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SAMPLING AND ANALYSIS OUTLINE REPORT FOR YELLOW WATER WEAPONS COMPOUND HIGH EXPLOSIVES MAGAZINES/HELICOPTER LANDING PAD AREA BASE REALIGNMENT AND CLOSURE NAS CECIL FIELD FL

3/1/2000

TETRA TECH NUS INC

Sampling and Analysis Outline Report

for

Yellow Water Weapons Compound – High Explosives Magazines/ Helicopter Landing Pad Area

Base Realignment and Closure

Naval Air Station Cecil Field

Jacksonville, Florida

Southern Division
Naval Facilities Engineering Command

Contract Number N62467-94-D-0888

Contract Task Order 0078

March 2000

129905/P

SAMPLING AND ANALYSIS REPORT
FOR
YELLOW WATER WEAPONS COMPOUND – HIGH EXPLOSIVES MAGAZINES/HELICOPTER LANDING PAD AREA

BASE REALIGNMENT AND CLOSURE

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT N62467-89-D-0088

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

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

MARCH 2000

PREPARED UNDER THE SUPERVISION OF:

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03985

The professional opinions rendered in this decision document identified as Sampling and Analysis Outline Report for Yellow Water Weapons Compound High Explosives Magazines/Helicopter Landing Pad Area, Naval Air Station Cecil Field, Jacksonville, Florida were developed in accordance with commonly accepted procedures consistent with applicable standards of practice. Decision documents are based on information obtained from others and under the supervision of the signing engineer. If conditions are determined to exist differently than those described in this document, then the undersigned professional engineer should be notified to evaluate the effects of any additional information on this project described in this report.

_____

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

Date:_____

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ACRONYMS

ABB-ES	ABB Environmental Services, Inc.
BCT	BRAC Cleanup Team
BRAC	Base Realignment and Closure
CTO	Contract Task Order
EISOPQAM	Environmental Investigations Standard Operating Procedures and Quality Assurance Manual
F.A.C.	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
GTCL	Groundwater target cleanup level
HEL	Helicopter Landing Pad
HEM	High Explosives Magazines
NAS	Naval Air Station
NGC	Northrup-Grumman Corporation
PRE	Preliminary Risk Evaluation
PVC	Polyvinyl chloride
STCL	Soil target cleanup level
TtNUS	Tetra Tech NUS, Inc.
U.S. EPA	United States Environmental Protection Agency

1.0 INTRODUCTION

Tetra Tech NUS, Inc. (TtNUS), under contract to Southern Division, Naval Facilities Engineering Command, has completed the Base Realignment and Closure (BRAC) Phase II Sampling and Analysis Program for the High Explosives Magazines (HEM) and Helicopter Landing Pad (HEL) areas in the Yellow Water Weapons Compound at Naval Air Station (NAS) Cecil Field. This program was conducted under Contract Number N62467-94-D-088, Contract Task Order (CTO) 0078. This report summarizes the related field operations, results, conclusions, and recommendations of the Phase II investigation.

The High Explosives Magazines and Helicopter Landing Areas are located northwest of the Main Base Area in the Yellow Water Weapons Compound (see Figure 1-1). Sampling was conducted to confirm the results of soil and groundwater samples collected in 1997 on behalf of Northrup-Grumman Corporation (NGC) as part of a due diligence investigation (Golder Associates, 1998). In the NGC investigation, 13 shallow and 13 intermediate depth temporary monitoring wells were installed, sampled, and analyzed for organic and inorganic parameters. Eighteen shallow soil samples were collected and analyzed for organic and inorganic parameters.

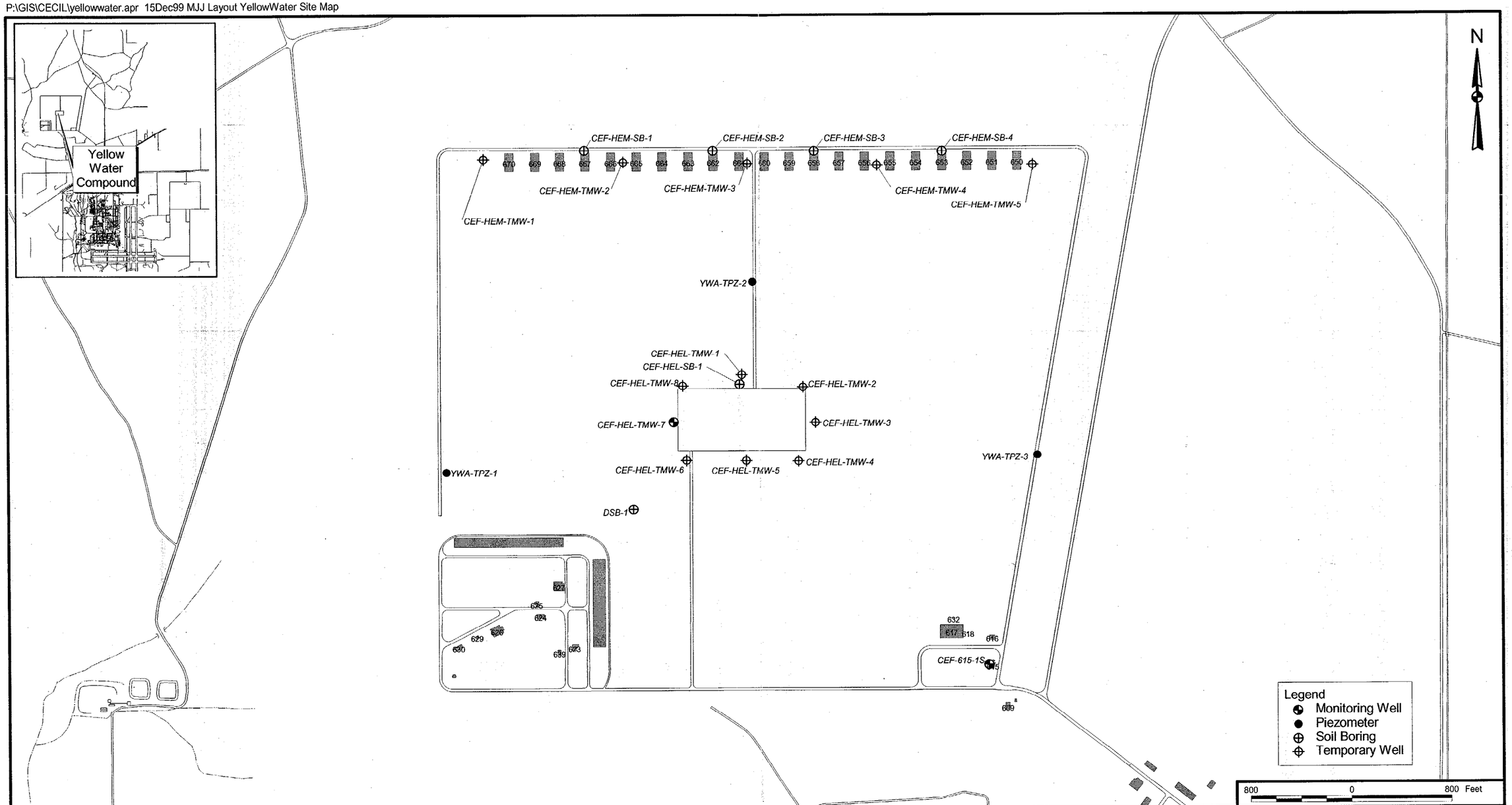
During the NGC investigation in the HEM area, arsenic was detected at a concentration greater than the Florida Department of Environmental Protection (FDEP) soil target cleanup level (STCL) in one soil sample. Lead was detected at concentrations greater than the FDEP groundwater target cleanup level (GTCL) in two wells. Concentrations of other organic and inorganic analytes were less than FDEP criteria.

At the HEL area, no parameters were detected at concentrations greater than FDEP STCLs in soil samples. Lead was detected at concentrations greater than the FDEP GTCL in 10 wells. Chromium was detected at a concentration greater than the FDEP criteria in one well. Nickel was detected at a concentration greater than the FDEP GTCL in one well. Vanadium was detected at concentrations greater than the GTCL in four wells. Bis(2-ethylhexyl) phthalate was detected at a concentration greater than the GTCL in one well. Concentrations of other inorganics and organics were less than FDEP GTCLs.

Nickel was detected in only one well and was not investigated further because the concentrations of the metals appear to be influenced by the suspended solids in the groundwater samples. Bis(2-ethylhexyl) phthalate, detected in only one well, was not investigated further because it was concluded to be a laboratory or field sampling contaminant (Golder Associates, 1998).

During the NGC investigation, the sample from well 7D was analyzed for both total and dissolved metals. In that sample, total barium, chromium, lead, vanadium, and zinc were detected, but only dissolved barium was detected. Thus, it was concluded that a significant portion of the total metals was associated with suspended solids in the samples from the temporary wells. The NGC temporary wells were installed using direct push technology without sand packing. This observation appears to be consistent with the observations made at Building 900 and Building 68 by NGC.

P:\GIS\CECIL\yellowwater.apr 15Dec99 MJJ Layout YellowWater Site Map



NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY MJJ	DATE 24Nov99
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	

SITE MAP
YELLOW WATER WEAPONS COMPOUND
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

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

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2.0 SAMPLING AND ANALYSIS OUTLINE

The Sampling and Analysis Plan for the assessment of this site was prepared by TtNUS and approved by the BRAC Cleanup Team (BCT) (TtNUS, 1999a and TtNUS, 1999b).

The Phase II investigation included the collection of one surface soil sample and the installation and sampling of two monitoring wells. Field activities were conducted in general conformance with the NAS Cecil Field Base-Wide Generic Work Plan (TtNUS, 1998) and the United States Environmental Protection Agency (U.S. EPA) Region IV Environmental Investigation Standard Operating Procedures and Quality Assurance Manual (EISOPQAM) (U.S. EPA, 1996). A site plan indicating the locations of the soil samples and monitoring wells is presented on Figure 2-1. Analytical results are provided in Appendix A, and boring logs and monitoring well construction information are presented in Appendix B.

One surface soil sample (CEF-HEM-SS-001) was collected from 0 to 1 foot below ground surface at approximately the same location as the NGC sample with the arsenic exceedance (HEM-SB-4). Sample CEF-HEM-SS-001 was analyzed for arsenic.

Two monitoring wells were located near the highest concentrations of lead detected in groundwater during the NGC study. The two monitoring wells (CEF-HEM-1S, CEF-HEL-1S) were constructed of 2-inch polyvinyl chloride (PVC) to depths of approximately 15 feet bgs with a 10-foot screen of 0.010 slot size. The wells were developed prior to sampling, and the samples were collected on July 13, 1999 using low-flow sampling techniques. The groundwater samples were analyzed for total and dissolved lead, chromium, and vanadium. The sample for dissolved metals analysis was passed through a 1-micron filter in the field prior to analysis.

Total chromium, lead, and vanadium concentrations in groundwater from CEF-HEL-1S and total lead and vanadium concentrations in CEF-HEM-1S were greater than FDEP GTCLs, but concentrations were less than the FDEP GTCLs (or not detected) in the filtered samples. Because of concerns that turbidity in the newly installed wells might have resulted in the elevated metals concentrations, the wells were resampled on October 21, 1999 and analyzed for total and dissolved lead, chromium, and vanadium. In addition, a groundwater sample from well CEF-615-1S, southeast of the HEL area, also was collected and analyzed for total and dissolved chromium, lead, and vanadium.

In the second round of sampling, no total metals concentrations were greater than FDEP GTCLs.

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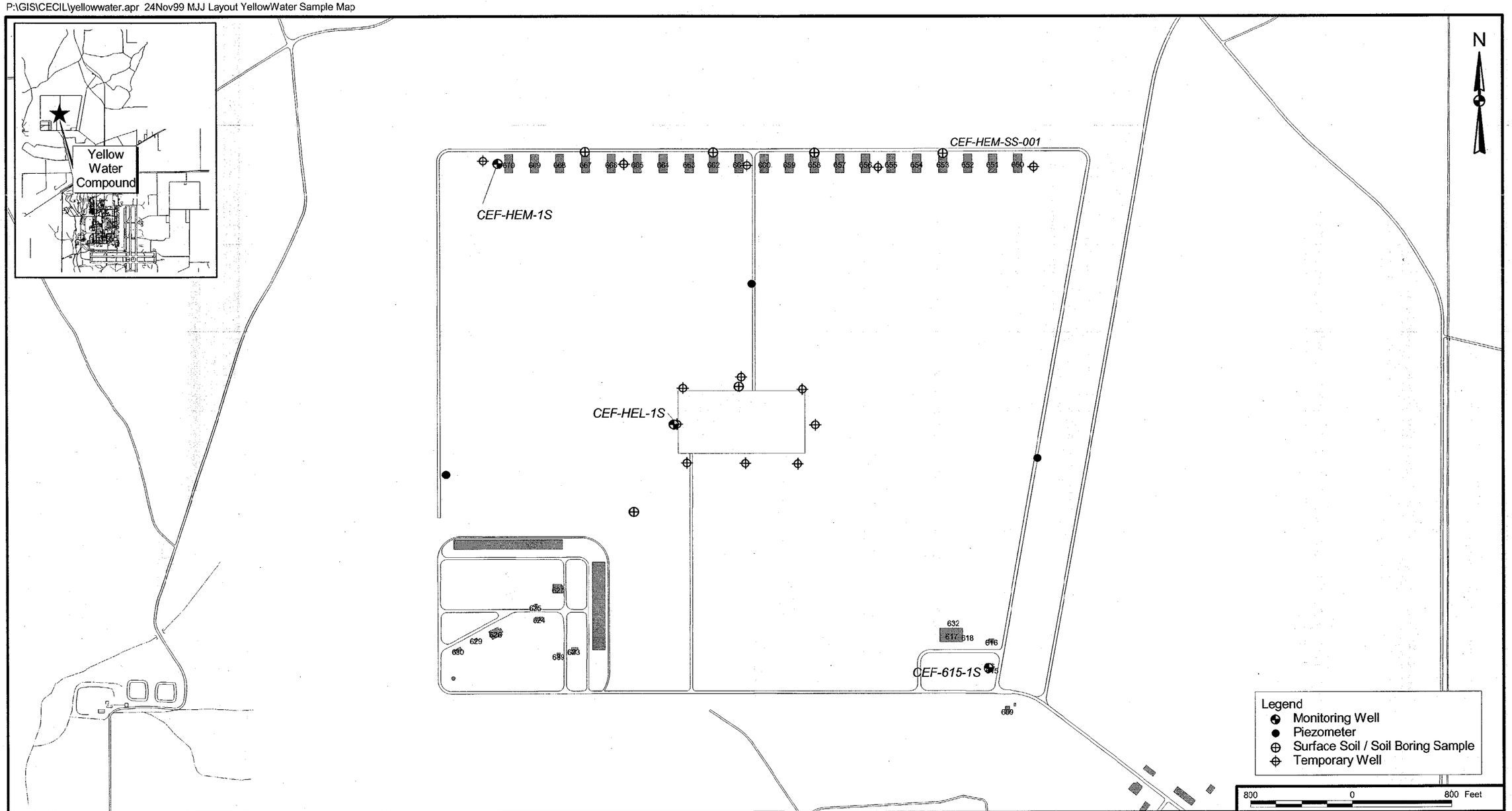
P:\GIS\CECIL\yellowwater.apr 24Nov99 MJJ Layout YellowWater Sample Map



NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY MJJ	DATE 24Nov99
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	

SAMPLE LOCATION MAP
YELLOW WATER WEAPONS COMPOUND
NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

CONTRACT NO. 0039	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 2-1	REV. 0

03985K022

3.0 RESULTS AND PRELIMINARY RISK EVALUATION

Arsenic was not detected in the soil sample collected from the HEM area. Total chromium, lead, and vanadium concentrations were less than FDEP GTCLs in the second round of groundwater samples collected from CEF-HEM-1S and CEF-HEL-1S and also from CEF-615-1S. Based on this information, a human health preliminary risk evaluation (PRE) is not required for HEM/HEL area.

No arsenic was detected in soil, therefore, an ecological risk assessment is not required.

4.0 CONCLUSIONS AND RECOMMENDATION

Chromium, lead and vanadium in groundwater collected at the HEM/HEL area do not represent a risk to human health or the environment at the detected concentrations. No contaminants were detected in the soil. No other environmental concerns have been identified for this facility.

