	88.8		
0	BLANK	BLANK	0		0.000	0.000	0.100	mg/L			
1	9808185-17	149-S01-034	0		0.000	0.000	0.100	mg/L			
2	9808185-18	149-S01-035	0.35		0.350	0.350	0.100	mg/L			
3	9808186-01	149-S24-081	1.84		1.84	1.84	0.100	mg/L			
4	9808186-02	149-S24-082	6.42		6.42	6.42	0.100	mg/L			
5	9808186-03	149-S01-036	6.81		6.81	34.0	0.500	mg/L			
6	9808186-04	149-S01-037	6.42		6.42	128	2.00	mg/L			
7	9808186-05	149-S01-039	10.33		10.3	51.6	0.500	mg/L			
8	9808186-06	149-S09-016	0.31		0.310	1.55	0.500	mg/L			
9	9808186-06D	149-S09-016D	0.31		0.310	1.55	0.500	mg/L		0.000	
0	9808186-06S	149-S09-016S	2.79		2.79	14.0	0.500	mg/L	99.2		
1	WC0222	WC0222	0.71		0.710	3.55	0.500	mg/L	88.8		
2	BLANK	BLANK	0		0.000	0.000	0.100	mg/L			
3	9808186-07	149-S09-017	1.14		1.14	5.70	0.500	mg/L			
4	9808186-08	149-S09-018	0.47		0.470	2.35	0.500	mg/L			
5	9808186-09	149-S09-019	0.23		0.230	1.15	0.500	mg/L			
6	9808186-11	149-S09-020	1.08		1.08	5.40	0.500	mg/L			
7	9808191-01	CF-8-MW-09S-01	0.35		0.350	0.350	0.100	mg/L			
8	9808191-02	CF-8-MW-01S-01	0.37		0.370	0.370	0.100	mg/L			
9	9808191-04	CF-8-MW-04S-01	1.14		1.14	1.14	0.100	mg/L			
0	9808208-01	149-S02-011	0		0.000	0.000	0.100	mg/L			
1	9808208-02	149-S02-012	0		0.000	0.000	0.400	mg/L			
2	9808208-03	149-S02-013	0		0.000	0.000	0.100	mg/L			
3	WC0222	WC0222	0.80		0.800	4.00	0.500	mg/L	100		
4	BLANK	BLANK	0		0.000	0.000	0.100	mg/L			
5	9808208-04	149-S02-014	0		0.000	0.000	0.100	mg/L			
6	9808208-05	149-S21-004	0		0.000	0.000	0.100	mg/L			
7	9808208-06	149-S22-004	2.33		2.33	2.33	0.100	mg/L			
8	9808208-07	149-S01-038	2.79		2.79	11.2	0.400	mg/L			

LM LM 9/3/98
Analyst / Date

Tracy C Wardell 9-11-98
Lab Supervisor / Date

RUN SUMMARY SHEET
CHLORIDE BY IC METHOD 300

ATA FILE: NUS91398
ISTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 09/13/1998

eq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	3979		-0.017	-0.017	0.100	mg/L			
2	0.1 PPM	S1	122608		0.297	0.297	0.100	mg/L			
3	0.5 PPM	S2	173544		0.433	0.433	0.100	mg/L			
4	1.0 PPM	S3	354496		0.913	0.913	0.100	mg/L			
5	3.0 PPM	S4	1110108		2.92	2.92	0.100	mg/L			
6	5.0 PPM	S5	1917233		5.06	5.06	0.100	mg/L			
7	ERA981#804	ERA981#804	714546		1.87	9.34	0.500	mg/L	87.3		
8	BLANK	ICB	50435		0.106	0.106	0.100	mg/L			
9	9808184-01	CF-8-MW-12S-01	2599530		6.87	6.87	0.100	mg/L			
10	9808184-01D	CF-8-MW-12S-01D	2597545		6.86	6.86	0.100	mg/L		0.077	
11	9808184-01S	CF-8-MW-12S-01S	2162285		5.71	11.4	0.200	mg/L	9.10		
12	9808184-02	CF-8-MW-07S-01	20192509		53.5	53.5	0.100	mg/L			
13	9808184-04	CF-8-DUP-01	2608783		6.89	6.89	0.100	mg/L			
14	9808191-01	CF-8-MW-09S-01	1940739		5.12	5.12	0.100	mg/L			
15	CCV1	CCV1	851424		2.23	11.2	0.500	mg/L	104		
16	CCB1	CCB1	7991		-0.007	-0.007	0.100	mg/L			
17	9808191-02	CF-8-MW-01S-01	1448339		3.81	3.81	0.100	mg/L			
18	9808191-04	CF-8-MW-04S-01	4832434		12.8	12.8	0.100	mg/L			
19	CCV2	CCV2	858284		2.25	11.2	0.500	mg/L	105		
20	CCB2	CCB2	0		-0.028	-0.028	0.100	mg/L			

Y Wardell TW 10-13-98
Analyst / Date

Lab Supervisor / Date

RUN SUMMARY SHEET
SULFATE BY IC METHOD 300

ATA FILE: NUS91398
ISTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 09/13/1998

eq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	0		0.032	0.032	0.100	mg/L			
2	0.1 PPM	S1	34663		0.174	0.174	0.100	mg/L			
3	0.5 PPM	S2	124758		0.544	0.544	0.100	mg/L			
4	1.0 PPM	S3	199023		0.848	0.848	0.100	mg/L			
5	3.0 PPM	S4	713964		2.96	2.96	0.100	mg/L			
6	5.0 PPM	S5	1220339		5.04	5.04	0.100	mg/L			
7	ERA981#804	ERA981#804	282788		1.19	5.96	0.500	mg/L	97.7		
8	BLANK	ICB	0		0.032	0.032	0.100	mg/L			
9	9808184-01	CF-8-MW-12S-01	2151519		8.86	8.86	0.100	mg/L			
10	9808184-01D	CF-8-MW-12S-01D	2153326		8.87	8.87	0.100	mg/L		0.084	
11	9808184-01S	CF-8-MW-12S-01S	1664054		6.86	13.7	0.200	mg/L	9.72		
12	9808184-02	CF-8-MW-07S-01	9787948		40.2	40.2	0.100	mg/L			
13	9808184-04	CF-8-DUP-01	2167146		8.93	8.93	0.100	mg/L			
14	9808191-01	CF-8-MW-09S-01	582295		2.42	2.42	0.100	mg/L			
15	CCV1	CCV1	273754		1.16	5.78	0.500	mg/L	94.7		
16	CCB1	CCB1	2410		0.041	0.041	0.100	mg/L			
17	9808191-02	CF-8-MW-01S-01	12508356		51.4	51.4	0.100	mg/L			
18	9808191-04	CF-8-MW-04S-01	3098770		12.8	12.8	0.100	mg/L			
19	CCV2	CCV2	276438		1.17	5.83	0.500	mg/L	95.6		
20	CCB2	CCB2	0		0.032	0.032	0.100	mg/L			

TWardell TW 10-12-98
Analyst / Date

Lab Supervisor / Date

RUN SUMMARY SHEET
SULFATE BY IC METHOD 300

FILE: S0482198
:UMENT FILE:

INSTRUMENT: DIONEX

ANALYZED: 08/21/1998

.ab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
:RA981#804	ICV	1.5128		1.51	7.56	0.500	mg/L	124		
3LANK	ICB	-0.0306		-0.031	-0.031	0.100	mg/L			
9808174-01	CF-8-MW-17S-01	over cal.		0.000	0.000	0.100	mg/L			
9808174-01D	CF-8-MW-17S-01D	over cal.		0.000	0.000	0.100	mg/L		DIV BY	
9808174-01S	CF-8-MW-17S-01S	over cal.		0.000	0.000	0.200	mg/L	0.000		
9808174-02	CF-8-MW-10S-01	over cal.		0.000	0.000	0.100	mg/L			
9808174-03	CF-8-MW-06S-01	over cal.		0.000	0.000	0.100	mg/L			
9808174-04	CF-8-MW-18S-01	over cal.		0.000	0.000	0.100	mg/L			
9808174-05	CF-8-MW-13S-01	over cal.		0.000	0.000	0.100	mg/L			
ERA981#804	ERA981#804	1.5843		1.58	7.92	0.500	mg/L	130		
BLANK	BLANK	-0.0306		-0.031	-0.031	0.100	mg/L			
9808184-01	CF-8-MW-12S-01	over cal.		0.000	0.000	0.100	mg/L			
9808184-02	CF-8-MW-07S-01	over cal.		0.000	0.000	0.100	mg/L			
9808184-04	CF-8-DUP-01	over cal.		0.000	0.000	0.100	mg/L			
9808191-01	CF-8-MW-09S-01	1.8335		1.83	1.83	0.100	mg/L			
9808191-02	CF-8-MW-01S-01	over cal.		0.000	0.000	0.100	mg/L			
9808191-04	CF-8-MW-04S-01	over cal.		0.000	0.000	0.100	mg/L			
ERA981#804	ERA981#804	1.4536		1.45	7.27	0.500	mg/L	119		
BLANK	BLANK	-0.0306		-0.031	-0.031	0.100	mg/L			

T Wardell TW 10-6-98
Analyst / Date

Lab Supervisor / Date

RUN SUMMARY SHEET
BROMIDE BY IC METHOD 300

TA FILE: IC-82198
STRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 08/21/1998

q	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	S0	S0	0		-0.026	-0.026	0.100	mg/L			
2	S1	S1	6281		0.089	0.089	0.100	mg/L			
3	S2	S2	16616		0.276	0.276	0.100	mg/L			
4	S3	S3	28016		0.483	0.483	0.100	mg/L			
5	S4	S4	58755		1.04	1.04	0.100	mg/L			
6	S5	S5	165792		2.99	2.99	0.100	mg/L			
7	ERA981#804	ICV	125960		2.26	11.3	0.500	mg/L	89.8		
8	for nitrite only										
9	BLANK	ICB	0		-0.026	-0.026	0.100	mg/L			
10	9808174-01	CF-8-MW-17S-01	0		-0.026	-0.026	0.100	mg/L			
11	9808174-01D	CF-8-MW-17S-01D	0		-0.026	-0.026	0.100	mg/L		0.000	
12	9808174-01S	CF-8-MW-17S-01S	116309		2.09	4.17	0.200	mg/L	139		
13	9808174-02	CF-8-MW-10S-01	0		-0.026	-0.026	0.100	mg/L			
14	9808174-03	CF-8-MW-06S-01	0		-0.026	-0.026	0.100	mg/L			
15	9808174-04	CF-8-MW-18S-01	0		-0.026	-0.026	0.100	mg/L			
16	9808174-05	CF-8-MW-13S-01	0		-0.026	-0.026	0.100	mg/L			
17	ERA981#804	ERA981#804	126577		2.27	11.4	0.500	mg/L	90.2		
18	for nitrite only										
19	BLANK	BLANK	0		-0.026	-0.026	0.100	mg/L			
20	9808184-01	CF-8-MW-12S-01	0		-0.026	-0.026	0.100	mg/L			
21	9808184-02	CF-8-MW-07S-01	0		-0.026	-0.026	0.100	mg/L			
22	9808184-04	CF-8-DUP-01	0		-0.026	-0.026	0.100	mg/L			
23	9808191-01	CF-8-MW-09S-01	0		-0.026	-0.026	0.100	mg/L			
24	9808191-02	CF-8-MW-01S-01	0		-0.026	-0.026	0.100	mg/L			
25	9808191-04	CF-8-MW-04S-01	0		-0.026	-0.026	0.100	mg/L			
26	ERA981#804	ERA981#804	123276		2.21	11.1	0.500	mg/L	87.8		
27	for nitrite only										
28	BLANK	BLANK	0		-0.026	-0.026	0.100	mg/L			

TWarden TW 10-6-98
Analyst / Date

Lab Supervisor / Date

RUN SUMMARY SHEET
NITRATE BY IC

ATA FILE: IC-82198
NSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 08/21/1998