Based upon the findings of this evaluation, the color code for the HEM/HEL area should be reclassified to Light Green. No remedial action or further evaluation is recommended at this site.

REFERENCES

ABB-ES (ABB Environmental Services, Inc.), 1994. Base Realignment and Closure Environmental Baseline Survey Report, Naval Air Station Cecil Field, Jacksonville, Florida. Tallahassee, FL.

Florida Department of Environmental Protection (FDEP), 1999. Contaminant Target Cleanup Levels, Florida Administrative Code (F.A.C.) Chapter 62-777, August.

Golder Associates, 1998. Due Diligence Assessment of Environmental Concerns – Yellow Water Weapons Compound, January.

Tetra Tech NUS, Inc. (TtNUS), 1999a. Sampling and Analysis Plan, YWWC High Explosives Magazines/Helicopter Landing Pad Area, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina, June.

TtNUS, 1999b. Groundwater Sampling and Analysis Plan, YWWC High Explosives Magazines/Helicopter Landing Pad Area, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina, October.

TtNUS, 1998. Base-Wide Generic Work Plan, Naval Air Station Cecil Field, Jacksonville, Florida. Prepared for Southern Division Naval Facilities Engineering Command, North Charleston, South Carolina, October.

United States Environmental Protection Agency (U.S. EPA), 1996. Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM), May.

APPENDIX A
LABORATORY ANALYTICAL DATA

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-07-9-198

TO:	**M. SPERANZA**	**DATE:**	**AUGUST 9, 1999**
FROM:	**JENNIFER MALLE**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION-TAL METALS**
CTO 078 – NAS CECIL FIELD, FLORIDA
SDGs –F4465, F4499

SAMPLES: **SDG – F4465**
2/SOIL/

CEF-HEM-SS-001 CEF-HEM-SS-DU01

SDG – F4499
13/SOIL/

CEF-P21-SS-208-01	CEF-P21-SS-209-01	CEF-P21-SS-210-01
CEF-P21-SS-211-01	CEF-P21-SS-213-04	CEF-P21-SS-214-03
CEF-P21-SS-215-01	CEF-P21-SS-216-01	CEF-P21-SS-217-01
CEF-P21-SS-218-02	CEF-P21-SS-212-04	CEF-P21-SS-DU03
CEF-P21-SS-DU04		

Overview

The sample set for CTO 078, Cecil Field, SDG F4465 consists of two (2) soil environmental samples. One (1) field duplicate pair (CEF-HEM-SS-01 / CEF-HEM-SS-DU01) was included within this SDG.

The sample set for CTO 078, Cecil Field, SDG F4499 consists of thirteen (13) soil environmental samples. Two (2) field duplicate pairs (CEF-P21-SS-217-01 / CEF-P21-SS-DU03 and CEF-P21-SS-214-03 / CEF-P21-SS-DU04) were included within this SDG.

The samples for SDG F4465 were analyzed for arsenic. The samples were collected by Tetra Tech NUS on July 6,1999 and analyzed by Accutest Laboratory under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. Arsenic analyses were conducted using SW846 method 6010B.

The samples for SDG F4499 were analyzed for arsenic. The samples were collected by Tetra Tech NUS on July 12-13, 1999 and analyzed by Accutest Laboratory under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. Arseni analyses were conducted using SW846 method 6010B.

The data for SDG F4465 and F4499 were evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Initial and Continuing Calibration Recoveries
  • Laboratory Blank Analyses
* • Field Duplicates
* • Detection Limits

* - All quality control criteria were met for this parameter.

The following contaminants were detected in the laboratory method/preparation blanks at the following maximum concentrations:

Samples affected: SDG F4465

Analyte	Maximum Concentration	Action Level (soil)
Arsenic	3.5 ug/L	1.75 mg/kg

Samples affected: SDG F4499

Analyte	Maximum Concentration	Action Level (soil)
Arsenic	3.5 ug/L	1.75 mg/kg

An action level of 5x the maximum concentration has been used to evaluate the sample data for blank contamination. Sample aliquot, percent solids and dilution factors were taken into consideration when evaluating for blank contamination. Positive results less than the action levels for arsenic have been qualified as a nondetected, "U".

Notes

The Contract Required Detection Limit (CRDL) Percent Recoveries (%Rs) for arsenic in SDG F4465 and SDG F4499 were > 120%. No validation action was required.

The results reported in the Electronic Deliverable Data (EDD) did not match the Form 1's for both SDG F4465 and SDG F4499. Corrections were made to the EDDs by the data reviewer.

A comparison of field duplicate pairs, CEF-HEM-SS-01/CEF-HEM-SS-DU01, CEF-P21-SS-217-01/CEF-P21-SS-DU03 and CEF-P21-SS-214-03/CEF-P21-SS-DU04, is contained in Appendix C.

Executive Summary

Laboratory Performance: Arsenic was present in the laboratory method / 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 entitled "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
Jennifer Malle
Environmental Scientist

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

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

APPENDIX A

Qualified Analytical Results

SDG- F4465

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
D = MS/MSD Noncompliance
E = LCS/LCSD Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - include ICSAB % R's
L = Instrument Calibration Range Exceedance
M = Sample Preservation
N = Internal Standard Noncompliance
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = Pest/PCB D% between columns for positive results
V = Non-linear calibrations, tuning $r < 0.995$ (correlation coefficient)
W = EMPC result
X = Signal to noise response drop
Y = % Solid content is less than 30%

CTO078 - NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F4465

SAMPLE NUMBER:	CEF-HEM-SS-001			CEF-HEM-SS-DU01								
SAMPLE DATE:	07/06/99			07/06/99			/ /			/ /		
LABORATORY ID:	F4465-1			F4465-2								
QC_TYPE:	NORMAL			NORMAL								
% SOLIDS:	86.4 %			86.2 %			100.0 %			100.0 %		
UNITS:	MG/KG			MG/KG								
FIELD DUPLICATE OF:				CEF-HEM-SS-001								
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
ARSENIC	0.60	U	A	0.73	U	A						

APPENDIX A

Qualified Analytical Results

SDG- F4499

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
D = MS/MSD Noncompliance
E = LCS/LCSD Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - include ICSAB % R's
L = Instrument Calibration Range Exceedance
M = Sample Preservation
N = Internal Standard Noncompliance
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = Pest/PCB D% between columns for positive results
V = Non-linear calibrations, tuning $r < 0.995$ (correlation coefficient)
W = EMPC result
X = Signal to noise response drop
Y = % Solid content is less than 30%

CTO078 - NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F4499

SAMPLE NUMBER:	CEF-P21-SS-208-01			CEF-P21-SS-209-01			CEF-P21-SS-210-01			CEF-P21-SS-211-01		
SAMPLE DATE:	07/12/99			07/12/99			07/12/99			07/12/99		
LABORATORY ID:	F4499-1			F4499-2			F4499-3			F4499-4		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	87.0 %			86.4 %			79.7 %			88.8 %		
UNITS:	MG/KG			MG/KG			MG/KG			MG/KG		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
ARSENIC	1.6	U	A	6.2			19.1			1.6	U	A

CTO078 - NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F4499

SAMPLE NUMBER:	CEF-P21-SS-212-04			CEF-P21-SS-213-04			CEF-P21-SS-214-03			CEF-P21-SS-215-01		
SAMPLE DATE:	07/12/99			07/12/99			07/12/99			07/12/99		
LABORATORY ID:	F4499-5			F4499-6			F4499-7			F4499-8		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	77.1 %			80.4 %			82.9 %			73.1 %		
UNITS:	MG/KG			MG/KG			MG/KG			MG/KG		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
ARSENIC	39.0			65.8			10.5			9.6		

CTO078 - NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F4499

SAMPLE NUMBER:	CEF-P21-SS-216-01			CEF-P21-SS-217-01			CEF-P21-SS-218-02			CEF-P21-SS-DU03		
SAMPLE DATE:	07/12/99			07/12/99			07/13/99			07/13/99		
LABORATORY ID:	F4499-9			F4499-10			F4499-11			F4499-12		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	84.6 %			82.1 %			74.5 %			82.6 %		
UNITS:	MG/KG			MG/KG			MG/KG			MG/KG		
FIELD DUPLICATE OF:										CEF-P21-SS-217-01		
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
ARSENIC	1.7	U	A	1.7	U	A	1.5	U	A	2.2		

CTO078 - NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F4499

SAMPLE NUMBER:	CEF-P21-SS-DU04											
SAMPLE DATE:	07/13/99			/ /			/ /			/ /		
LABORATORY ID:	F4499-13											
QC_TYPE:	NORMAL											
% SOLIDS:	81.1 %			100.0 %			100.0 %			100.0 %		
UNITS:	MG/KG											
FIELD DUPLICATE OF:	CEF-P21-SS-214-03											
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
ARSENIC	12.8											

APPENDIX B

Results as reported by the Laboratory

SDG- F4465

Report of Analysis

Client Sample ID:	CEF-HEM-SS-001		
Lab Sample ID:	F4465-1	**Date Sampled:**	07/06/99
Matrix:	SO - Soil	**Date Received:**	07/09/99
		Percent Solids:	86.4
Project:	NAS Cecil Field		

Metals Analysis

Analyte	Result	RDL	Units	DF	Prep	Analyzed By		Method
Arsenic	0.60 B	1.0	mg/kg	1	07/19/99	07/21/99	JK	SW846 6010A

RDL = Reported Detection Limit

Report of Analysis

Client Sample ID:	CEF-HEM-SS-DU01		
Lab Sample ID:	F4465-2	**Date Sampled:**	07/06/99
Matrix:	SO - Soil	**Date Received:**	07/09/99
		Percent Solids:	86.2
Project:	NAS Cecil Field		

Metals Analysis

Analyte	Result	RDL	Units	DF	Prep	Analyzed	By	Method
Arsenic	0.73 B	1.1	mg/kg	1	07/19/99	07/21/99	JK	SW846 6010A

RDL = Reported Detection Limit

APPENDIX B

Results as reported by the Laboratory

SDG- F4499

Report of Analysis

Client Sample ID:	CEF-P21-SS-208-01		
Lab Sample ID:	F4499-1	**Date Sampled:**	07/12/99
Matrix:	SO - Soil	**Date Received:**	07/14/99
		Percent Solids:	87.0
Project:	NAS Cecil Field-PSC 21		

Metals Analysis

Analyte	Result	RDL	Units	DF	Prep	Analyzed By		Method
Arsenic	1.6	1.1	mg/kg	1	07/19/99	07/21/99	JK	SW846 6010A

RDL = Reported Detection Limit

Report of Analysis

Client Sample ID:	CEF-P21-SS-209-01		
Lab Sample ID:	F4499-2	**Date Sampled:**	07/12/99
Matrix:	SO - Soil	**Date Received:**	07/14/99
		Percent Solids:	86.4
Project:	NAS Cecil Field-PSC 21		

Metals Analysis

Analyte	Result	RDL	Units	DF	Prep	Analyzed	By	Method
Arsenic	6.2	1.0	mg/kg	1	07/19/99	07/21/99	JK	SW846 6010A

RDL = Reported Detection Limit

Report of Analysis

Client Sample ID:	CEF-P21-SS-210-01		
Lab Sample ID:	F4499-3	**Date Sampled:**	07/12/99
Matrix:	SO - Soil	**Date Received:**	07/14/99
		Percent Solids:	79.7
Project:	NAS Cecil Field-PSC 21		

Metals Analysis

Analyte	Result	RDL	Units	DF	Prep	Analyzed	By	Method
Arsenic	19.1	1.1	mg/kg	1	07/19/99	07/21/99	JK	SW846 6010A

RDL = Reported Detection Limit

Report of Analysis

Client Sample ID:	CEF-P21-SS-211-01		
Lab Sample ID:	F4499-4	**Date Sampled:**	07/12/99
Matrix:	SO - Soil	**Date Received:**	07/14/99
		Percent Solids:	88.8
Project:	NAS Cecil Field-PSC 21		

Metals Analysis

Analyte	Result	RDL	Units	DF	Prep	Analyzed By		Method
Arsenic	1.6	1.1	mg/kg	1	07/19/99	07/21/99	JK	SW846 6010A

RDL = Reported Detection Limit

Report of Analysis

Client Sample ID:	CEF-P21-SS-212-04		
Lab Sample ID:	F4499-5	**Date Sampled:**	07/12/99
Matrix:	SO - Soil	**Date Received:**	07/14/99
		Percent Solids:	77.1
Project:	NAS Cecil Field-PSC 21		

Metals Analysis

Analyte	Result	RDL	Units	DF	Prep	Analyzed By		Method
Arsenic	39.0	1.3	mg/kg	1	07/19/99	07/21/99	JK	SW846 6010A

RDL = Reported Detection Limit

Report of Analysis

Client Sample ID:	CEF-P21-SS-213-04		
Lab Sample ID:	F4499-6	**Date Sampled:**	07/12/99
Matrix:	SO - Soil	**Date Received:**	07/14/99
		Percent Solids:	80.4
Project:	NAS Cecil Field-PSC 21		

Metals Analysis

Analyte	Result	RDL	Units	DF	Prep	Analyzed By		Method
Arsenic	65.8	1.2	mg/kg	1	07/19/99	07/21/99	JK	SW846 6010A

RDL = Reported Detection Limit

Report of Analysis

Client Sample ID:	CEF-P21-SS-214-03		
Lab Sample ID:	F4499-7	**Date Sampled:**	07/12/99
Matrix:	SO - Soil	**Date Received:**	07/14/99
		Percent Solids:	82.9
Project:	NAS Cecil Field-PSC 21		

Metals Analysis

Analyte	Result	RDL	Units	DF	Prep	Analyzed	By	Method
Arsenic	10.5	1.1	mg/kg	1	07/19/99	07/21/99	JK	SW846 6010A

RDL = Reported Detection Limit

Report of Analysis

Client Sample ID:	CEF-P21-SS-215-01		
Lab Sample ID:	F4499-8	**Date Sampled:**	07/12/99
Matrix:	SO - Soil	**Date Received:**	07/14/99
		Percent Solids:	73.1
Project:	NAS Cecil Field-PSC 21		

Metals Analysis

Analyte	Result	RDL	Units	DF	Prep	Analyzed By		Method
Arsenic	9.6	1.4	mg/kg	1	07/19/99	07/21/99	JK	SW846 6010A

RDL = Reported Detection Limit

Report of Analysis

Client Sample ID:	CEF-P21-SS-216-01		
Lab Sample ID:	F4499-9	**Date Sampled:**	07/12/99
Matrix:	SO - Soil	**Date Received:**	07/14/99
		Percent Solids:	84.6
Project:	NAS Cecil Field-PSC 21		

Metals Analysis

Analyte	Result	RDL	Units	DF	Prep	Analyzed	By	Method
Arsenic	1.7	1.1	mg/kg	1	07/19/99	07/21/99	JK	SW846 6010A

RDL = Reported Detection Limit

Report of Analysis

Client Sample ID:	CEF-P21-SS-217-01		
Lab Sample ID:	F4499-10	**Date Sampled:**	07/12/99
Matrix:	SO - Soil	**Date Received:**	07/14/99
		Percent Solids:	82.1
Project:	NAS Cecil Field-PSC 21		

Metals Analysis

Analyte	Result	RDL	Units	DF	Prep	Analyzed	By	Method
Arsenic	1.7	1.1	mg/kg	1	07/19/99	07/21/99	JK	SW846 6010A

RDL = Reported Detection Limit

Report of Analysis

Client Sample ID:	CEF-P21-SS-218-02		
Lab Sample ID:	F4499-11	**Date Sampled:**	07/13/99
Matrix:	SO - Soil	**Date Received:**	07/14/99
		Percent Solids:	74.5
Project:	NAS Cecil Field-PSC 21		

Metals Analysis

Analyte	Result	RDL	Units	DF	Prep	Analyzed By		Method
Arsenic	1.5	1.3	mg/kg	1	07/19/99	07/21/99	JK	SW846 6010A

RDL = Reported Detection Limit

Report of Analysis

Client Sample ID:	CEF-P21-SS-DU03		
Lab Sample ID:	F4499-12	**Date Sampled:**	07/13/99
Matrix:	SO - Soil	**Date Received:**	07/14/99
		Percent Solids:	82.6
Project:	NAS Cecil Field-PSC 21		

Metals Analysis

Analyte	Result	RDL	Units	DF	Prep	Analyzed By		Method
Arsenic	2.2	1.0	mg/kg	1	07/19/99	07/21/99	JK	SW846 6010A

RDL = Reported Detection Limit

Report of Analysis

Client Sample ID:	CEF-P21-SS-DU04		
Lab Sample ID:	F4499-13	**Date Sampled:**	07/13/99
Matrix:	SO - Soil	**Date Received:**	07/14/99
		Percent Solids:	81.1
Project:	NAS Cecil Field-PSC 21		

Metals Analysis

Analyte	Result	RDL	Units	DF	Prep	Analyzed By		Method
Arsenic	12.8	1.0	mg/kg	1	07/19/99	07/21/99	JK	SW846 6010A

RDL = Reported Detection Limit

APPENDIX C

Support Documentation

SDG- F4465

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER YWW-1 | PAGE 1 OF 1

00005

PROJECT NO: 0039	SITE NAME: YWW
PROJECT MANAGER AND PHONE NUMBER: Joe Logan	LABORATORY NAME AND CONTACT: Accutest Labs H. Behzadi
SAMPLERS (SIGNATURE): [signature]	FIELD OPERATIONS LEADER AND PHONE NUMBER: Abby Wilcox 904281-0400
	ADDRESS: 9405 Vineland Rd.
CARRIER/WAYBILL NUMBER: Greyhound	CITY, STATE: Orlando, FL

STANDARD TAT ~~☒ 28 day~~
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☒ 14 day

DATE YEAR 1999	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: Arsenic								COMMENTS
		CONTAINER TYPE PLASTIC (P) or GLASS (G)				G								
		PRESERVATIVE USED				/								
7/6	1613	CEF-HEM-SS-001	SS	G	1	1		FILTER		-1	MS/MSD			COOL TO 4°C
7/6	[illegible]	CEF-HEM-SS-DUP01	SS	G	1	1				-2				
7/6	1613 1601	CEF-HEM-SS-MSMSD01	SS	G	1	1				(-1	MS/MSD)			
														COOLER 4°C

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY [signature]	7-8-99	1318	1. RECEIVED BY Abby Wilcox	7-9-99	0945
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

3/99
FORM NO. TINUS-001

F4465

HOLDING TIME
07/22/99

Units	Nsample	Lab Id	Qc Type	Sdg	Sort	Samp Date	Extr Date	Anal Date	SAMP_DATE TO EXTR_DATE	EXTR_DATE TO ANAL_DATE	SAMP_DATE TO ANAL_DATE
MG/KG	CEF-HEM-SS-001	F4465-1	NORMAL	F4465	M	07/06/99	07/19/99	07/21/99	13	2	15
MG/KG	CEF-HEM-SS-DU01	F4465-2	NORMAL	F4465	M	07/06/99	07/19/99	07/21/99	13	2	15

LOW CALIBRATION CHECK STANDARDS SUMMARY

Login Number: F4465
Account: TETRPAPT - Tetra Tech, NUS
Project: TETRPAPT1252 - NAS Cecil Field

File ID: IR0721M1.ASC
QC Limits: 70 to 130 % Recovery

Date Analyzed: 07/21/99
Run ID: MA1491

Methods: EPA 200.7, SW846 6010A
Units: ug/l

Metal	CRI True	CRIA True	CRIA Results	% Rec	CRI Results	% Rec	CRIA Results	% Rec	CRIA Results	% Rec
Aluminum	200									
Antimony		5.0								
Arsenic		10					12.1	121.0	11.9	119.0
Barium	200									
Beryllium	5.0									
Cadmium	5.0									
Calcium	1000									
Chromium	10									
Cobalt	50									
Copper	25									
Iron	300									
Lead		5.0								
Magnesium	5000									
Manganese	15									
Molybdenum	50									
Nickel	40									
Potassium	5000									
Selenium		10								
Silver	10									
Sodium	5000									
Thallium		10								
Tin	50									
Vanadium	50									
Zinc	20									

(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: F4465
Account: TETRPAPT - Tetra Tech, NUS
Project: TETRPAPT1252 - NAS Cecil Field

File ID: IR0721M1.ASC
QC Limits: result < RDL

Date Analyzed: 07/21/99
Run ID: MA1491

Methods: EPA 200.7, SW846 6010A
Units: ug/l

Metal	RDL	IDL	CCB raw	final	CCB raw	final
Aluminum	200	30	anr			
Antimony	5.0	2.39	anr			
Arsenic	10	3.4	3.5	<10	1.6	<10
Barium	200	.39	anr			
Beryllium	5.0	.36	anr			
Cadmium	5.0	.33	anr			
Calcium	1000	19.5	anr			
Chromium	10	.637	anr			
Cobalt	50	.797	anr			
Copper	25	.747	anr			
Iron	300	32	anr			
Lead	5.0	1.59	anr			
Magnesium	5000	17.6	anr			
Manganese	15	.16	anr			
Molybdenum	50	.68	anr			
Nickel	40	1	anr			
Potassium	5000	28.2	anr			
Selenium	10	2	anr			
Silver	10	.96	anr			
Sodium	5000	153	anr			
Thallium	10	2.69	anr			
Tin	50	2.2	anr			
Vanadium	50	.717	anr			
Zinc	20	.83	anr			

(*) Outside of QC limits
(anr) Analyte not requested

FIELD DUPLICATE PRECISION

COMPOUND	CEF-HEM-SS-001	CEF-HEM-SS-DU01	RPD
	mg/kg	mg/kg	%
Arsenic	0.6	0.73	19.55

METALS DIGESTION LOG: SOIL

Method of Digestion: EPA-3050B Temp: 94°C Thermometer ID#: 18

Analyst: J.

Added:	HNO_3	HCl	H_2O_2
Mfg:	Fisher	Fisher	Fisher
Lot #:	118010	418090	983019

Sample #	WT	Final Vol.	% Sol	Digestion Factor	Date	Comments
F4503-5 -DUP	1.009	100-1			7/19/95	
F4503-5 -MS	1.039					
F4503-5 -MSD	1.079					
2- F4503-5	1.019					
3- F4455-2	1.129					
4- F4465-1	1.149					
5- F4465-2	1.059					
6- F4499-11	1.079					
7- F4499-12	1.189					
8- F4499-13	1.199					
9-						
10-						
11-						
12-						
13-						
14-						
15-						
16-						
17-						
18-						
19-						
20-						
MB/SB	100 ml	100 ml	—	1	7/19/95	
MB/SB	—	—	—	1	—	

RELINQUISHED BY: [illegible] DATE: 7/19/95

1949

00029

Method: TRACE1 Sample Name: F4465-1 Operator:
Run Time: 07/21/99 05:52 Filename: R0721M1
Mode: CONC Type: S Corr. Factor: 1.00000
Lab ID.: Cust. Smpl. ID.: Cust. ID.:

Elems	Ag3280	Al3082	As1890	Ba4934	Be3130	Ca3179
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0003	26.92	.0059	.1453	.0019	567.4
SDev	.0006	.0488	.0012	.0004	.0001	3.371
%RSD	162.8	.1813	20.57	.2836	5.398	.5941

Elems	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0015	.0033	.0526	.0992	8.118	.4257
SDev	.0002	.0001	.0005	.0002	.0325	.0069
%RSD	11.04	2.01	.9914	.2269	.3999	1.627

Elems	Mg2790	Mn2576	Mo2020	Na3302	Ni2316	2203/1
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avge	3.786	.1129	.0015	2.352	.1061	.0760
SDev	.0158	.0005	.0004	.0557	.001	.0016
%RSD	.4184	.4788	26.43	2.367	.8975	2.071

Elems	2203/2	Pb2203	Se1960	Sb2068	1960/1	1960/2
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0975	.0903	.0077	L-.0107	-.0024	.0127
SDev	.0016	.0011	.0018	.0013	.0016	.0027
%RSD	1.631	1.174	23.6	12.04	67.36	21.3

Elems	Sn1899	Tl1908	V 2924	Zn2062
Units	ppm	ppm	ppm	ppm
Avge	.0056	-.0074	.0392	.1268
SDev	.0019	.0018	.0005	.0006
%RSD	34.81	23.98	1.382	.5066

$$.0059\,mg/L\left(\frac{1L}{1000ml}\right)\left(\frac{100ml}{1.14g}\right)\left(\frac{1000g}{1kg}\right)\left(\frac{1}{.864}\right) = .60\,mg/kg$$

APPENDIX A

Qualified Analytical Results

SDG- F4499

APPENDIX C

Support Documentation

SDG- F4499

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER PSC 21-5 | PAGE 1 OF 1

00016

PROJECT NO: 0039	SITE NAME: PSC 21	PROJECT MANAGER AND PHONE NUMBER: ROB SIMCIK/MSPERANZA 412 921 8163	LABORATORY NAME AND CONTACT: ACCUTEST H. BEHZADI
SAMPLERS (SIGNATURE): Abby Wilcox, Eric Paler		FIELD OPERATIONS LEADER AND PHONE NUMBER: ABBY WILCOX 904 2810400	ADDRESS: 4405 VINELAND RD
		CARRIER/WAYBILL NUMBER: GREYHOUND	CITY, STATE: ORLANDO FL

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☒ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G)

PRESERVATIVE USED

TYPE OF ANALYSIS: As 6010B

DATE YEAR 1999	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	As 6010B								COMMENTS
7/12	1516	CEF-P21-SS-208-01	SS	G	1	1			F4	4991				COOL TO 4°C
7/12	1515	CEF-P21-SS-209-01	↓	↓	1	1				-2				
7/12	1510	CEF-P21-SS-210-01			1	1				-3				
7/12	1505	CEF-P21-SS-211-01			1	1				-4				
7/13	0910	CEF-P21-SS-212-04			1	1				-5				
7/13	0920	CEF-P21-SS-213-04			1	1				-6				
7/13	0930	CEF-P21-SS-214-03			1	1				-7				
7/12	1540	CEF-P21-SS-215-01			1	1				-8				
7/12	1550	CEF-P21-SS-216-01			1	1				-9				
7/12	1555	CEF-P21-SS-217-01			1	1				-10	MS/MSD			
7/13	0940	CEF-P21-SS-218-02			1	1				-11				Cooler
7/13	0000	CEF-P21-SS-DUP03			1	1				-12				24c
7/13	0000	CEF-P21-SS-DUP04	↓	↓	1	1				-13				

1. RELINQUISHED BY: Abby Wilcox	DATE 7/13	TIME 1800	1. RECEIVED BY: Abby Wilson	DATE 7-14-99	TIME 1000
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

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FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER PSC 21-5 | PAGE 2 OF 2

PROJECT NO: 0039	SITE NAME: PSC 21	PROJECT MANAGER AND PHONE NUMBER: M. SPERANZA 412 921 8163	LABORATORY NAME AND CONTACT: ACCUTEST LABS H DEHZADI
SAMPLERS (SIGNATURE): Abby Bullard, Evan Pate		FIELD OPERATIONS LEADER AND PHONE NUMBER: ABBY WILCOX 904 281 0400	ADDRESS: 4405 VINELAND RD
		CARRIER/WAYBILL NUMBER: GREYHOUND	CITY, STATE: ORLANDO FL

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☒ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G
PRESERVATIVE USED: -

DATE YEAR 1999	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: As 6010B								COMMENTS
7/13	1610	CEF-P21-SS-MS/MSD02	SS	G	1	1			F4499-1			(10 MS/MSD)		

Cooler ~ 4°C

1. RELINQUISHED BY: Abby Bullard	DATE: 7/13	TIME: 1500	1. RECEIVED BY: Abby Wilcox	DATE: 7.14.99	TIME: 1000
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

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000017

F4499

HOLDING TIME
07/22/99

Units	Nsample	Lab Id	Qc Type	Sdg	Sort	Samp Date	Extr Date	Anal Date	SAMP_DATE TO EXTR_DATE	EXTR_DATE TO ANAL_DATE	SAMP_DATE TO ANAL_DATE
MG/KG	CEF-P21-SS-208-01	F4499-1	NORMAL	F4499	M	07/12/99	07/19/99	07/21/99	7	2	9
MG/KG	CEF-P21-SS-209-01	F4499-2	NORMAL	F4499	M	07/12/99	07/19/99	07/21/99	7	2	9
MG/KG	CEF-P21-SS-210-01	F4499-3	NORMAL	F4499	M	07/12/99	07/19/99	07/21/99	7	2	9
MG/KG	CEF-P21-SS-211-01	F4499-4	NORMAL	F4499	M	07/12/99	07/19/99	07/21/99	7	2	9
MG/KG	CEF-P21-SS-212-04	F4499-5	NORMAL	F4499	M	07/12/99	07/19/99	07/21/99	7	2	9
MG/KG	CEF-P21-SS-213-04	F4499-6	NORMAL	F4499	M	07/12/99	07/19/99	07/21/99	7	2	9
MG/KG	CEF-P21-SS-214-03	F4499-7	NORMAL	F4499	M	07/12/99	07/19/99	07/21/99	7	2	9
MG/KG	CEF-P21-SS-215-01	F4499-8	NORMAL	F4499	M	07/12/99	07/19/99	07/21/99	7	2	9
MG/KG	CEF-P21-SS-216-01	F4499-9	NORMAL	F4499	M	07/12/99	07/19/99	07/21/99	7	2	9
MG/KG	CEF-P21-SS-217-01	F4499-10	NORMAL	F4499	M	07/12/99	07/19/99	07/21/99	7	2	9
MG/KG	CEF-P21-SS-218-02	F4499-11	NORMAL	F4499	M	07/13/99	07/19/99	07/21/99	6	2	8
MG/KG	CEF-P21-SS-DU03	F4499-12	NORMAL	F4499	M	07/13/99	07/19/99	07/21/99	6	2	8
MG/KG	CEF-P21-SS-DU04	F4499-13	NORMAL	F4499	M	07/13/99	07/19/99	07/21/99	6	2	8

LOW CALIBRATION CHECK STANDARDS SUMMARY

Login Number: F4499
Account: TETRPAPT - Tetra Tech, NUS
Project: TETRPAPT1443 - NAS Cecil Field-PSC 21

File ID: IR0721M1.ASC
QC Limits: 70 to 130 % Recovery

Date Analyzed: 07/21/99
Run ID: MA1491

Methods: EPA 200.7, SW846 6010A
Units: ug/l

Metal	CRI True	CRIA True	CRIA Results	% Rec	CRI Results	% Rec	CRIA Results	% Rec	CRIA Results	% Rec
Aluminum	200									
Antimony		5.0								
Arsenic		10					12.1	121.0	11.9	119.0
Barium	200									
Beryllium	5.0									
Cadmium	5.0									
Calcium	1000									
Chromium	10									
Cobalt	50									
Copper	25									
Iron	300									
Lead		5.0								
Magnesium	5000									
Manganese	15									
Molybdenum	50									
Nickel	40									
Potassium	5000									
Selenium		10								
Silver	10									
Sodium	5000									
Thallium		10								
Tin	50									
Vanadium	50									
Zinc	20									

(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: F4499
Account: TETRPAPT - Tetra Tech, NUS
Project: TETRPAPT1443 - NAS Cecil Field-PSC 21

File ID: IR0721M1.ASC
QC Limits: result < RDL

Date Analyzed: 07/21/99
Run ID: MA1491

Methods: EPA 200.7, SW846 6010A
Units: ug/l

Metal	RDL	IDL	CCB raw	final	CCB raw	final
Aluminum	200	30	anr			
Antimony	5.0	2.39	anr			
Arsenic	10	3.4	[illegible]	<10	1.6	<10
Barium	200	.39	anr			
Beryllium	5.0	.36	anr			
Cadmium	5.0	.33	anr			
Calcium	1000	19.5	anr			
Chromium	10	.637	anr			
Cobalt	50	.797	anr			
Copper	25	.747	anr			
Iron	300	32	anr			
Lead	5.0	1.59	anr			
Magnesium	5000	17.6	anr			
Manganese	15	.16	anr			
Molybdenum	50	.68	anr			
Nickel	40	1	anr			
Potassium	5000	28.2	anr			
Selenium	10	2	anr			
Silver	10	.96	anr			
Sodium	5000	153	anr			
Thallium	10	2.69	anr			
Tin	50	2.2	anr			
Vanadium	50	.717	anr			
Zinc	20	.83	anr			

(*) Outside of QC limits
(anr) Analyte not requested

FIELD DUPLICATE PRECISION

COMPOUND	CEF-P21-SS-217-01	CEF-P21-SS-DU03	RPD
	mg/kg	mg/kg	%
Arsenic	1.7	2.2	25.64

FIELD DUPLICATE PRECISION

COMPOUND	CEF-P21-SS-214-03	CEF-P21-SS-DU04	RPD
	mg/kg	mg/kg	%
Arsenic	10.5	12.8	19.74

METALS DIGESTION LOG: SOIL

Method of Digestion: EPA-3050-B Temp: 94°C Thermometer ID#: 18

Analyst: J. W

Added:	HNO_3	HCl	H_2O_2
Mfg:	Fisher	Fisher	Fisher
Lot #:	117070	418040	373015

Sample #	WT	Final Vol.	% Sol	Digestion Factor	Date	Comments
F4499-1 -DUP	1.059	100			7/19/99	
F4499-1 -MS	1.005					
1 F4499-1-50	1.07					
2 F4499-1	1.049					
3 F4499-2	1.119					
4 F4499-3	1.149					
5 F4499-4	1.015					
6 F4499-5	1.009					
7 F4499-6	1.039					
8 F4499-7	1.099					
9 F4499-8	1.019					
10 F4499-9	1.109					
11 F4499-10	1.119					
12-						
13-						
14-						
15-						
16-						
17-						
18-						
19-						
20-						
MB/SB	100	100	—	1	7/19/99	
MB/SB	"	"	—	1	"	

RELINQUISHED BY: [signature] DATE: 7/19/99

7/19/99

up 1950

00059

METALS DIGESTION LOG: SOIL

Method of Digestion: EPA-3050B Temp: 94°C Thermometer ID#: 18

Analyst: J.