eq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	S0	S0	0		0.034	0.034	0.100	mg/L			
2	S1	S1	22496		0.104	0.104	0.100	mg/L			
3	S2	S2	63119		0.232	0.232	0.100	mg/L			
4	S3	S3	140325		0.475	0.475	0.100	mg/L			
5	not using this point										
6	S5	S5	944510		3.00	3.00	0.100	mg/L			
7	ERA981#804	ICV	619664		1.98	9.91	0.500	mg/L	91.8		
8	WC0207	WC0207	0		0.034	0.336	1.00	mg/L	3.11		
9	BLANK	ICB	0		0.034	0.034	0.100	mg/L			
10	9808174-01	CF-8-MW-17S-01	0		0.034	0.034	0.100	mg/L			
11	9808174-01D	CF-8-MW-17S-01D	0		0.034	0.034	0.100	mg/L		0.000	
12	9808174-01S	CF-8-MW-17S-01S	581232		1.86	3.72	0.200	mg/L	124		
13	9808174-02	CF-8-MW-10S-01	3875		0.046	0.046	0.100	mg/L			
14	9808174-03	CF-8-MW-06S-01	17115		0.087	0.087	0.100	mg/L			
15	9808174-04	CF-8-MW-18S-01	0		0.034	0.034	0.100	mg/L			
16	9808174-05	CF-8-MW-13S-01	4093		0.046	0.046	0.100	mg/L			
17	ERA981#804	ERA981#804	619676		1.98	9.91	0.500	mg/L	91.8		
18	WC0207	WC0207	0		0.034	0.336	1.00	mg/L	3.11		
19	BLANK	BLANK	0		0.034	0.034	0.100	mg/L			
20	9808184-01	CF-8-MW-12S-01	4532		0.048	0.048	0.100	mg/L			
21	9808184-02	CF-8-MW-07S-01	4482		0.048	0.048	0.100	mg/L			
22	9808184-04	CF-8-DUP-01	3638		0.045	0.045	0.100	mg/L			
23	9808191-01	CF-8-MW-09S-01	0		0.034	0.034	0.100	mg/L			
24	9808191-02	CF-8-MW-01S-01	4168		0.047	0.047	0.100	mg/L			
25	9808191-04	CF-8-MW-04S-01	7803		0.058	0.058	0.100	mg/L			
26	ERA981#804	ERA981#804	647776		2.07	10.4	0.500	mg/L	95.9		
27	WC0207	WC0207	0		0.034	0.336	1.00	mg/L	3.11		
28	BLANK	BLANK	0		0.034	0.034	0.100	mg/L			

LWardell TW 10-6-98
Analyst / Date

Lab Supervisor / Date

RUN SUMMARY SHEET
NITRITE BY IC

ATA FILE: IC-82198
ISTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 08/21/1998

eq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	S0	S0	0		-0.023	-0.023	0.100	mg/L			
2	S1	S1	26349		0.073	0.073	0.100	mg/L			
3	S2	S2	71695		0.239	0.239	0.100	mg/L			
4	S3	S3	161979		0.568	0.568	0.100	mg/L			
5	S4	S4	282475		1.01	1.01	0.100	mg/L			
6	S5	S5	825708		2.99	2.99	0.100	mg/L			
7	ccv for other analytes										
8	WC0207	WC0207	201920		0.713	7.13	1.00	mg/L	103		
9	BLANK	ICB	0		-0.023	-0.023	0.100	mg/L			
10	9808174-01	CF-8-MW-17S-01	0		-0.023	-0.023	0.100	mg/L			
11	9808174-01D	CF-8-MW-17S-01D	0		-0.023	-0.023	0.100	mg/L		0.000	
12	9808174-01S	CF-8-MW-17S-01S	695349		2.51	5.02	0.200	mg/L	72.8		
13	9808174-02	CF-8-MW-10S-01	21397		0.055	0.055	0.100	mg/L			
14	9808174-03	CF-8-MW-06S-01	15576		0.034	0.034	0.100	mg/L			
15	9808174-04	CF-8-MW-18S-01	14248		0.029	0.029	0.100	mg/L			
16	9808174-05	CF-8-MW-13S-01	53808		0.173	0.173	0.100	mg/L			
17	ccv for other analytes										
18	WC0207	WC0207	201164		0.710	7.10	1.00	mg/L	103		
19	BLANK	BLANK	0		-0.023	-0.023	0.100	mg/L			
20	9808184-01	CF-8-MW-12S-01	26693		0.075	0.075	0.100	mg/L			
21	9808184-02	CF-8-MW-07S-01	124316		0.430	0.430	0.100	mg/L			
22	9808184-04	CF-8-DUP-01	154357		0.540	0.540	0.100	mg/L			
23	9808191-01	CF-8-MW-09S-01	49843		0.159	0.159	0.100	mg/L			
24	9808191-02	CF-8-MW-01S-01	31139		0.091	0.091	0.100	mg/L			
25	9808191-04	CF-8-MW-04S-01	50539		0.162	0.162	0.100	mg/L			
26	ccv for other analytes										
27	WC0207	WC0207	208051		0.736	7.36	1.00	mg/L	107		
28	BLANK	BLANK	0		-0.023	-0.023	0.100	mg/L			

Twardell TW 10-6-98
Analyst / Date

Lab Supervisor / Date

RUN SUMMARY SHEET
ORTHOPHOSPHATE

ATA FILE: IC-82198
NSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 08/21/1998

eq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	S0	S0	0		0.009	0.009	0.100	mg/L			
2	S1	S1	3381		0.100	0.100	0.100	mg/L			
3	S2	S2	8804		0.247	0.247	0.100	mg/L			
4	S3	S3	17928		0.493	0.493	0.100	mg/L			
5	not using in calibration										
6	S5	S5	110689		3.00	3.00	0.100	mg/L			
7	ERA981#804	ICV	86997		2.36	11.8	0.500	mg/L	102		
8	WC0207	WC0207	0		0.009	0.086	1.00	mg/L	0.743		
9	BLANK	ICB	0		0.009	0.009	0.100	mg/L			
10	9808174-01	CF-8-MW-17S-01	0		0.009	0.009	0.100	mg/L			
11	9808174-01D	CF-8-MW-17S-01D	0		0.009	0.009	0.100	mg/L		0.000	
12	9808174-01S	CF-8-MW-17S-01S	61019		1.66	3.32	0.200	mg/L	111		
13	9808174-02	CF-8-MW-10S-01	1811		0.058	0.058	0.100	mg/L			
14	9808174-03	CF-8-MW-06S-01	0		0.009	0.009	0.100	mg/L			
15	9808174-04	CF-8-MW-18S-01	2225		0.069	0.069	0.100	mg/L			
16	9808174-05	CF-8-MW-13S-01	1761		0.056	0.056	0.100	mg/L			
17	ERA981#804	ERA981#804	85109		2.31	11.5	0.500	mg/L	99.6		
18	WC0207	WC0207	0		0.009	0.086	1.00	mg/L	0.743		
19	BLANK	BLANK	0		0.009	0.009	0.100	mg/L			
20	9808184-01	CF-8-MW-12S-01	0		0.009	0.009	0.100	mg/L			
21	9808184-02	CF-8-MW-07S-01	0		0.009	0.009	0.100	mg/L			
22	9808184-04	CF-8-DUP-01	0		0.009	0.009	0.100	mg/L			
23	9808191-01	CF-8-MW-09S-01	8955		0.251	0.251	0.100	mg/L			
24	9808191-02	CF-8-MW-01S-01	0		0.009	0.009	0.100	mg/L			
25	9808191-04	CF-8-MW-04S-01	0		0.009	0.009	0.100	mg/L			
26	ERA981#804	ERA981#804	85132		2.31	11.6	0.500	mg/L	99.6		
27	WC0207	WC0207	0		0.009	0.086	1.00	mg/L	0.743		
28	BLANK	BLANK	0		0.009	0.009	0.100	mg/L			

L Wardell TW 10-6-98
Analyst / Date

Lab Supervisor / Date

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-10-8-155

TO: [redacted] **DATE:** OCTOBER 22, 1998

FROM: GRETCHEN PHIPPS **COPIES:** DV FILE

SUBJECT: **DATA VALIDATION – METAL AND MISCELLANEOUS**
CTO 039 - CECIL FIELD
SDG - 9808174

SAMPLES: 5/Aqueous/

CF-8-MW-06S-01	CF-8-MW-10S-01	CF-8-MW-10S-01
CF-8-MW-17S-01	CF-8-MW-18S-01	

Overview

The sample set for CTO 039, NAS Cecil Field, SDG 9808174, consists of five (5) aqueous environmental samples.