Added:	HNO_3	HCl	H_2O_2
Mfg:	Fisher	Fisher	Fisher
Lot #:	118010	418090	983015

Sample #	WT	Final Vol.	% Sol	Digestion Factor	Date	Comments
F4503-5 -DUP	1.00g	100-1			7/19/95	
F4503-5 -MS	1.05g					
F4503-5 -MSD	1.07g					
2- F4503-5	1.01g					
3- F4495-2	1.12g					
4- F4465-1	1.14g					
5- F4465-2	1.05g					
6- F4499-11	1.07g					
7- F4499-12	1.18g					
8- F4499-13	1.19g					
9-						
10-						
11-						
12-						
13-						
14-						
15-						
16-						
17-						
18-						
19-						
20-						
MB/SB	100 ✓	100 ✓	–	1	7/19/95	
MB/SB	–	–	–	1	–	

RELINQUISHED BY: [signature] DATE: 7/19/95

1949 00060

Method: TRACE1 Sample Name: F4499-2 Operator:
Run Time: 07/21/99 07:23 Filename: R0721M1
Mode: CONC Type: S Corr. Factor: 1.00000
Lab ID.: Cust. Smpl. ID.: Cust. ID.:

Elems	Ag3280	Al3082	As1890	Ba4934	Be3130	Ca3179
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0274	7.749	.0591	.1101	.0011	14.95
SDev	.0004	.082	.0004	.0007	0	.0826
%RSD	1.429	1.059	.7471	.6511	2.257	.5528

Elems	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0087	.0010	.0494	.2841	5.378	.2649
SDev	0	.0002	.0007	.0019	.0213	.0037
%RSD	.2706	21.34	1.335	.6548	.3963	1.389

Elems	Mg2790	Mn2576	Mo2020	Na3302	Ni2316	2203/1
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.5342	.0668	.0013	2.920	.0099	.2075
SDev	.0034	.0002	.0001	.0606	.0014	.0006
%RSD	.6418	.3557	3.803	2.076	14.58	.292

Elems	2203/2	Pb2203	Se1960	Sb2068	1960/1	1960/2
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.2088	.2084	.0009	.0033	.0037	-.0005
SDev	.0013	.0007	.0022	.002	.0038	.0016
%RSD	.6247	.3547	250.4	60.27	103.1	306.8

Elems	Sn1899	Tl1908	V 2924	Zn2062
Units	ppm	ppm	ppm	ppm
Avge	.0586	-.0042	.0114	.7160
SDev	.0017	.0012	.0001	.0038
%RSD	2.938	29.01	1.01	.5319

$$(.0591\ mg/L)\left(\frac{1\ L}{1000\ mL}\right)\left(\frac{100\ mL}{1.11\ g}\right)\left(\frac{1000\ g}{1\ kg}\right)\left(\frac{1}{.864}\right) = 6.2\ mg/kg$$

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-08-9-016

TO:	**M. SPERANZA**	**DATE:**	**AUGUST 9, 1999**
FROM:	**JENNIFER MALLE**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION-SELECTED METALS**
CTO 078 – CECIL FIELD
SDG – F4500

SAMPLES: 6/Aqueous/

CEF-HEL-GW-1S-1	CEF-HEL-GW-1S-1-F	CEF-HEM-GW-1S-1
CEF-HEM-GW-1S-1-F	CEF-HEM-GW-DU01	CEF-HEM-GW-DU01-F

Overview

The sample set for CTO 078, Cecil Field, SDG F4500, consists of six (6) aqueous environmental samples. Two (2) field duplicate pairs (CEF-HEM-GW-1S-1 / CEF-HEM-GW-DU01 and CEF-HEM-GW-1S-1-F / CEF-HEM-GW-DU01-F) were included within this SDG.

The samples were analyzed for selected metals including chromium, lead and vanadium. The samples were collected by Tetra Tech NUS on July 12-13, 1999 and analyzed by Accutest Laboratory under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. All metal analyses were conducted using SW846 method 6010B.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Initial and Continuing Calibration Recoveries
• Laboratory Blank Analyses
• Field Duplicates
* • Detection Limits

* - All quality control criteria were met for this parameter.

The following contaminants were detected in the laboratory method/preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level (aqueous)
Chromium	3.5 ug/L	17.5 ug/L
Lead	6.4 ug/L	32 ug/L
Vanadium	0.90 ug/L	4.5 ug/L

An action level of 5x the maximum concentration has been used to evaluate the sample data for blank contamination. Sample aliquot, percent solids and dilution factors were taken into consideration when evaluating for blank contamination. Positive results less than the action levels for chromium, lead and vanadium have been qualified as a nondetect, "U".

Field Duplicate Precision

Field duplicate imprecision >30% was noted for lead. All positive values for lead have been qualifed as estimated, "J".

Notes

The CRDL Percent Recovery (%R) for vanadium was < 80% quality control limits. However, no validation action is required.

Executive Summary

Laboratory Performance: Chromium, lead and vanadium were detected in the laboratory / preparation blanks.

Other Factors Affecting Data Quality: Field duplicate imprecision was noted for lead.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitled "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)."

Jennifer Malle

Tetra Tech NUS
Jennifer Malle
Environmental Scientist

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

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

APPENDIX A

Qualified Analytical Results

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
D = MS/MSD Noncompliance
E = LCS/LCSD Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - include ICSAB % R's
L = Instrument Calibration Range Exceedance
M = Sample Preservation
N = Internal Standard Noncompliance
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = Pest/PCB D% between columns for positive results
V = Non-linear calibrations, tuning $r < 0.995$ (correlation coefficient)
W = EMPC result
X = Signal to noise response drop
Y = % Solid content is less than 30%

CTO078 - NAS CECIL FIELD
WATER DATA
Accutest, NJ
SDG: F4500

SAMPLE NUMBER:	CEF-HEL-GW-1S-1			CEF-HEL-GW-1S-1-F			CEF-HEM-GW-1S-1			CEF-HEM-GW-1S-1-F		
SAMPLE DATE:	07/13/99			07/13/99			07/12/99			07/12/99		
LABORATORY ID:	F4500-2			F4500-2A			F4500-1			F4500-1A		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0.0 %			0.0 %		
UNITS:	UG/L			UG/L			UG/L			UG/L		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
CHROMIUM	152			2	U	A	93.5			4.7	U	A
LEAD	174	J	G	6.2	U	A	99.8	J	G	9.4	U	A
VANADIUM	234			2.3	U	A	184			7.2		

CTO078 - NAS CECIL FIELD
WATER DATA
Accutest, NJ
SDG: F4500

SAMPLE NUMBER:	CEF-HEM-GW-DU01	CEF-HEM-GW-DU01-F		
SAMPLE DATE:	07/12/99	07/12/99	/ /	/ /
LABORATORY ID:	F4500-3	F4500-3A		
QC_TYPE:	NORMAL	NORMAL		
% SOLIDS:	0.0 %	0.0 %	100.0 %	100.0 %
UNITS:	UG/L	UG/L		
FIELD DUPLICATE OF:	CEF-HEM-GW-1S-1	CEF-HEM-GW-1S-1-F		

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
CHROMIUM	115			3.5	U	A						
LEAD	143	J	G	7.7	U	A						
VANADIUM	210			5.8								

APPENDIX B

Results as reported by the Laboratory

ACCUTEST

Report of Analysis

Client Sample ID:	CEF-HEM-GW-1S-1		
Lab Sample ID:	F4500-1	**Date Sampled:**	07/12/99
Matrix:	AQ - Ground Water	**Date Received:**	07/14/99
		Percent Solids:	n/a
Project:	NAS Cecil Field		

Metals Analysis

Analyte	Result	RDL	Units	DF	Prep	Analyzed	By	Method
Chromium	93.5	10.0	ug/l	1	07/23/99	07/27/99	JK	SW846 6010A
Lead	99.8	10	ug/l	1	07/23/99	07/27/99	JK	SW846 6010A
Vanadium	184	50.0	ug/l	1	07/23/99	07/27/99	JK	SW846 6010A

RDL = Reported Detection Limit

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ACCUTEST

Report of Analysis

Client Sample ID:	CEF-HEL-GW-1S-1		
Lab Sample ID:	F4500-2	**Date Sampled:**	07/13/99
Matrix:	AQ - Ground Water	**Date Received:**	07/14/99
		Percent Solids:	n/a
Project:	NAS Cecil Field		

Metals Analysis

Analyte	Result	RDL	Units	DF	Prep	Analyzed By		Method
Chromium	152	10.0	ug/l	1	07/23/99	07/27/99	JK	SW846 6010A
Lead	174	10	ug/l	1	07/23/99	07/27/99	JK	SW846 6010A
Vanadium	234	50.0	ug/l	1	07/23/99	07/27/99	JK	SW846 6010A

RDL = Reported Detection Limit

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ACCUTEST

Report of Analysis

Client Sample ID:	CEF-HEM-GW-DU01		
Lab Sample ID:	F4500-3	**Date Sampled:**	07/12/99
Matrix:	AQ - Ground Water	**Date Received:**	07/14/99
		Percent Solids:	n/a
Project:	NAS Cecil Field		

Metals Analysis

Analyte	Result	RDL	Units	DF	Prep	Analyzed By		Method
Chromium	115	10.0	ug/l	1	07/23/99	07/27/99	JK	SW846 6010A
Lead	143	10	ug/l	1	07/23/99	07/27/99	JK	SW846 6010A
Vanadium	210	50.0	ug/l	1	07/23/99	07/27/99	JK	SW846 6010A

RDL = Reported Detection Limit

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ACCUTEST

Report of Analysis

Client Sample ID:	CEF-HEM-GW-1S-1-F		
Lab Sample ID:	F4500-1A 8/3/99 gmm	**Date Sampled:**	07/12/99
Matrix:	AQ - Groundwater Filtered	**Date Received:**	07/14/99
		Percent Solids:	n/a
Project:	NAS Cecil Field		

Metals Analysis

Analyte	Result	RDL	Units	DF	Prep	Analyzed	By	Method
Chromium	4.7 B	10.0	ug/l	1	07/23/99	07/27/99	JK	SW846 6010A
Lead	9.4	10	ug/l	1	07/23/99	07/27/99	JK	SW846 6010A
Vanadium	7.2 B	50.0	ug/l	1	07/23/99	07/27/99	JK	SW846 6010A

RDL = Reported Detection Limit

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ACCUTEST

Report of Analysis

Client Sample ID:	CEF-HEL-GW-1S-1 - F		
Lab Sample ID:	F4500-2A 8/3/99 JMM	**Date Sampled:**	07/13/99
Matrix:	AQ - Groundwater Filtered	**Date Received:**	07/14/99
		Percent Solids:	n/a
Project:	NAS Cecil Field		

Metals Analysis

Analyte	Result	RDL	Units	DF	Prep	Analyzed By	Method
Chromium	2.0 B	10.0	ug/l	1	07/23/99	07/27/99 JK	SW846 6010A
Lead	6.2	10	ug/l	1	07/23/99	07/27/99 JK	SW846 6010A
Vanadium	2.3 B	50.0	ug/l	1	07/23/99	07/27/99 JK	SW846 6010A

RDL = Reported Detection Limit

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ACCUTEST

Report of Analysis

Client Sample ID:	CEF-HEM-GW-DU01 - F		
Lab Sample ID:	F4500-3A 8/3/99 gmm	**Date Sampled:**	07/12/99
Matrix:	AQ - Groundwater Filtered	**Date Received:**	07/14/99
		Percent Solids:	n/a
Project:	NAS Cecil Field		

Metals Analysis

Analyte	Result	RDL	Units	DF	Prep	Analyzed By	Method
Chromium	3.5 B	10.0	ug/l	1	07/23/99	07/27/99 JK	SW846 6010A
Lead	7.7	10	ug/l	1	07/23/99	07/27/99 JK	SW846 6010A
Vanadium	5.8 B	50.0	ug/l	1	07/23/99	07/27/99 JK	SW846 6010A

RDL = Reported Detection Limit

00008

APPENDIX C
Support Documentation

F4500

HOLDING TIME

07/29/99

Units	Nsample	Lab Id	Qc Type	Sdg	Sort	Samp Date	Extr Date	Anal Date	SAMP_DATE TO EXTR_DATE	EXTR_DATE TO ANAL_DATE	SAMP_DATE TO ANAL_DATE
UG/L	CEF-HEL-GW-1S-1	F4500-2	NORMAL	F4500	M	07/13/99	07/23/99	07/27/99	10	4	14
UG/L	CEF-HEM-GW-1S-1	F4500-1	NORMAL	F4500	M	07/12/99	07/23/99	07/27/99	11	4	15
UG/L	CEF-HEM-GW-DU01	F4500-3	NORMAL	F4500	M	07/12/99	07/23/99	07/27/99	11	4	15
UG/L	CEF-HEL-GW-1S-1-F	F4500-2A	NORMAL	F4500	MF	07/13/99	07/23/99	07/27/99	10	4	14
UG/L	CEF-HEM-GW-1S-1-F	F4500-1A	NORMAL	F4500	MF	07/12/99	07/23/99	07/27/99	11	4	15
UG/L	CEF-HEM-GW-DU01-F	F4500-3A	NORMAL	F4500	MF	07/12/99	07/23/99	07/27/99	11	4	15

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER YWW-2 | PAGE 1 OF 1

PROJECT NO: 0039	SITE NAME: YWW	PROJECT MANAGER AND PHONE NUMBER: JOE LOGAN 412 921 7231	LABORATORY NAME AND CONTACT: ACCUTEST LABS K BENZADI
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER AND PHONE NUMBER: ABBY WILCOX 904 281 0400	ADDRESS: 4405 VINELAND RD
		CARRIER/WAYBILL NUMBER: GREYHOUND	CITY, STATE: ORLANDO FL

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☒ 14 day

DATE YEAR 1999	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	Lead	Chromium	Vanadium	Lead (F)	Chromium (F)	Vanadium (F)	(MS/MSD)	COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)						P	P	P	P	P	P		
PRESERVATIVE USED						HNO_3	HNO_3	HNO_3	HNO_3	HNO_3	HNO_3		
7/12	1531	CEF-HEM-GW-15-1	GW	G	2	1	1	1	1	1	1	F4450-1	COOL TO 4°C
7/13	1638	CEF-HEL-GW-15-1	GW	G	2	1	1	1	1	1	1	-2	
7/12	0000	CEF-HEM-GW-DUO1	GW	G	2	1	1	1	1	1	1	-3	
7/12	1531	CEF-HEM-GW-MSMSD01	GW	G	4	2	2	2	2	2	2	(-1 MS/MSD	
													COOLER 4°C