The samples were analyzed for select metals, anions, dissolved organic carbon, dissolved sulfide, alkalinity and ammonia. The samples were collected by Tetra Tech NUS on August 19, 1998 and analyzed by GP Environmental Services.

Select metals analyses were conducted using SW-846 method 6010B. Anions analyses were conducted using EPA method 300. Dissolved organic carbon analyses were conducted using SM method A5310C. Reactive sulfide analyses were conducted using RPA method 376.1. Alkalinity analyses were conducted using EPA method 310.1. Ammonia analyses were conducted using EPA method 350.1.

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:

Laboratory Blank Analyses

Affected samples: All

Analyte	Maximum Concentration	Action Level(aqueous)
Magnesium	143µg/L	715µg/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 magnesium were qualified, "U", as a result of blank contamination.

Notes

The Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV) for Sulfate analyses were >110% quality control limit. However, no validation action was required as all sulfate results reported were nondetected.

Executive Summary

Laboratory Performance: The Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV) for Sulfate analyses were >110% quality control limit. Magnesium was present in the laboratory preparation blank.

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)."

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Control Officer

Cecil Field
SDG 9808174

Table 1 - RECOMMENDATION SUMMARY

Aluminum	
Calcium	
Iron	
Magnesium	A[1]
Potassium	
Sodium	
Bromide	
Chloride	
Dissolved Organic Carbon	
Nitrate	
Nitrite	
Sulfate	
O-Phosphate	
Reactive Sulfide	
Alkalinity	
Ammonia	

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.

Cobalt
Copper
Iron
Lead
Magnesi
Mangane
Mercury

Nickel
Vanad
Zinc

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

06S-01

Lab Name: GP ENVIRONMENTAL Contract:

Lab Code: GP Case No.: SAS No.: SDG No.: NUS174

Matrix (soil/water): WATER Lab Sample ID: 9808174-03

Level (low/med): LOW Date Received: 08/20/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	483			P
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium	12800			P
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	181			P
7439-92-1	Lead				
7439-95-4	Magnesium	582	B		P
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium	803	B		P
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	1650	B		P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

FORM I - IN

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

10S-01

Lab Name: GP ENVIRONMENTAL Contract:

Lab Code: GP Case No.: SAS No.: SDG No.: NUS174

Matrix (soil/water): WATER Lab Sample ID: 9808174-02

Level (low/med): LOW Date Received: 08/20/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	267			P
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium	8930			P
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	362			P
7439-92-1	Lead				
7439-95-4	Magnesium	602	B		P
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium	1780	B		P
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	4560	B		P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

FORM I - IN

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

13S-01

Lab Name: GP ENVIRONMENTAL Contract:

Lab Code: GP Case No.: SAS No.: SDG No.: NUS174

Matrix (soil/water): WATER Lab Sample ID: 9808174-05

Level (low/med): LOW Date Received: 08/20/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	398			P
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium	15500			P
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	583			P
7439-92-1	Lead				
7439-95-4	Magnesium	794	B		P
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium	5380			P
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	3460	B		P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

FORM I - IN

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

17S-01

Lab Name: GP ENVIRONMENTAL Contract:

Lab Code: GP Case No.: SAS No.: SDG No.: NUS174

Matrix (soil/water): WATER Lab Sample ID: 9808174-01

Level (low/med): LOW Date Received: 08/20/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	200	U		P
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium	1000	U		P
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	182			P
7439-92-1	Lead				
7439-95-4	Magnesium	742	B		P
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium	213	B		P
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	2710	B		P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

FORM I - IN

ENVIROFORMS/INORGANIC CLP

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE NO.

18S-01

Lab Name: GP ENVIRONMENTAL Contract:

Lab Code: GP Case No.: SAS No.: SDG No.: NUS174

Matrix (soil/water): WATER Lab Sample ID: 9808174-04

Level (low/med): LOW Date Received: 08/20/98

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	279			P
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium	52700			P
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron	104			P
7439-92-1	Lead				
7439-95-4	Magnesium	1760	B		P
7439-96-5	Manganese				
7439-97-6	Mercury				
7440-02-2	Nickel				
7440-09-7	Potassium	7790			P
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium	5580			P
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				
7740-42-8	Boron				
7740-42-0	Tin				

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

FORM I - IN

RUN SUMMARY SHEET
NITRITE BY IC

DATA FILE: IC-82198
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 08/21/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	S0	S0	0		-0.023	-0.023	0.100	mg/L			
2	S1	S1	26349		0.073	0.073	0.100	mg/L			
3	S2	S2	71695		0.239	0.239	0.100	mg/L			
4	S3	S3	161979		0.568	0.568	0.100	mg/L			
5	S4	S4	282475		1.01	1.01	0.100	mg/L			
6	S5	S5	825708		2.99	2.99	0.100	mg/L			
7	ccv for other analytes										
8	WC0207	WC0207	201920		0.713	7.13	1.00	mg/L	103		
9	BLANK	ICB	0		-0.023	-0.023	0.100	mg/L			
10	9808174-01	CF-8-MW-17S-01	0		-0.023	-0.023	0.100	mg/L			
11	9808174-01D	CF-8-MW-17S-01D	0		-0.023	-0.023	0.100	mg/L		0.000	
12	9808174-01S	CF-8-MW-17S-01S	695349		2.51	5.02	0.200	mg/L	72.8		
13	9808174-02	CF-8-MW-10S-01	21397		0.055	0.055	0.100	mg/L			
14	9808174-03	CF-8-MW-06S-01	15576		0.034	0.034	0.100	mg/L			
15	9808174-04	CF-8-MW-18S-01	14248		0.029	0.029	0.100	mg/L			
16	9808174-05	CF-8-MW-13S-01	53808		0.173	0.173	0.100	mg/L			
17	ccv for other analytes										
18	WC0207	WC0207	201164		0.710	7.10	1.00	mg/L	103		
19	BLANK	BLANK	0		-0.023	-0.023	0.100	mg/L			
20	9808184-01	CF-8-MW-12S-01	26693		0.075	0.075	0.100	mg/L			
21	9808184-02	CF-8-MW-07S-01	124316		0.430	0.430	0.100	mg/L			
22	9808184-04	CF-8-DUP-01	154357		0.540	0.540	0.100	mg/L			
23	9808191-01	CF-8-MW-09S-01	49843		0.159	0.159	0.100	mg/L			
24	9808191-02	CF-8-MW-01S-01	31139		0.091	0.091	0.100	mg/L			
25	9808191-04	CF-8-MW-04S-01	50539		0.162	0.162	0.100	mg/L			
26	ccv for other analytes										
27	WC0207	WC0207	208051		0.736	7.36	1.00	mg/L	107		
28	BLANK	BLANK	0		-0.023	-0.023	0.100	mg/L			