1. RELINQUISHED BY [signature]	DATE 7/13	TIME 1500	1. RECEIVED BY Abby Wilcox	DATE 7.14.99	TIME 1000
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

00009

LOW CALIBRATION CHECK STANDARDS SUMMARY

Login Number: F4500
Account: TETRPAPT - Tetra Tech, NUS
Project: TETRPAPT1252 - NAS Cecil Field

File ID: IR0727M2.ASC Date Analyzed: 07/27/99 Methods: SW846 6010A
QC Limits: 70 to 130 % Recovery Run ID: MA1497 Units: ug/l

Metal	CRI True	CRIA True	CRIA Results	% Rec	CRI Results	% Rec
Aluminum	200					
Antimony		5.0	anr			
Arsenic		10	anr			
Barium	200					
Beryllium	5.0					
Cadmium	5.0					
Calcium	1000					
Chromium	10				10.5	105.0
Cobalt	50					
Copper	25					
Iron	300					
Lead		5.0	12.0	120.0		
Magnesium	5000					
Manganese	15					
Molybdenum	50					
Nickel	40					
Potassium	5000					
Selenium		10	anr			
Silver	10					
Sodium	5000					
Thallium		10	anr			
Tin	50					
Vanadium	50				[redacted]	99.6
Zinc	20					

(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: F4500
Account: TETRPAPT - Tetra Tech, NUS
Project: TETRPAPT1252 - NAS Cecil Field

File ID: IR0727M2.ASC
QC Limits: result < RDL

Date Analyzed: 07/27/99
Run ID: MA1497

Methods: SW846 6010A
Units: ug/l

Metal	RDL	IDL	ICB raw	final	CCB raw	final	CCB raw	final	CCB raw	final
Aluminum	200	30	anr							
Antimony	5.0	2.4	anr							
Arsenic	10.0	3.4	anr							
Barium	200	.39	anr							
Beryllium	5.0	.36	anr							
Cadmium	5.0	.33	anr							
Calcium	1000	19.5	anr							
Chromium	10.0	.64	0.40	<10.0	0.80	<10.0B	0.80	<10.0B	1.6	<10.0B
Cobalt	50.0	.8	anr							
Copper	25.0	.75	anr							
Iron	300	32	anr							
Lead	5.0	1.6	6.2	<10	6.4	<10	5.5	<10	4.6	<5.0B
Magnesium	5000	17.6	anr							
Manganese	15.0	.16	anr							
Molybdenum	50.0	.68	anr							
Nickel	40.0	1	anr							
Potassium	5000	28.2	anr							
Selenium	10.0	2	anr							
Silver	10.0	.96	anr							
Sodium	5000	153	anr							
Thallium	10.0	2.7	anr							
Tin	50.0	2.2	anr							
Vanadium	50.0	.72	0.60	<50.0	0.80	<50.0B	0.80	<50.0B	0.80	<50.0B
Zinc	20.0	.83	anr							

(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: F4500
Account: TETRPAPT - Tetra Tech, NUS
Project: TETRPAPT1252 - NAS Cecil Field

File ID: IR0727M2.ASC
QC Limits: result < RDL

Date Analyzed: 07/27/99
Run ID: MA1497

Methods: SW846 6010A
Units: ug/l

Metal	RDL	IDL	CCB raw	final	CCB raw	final
Aluminum	200	30	anr			
Antimony	5.0	2.4	anr			
Arsenic	10.0	3.4	anr			
Barium	200	.39	anr			
Beryllium	5.0	.36	anr			
Cadmium	5.0	.33	anr			
Calcium	1000	19.5	anr			
Chromium	10.0	.64	1.9	<10.0B	3.5	<10.0B
Cobalt	50.0	.8	anr			
Copper	25.0	.75	anr			
Iron	300	32	anr			
Lead	5.0	1.6	5.5	<10	6.4	<10
Magnesium	5000	17.6	anr			
Manganese	15.0	.16	anr			
Molybdenum	50.0	.68	anr			
Nickel	40.0	1	anr			
Potassium	5000	28.2	anr			
Selenium	10.0	2	anr			
Silver	10.0	.96	anr			
Sodium	5000	153	anr			
Thallium	10.0	2.7	anr			
Tin	50.0	2.2	anr			
Vanadium	50.0	.72	0.70	<50.0	0.90	<50.0B
Zinc	20.0	.83	anr			

(*) Outside of QC limits
(anr) Analyte not requested

FIELD DUPLICATE PRECISION

COMPOUND	CEF-HEM-GW-1S-1	CEF-HEM-GW-DU01	RPD
	ug/l	ug/l	%
Chromium	93.5	115	20.62
Lead	99.8	143	35.58
Vanadium	184	210	13.20

FIELD DUPLICATE PRECISION

COMPOUND	CEF-HEM-GW-1S-1-F	CEF-HEM-GW-DU01-F	RPD
	ug/l	ug/l	%
Chromium	2	3.5	54.55
Lead	6.2	7.7	21.58
Vanadium	2.3	5.8	86.42

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: F4500
Account: TETRPAPT - Tetra Tech, NUS
Project: TETRPAPT1252 - NAS Cecil Field

File ID: IR0727M2.ASC
Analyst: JK
Parameters: Cr,Pb,V

Date Analyzed: 07/27/99
Run ID: MA1497

Methods: SW846 6010A

Time	Sample Description	Dilution Factor	PS Recov	Comments
10:30	MA1497-HSTD1	1		
10:35	MA1497-ICV1	1		
10:45	MA1497-ICB1	1		
10:51	MA1497-CCV1	1		
10:56	MA1497-CCB1	1		
11:01	MA1497-CRIA1	1		
11:07	MA1497-CRI1	1		
11:12	MA1497-ICSA1	1		
11:18	MA1497-ICSAB1	1		
11:23	MA1497-CCV2	1		
11:29	MA1497-CCB2	1		
11:34	F4500-1	1		
11:40	F4500-2	1		
11:45	F4500-3	1		
11:51	F4500-1A	1		
11:56	F4500-2A	1		
12:02	F4500-3A	1		
12:07	ZZZZZZ	1		
12:13	ZZZZZZ	1		
12:18	ZZZZZZ	1		
12:24	ZZZZZZ	1		
12:29	MA1497-CCV3	1		
12:35	MA1497-CCB3	1		
12:40	ZZZZZZ	1		
12:46	ZZZZZZ	1		
12:51	ZZZZZZ	1		
12:57	ZZZZZZ	1		
13:02	ZZZZZZ	1		
13:08	ZZZZZZ	1		
13:13	ZZZZZZ	1		
13:19	ZZZZZZ	1		
13:24	ZZZZZZ	1		
13:29	MP1966-MB1	1		

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: F4500
Account: TETRPAPT - Tetra Tech, NUS
Project: TETRPAPT1252 - NAS Cecil Field

File ID: IR0727M2.ASC
Analyst: JK
Parameters: Cr,Pb,V

Date Analyzed: 07/27/99
Run ID: MA1497

Methods: SW846 6010A

Time	Sample Description	Dilution Factor	PS Recov	Comments
13:35	MA1497-CCV4	1		
13:41	MA1497-CCB4	1		
13:46	MP1966-B1	1		
13:52	MP1966-D1	1		
13:57	F4553-16	1		(sample used for QC only; not part of login F4500)
14:04	MP1966-S1	1		
14:09	MP1966-S2	1		
14:14	MP1966-SD1	5		
14:20	MA1497-CCV5	1		
14:25	MA1497-CCB5	1		

Refer to raw data for calibration curve and standards.

METALS DIGESTION LOG: WATER

Method of Digestion: IC-3010A **Temp:** 93°C **Thermometer ID#:** 18

Analyst: J.

	HNO_3	HCl	H_2O_2
Added:			
Mfg:	Fisher	Fisher	
Lot #:	118070	418090	

Sample #	Initial Vol.	Final Vol.	Date	Comments
F4523-2 -DUP	50-1	50-1	7/23/99	
F4523-2 -MS				
1- F4523-2-SD				
2- F4523-2				
3- F4523-1				
4- F4523-3				
5- F4523-4				
6- F4523-5				
7- F4500-1				
8- F4500-2				
9- F4500-3				
10- F4500-1A				
11- F4500-2A	✓	✓	✓	
12-				
13-				
14-				
15-				
16-				
17-				
18-				
19-				
20-				
MB/SB	50-1	50-1	7/23/99	
MB/SB	✓	✓	✓	

RELINQUISHED BY: [signature] DATE: 7/23/99

ACCEPTED BY: [signature] DATE: 7/23/99

mp 1/6

00040

METALS DIGESTION LOG: WATER

Method of Digestion: EPA 3010A Temp: 93°C Thermometer ID#: 18

Analyst: J

	HNO_3	HCl	H_2O_2
Added:			
Mfg:	Fisher	Fisher	
Lot #:	118070	418090	

Sample #	Initial Vol.	Final Vol.	Date	Comments
F4523-2A-DUP	50-1	50-1	7/23/99	
F4523-2A-MS				
F4523-2A-SD				
2- F4523-2A				
3- F4523-1A				
4- F4523-3A				
5- F4623-4A				
6- F4523-5A				
7- F4500-3A				
8- F4517-1				
9- F4517-2				
10- F4517-3				
11- F4517-4				
12-				
13-				
14-				
15-				
16-				
17-				
18-				
19-				
20-				
MB/SB	50-1	50-1	7/23/99	
MB/SB	L	L	L	

RELINQUISHED BY: DATE: 7/23/99

ACCEPTED BY: DATE: 7/23/99

wp 1963

0004

Method: TRACE2 Sample Name: [redacted] Operator:
Run Time: 07/27/99 11:34 Filename: R0727M2
Mode: CONC Type: S Corr. Factor: 1.00000
Lab ID.: Cust. Smpl. ID.: Cust. ID.:

Elems	Ag3280	Al3082	As1890	Ba4934	Be3130	Ca3179
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avge	-.0003	77.41	.0035	.2933	.0063	3.229
SDev	.0004	.5444	.0016	.001	0	.0036
%RSD	150.1	.7032	47.51	.3521	.4278	.1124

Elems	Cd2265	Co2286	Cr2677	Cu3247	Fe2714	K_7664
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.0002	.0037	.0935	.0190	11.11	1.447
SDev	.0001	.0003	.0049	0	.0356	.0081
%RSD	67.14	7.224	5.277	.1156	.3207	.5602

Elems	Mg2790	Mn2576	Mo2020	Na3302	Ni2316	2203/1
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avge	5.397	.0315	.0068	9.979	.0348	.0941
SDev	.0132	.0007	.0002	.0384	.0048	.0005
%RSD	.2446	2.167	3.105	.3848	13.77	.5766

Elems	2203/2	[redacted]	Se1960	Sb2068	1960/1	1960/2
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avge	.1003	[redacted]	.0204	.0017	.0158	.0207
SDev	.0007	.0003	.002	.0012	.002	.0029
%RSD	.6613	.3024	9.699	69.98	12.4	13.96

Elems	Sn1899	Tl1908	V_2924	Zn2062
Units	ppm	ppm	ppm	ppm
Avge	.0652	-.0007	.1840	.0491
SDev	.0009	.0026	.0002	.0003
%RSD	1.315	350	.1222	.6021

$.0998 \text{ mg/l} \left(\frac{1000 \text{ ug}}{1 \text{ mg}} \right) = 99.8 \text{ ug/l}$

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-11-09-044

TO:	**M. SPERANZA**	**DATE:**	**NOVEMBER 10, 1999**
FROM:	**GRETCHEN PHIPPS**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – SELECT METALS**
CTO 078 - CECIL FIELD
SDGs – F5152 AND F5154

SAMPLES: **F5152**

8/Aqueous/

CEF-615-GW-01S-1	CEF-615-GW-01S-1-F
CEF-HEL-GW-01S-2	CEF-HEL-GW-01S-2-F
CEF-HEL-GW-DU02	CEF-HEL-GW-DU02-F
CEF-HEM-GW-01S-2	CEF-HEM-GW-01S-2-F

F5154

4/Soils/

CEF-P21-SS-401-01	CEF-P21-SU-403-03
CEF-P21-SU-404-03	CEF-P21-SU-DU06

Overview

The sample set for CTO 078, Cecil Field, SDGs F5152 and F5154 consists of eight (8) aqueous and four (4) soil environmental samples. Three (3) field duplicate pairs (CEF-HEL-GW-01S-2/ CEF-HEL-GW-DU02, CEF-HEL-GW-01S-2-F / CEF-HEM-GW-01S-2-F and CEF-P21-SU-404-03 / CEF-P21-SU-DU06) were included within these SDGs.

All aqueous samples, with exception those designated –F, were analyzed for total chromium, lead and vanadium. The aqueous samples designated –F were analyzed for dissolved chromium, lead and vanadium. The soil samples were analyzed for arsenic. The samples were collected by Tetra Tech NUS on October 21 and 22, 1999 and analyzed by Accutest Laboratory under Naval Facilities Engineering Service Center (NFESC) Quality Assurance / Quality Control (QA / QC) criteria. Metals analyses were conducted using SW 846 method 6010B.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Verifications
  • Laboratory Blank Analyses

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide." (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

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

Gretchen A Phipps

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Control Officer

Attachments:

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

APPENIDX A
QUALIFIED ANALYTICAL RESULTS

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
D = MS/MSD Noncompliance
E = LCS/LCSD Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - include ICSAB % R's
L = Instrument Calibration Range Exceedance
M = Sample Preservation
N = Internal Standard Noncompliance
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = Pest/PCB D% between columns for positive results
V = Non-linear calibrations, tuning $r < 0.995$ (correlation coefficient)
W = EMPC result
X = Signal to noise response drop
Y = % Solid content is less than 30%

CTO078 - NAS CECIL FIELD
WATER DATA
Accutest, NJ
SDG: F5152

SAMPLE NUMBER:	CEF-615-GW-01S-1			CEF-615-GW-01S-1-F			CEF-HEL-GW-01S-2			CEF-HEL-GW-01S-2-F		
SAMPLE DATE:	10/21/99			10/21/99			10/21/99			10/21/99		
LABORATORY ID:	F5152-2			F5152-2A			F5152-1			F5152-1A		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0.0 %			0.0 %		
UNITS:	UG/L			UG/L			UG/L			UG/L		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
CHROMIUM	0.64	U		0.64	U		3.7			1.6		
LEAD	1.6	U		1.6	U		2.4			1.6	U	
VANADIUM	3.2	U	A	2.5	U	A	10.6			7.0		

CTO078 - NAS CECIL FIELD
WATER DATA
Accutest, NJ
SDG: F5152

SAMPLE NUMBER:	CEF-HEL-GW-DU02			CEF-HEL-GW-DU02-F			CEF-HEM-GW-01S-2			CEF-HEM-GW-01S-2-F		
SAMPLE DATE:	10/22/99			10/22/99			10/22/99			10/22/99		
LABORATORY ID:	F5152-4			F5152-4A			F5152-3			F5152-3A		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0.0 %			0.0 %		
UNITS:	UG/L			UG/L			UG/L			UG/L		
FIELD DUPLICATE OF:	CEF-HEL-GW-01S-2			CEF-HEL-GW-01S-2								
	RESULT	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**
INORGANICS												
CHROMIUM	2.6			0.95			7.5			0.72		
LEAD	1.6			1.6	U		7.4			1.6	U	
VANADIUM	8.6			6.4			7.1			1.6	U	A

CTO078 - NAS CECIL FIELD
SOIL DATA
Accutest, NJ
SDG: F5154

SAMPLE NUMBER:	CEF-P21-SS-401-01			CEF-P21-SU-403-03			CEF-P21-SU-404-03			CEF-P21-SU-404-03-D		
SAMPLE DATE:	10/22/99			10/22/99			10/22/99			10/22/99		
LABORATORY ID:	F5154-1			F5154-3			F5154-4			F5154-5		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	86.1 %			76.5 %			80.6 %			78.5 %		
UNITS:	MG/KG			MG/KG			MG/KG			MG/KG		
FIELD DUPLICATE OF:										CEF-P21-SU-404-03		
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
ARSENIC	1.9	U	A	0.95	U	A	0.42	U				