YWardell TW 10-6-98
Analyst / Date

Lab Supervisor / Date

RUN SUMMARY SHEET
CHLORIDE BY IC METHOD 300

ATA FILE: NUS91098
ISTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 09/10/1998

eq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	3979		-0.017	-0.017	0.100	mg/L			
2	0.1 PPM	S1	122608		0.297	0.297	0.100	mg/L			
3	0.5 PPM	S2	173544		0.433	0.433	0.100	mg/L			
4	1.0 PPM	S3	354496		0.913	0.913	0.100	mg/L			
5	3.0 PPM	S4	1110108		2.92	2.92	0.100	mg/L			
6	5.0 PPM	S5	1917233		5.06	5.06	0.100	mg/L			
7	ERA981#804	ERA981#804	750450		1.96	9.81	0.500	mg/L	91.7		
8	BLANK	ICB	38102		0.073	0.073	0.100	mg/L			
9	9808174-01	CF-8-MW-17S-01	149706		0.369	0.369	0.100	mg/L			
10	9808174-01	CF-8-MW-17S-01	74502		0.170	3.40	2.00	mg/L			
11	9808174-02	CF-8-MW-10S-01	1799968		4.75	4.75	0.100	mg/L			
12	9808174-02	CF-8-MW-10S-01	81245		0.188	3.75	2.00	mg/L			
13	9808174-03	CF-8-MW-06S-01	1723470		4.54	4.54	0.100	mg/L			
14	9808174-03	CF-8-MW-06S-01	71959		0.163	3.26	2.00	mg/L			
15	9808174-04	CF-8-MW-18S-01	741381		1.94	1.94	0.100	mg/L			
16	9808174-04	CF-8-MW-18S-01	44018		0.089	1.78	2.00	mg/L			
17	CCV3	CCV3	773813		2.02	10.1	0.500	mg/L	94.6		
18	CCB3	CCB3	18322		0.021	0.021	0.100	mg/L			
19	9808174-05	CF-8-MW-13S-01	1626340		4.29	4.29	0.100	mg/L			
20	9808174-05	CF-8-MW-13S-01	101375		0.241	4.82	2.00	mg/L			
21	9808174-05D	CF-8-MW-13S-01D	1412153		3.72	3.72	0.100	mg/L		14.2	
22	9808174-05S	CF-8-MW-13S-01S	1773806		4.68	9.35	0.200	mg/L	101		
23	CCV4	CCV4	783340		2.05	10.3	0.500	mg/L	95.8		
24	CCB4	CCB4	2817		-0.020	-0.020	0.100	mg/L			

L Wardell TW 10-6-98
Analyst / Date

Lab Supervisor / Date

5047

RUN SUMMARY SHEET
ORTHOPHOSPHATE

DATA FILE: IC-82198
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 08/21/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	S0	S0	0		0.009	0.009	0.100	mg/L			
2	S1	S1	3381		0.100	0.100	0.100	mg/L			
3	S2	S2	8804		0.247	0.247	0.100	mg/L			
4	S3	S3	17928		0.493	0.493	0.100	mg/L			
5	not using in calibration										
6	S5	S5	110689		3.00	3.00	0.100	mg/L			
7	ERA981#804	ICV	86997		2.36	11.8	0.500	mg/L	102		
8	WC0207	WC0207	0		0.009	0.086	1.00	mg/L	0.743		
9	BLANK	ICB	0		0.009	0.009	0.100	mg/L			
10	9808174-01	CF-8-MW-17S-01	0		0.009	0.009	0.100	mg/L			
11	9808174-01D	CF-8-MW-17S-01D	0		0.009	0.009	0.100	mg/L		0.000	
12	9808174-01S	CF-8-MW-17S-01S	61019		1.66	3.32	0.200	mg/L	111		
13	9808174-02	CF-8-MW-10S-01	1811		0.058	0.058	0.100	mg/L			
14	9808174-03	CF-8-MW-06S-01	0		0.009	0.009	0.100	mg/L			
15	9808174-04	CF-8-MW-18S-01	2225		0.069	0.069	0.100	mg/L			
16	9808174-05	CF-8-MW-13S-01	1761		0.056	0.056	0.100	mg/L			
17	ERA981#804	ERA981#804	85109		2.31	11.5	0.500	mg/L	99.6		
18	WC0207	WC0207	0		0.009	0.086	1.00	mg/L	0.743		
19	BLANK	BLANK	0		0.009	0.009	0.100	mg/L			
20	9808184-01	CF-8-MW-12S-01	0		0.009	0.009	0.100	mg/L			
21	9808184-02	CF-8-MW-07S-01	0		0.009	0.009	0.100	mg/L			
22	9808184-04	CF-8-DUP-01	0		0.009	0.009	0.100	mg/L			
23	9808191-01	CF-8-MW-09S-01	8955		0.251	0.251	0.100	mg/L			
24	9808191-02	CF-8-MW-01S-01	0		0.009	0.009	0.100	mg/L			
25	9808191-04	CF-8-MW-04S-01	0		0.009	0.009	0.100	mg/L			
26	ERA981#804	ERA981#804	85132		2.31	11.6	0.500	mg/L	99.6		
27	WC0207	WC0207	0		0.009	0.086	1.00	mg/L	0.743		
28	BLANK	BLANK	0		0.009	0.009	0.100	mg/L			