APPENDIX B
RESULTS AS REPORTED BY THE LABORATORY

ACCUTEST

11-4-99

GAP

Report of Analysis

Client Sample ID:	CEF-~~6~~15-GW-01S-1		
Lab Sample ID:	F5152-2	**Date Sampled:**	10/21/99
Matrix:	AQ - Ground Water	**Date Received:**	10/23/99
		Percent Solids:	n/a
Project:	NAS Cecil Field		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method
Chromium	0.64 U	10.0	ug/l	1	10/26/99	10/27/99 JK	SW846 6010A
Lead	1.6 U	5.0	ug/l	1	10/26/99	10/27/99 JK	SW846 6010A
Vanadium	3.2 B	50.0	ug/l	1	10/26/99	10/27/99 JK	SW846 6010A

RL = Reporting Limit

ACCUTEST

GAP 11-4-99

Report of Analysis

Client Sample ID:	CEF-G15-GW-01S-1		
Lab Sample ID:	F5152-2A	**Date Sampled:**	10/21/99
Matrix:	AQ - Groundwater Filtered	**Date Received:**	10/23/99
		Percent Solids:	n/a
Project:	NAS Cecil Field		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method
Chromium	0.64 U	10.0	ug/l	1	10/26/99	10/27/99 JK	SW846 6010A
Lead	1.6 U	5.0	ug/l	1	10/26/99	10/27/99 JK	SW846 6010A
Vanadium	2.5 B	50.0	ug/l	1	10/26/99	10/27/99 JK	SW846 6010A

RL = Reporting Limit

000008

ACCUTEST

Report of Analysis

Client Sample ID:	CEF-HEL-GW-01S-2		
Lab Sample ID:	F5152-1	**Date Sampled:**	10/21/99
Matrix:	AQ - Ground Water	**Date Received:**	10/23/99
		Percent Solids:	n/a
Project:	NAS Cecil Field		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By		Method
Chromium	3.7 B	10.0	ug/l	1	10/26/99	10/27/99	JK	SW846 6010A
Lead	2.4 B	5.0	ug/l	1	10/26/99	10/27/99	JK	SW846 6010A
Vanadium	10.6 B	50.0	ug/l	1	10/26/99	10/27/99	JK	SW846 6010A

RL = Reporting Limit

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ACCUTEST

Report of Analysis

Client Sample ID:	CEF-HEL-GW-01S-2		
Lab Sample ID:	F5152-1A	**Date Sampled:**	10/21/99
Matrix:	AQ - Groundwater Filtered	**Date Received:**	10/23/99
		Percent Solids:	n/a
Project:	NAS Cecil Field		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method
Chromium	1.6 B	10.0	ug/l	1	10/26/99	10/27/99	JK	SW846 6010A
Lead	1.6 U	5.0	ug/l	1	10/26/99	10/27/99	JK	SW846 6010A
Vanadium	7.0 B	50.0	ug/l	1	10/26/99	10/27/99	JK	SW846 6010A

RL = Reporting Limit

ACCUTEST

Report of Analysis

Client Sample ID:	CEF-HEL-GW-DU02		
Lab Sample ID:	F5152-4	**Date Sampled:**	10/22/99
Matrix:	AQ - Ground Water	**Date Received:**	10/23/99
		Percent Solids:	n/a
Project:	NAS Cecil Field		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By		Method
Chromium	2.6 B	10.0	ug/l	1	10/26/99	10/27/99	JK	SW846 6010A
Lead	1.6 B	5.0	ug/l	1	10/26/99	10/27/99	JK	SW846 6010A
Vanadium	8.6 B	50.0	ug/l	1	10/26/99	10/27/99	JK	SW846 6010A

RL = Reporting Limit

000006

ACCUTEST

Report of Analysis

Client Sample ID:	CEF-HEL-GW-DU02		
Lab Sample ID:	F5152-4A	**Date Sampled:**	10/22/99
Matrix:	AQ - Groundwater Filtered	**Date Received:**	10/23/99
		Percent Solids:	n/a
Project:	NAS Cecil Field		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method
Chromium	0.95 B	10.0	ug/l	1	10/26/99	10/27/99	JK	SW846 6010A
Lead	1.6 U	5.0	ug/l	1	10/26/99	10/27/99	JK	SW846 6010A
Vanadium	6.4 B	50.0	ug/l	1	10/26/99	10/27/99	JK	SW846 6010A

RL = Reporting Limit

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ACCUTEST

Report of Analysis

Client Sample ID:	CEF-HEM-GW-01S-2		
Lab Sample ID:	F5152-3	**Date Sampled:**	10/22/99
Matrix:	AQ - Ground Water	**Date Received:**	10/23/99
		Percent Solids:	n/a
Project:	NAS Cecil Field		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By		Method
Chromium	7.5 B	10.0	ug/l	1	10/26/99	10/27/99	JK	SW846 6010A
Lead	7.4	5.0	ug/l	1	10/26/99	10/27/99	JK	SW846 6010A
Vanadium	7.1 B	50.0	ug/l	1	10/26/99	10/27/99	JK	SW846 6010A

RL = Reporting Limit

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ACCUTEST

Report of Analysis

Client Sample ID:	CEF-HEM-GW-01S-2		
Lab Sample ID:	F5152-3A	**Date Sampled:**	10/22/99
Matrix:	AQ - Groundwater Filtered	**Date Received:**	10/23/99
		Percent Solids:	n/a
Project:	NAS Cecil Field		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method
Chromium	0.72 B	10.0	ug/l	1	10/26/99	10/27/99 JK	SW846 6010A
Lead	1.6 U	5.0	ug/l	1	10/26/99	10/27/99 JK	SW846 6010A
Vanadium	1.6 B	50.0	ug/l	1	10/26/99	10/27/99 JK	SW846 6010A

RL = Reporting Limit

000009

ACCUTEST

Report of Analysis

Client Sample ID:	CEF-P21-SS-401-01		
Lab Sample ID:	F5154-1	**Date Sampled:**	10/22/99
Matrix:	SO - Soil	**Date Received:**	10/23/99
		Percent Solids:	86.1
Project:	NAS Cecil Field		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By		Method
Arsenic	1.9	1.2	mg/kg	1	10/26/99	10/27/99	JK	SW846 6010A

RL = Reporting Limit

000003

ACCUTEST

Report of Analysis

Client Sample ID:	CEF-P21-SU-403-03		
Lab Sample ID:	F5154-3	**Date Sampled:**	10/22/99
Matrix:	SO - Soil	**Date Received:**	10/23/99
		Percent Solids:	76.5
Project:	NAS Cecil Field		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By		Method
Arsenic	0.95 B	1.2	mg/kg	1	10/27/99	10/28/99	JK	SW846 6010A

RL = Reporting Limit

ACCUTEST

Report of Analysis

Client Sample ID:	CEF-P21-SU-404-03		
Lab Sample ID:	F5154-4	**Date Sampled:**	10/22/99
Matrix:	SO - Soil	**Date Received:**	10/23/99
		Percent Solids:	80.6
Project:	NAS Cecil Field		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By		Method
Arsenic	0.42 U	1.2	mg/kg	1	10/27/99	10/28/99	JK	SW846 6010A

RL = Reporting Limit

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ACCUTEST

Report of Analysis

Client Sample ID:	CEF-P21-SU-DU06		
Lab Sample ID:	F5154-5	**Date Sampled:**	10/22/99
Matrix:	SO - Soil	**Date Received:**	10/23/99
		Percent Solids:	78.5
Project:	NAS Cecil Field		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method
Arsenic	0.87 B	1.2	mg/kg	1	10/27/99	10/28/99	JK	SW846 6010A

RL = Reporting Limit

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APPENDIX C
SUPPORT DOCUMENTATION

F5154

HOLDING TIME
11/03/99

Units	Nsample	Lab Id	Qc Type	Sdg	Sort	Samp Date	Extr Date	Anal Date	SAMP_DATE TO EXTR_DATE	EXTR_DATE TO ANAL_DATE	SAMP_DATE TO ANAL_DATE
MG/KG	CEF-P21-SS-401-01	F5154-1	NORMAL	F5154	M	10/22/99	10/26/99	10/27/99	4	1	5
MG/KG	CEF-P21-SU-403-03	F5154-3	NORMAL	F5154	M	10/22/99	10/27/99	10/28/99	5	1	6
MG/KG	CEF-P21-SU-404-03	F5154-4	NORMAL	F5154	M	10/22/99	10/27/99	10/28/99	5	1	6
MG/KG	CEF-P21-SU-DU06	F5154-5	NORMAL	F5154	M	10/22/99	10/27/99	10/28/99	5	1	6
UG/KG	CEF-P21-SU-402-03	F5154-2	NORMAL	F5154	PEST	10/22/99	10/26/99	10/28/99	4	2	6

F5152

HOLDING TIME
11/03/99

Units	Nsample	Lab Id	Qc Type	Sdg	Sort	Samp Date	Extr Date	Anal Date	SAMP_DATE TO EXTR_DATE	EXTR_DATE TO ANAL_DATE	SAMP_DATE TO ANAL_DATE
UG/L	CEF-615-GW-01S-1	F5152-2	NORMAL	F5152	M	10/21/99	10/26/99	10/27/99	5	1	6
UG/L	CEF-615-GW-01S-1-F	F5152-2A	NORMAL	F5152	M	10/21/99	10/26/99	10/27/99	5	1	6
UG/L	CEF-HEL-GW-01S-2	F5152-1	NORMAL	F5152	M	10/21/99	10/26/99	10/27/99	5	1	6
UG/L	CEF-HEL-GW-01S-2-F	F5152-1A	NORMAL	F5152	M	10/21/99	10/26/99	10/27/99	5	1	6
UG/L	CEF-HEL-GW-DU02	F5152-4	NORMAL	F5152	M	10/22/99	10/26/99	10/27/99	4	1	5
UG/L	CEF-HEL-GW-DU02-F	F5152-4A	NORMAL	F5152	M	10/22/99	10/26/99	10/27/99	4	1	5
UG/L	CEF-HEM-GW-01S-2	F5152-3	NORMAL	F5152	M	10/22/99	10/26/99	10/27/99	4	1	5
UG/L	CEF-HEM-GW-01S-2-F	F5152-3A	NORMAL	F5152	M	10/22/99	10/26/99	10/27/99	4	1	5

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER YWW-3 | PAGE 1 OF 1

PROJECT NO: 0039	SITE NAME: YWW	PROJECT MANAGER AND PHONE NUMBER: Joe Logan 412-921-7231	LABORATORY NAME AND CONTACT: H. Behzadi Accutest Labs
SAMPLERS (SIGNATURE): [signature]		FIELD OPERATIONS LEADER AND PHONE NUMBER: Jennifer Elliott 904-281-0100	ADDRESS: 4403 Vineland Rd C-15
		CARRIER/WAYBILL NUMBER: Greyhound	CITY, STATE: Orlando, FL 32811

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☒ 14 day

DATE YEAR 1999	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	Total Pb CCV	Filtered Pb CCV							COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)						P	P							
PRESERVATIVE USED						HNO3	HNO3							
10-21	1540	[redacted]	GW	G	2	1	1			FS152-1MS/MSD				Cool to 4°C
↓	1600	[redacted]	↓	↓	2	1	1			-2				
10-22	1400	[redacted]	↓	↓	2	1	1			-3				
10-22	0000	[redacted]	GW	G	2	1	1			-4				
↓	1540	CEF-HEL-GW-MSMSD02	↓	↓	4	2	2			(-1 MS/MSD)				

Note: Check the pH on all bottles to insure that preservative did not break down.

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY [signature]	10-22-99	1430	1. RECEIVED BY 2039 DSO 05PB10		
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY Cindy Nibin	10-25-99	1200
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

3/99
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 21-9 | PAGE 1 OF 1

PROJECT NO: 0039	SITE NAME: PSC 21	PROJECT MANAGER AND PHONE NUMBER: Joe Logan 412-921-7231	LABORATORY NAME AND CONTACT: H. Behzadi Accutest Labs
SAMPLERS (SIGNATURE): Jennifer Elliott		FIELD OPERATIONS LEADER AND PHONE NUMBER: Jennifer Elliott 904-281-0400	ADDRESS: 4405 Vineland Rd C-15
		CARRIER/WAYBILL NUMBER: Greyhound	CITY, STATE: Orlando, FL 32811

STANDARD TAT ☐
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☒ 14 day

DATE YEAR 1999	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	Arsenic	Pesticides							COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)						G	G							
PRESERVATIVE USED						/	/							
10-20	1821	[redacted]	Soil	G	1	1					FS754-1			Cool to 4°C
↓	1842	CEF-P21-SU-402-03	↓	↓	1		1				-2			
	1837	[redacted]			1	1					-3	MS/MSD		
↓	1825	[redacted]			1	1					-4			
					5+									
10-20	0000	[redacted]	Soil	G	1	1					-5			
↓	1837	CEF-P21-SU-MSMSD04	↓	↓	1	1					(-5 MS/MSD)			
														Cooler ~4°C

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	10-20-99	1930	1. RECEIVED BY 0039 DSO 05PB10		
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE 10-25-99	TIME 1200
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

3/99
FORM NO. TINUS-001

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: F5152
Account: TETRPAPT - Tetra Tech, NUS
Project: TETRPAPT1252 - NAS Cecil Field

File ID: IR1027M1.ASC
QC Limits: result < RDL

Date Analyzed: 10/27/99
Run ID: MA1610

Methods: SW846 6010A
Units: ug/l

Metal	RDL	IDL	ICB raw	final	CCB raw	final	CCB raw	final	CCB raw	final
Aluminum	200	30	anr							
Antimony	5.0	2.39	anr							
Arsenic	10	3.4	anr							
Barium	200	.39	anr							
Beryllium	5.0	.36	anr							
Cadmium	5.0	.33	anr							
Calcium	1000	19.5	anr							
Chromium	10	.637	0.60	<10.0	-0.1	<10.0	-0.40	<10.0	-0.20	<10.0
Cobalt	50	.797	anr							
Copper	25	.747	anr							
Iron	300	32	anr							
Lead	5.0	1.59	-0.30	<5.0	0.40	<5.0	0.60	<5.0	-0.20	<5.0
Magnesium	5000	17.6	anr							
Manganese	15	.16	anr							
Molybdenum	50	.68	anr							
Nickel	40	1	anr							
Potassium	5000	28.2	anr							
Selenium	10	2	anr							
Silver	10	.96	anr							
Sodium	5000	153	anr							
Thallium	10	2.69	anr							
Tin	50	2.2	anr							
Vanadium	50	.717	1.0	<50.0B	0.30	<50.0	-0.40	<50.0	0.30	<50.0
Zinc	20	.83	anr							

(*) Outside of QC limits
(anr) Analyte not requested

000028

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: F5152
Account: TETRPAPT - Tetra Tech, NUS
Project: TETRPAPT1252 - NAS Cecil Field

File ID: IR1027M1.ASC
QC Limits: result < RDL

Date Analyzed: 10/27/99
Run ID: MA1610

Methods: SW846 6010A
Units: ug/l

Metal	RDL	IDL	CCB raw	final	CCB raw	final	CCB raw	final	CCB raw	final
Aluminum	200	30	anr							
Antimony	5.0	2.39	anr							
Arsenic	10	3.4	anr							
Barium	200	.39	anr							
Beryllium	5.0	.36	anr							
Cadmium	5.0	.33	anr							
Calcium	1000	19.5	anr							
Chromium	10	.637	-0.10	<10.0	0.17	<10	0.21	<10	0.50	<10.0
Cobalt	50	.797	anr							
Copper	25	.747	anr							
Iron	300	32	anr							
Lead	5.0	1.59	0.20	<5.0	-0.25	<5.0	1.0	<5.0	0.80	<5.0
Magnesium	5000	17.6	anr							
Manganese	15	.16	anr							
Molybdenum	50	.68	anr							
Nickel	40	1	anr							
Potassium	5000	28.2	anr							
Selenium	10	2	anr							
Silver	10	.96	anr							
Sodium	5000	153	anr							
Thallium	10	2.69	anr							
Tin	50	2.2	anr							
Vanadium	50	.717	0.20	<50.0	0.47	<50	0.32	<50	0.80	<50.0B
Zinc	20	.83	anr							