L Wardell TW 10-6-98
Analyst / Date

Lab Supervisor / Date

RUN SUMMARY SHEET
NITRATE BY IC

DATA FILE: IC-82198
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 08/21/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	S0	S0	0		0.034	0.034	0.100	mg/L			
2	S1	S1	22496		0.104	0.104	0.100	mg/L			
3	S2	S2	63119		0.232	0.232	0.100	mg/L			
4	S3	S3	140325		0.475	0.475	0.100	mg/L			
5	not using this point										
6	S5	S5	944510		3.00	3.00	0.100	mg/L			
7	ERA981#804	ICV	619664		1.98	9.91	0.500	mg/L	91.8		
8	WC0207	WC0207	0		0.034	0.336	1.00	mg/L	3.11		
9	BLANK	ICB	0		0.034	0.034	0.100	mg/L			
10	9808174-01	CF-8-MW-17S-01	0		0.034	0.034	0.100	mg/L			
11	9808174-01D	CF-8-MW-17S-01D	0		0.034	0.034	0.100	mg/L		0.000	
12	9808174-01S	CF-8-MW-17S-01S	581232		1.86	3.72	0.200	mg/L	124		
13	9808174-02	CF-8-MW-10S-01	3875		0.046	0.046	0.100	mg/L			
14	9808174-03	CF-8-MW-06S-01	17115		0.087	0.087	0.100	mg/L			
15	9808174-04	CF-8-MW-18S-01	0		0.034	0.034	0.100	mg/L			
16	9808174-05	CF-8-MW-13S-01	4093		0.046	0.046	0.100	mg/L			
17	ERA981#804	ERA981#804	619676		1.98	9.91	0.500	mg/L	91.8		
18	WC0207	WC0207	0		0.034	0.336	1.00	mg/L	3.11		
19	BLANK	BLANK	0		0.034	0.034	0.100	mg/L			
20	9808184-01	CF-8-MW-12S-01	4532		0.048	0.048	0.100	mg/L			
21	9808184-02	CF-8-MW-07S-01	4482		0.048	0.048	0.100	mg/L			
22	9808184-04	CF-8-DUP-01	3638		0.045	0.045	0.100	mg/L			
23	9808191-01	CF-8-MW-09S-01	0		0.034	0.034	0.100	mg/L			
24	9808191-02	CF-8-MW-01S-01	4168		0.047	0.047	0.100	mg/L			
25	9808191-04	CF-8-MW-04S-01	7803		0.058	0.058	0.100	mg/L			
26	ERA981#804	ERA981#804	647776		2.07	10.4	0.500	mg/L	95.9		
27	WC0207	WC0207	0		0.034	0.336	1.00	mg/L	3.11		
28	BLANK	BLANK	0		0.034	0.034	0.100	mg/L			

L Wardell TW 10-6-98
Analyst / Date

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RUN SUMMARY SHEET
SULFATE BY IC METHOD 300

DATA FILE: S0482198
INSTRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 08/21/1998

Seq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	ERA981#804	ICV	1.5128		1.51	7.56	0.500	mg/L	124		
2	BLANK	ICB	-0.0306		-0.031	-0.031	0.100	mg/L			
3	9808174-01	CF-8-MW-17S-01	over cal.		0.000	0.000	0.100	mg/L			
4	9808174-01D	CF-8-MW-17S-01D	over cal.		0.000	0.000	0.100	mg/L		DIV BY	
5	9808174-01S	CF-8-MW-17S-01S	over cal.		0.000	0.000	0.200	mg/L	0.000		
6	9808174-02	CF-8-MW-10S-01	over cal.		0.000	0.000	0.100	mg/L			
7	9808174-03	CF-8-MW-06S-01	over cal.		0.000	0.000	0.100	mg/L			
8	9808174-04	CF-8-MW-18S-01	over cal.		0.000	0.000	0.100	mg/L			
9	9808174-05	CF-8-MW-13S-01	over cal.		0.000	0.000	0.100	mg/L			
10	ERA981#804	ERA981#804	1.5843		1.58	7.92	0.500	mg/L	130		
11	BLANK	BLANK	-0.0306		-0.031	-0.031	0.100	mg/L			
12	9808184-01	CF-8-MW-12S-01	over cal.		0.000	0.000	0.100	mg/L			
13	9808184-02	CF-8-MW-07S-01	over cal.		0.000	0.000	0.100	mg/L			
14	9808184-04	CF-8-DUP-01	over cal.		0.000	0.000	0.100	mg/L			
15	9808191-01	CF-8-MW-09S-01	1.8335		1.83	1.83	0.100	mg/L			
16	9808191-02	CF-8-MW-01S-01	over cal.		0.000	0.000	0.100	mg/L			
17	9808191-04	CF-8-MW-04S-01	over cal.		0.000	0.000	0.100	mg/L			
18	ERA981#804	ERA981#804	1.4536		1.45	7.27	0.500	mg/L	119		
19	BLANK	BLANK	-0.0306		-0.031	-0.031	0.100	mg/L			

T Wardell TW 10-6-98
Analyst / Date

Lab Supervisor / Date

RUN SUMMARY SHEET
SULFATE BY IC METHOD 300

TA FILE: NUS91098
STRUMENT FILE: INSTRUMENT: DIONEX ANALYZED: 09/10/1998

:q	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	BLANK	S0	0		0.032	0.032	0.100	mg/L			
2	0.1 PPM	S1	34663		0.174	0.174	0.100	mg/L			
3	0.5 PPM	S2	124758		0.544	0.544	0.100	mg/L			
4	1.0 PPM	S3	199023		0.848	0.848	0.100	mg/L			
5	3.0 PPM	S4	713964		2.96	2.96	0.100	mg/L			
6	5.0 PPM	S5	1220339		5.04	5.04	0.100	mg/L			
7	ERA981#804	ERA981#804	290785		1.23	6.13	0.500	mg/L	100		
8	BLANK	ICB	0		0.032	0.032	0.100	mg/L			
9	9808174-01	CF-8-MW-17S-01	3132759		12.9	12.9	0.100	mg/L			
10	9808174-01	CF-8-MW-17S-01	157446		0.678	13.6	2.00	mg/L			
11	9808174-02	CF-8-MW-10S-01	1744410		7.19	7.19	0.100	mg/L			
12	9808174-02	CF-8-MW-10S-01	104158		0.459	9.18	2.00	mg/L			
13	9808174-03	CF-8-MW-06S-01	1320735		5.45	5.45	0.100	mg/L			
14	9808174-03	CF-8-MW-06S-01	84020		0.376	7.53	2.00	mg/L			
15	9808174-04	CF-8-MW-18S-01	1202688		4.97	4.97	0.100	mg/L			
16	9808174-04	CF-8-MW-18S-01	71761		0.326	6.52	2.00	mg/L			
17	CCV3	CCV3	301521		1.27	6.35	0.500	mg/L	104		
18	CCB3	CCB3	3541		0.046	0.046	0.100	mg/L			
19	9808174-05	CF-8-MW-13S-01	712450		2.96	2.96	0.100	mg/L			
20	9808174-05	CF-8-MW-13S-01	50324		0.238	4.76	2.00	mg/L			
21	9808174-05D	CF-8-MW-13S-01D	823172		3.41	3.41	0.100	mg/L		14.3	
22	9808174-05S	CF-8-MW-13S-01S	1325678		5.47	10.9	0.200	mg/L	160		
23	CCV4	CCV4	295564		1.24	6.22	0.500	mg/L	102		
24	CCB4	CCB4	0		0.032	0.032	0.100	mg/L			