(*) Outside of QC limits
(anr) Analyte not requested

000027

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: F5152
Account: TETRPAPT - Tetra Tech, NUS
Project: TETRPAPT1252 - NAS Cecil Field

QC Batch ID: MP2193
Matrix Type: AQUEOUS

Methods: SW846 6010A
Units: ug/l

Prep Date: 10/26/99

Metal	RDL	IDL	MB raw	final
Aluminum	200	30	anr	
Antimony	5.0	2.4	anr	
Arsenic	10.0	3.4	anr	
Barium	200	.39	anr	
Beryllium	5.0	.36	anr	
Cadmium	5.0	.33	anr	
Calcium	1000	19.5	anr	
Chromium	10.0	.64	-0.31	<10.0
Cobalt	50.0	.8	anr	
Copper	25.0	.75	anr	
Iron	300	32	anr	
Lead	5.0	1.6	0.56	<5.0
Magnesium	5000	17.6	anr	
Manganese	15.0	.16	anr	
Molybdenum	50.0	.68	anr	
Nickel	40.0	1	anr	
Potassium	5000	28.2	anr	
Selenium	10.0	2	anr	
Silver	10.0	.96	anr	
Sodium	5000	153	anr	
Thallium	10.0	2.7	anr	
Tin	50.0	2.2	anr	
Vanadium	50.0	.72	-0.11	<50.0
Zinc	20.0	.83	anr	

Associated samples MP2193: F5152-1, F5152-2, F5152-3, F5152-4, F5152-1A, F5152-2A, F5152-3A, F5152-4A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

Metals Digestion Log: Water MP2193

Method Of Digestion: ICP 3010A Temp: 94 Thermometer ID#: 18

Added:	HNO_3	HC1	H_2O_2
Mfg:	Fisher	Fisher	
Lot #:	118070	418091	

Sample #	Init. Vol / Wt	Final Vol / Wt	Date	Comments
F5152.1 -DUP	50	50	10.26.99	
F5152.1 -MS				spiked w/1.0 ml QCC173+0.5ml GN762+0.25ml QCC149
1- F5152.1 MSD				same as MS
2- F5152.1				
3- F5152.2				
4- F5152.3				
5- F5152.4				
6- F5152.1A				
7- F5152.2A				
8- F5152.3A				
9- F5152.4A	✓	✓	✓	
10-				
11-				
12-				
13-				
14-				
15-				
16-				
17-				
18-				
19-				
20-				
MB/SB	50	50	10.26.99	
MB/SB	✓	✓	✓	same as MS

Analyst's Signature: Steve Lee Date: 10.26.99

QC Review: Date:

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: F5152
Account: TETRPAPT - Tetra Tech, NUS
Project: TETRPAPT1252 - NAS Cecil Field

File ID: IR1027M1.ASC
Analyst: JK
Parameters: Cr,Pb,V

Date Analyzed: 10/27/99
Run ID: MA1610

Methods: SW846 6010A

Time	Sample Description	Dilution Factor	PS Recov	Comments
08:02	MA1610-ICV1	1		
08:08	MA1610-ICB1	1		
08:14	MA1610-CCV1	1		
08:20	MA1610-CCB1	1		
08:26	MA1610-CRIA1	1		
08:36	MA1610-CRI1	1		
08:44	MA1610-ICSA1	1		
08:53	MA1610-ICSAB1	1		
09:00	MA1610-CCV2	1		
09:08	MA1610-CCB2	1		
09:14	MP2192-MB1	1		
09:20	MP2192-B1	1		
09:26	MP2192-D1	1		
09:32	F5105-1	1		(sample used for QC only; not part of login F5152)
09:37	MP2192-S1	1		
09:43	MP2192-S2	1		
09:49	MP2192-SD1	5		
09:55	ZZZZZZ	1		
10:01	MP2193-MB1	1		
10:07	MA1610-CCV3	1		
10:13	MA1610-CCB3	1		
10:20	MP2193-B1	1		
10:26	MP2193-D1	1		
10:32	F5152-1	1		
10:38	MP2193-S1	1		
10:44	MP2193-S2	1		
10:50	MP2193-SD1	5		
10:56	F5152-2	1		
11:01	F5152-3	1		
11:07	F5152-4	1		
11:13	MA1610-CCV4	1		
11:19	MA1610-CCB4	1		
11:25	F5152-1A	1		

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: F5152
Account: TETRPAPT - Tetra Tech, NUS
Project: TETRPAPT1252 - NAS Cecil Field

File ID: IR1027M1.ASC
Analyst: JK
Parameters: Cr,Pb,V

Date Analyzed: 10/27/99
Run ID: MA1610

Methods: SW846 6010A

Time	Sample Description	Dilution Factor	PS Recov	Comments
11:31	F5152-2A	1		
11:37	F5152-3A	1		
11:44	F5152-4A	1		
11:50	MP2194-MB1	1		
11:56	MP2194-B1	1		
12:02	MP2194-D1	1		
12:08	F5136-6	1		(sample used for QC only; not part of login F5152)
12:13	MP2194-S1	1		
12:21	MA1610-CCV5	1		
12:27	MA1610-CCB5	1		
12:33	MP2194-S2	1		
12:39	MP2194-SD1	5		
12:44	ZZZZZZ	1		
12:50	ZZZZZZ	1		
12:56	ZZZZZZ	1		
13:02	ZZZZZZ	1		
13:08	ZZZZZZ	1		
13:14	ZZZZZZ	1		
13:20	ZZZZZZ	1		
13:26	MA1610-CCV6	1		
13:32	MA1610-CCB6	1		
13:38	ZZZZZZ	1		
13:44	ZZZZZZ	1		
13:50	MA1610-CCV7	1		
13:55	MA1610-CCB7	1		

Refer to raw data for calibration curve and standards.

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: F5154
Account: TETRPAPT - Tetra Tech, NUS
Project: TETRPAPT1252 - NAS Cecil Field

File ID: IR1027M1.ASC
QC Limits: result < RDL

Date Analyzed: 10/27/99
Run ID: MA1610

Methods: SW846 6010A
Units: ug/l

Metal	RDL	IDL	ICB raw	final	CCB raw	final	CCB raw	final	CCB raw	final
Aluminum	200	30	anr							
Antimony	5.0	2.39	anr							
Arsenic	10	3.4	4.4	<10.0B	0.90	<10.0	-1.1	<10.0	0.30	<10.0
Barium	200	.39	anr							
Beryllium	5.0	.36	anr							
Cadmium	5.0	.33	anr							
Calcium	1000	19.5	anr							
Chromium	10	.637	anr							
Cobalt	50	.797	anr							
Copper	25	.747	anr							
Iron	300	32	anr							
Lead	5.0	1.59	anr							
Magnesium	5000	17.6	anr							
Manganese	15	.16	anr							
Molybdenum	50	.68	anr							
Nickel	40	1	anr							
Potassium	5000	28.2	anr							
Selenium	10	2	anr							
Silver	10	.96	anr							
Sodium	5000	153	anr							
Thallium	10	2.69	anr							
Tin	50	2.2	anr							
Vanadium	50	.717	anr							
Zinc	20	.83	anr							

(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: F5154
Account: TETRPAPT - Tetra Tech, NUS
Project: TETRPAPT1252 - NAS Cecil Field

File ID: IR1027M1.ASC
QC Limits: result < RDL

Date Analyzed: 10/27/99
Run ID: MA1610

Methods: SW846 6010A
Units: ug/l

Metal	RDL	IDL	CCB raw	final	CCB raw	final	CCB raw	final	CCB raw	final
Aluminum	200	30	anr							
Antimony	5.0	2.39	anr							
Arsenic	10	3.4	1.6	<10.0	0.85	<10	2.7	<10	3.2	<10.0
Barium	200	.39	anr							
Beryllium	5.0	.36	anr							
Cadmium	5.0	.33	anr							
Calcium	1000	19.5	anr							
Chromium	10	.637	anr							
Cobalt	50	.797	anr							
Copper	25	.747	anr							
Iron	300	32	anr							
Lead	5.0	1.59	anr							
Magnesium	5000	17.6	anr							
Manganese	15	.16	anr							
Molybdenum	50	.68	anr							
Nickel	40	1	anr							
Potassium	5000	28.2	anr							
Selenium	10	2	anr							
Silver	10	.96	anr							
Sodium	5000	153	anr							
Thallium	10	2.69	anr							
Tin	50	2.2	anr							
Vanadium	50	.717	anr							
Zinc	20	.83	anr							

(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: F5154
Account: TETRPAPT - Tetra Tech, NUS
Project: TETRPAPT1252 - NAS Cecil Field

File ID: IR1028M1.ASC
QC Limits: result < RDL

Date Analyzed: 10/28/99
Run ID: MA1615

Methods: SW846 6010A
Units: ug/l

Metal	RDL	IDL	ICB raw	final	CCB raw	final	CCB raw	final	CCB raw	final
Aluminum	200	30	anr							
Antimony	60	2.39	anr							
Arsenic	10	3.4	0.56	<500	0.80	<500	-0.31	<500	0.60	<10.0
Barium	200	.39	anr							
Beryllium	5.0	.36	anr							
Cadmium	4.0	.33	anr							
Calcium	5000	19.5	anr							
Chromium	10	.637	anr							
Cobalt	50	.797	anr							
Copper	25	.747	anr							
Iron	100	32	anr							
Lead	100	1.59	anr							
Magnesium	5000	17.6	anr							
Manganese	15	.16	anr							
Molybdenum	50	.68	anr							
Nickel	40	1	anr							
Potassium	5000	28.2	anr							
Selenium	100	2	anr							
Silver	10	.96	anr							
Sodium	5000	153	anr							
Thallium	10	2.69	anr							
Tin	50	2.2	anr							
Vanadium	50	.717	anr							
Zinc	20	.83	anr							

(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: F5154
Account: TETRPAPT - Tetra Tech, NUS
Project: TETRPAPT1252 - NAS Cecil Field

File ID: IR1028M1.ASC
QC Limits: result < RDL

Date Analyzed: 10/28/99
Run ID: MA1615

Methods: SW846 6010A
Units: ug/l

Metal	RDL	IDL	CCB raw	final	CCB raw	final	CCB raw	final
Aluminum	200	30	anr					
Antimony	60	2.39	anr					
Arsenic	10	3.4	1.6	<500	-1.7	<10.0	0.51	<500
Barium	200	.39	anr					
Beryllium	5.0	.36	anr					
Cadmium	4.0	.33	anr					
Calcium	5000	19.5	anr					
Chromium	10	.637	anr					
Cobalt	50	.797	anr					
Copper	25	.747	anr					
Iron	100	32	anr					
Lead	100	1.59	anr					
Magnesium	5000	17.6	anr					
Manganese	15	.16	anr					
Molybdenum	50	.68	anr					
Nickel	40	1	anr					
Potassium	5000	28.2	anr					
Selenium	100	2	anr					
Silver	10	.96	anr					
Sodium	5000	153	anr					
Thallium	10	2.69	anr					
Tin	50	2.2	anr					
Vanadium	50	.717	anr					
Zinc	20	.83	anr					

(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: F5154
Account: TETRPAPT - Tetra Tech, NUS
Project: TETRPAPT1252 - NAS Cecil Field

QC Batch ID: MP2194
Matrix Type: SOLID

Methods: SW846 6010A
Units: mg/kg

Prep Date: 10/26/99

Metal	RDL	IDL	MB raw	final
Aluminum	20	3	anr	
Antimony	6.0	.239	anr	
Arsenic	1.0	.345	0.13	<1.0
Barium	20	.039	anr	
Beryllium	0.50	.0363	anr	
Cadmium	0.40	.033	anr	
Calcium	500	1.95	anr	
Chromium	1.0	.0637	anr	
Cobalt	5.0	.0797	anr	
Copper	2.5	.0747	anr	
Iron	10	3.2	anr	
Lead	10	.159	anr	
Magnesium	500	1.76	anr	
Manganese	1.5	.016	anr	
Molybdenum	5.0	.068	anr	
Nickel	4.0	.1	anr	
Potassium	500	2.82	anr	
Selenium	10	.204	anr	
Silver	1.0	.0963	anr	
Sodium	500	15.3	anr	
Thallium	1.0	.269	anr	
Tin	5.0	.223	anr	
Vanadium	5.0	.0717	anr	
Zinc	2.0	.083	anr	

Associated samples MP2194: F5154-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: F5154
Account: TETRPAPT - Tetra Tech, NUS
Project: TETRPAPT1252 - NAS Cecil Field

QC Batch ID: MP2198
Matrix Type: SOLID

Methods: SW846 6010A
Units: mg/kg

Prep Date: 10/27/99

Metal	RDL	IDL	MB raw	final
Aluminum	20.0	3	anr	
Antimony	6.0	.24	anr	
Arsenic	1.0	.34	0.02	<1.0
Barium	20.0	.04	anr	
Beryllium	0.50	.04	anr	
Cadmium	0.40	.03	anr	
Calcium	500	2	anr	
Chromium	1.0	.06	anr	
Cobalt	5.0	.08	anr	
Copper	2.5	.07	anr	
Iron	10.0	3.2	anr	
Lead	10.0	.16	anr	
Magnesium	500	1.8	anr	
Manganese	1.5	.02	anr	
Molybdenum	5.0	.07	anr	
Nickel	4.0	.1	anr	
Potassium	500	2.8	anr	
Selenium	10.0	.2	anr	
Silver	1.0	.1	anr	
Sodium	500	15.3	anr	
Thallium	1.0	.27	anr	
Tin	5.0	.22	anr	
Vanadium	5.0	.07	anr	
Zinc	2.0	.08	anr	

Associated samples MP2198: F5154-3, F5154-4, F5154-5

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

METALS DIGESTION LOG: SOIL MP2194

Method of Digestion: ICP 3050B Temp: 94 Thermometer ID#: 18

Analyst: SJL

Added:	HNO_3	HCl	H_2O_2
Mfg:	Fisher	Fisher	Fisher
Lot #:	118070	418091	983019

Sample #	WT	Final Vol.	% Sol	Digestion Factor	Date	Comments
F5136.6 DUP	0.97	100			102699	
F5136.6 MS	0.95					spiked w/ 2.0ml ccc113 + 1.0ml QN7632 + 0.5ml ccc149 SJL
1- F5136.6 MSD	0.95					same as MS
2- F5136.6	1.07					
3- F5136.7	1.03					
4- F5149.2	1.06					
5- F5149.3	0.96					
6- F5149.4	1.01					
7- F5149.5	0.97					
8- F5149.6	1.01					
9- F5149.7	1.04					
10- F5153.2	1.00					
11- F5154.1	0.98	✓			✓	
12-						
13-						
14-						
15-						
16-						
17-						
18-						
19-						
20-						
MB/SB	100	100			102699	
MB/SB	✓	✓			✓	same as MS

RELINQUISHED BY: Steel Lee DATE: 10.26.99

METALS DIGESTION LOG: SOIL MP2198

Method of Digestion: ICP 3050B Temp: 94 Thermometer ID#: 18

Analyst: SJL

Added:	HNO_3	HCl	H_2O_2
Mfg:	Fisher	Fisher	Fisher
Lot #:	118070	418091	983019

Sample #	WT	Final Vol.	% Sol	Digestion Factor	Date	Comments
F5154.3 - DUP	1.02	100			10.27.99	
F5154.3 - MS	1.06	↓			↓	spiked w/2.0ml acc173 + 1.0ml GN807 + 0.5ml acc149
1- F5154.3 (MSD)	1.14	↓			↓	same as MS
2- F5154.3	1.06	↓			↓	
3- F5154.4	1.03	↓			↓	
4- F5154.5	1.06	↓			↓	
5- F5166.1	1.02	↓			↓	
6- F5166.2	1.08	↓			↓	
7- F5166.3	0.98	↓			↓	
8- F5166.4	1.07	↓			↓	
9-						
10-						
11-						
12-						
13-						
14-						
15-						
16-						
17-						
18-						
19-						
20-						
MB/SB	100	100			10.27.99	
MB/SB	↓	↓			↓	same as MS

RELINQUISHED BY: Steve Lee DATE: 10.27.99

ACCEPTED BY: DATE:

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: F5154
Account: TETRPAPT - Tetra Tech, NUS
Project: TETRPAPT1252 - NAS Cecil Field

File ID: IR1027M1.ASC
Analyst: JK
Parameters: As

Date Analyzed: 10/27/99
Run ID: MA1610

Methods: SW846 6010A

Time	Sample Description	Dilution Factor	PS Recov	Comments
08:02	MA1610-ICV1	1		
08:08	MA1610-ICB1	1		
08:14	MA1610-CCV1	1		
08:20	MA1610-CCB1	1		
08:26	MA1610-CRIA1	1		
08:36	MA1610-CRI1	1		
08:44	MA1610-ICSA1	1		
08:53	MA1610-ICSAB1	1		
09:00	MA1610-CCV2	1		
09:08	MA1610-CCB2	1		
09:14	MP2192-MB1	1		
09:20	MP2192-B1	1		
09:26	MP2192-D1	1		
09:32	F5105-1	1		(sample used for QC only; not part of login F5154)
09:37	MP2192-S1	1		
09:43	MP2192-S2	1		
09:49	MP2192-SD1	5		
09:55	ZZZZZZ	1		
10:01	MP2193-MB1	1		
10:07	MA1610-CCV3	1		
10:13	MA1610-CCB3	1		
10:20	MP2193-B1	1		
10:26	MP2193-D1	1		
10:32	F5152-1	1		(sample used for QC only; not part of login F5154)
10:38	MP2193-S1	1		
10:44	MP2193-S2	1		
10:50	MP2193-SD1	5		
10:56	ZZZZZZ	1		
11:01	ZZZZZZ	1		
11:07	ZZZZZZ	1		
11:13	MA1610-CCV4	1		
11:19	MA1610-CCB4	1		
11:25	ZZZZZZ	1		

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: F5154
Account: TETRPAPT - Tetra Tech, NUS
Project: TETRPAPT1252 - NAS Cecil Field

File ID: IR1027M1.ASC
Analyst: JK
Parameters: As

Date Analyzed: 10/27/99
Run ID: MA1610

Methods: SW846 6010A

Time	Sample Description	Dilution Factor	PS Recov	Comments
11:31	ZZZZZZ	1		
11:37	ZZZZZZ	1		
11:44	ZZZZZZ	1		
11:50	MP2194-MB1	1		
11:56	MP2194-B1	1		
12:02	MP2194-D1	1		
12:08	F5136-6	1		(sample used for QC only; not part of login F5154)
12:13	MP2194-S1	1		
12:21	MA1610-CCV5	1		
12:27	MA1610-CCB5	1		
12:33	MP2194-S2	1		
12:39	MP2194-SD1	5		
12:44	ZZZZZZ	1		
12:50	ZZZZZZ	1		
12:56	ZZZZZZ	1		
13:02	ZZZZZZ	1		
13:08	ZZZZZZ	1		
13:14	ZZZZZZ	1		
13:20	ZZZZZZ	1		
13:26	MA1610-CCV6	1		
13:32	MA1610-CCB6	1		
13:38	ZZZZZZ	1		
13:44	F5154-1	1		
13:50	MA1610-CCV7	1		
13:55	MA1610-CCB7	1		

Refer to raw data for calibration curve and standards.

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: F5154
Account: TETRPAPT - Tetra Tech, NUS
Project: TETRPAPT1252 - NAS Cecil Field

File ID: IR1028M1.ASC
Analyst: JK
Parameters: As

Date Analyzed: 10/28/99
Run ID: MA1615

Methods: SW846 6010A

Time	Sample Description	Dilution Factor	PS Recov	Comments
07:33	MA1615-ICV1	1		
07:39	MA1615-ICB1	1		
07:45	MA1615-CCV1	1		
07:51	MA1615-CCB1	1		
07:57	MA1615-CRIA1	1		
08:03	MA1615-CRI1	1		
08:10	MA1615-ICSA1	1		
08:22	MA1615-ICSAB1	1		
08:28	MA1615-CCV2	1		
08:34	MA1615-CCB2	1		
08:40	MP2197-MB1	1		
08:45	MP2197-B1	1		
08:52	MP2199-MB1	1		
08:58	MP2199-B1	1		
09:03	MP2199-D1	1		
09:09	F5175-1	1		(sample used for QC only; not part of login F5154)
09:15	MP2199-S1	1		
09:21	MP2199-S2	1		
09:27	MP2199-SD1	5		
09:33	MA1615-CCV3	1		
09:39	MA1615-CCB3	1		
09:45	ZZZZZZ	1		
09:51	ZZZZZZ	1		
09:57	ZZZZZZ	1		
10:03	ZZZZZZ	1		
10:09	ZZZZZZ	1		
10:20	ZZZZZZ	1		
10:26	ZZZZZZ	1		
10:32	MP2197-D1	1		
10:38	F5160-3	1		(sample used for QC only; not part of login F5154)
10:48	MA1615-CCV4	1		
10:54	MA1615-CCB4	1		
11:00	MP2197-S1	1		

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: F5154
Account: TETRPAPT - Tetra Tech, NUS
Project: TETRPAPT1252 - NAS Cecil Field

File ID: IR1028M1.ASC
Analyst: JK
Parameters: As

Date Analyzed: 10/28/99
Run ID: MA1615

Methods: SW846 6010A

Time	Sample Description	Dilution Factor	PS Recov	Comments
11:06	MP2197-S2	1		
11:12	MP2197-SD1	5		
11:18	ZZZZZZ	1		
11:24	MP2197-MB2	1		
11:34	MP2198-MB1	1		
11:40	MP2198-B1	1		
11:46	MP2198-D1	1		
11:52	F5154-3	1		
11:58	MA1615-CCV5	1		
12:03	MA1615-CCB5	1		
12:09	MP2198-S1	1		
12:15	MP2198-S2	1		
12:21	MP2198-SD1	5		
12:28	F5154-4	1		
12:34	F5154-5	1		
12:40	ZZZZZZ	1		
12:46	ZZZZZZ	1		
12:51	ZZZZZZ	1		
12:57	ZZZZZZ	1		
13:03	MA1615-CCV6	1		
13:09	MA1615-CCB6	1		

Refer to raw data for calibration curve and standards.

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE 1 OF 1

CLIENT Cecil Field		JOB NUMBER	
SUBJECT Field Duplicate Comparison			
BASED ON		DRAWING NUMBER	
BY Gap	CHECKED BY	APPROVED BY	DATE

	CEF-HEL-GW-01S-2	CEF-HEL-GW-DU02	%RPD
Cr	3.7	2.6	35%
Pb	2.4	1.6	40%
V	10.6	8.6	21%

	CEF-HEL-GW-01S-2-F	CEF-HEL-GW-DU02-F	%RPD
Cr	1.6	0.95	51%
Pb	1.6 U	1.6 U	0%
V	7.0	6.4	9%

	CEF-PZ1-SU-404-03	CEF-PZ1-SU-DU06	%RPD
As	0.42 U	0.87 U	0%

APPENDIX B
BORING LOGS AND
MONITORING WELL CONSTRUCTION INFORMATION

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NAS CECIL FIELD
PROJECT NUMBER: 0039
DRILLING COMPANY: GROUNDWATER PROTECTION
DRILLING RIG: DIEDRICH D-25

BORING NUMBER: CEF-HEL-01S
DATE: 7/6/99
GEOLOGIST: A WILCOX
DRILLER: SHANE NOWLEN

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole BZ	Driller BZ
	0-4		N/A			DK BRN	F SILTY SAND, ORG.	SM	DRY HA	19*			0
							SMELL, SOME HYDROCARBON						
	4-4.5					DK GREY	F SILTY SAND	SM	DRY				
	4.5-8					MD BRN	F SILTY SAND	SM	DAMP				
	8-9					LT GREY	F SILTY SAND	SM	MOIST	42*			
	9-10					LT BRN	F SILTY SAND	SM	WET				
	10-15					GREY/BROWN	F SILTY SAND W/CLAY	SM-SC	SATURATED				
							EOB 15' BLS						

* 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): 0.00

Remarks: HA-HAND AUGER TO 4' BLS. BZ=0.00 ppm

* POSSIBLY ORGANIC

Converted to Well: Yes ✓ No _____ Well I.D. #: CEF-HEL-01S

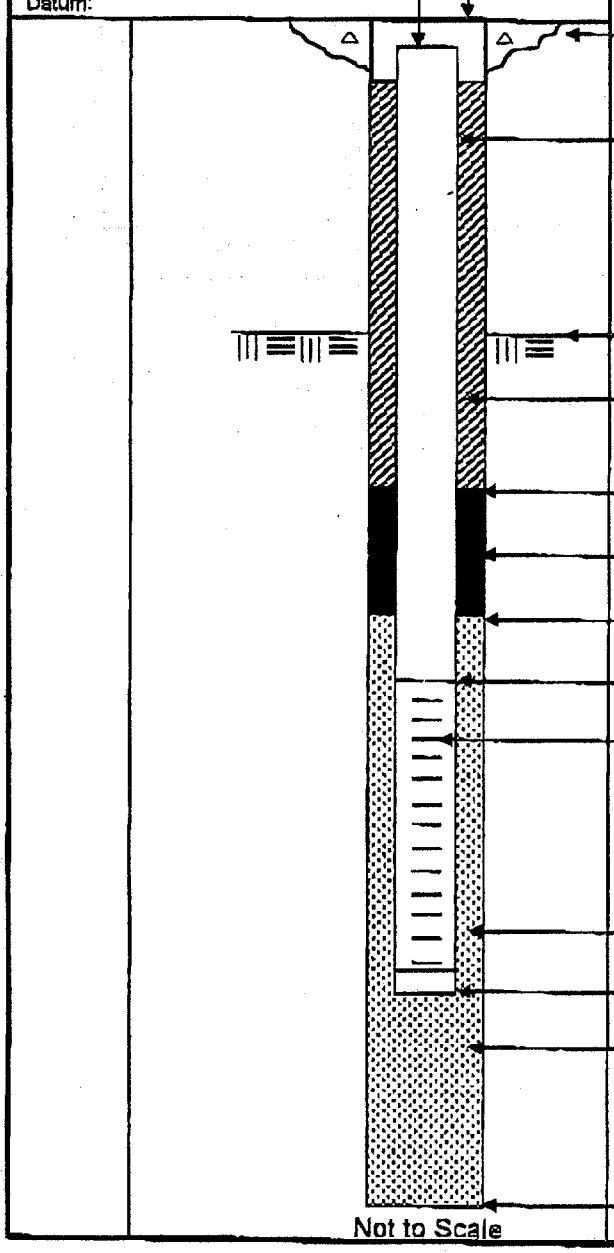
Tetra Tech NUS, Inc.

WELL No.: CEF-HEL-01S

MONITORING WELL SHEET

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	Groundwater Protection	BORING No.:	CEF-HEL-001S
PROJECT No.:	0039	DRILLER:	Shane Nowlen	DATE COMPLETED:	7/6/99
SITE:	HELO PAD	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	A WILLCOX	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =
Datum:



Not to Scale

Elevation / Depth of Top of Riser:	/
Elevation / Height of Top of Surface Casing:	/
I.D. of Surface Casing:	8"
Type of Surface Casing:	SS MANHOLE
Type of Surface Seal:	QUICKRETE
I.D. of Riser:	2"
Type of Riser:	PVC SCH 40
Borehole Diameter:	8"
Elevation / Depth Top of Rock:	/
Type of Backfill:	QUICKRETE
Elevation / Depth of Seal:	/ 1'
Type of Seal:	30/65 sand
Elevation / Depth of Top of Filter Pack:	/ 3'
Elevation / Depth of Top of Screen:	/ 5'
Type of Screen:	PVC SCH 40
Slot Size x Length:	0.010 x 10'
I.D. of Screen:	2"
Type of Filter Pack:	20/30 SAND
Elevation / Depth of Bottom of Screen:	/ 15'
Elevation / Depth of Bottom of Filter Pack:	/ 15'
Type of Backfill Below Well:	SOIL
Elevation / Total Depth of Borehole:	/ 15'

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NAS CECIL FIELD
PROJECT NUMBER: 0039
DRILLING COMPANY: GROUNDWATER PROTECTION
DRILLING RIG: DIEDRICH D-25

BORING NUMBER: CEF-HEM-~~15~~ 015
DATE: 7/6/99
GEOLOGIST: A WILCOX
DRILLER: SHANE NOWLEN

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	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	PID/FID Reading (ppm): Sampler BZ	PID/FID Reading (ppm): Borehole	PID/FID Reading (ppm): Drill Bit
	0-1		N/A		N/A	DK BRN	F SILTY SAND	SM	DRY HA				0
	1-3					LT BRN	F SILTY SAND w/ CLAY	SM-SC	MOIST				
	3-9					LT BRN	F SILTY SAND w/ SOME CLAY	SM-SC	SATURATED ~4'				
	9-12					MED BRN	F SILTY SAND EOB - 12' BLS.	SM	SATURATED				

* 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): 0.00

Remarks: HAND AUGER TO 4' BZ = 0.00 PPM.

Converted to Well: Yes ✓ No _____ Well I.D. #: CEF-HEM-015

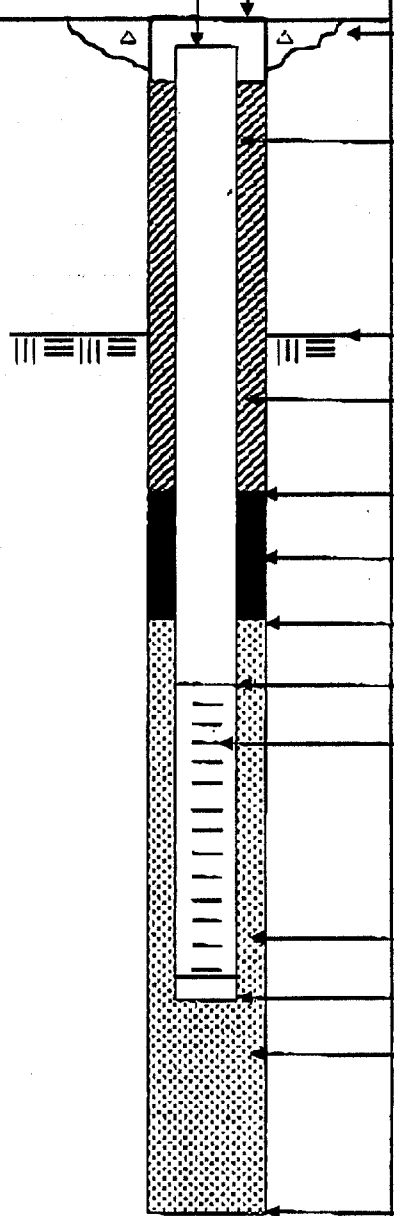
Tetra Tech NUS, Inc.

WELL No.: CEF-HEM-01S

MONITORING WELL SHEET

PROJECT:	NAS CECIL FIELD	DRILLING Co.:	Groundwater Protection	BORING No.:	CEF-HEM-01S
PROJECT No.:	0039	DRILLER:	Steve Nowlen	DATE COMPLETED:	7/6/99
SITE:	HEM	DRILLING METHOD:	HSA	NORTHING:	
GEOLOGIST:	A Wilcox	DEV. METHOD:	Submersible	EASTING:	

Ground Elevation =
Datum:



Not to Scale

Elevation / Depth of Top of Riser:	/
Elevation / Height of Top of Surface Casing:	/
I.D. of Surface Casing:	8"
Type of Surface Casing:	SS Manhole
Type of Surface Seal:	Quickcrete
I.D. of Riser:	2"
Type of Riser:	PVC 2" SCH40
Borehole Diameter:	8"
Elevation / Depth Top of Rock:	/
Type of Backfill:	Quickcrete
Elevation / Depth of Seal:	/ 0.5
Type of Seal:	30/65 Sand
Elevation / Depth of Top of Filter Pack:	/ 1.5
Elevation / Depth of Top of Screen:	/ 2
Type of Screen:	PVC SCH40
Slot Size x Length:	0.010 x 10'
I.D. of Screen:	2"
Type of Filter Pack:	20/30 Sand
Elevation / Depth of Bottom of Screen:	/ 12'
Elevation / Depth of Bottom of Filter Pack:	/ 12'
Type of Backfill Below Well:	
Elevation / Total Depth of Borehole:	/ 12'