Y Wardell TW 10-6-98
Analyst / Date

Lab Supervisor / Date

5048

RUN SUMMARY SHEET
Alkalinity

ATA FILE: ALK82898
NSTRUMENT FILE: INSTRUMENT: WET_LAB ANALYZED: 08/29/1998

eq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	WC0217	WC0217	220.8		221	221	1.00	mg/L	94.0		
2	BLANK	ICB	0		0.000	0.000	1.00	mg/L			
3	9808167-02	CF-8-MW-23S-01	37.5		37.5	37.5	1.00	mg/L			
4	9808174-01	CF-8-MW-17S-01	0		0.000	0.000	1.00	mg/L			
5	9808174-02	CF-8-MW-10S-01	27.1		27.1	27.1	1.00	mg/L			
6	9808174-03	CF-8-MW-06S-01	27.1		27.1	27.1	1.00	mg/L			
7	9808174-04	CF-8-MW-18S-01	150		150	150	1.00	mg/L			
8	9808174-05	CF-8-MW-13S-01	52.1		52.1	52.1	1.00	mg/L			
9	9808184-01	CF-8-MW-12S-01	20.8		20.8	20.8	1.00	mg/L			
10	9808184-02	CF-8-MW-07S-01	45.8		45.8	45.8	1.00	mg/L			
11	9808184-04	CF-8-DUP-01	14.6		14.6	14.6	1.00	mg/L			
12	9808191-01	CF-8-MW-09S-01	37.5		37.5	37.5	1.00	mg/L			
13	WC0217	WC0217	220.8		221	221	1.00	mg/L	94.0		
14	BLANK	BLANK	0		0.000	0.000	1.00	mg/L			
15	9808191-02	CF-8-MW-01S-01	39.6		39.6	39.6	1.00	mg/L			
16	9808191-04	CF-8-MW-04S-01	22.9		22.9	22.9	1.00	mg/L			
17	9808191-04D	CF-8-MW-04S-01D	22.9		22.9	22.9	1.00	mg/L		0.000	
18	WC0217	WC0217	233.3		233	233	1.00	mg/L	99.3		
19	BLANK	BLANK	0		0.000	0.000	1.00	mg/L			

LM

Analyst / Date

Lab Supervisor / Date

RUN SUMMARY SHEET
Dissolved Organic Carbon

ATA FILE: DOC82698
NSTRUMENT FILE: INSTRUMENT: DOHRMAN ANALYZED: 08/26/1998

eq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	WC0149	ICV	55.40		55.4	55.4	1.00	mg/L	103		
2	BLANK	ICB	0		0.000	0.000	1.00	mg/L			
3	9808167-02	CF-8-MW-23S-01	0.274		0.274	2.74	10.0	mg/L			
4	9808174-01	CF-8-MW-17S-01	3.889		3.89	3.89	1.00	mg/L			
5	9808174-02	CF-8-MW-10S-01	21.251		21.3	21.3	1.00	mg/L			
6	9808174-03	CF-8-MW-06S-01	5.4491		5.45	5.45	1.00	mg/L			
7	9808174-04	CF-8-MW-18S-01	5.532		5.53	5.53	1.00	mg/L			
8	9808174-05	CF-8-MW-13S-01	59.277		59.3	59.3	1.00	mg/L			
9	9808174-05D	CF-8-MW-13S-01D	59.503		59.5	59.5	1.00	mg/L		0.381	
10	9808174-05S	CF-8-MW-13S-01S	68.104		68.1	68.1	1.00	mg/L	88.3		
11	9808184-01	CF-8-MW-12S-01	4.094		4.09	4.09	1.00	mg/L			
12	9808184-02	CF-8-MW-07S-01	15.462		15.5	15.5	1.00	mg/L			
13	WC0149	CCV	58.931		58.9	58.9	1.00	mg/L	109		
14	BLANK	CCB	0		0.000	0.000	1.00	mg/L			
15	9808184-04	CF-8-DUP-01	4.156		4.16	4.16	1.00	mg/L			
16	9808191-01	CF-8-MW-09S-01	4.233		4.23	4.23	1.00	mg/L			
17	9808191-02	CF-8-MW-01S-01	30.919		30.9	30.9	1.00	mg/L			
18	9808191-04	CF-8-MW-04S-01	28.964		29.0	29.0	1.00	mg/L			
19	WC0149	CV	58.360		58.4	58.4	1.00	mg/L	108		
20	BLANK	CB	0		0.000	0.000	1.00	mg/L			

Chris Beal DCB 8-26-98
Analyst Date

Lab Supervisor / Date

RUN SUMMARY SHEET
Sulfide

ATA FILE: S2R82498
ISTRUMENT FILE: INSTRUMENT: WET_LAB ANALYZED: 08/24/1998

eq	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	9808167-02	CF-8-MW-23S-01	4		4.00	4.00	2.00	mg/L			
3	9808173-01	149-S11-073	0		0.000	0.000	2.00	mg/L			
4	9808173-01D	149-S11-073D	0		0.000	0.000	2.00	mg/L		DIV BY	
5	9808173-02	149-S11-068	0		0.000	0.000	2.00	mg/L			
6	9808173-03	149-S11-067	0		0.000	0.000	2.00	mg/L			
7	9808173-04	149-S11-069	0		0.000	0.000	2.00	mg/L			
8	9808173-05	149-S11-070	0		0.000	0.000	2.00	mg/L			
9	9808173-06	149-S11-071	4		4.00	4.00	2.00	mg/L			
10	9808173-07	149-S11-072	0		0.000	0.000	2.00	mg/L			
11	9808173-08	149-S11-059	0		0.000	0.000	2.00	mg/L			
12	BLANK	BLANK	0		0.000	0.000	2.00	mg/L			
13	9808173-10	149-S06-024	2		2.00	2.00	2.00	mg/L			
14	9808173-11	149-S06-025	2		2.00	2.00	2.00	mg/L			
15	9808173-12	149-S06-026	0		0.000	0.000	2.00	mg/L			
16	9808173-13	149-S06-027	8		8.00	8.00	2.00	mg/L			
17	9808174-01	CF-8-MW-17S-01	8		8.00	8.00	2.00	mg/L			
18	9808174-02	CF-8-MW-10S-01	6		6.00	6.00	2.00	mg/L			
19	9808174-03	CF-8-MW-06S-01	6		6.00	6.00	2.00	mg/L			
20	9808174-04	CF-8-MW-18S-01	6		6.00	6.00	2.00	mg/L			
21	9808174-05	CF-8-MW-13S-01	4		4.00	4.00	2.00	mg/L			
22	BLANK	BLANK	0		0.000	0.000	2.00	mg/L			
23	9808184-01	CF-8-MW-12S-01	2		2.00	2.00	2.00	mg/L			
24	9808184-02	CF-8-MW-07S-01	0		0.000	0.000	2.00	mg/L			
25	9808184-04	CF-8-DUP-01	6		6.00	6.00	2.00	mg/L			
26	9808184-04D	CF-8-DUP-01D	6		6.00	6.00	2.00	mg/L		0.000	
27	9808185-01	149-S11-054	12		12.0	12.0	2.00	mg/L			
28	9808185-02	149-S11-055	18		18.0	18.0	2.00	mg/L			
29	9808185-03	149-S11-056	18		18.0	18.0	2.00	mg/L			
30	9808185-04	149-S11-057	0		0.000	0.000	2.00	mg/L			
31	9808185-05	149-S11-060	0		0.000	0.000	2.00	mg/L			
32	9808185-06	149-S11-061	2		2.00	2.00	2.00	mg/L			
33	BLANK	BLANK	0		0.000	0.000	2.00	mg/L			
34	9808185-07	149-S11-063	0		0.000	0.000	2.00	mg/L			
35	9808185-08	149-S11-064	0		0.000	0.000	2.00	mg/L			
36	9808185-09	149-S11-065	0		0.000	0.000	2.00	mg/L			
37	9808185-10	149-S11-066	0		0.000	0.000	2.00	mg/L			
38	9808185-12	149-S06-023	6		6.00	6.00	2.00	mg/L			
39	9808185-13	149-S06-028	2		2.00	2.00	2.00	mg/L			
40	9808185-14	149-S06-029	2		2.00	2.00	2.00	mg/L			

LM LM 8/24/98
Analyst / Date

Lab Supervisor / Date

5088

RUN SUMMARY SHEET
Ammonia

ATA FILE: NH390298
ISTRUMENT FILE: INSTRUMENT: WET_LAB ANALYZED: 09/03/1998

eq	Lab ID	Client ID	Rep1	Rep2	Raw Conc.	Result	MDL	Units	%Recovery	%RPD	%RSD
1	WC0222	WC0222	0.71		0.710	3.55	0.500	mg/L	88.8		
2	BLANK	ICB	0		0.000	0.000	0.100	mg/L			
3	9808167-02	CF-8-MW-23S-01	0		0.000	0.000	0.100	mg/L			
4	9808173-01	149-S11-073	0.15		0.150	0.150	0.100	mg/L			
5	9808173-02	149-S11-068	0.11		0.110	0.110	0.100	mg/L			
6	9808173-03	149-S11-067	0.19		0.190	0.190	0.100	mg/L			
7	9808173-04	149-S11-069	0.41		0.410	0.410	0.100	mg/L			
8	9808173-05	149-S11-070	0		0.000	0.000	0.100	mg/L			
9	9808173-06	149-S11-071	2.79		2.79	2.79	0.100	mg/L			
10	9808173-07	149-S11-072	0		0.000	0.000	0.100	mg/L			
11	9808173-08	149-S11-059	0		0.000	0.000	0.100	mg/L			
12	9808173-10	149-S06-024	0.11		0.110	0.110	0.100	mg/L			
13	WC0222	WC0222	0.71		0.710	3.55	0.500	mg/L	88.8		
14	BLANK	BLANK	0		0.000	0.000	0.100	mg/L			
15	9808173-11	149-S06-025	4.49		4.49	4.49	0.100	mg/L			
16	9808173-12	149-S06-026	1.45		1.45	1.45	0.100	mg/L			
17	9808173-13	149-S06-027	0.13		0.130	0.130	0.100	mg/L			
18	9808174-01	CF-8-MW-17S-01	0		0.000	0.000	0.100	mg/L			
19	9808174-02	CF-8-MW-10S-01	0.75		0.750	0.750	0.100	mg/L			
20	9808174-03	CF-8-MW-06S-01	0.20		0.200	0.200	0.100	mg/L			
21	9808174-04	CF-8-MW-18S-01	0		0.000	0.000	0.100	mg/L			
22	9808174-05	CF-8-MW-13S-01	1.53		1.53	1.53	0.100	mg/L			
23	9808184-01	CF-8-MW-12S-01	1.84		1.84	1.84	0.100	mg/L			
24	9808184-01D	CF-8-MW-12S-01D	1.84		1.84	1.84	0.100	mg/L		0.000	
25	WC0222	WC0222	0.75		0.750	3.75	0.500	mg/L	93.8		
26	BLANK	BLANK	0		0.000	0.000	0.100	mg/L			
27	9808184-01S	CF-8-MW-12S-01S	3.76		3.76	3.76	0.100	mg/L	76.8		
28	9808184-02	CF-8-MW-07S-01	0.37		0.370	0.370	0.100	mg/L			
29	9808184-04	CF-8-DUP-01	1.63		1.63	1.63	0.100	mg/L			
30	9808185-01	149-S11-054	0.26		0.260	0.260	0.100	mg/L			
31	9808185-02	149-S11-055	0		0.000	0.000	0.100	mg/L			
32	9808185-03	149-S11-056	0		0.000	0.000	0.100	mg/L			
33	9808185-04	149-S11-057	0		0.000	0.000	0.100	mg/L			
34	9808185-05	149-S11-060	0		0.000	0.000	0.100	mg/L			
35	9808185-05D	149-S11-060D	0		0.000	0.000	0.100	mg/L		DIV BY	
36	9808185-05S	149-S11-060S	2.79		2.79	2.79	0.100	mg/L	112		
37	WC0222	WC0222	0.71		0.710	3.55	0.500	mg/L	88.8		
38	BLANK	BLANK	0		0.000	0.000	0.100	mg/L			

LM LM 9/3/98
Analyst / Date

Tracy E Wardell 9-11-98
Lab Supervisor / Date