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NAS KEY WEST  
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GROUNDWATER MONITORING REPORT FIRST QUARTER FOR BOCA CHICA FLYING  
CLUB UNDERGROUND STORAGE TANK SITE 9 WITH TRANSMITTAL LETTER NAS KEY  
WEST FL  
12/19/2000  
TETRA TECH NUS



TETRA TECH NUS, INC.

AIK-00-0415

December 19, 2000

Project Number HK 0395

*via Electronic Mail*

Byas Glover (Code 18410)  
Department of the Navy  
SOUTHDIV NAVFACENGCOM  
P.O. Box 190010  
North Charleston, South Carolina 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888  
Contract Task Order No. 059

Subject: Groundwater Monitoring Report for Flying Club Site, UST Site 9, 1<sup>st</sup> Quarter, Rev. 0,  
Naval Air Station Key West, Florida

Dear Mr. Glover:

TtNUS is pleased to submit the enclosed PDF file of the Groundwater Monitoring Report for Flying Club Site, UST Site 9, 1<sup>st</sup> Quarter, Rev. 0, Naval Air Station Key West, Florida. At your request, a copy of this report is being distributed to the Florida Department of Environmental Protection FDEP for their review and comment or concurrence. I am planning on receiving comments or concurrence on this document from FDEP within the next 30 days.

Table 1-1 of the enclosed report shows that benzene continues to exceed its cleanup target level of 10 µg/L in MW-6; however, the benzene appears to be attenuating over time. Thus, the current trend indicates that benzene will be reduced to below its target level within a year. The report recommends continuation of the quarterly monitoring at this site.

Please call me at (803) 649-7963, extension 345, if you have any questions regarding the enclosed report.

Sincerely,

C. M. Bryan  
Project Manager

CMB:spc

Enclosure

c: Ms. Debbie Wroblewski (Cover Letter Only)  
Mr. Jorge Caspary, FDEP  
File: 0395-7.3.1

Mr. R. Courtright, NAS Key West  
Mr. M. Perry/File

**GROUNDWATER MONITORING REPORT**  
**for**  
**FLYING CLUB SITE**  
**UST SITE 9**  
**(1ST QUARTER)**

**Naval Air Station**  
**Key West, Florida**



**Southern Division**  
**Naval Facilities Engineering Command**

**Contract Number N62467-94-D-0888**

**Contract Task Order 110**

**December 2000**

*Revision 0*

**GROUNDWATER MONITORING REPORT  
FOR  
FLYING CLUB SITE  
UST SITE 9  
  
(1<sup>ST</sup> QUARTER)**

**NAVAL AIR STATION  
KEY WEST, FLORIDA**

**COMPREHENSIVE PERFORMANCE  
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT**

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

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

**CONTRACT NUMBER N62467-94-D-0888  
CONTRACT TASK ORDER 0110**

**DECEMBER 2000**

**PREPARED UNDER THE SUPERVISION OF:**

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**CHUCK BRYAN  
TASK ORDER MANAGER  
TETRA TECH NUS, INC.  
AIKEN, SOUTH CAROLINA**

**APPROVED FOR SUBMITTAL BY:**



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

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## ACRONYMS

CLEAN	Comprehensive Long-Term Environmental Action, Navy
CTO	Contract Task Order
F.A.C.	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
GCTL	Groundwater Contaminant Target Levels
KAG	Kerosene Analytical Group
µg/L	micrograms per liter
MW	monitoring well
TRPH	total recoverable petroleum hydrocarbons
TtNUS	Tetra Tech NUS, Inc.
UST	underground storage tank

## **1.0 QUARTERLY REPORT**

Tetra Tech NUS, Inc. (TtNUS), is pleased to submit the Groundwater Monitoring Report for the referenced Contract Task Order (CTO). This report has been prepared for the U.S. Navy Southern Division Naval Facilities Engineering Command under CTO-0100, for the Comprehensive Long-Term Environmental Action, Navy (CLEAN) Contract Number N62467-94-D-0888.

### **1.1 SITE OVERVIEW**

A groundwater monitoring program presented in the Remedial Action Plan (ABB-ES, 1997) for the Flying Club Site (Underground Storage Tank [UST] Site 9), Naval Air Station, Key West, Florida, was implemented in August 1999. As stated in the program, four of the site's monitoring wells were sampled for the Kerosene Analytical Group (KAG) parameters for a period of one year. At the end of the program, only one monitoring well (KYW-A-127-MW-6) had concentrations that exceeded Florida Department of Protection (FDEP) Groundwater Contaminant Target Levels (GCTLs), Chapter 62-770, Florida Administrative Code (F.A.C.). Based on these results, TtNUS recommended (Annual Groundwater Monitoring Plan Report, 2000) that future groundwater monitoring include only the sampling of well KYW-A-127-MW-6 for an additional year (TtNUS, July 2000). In August 2000, FDEP approved the recommendation and requested that monitoring well KYW-A-127-MW-20 be added to the sampling program as a perimeter well.

### **1.2 MONITORING OBJECTIVES**

The objective of the quarterly monitoring program is to evaluate the natural attenuation of the groundwater contaminant plume to determine when and if Groundwater Cleanup Target Levels (GCTLs) are achieved. Groundwater samples will be analyzed for the KAG parameters listed in the FDEP GCTLs, Chapter 62-770, F.A.C.

Groundwater at the site is classified as a G-III aquifer (McKenzie, 1990). As a result of this classification, the FDEP GCTLs for groundwater of low yield/poor quality, as prescribed by Chapter 62-770, are the appropriate GCTLs for the site.

### **1.3 FIRST QUARTERLY MONITORING**

On October 5, 2000, TtNUS personnel collected groundwater samples from two UST Site 9 monitoring wells (KYW-A-127-MW-6 and KYW-A-127-MW-20). A duplicate groundwater sample was also collected for laboratory analysis. All sampling activities were conducted in accordance with the TtNUS FDEP-approved CompQAP #980038.

Immediately prior to collection of the groundwater samples, water levels and product measurements were recorded from each monitoring well. Free phase petroleum product was not detected in either well during this event. The water level data was used to determine purge volumes.

Following collection of the groundwater samples, the sample bottles were packed in ice and shipped via overnight transport to Katahdin Analytical Services in Westbrook, Maine. The samples were analyzed for the KAG parameters. Analytical results for the first quarterly groundwater sampling event are summarized in Table 1-1. A copy of the laboratory report is provided in Appendix A.

### **1.4 CONCLUSIONS AND RECOMMENDATIONS**

Benzene, toluene, ethylbenzene, and total xylene concentrations were detected in monitoring well KYW-A-127-MW-6 at concentrations of 20 micrograms per liter ( $\mu\text{g/L}$ ),  $7\mu\text{g/L}$ ,  $280\ \mu\text{g/L}$ , and  $44\ \mu\text{g/L}$ , respectively. Benzene was the only contaminant detected above its GCTL. Total Recoverable Petroleum Hydrocarbons (TRPH) was detected at a concentration of  $1,500\ \mu\text{g/L}$  in well KYW-A-127-MW-6, also above its GCTL of  $50\ \mu\text{g/L}$ . Other KAG constituents were below their respective GCTLs. Petroleum hydrocarbon concentrations, except for TRPH levels, were generally consistent with historical data collected from KYW-A-127-MW-6. TRPH levels were significantly higher during this quarter than results previously obtained.

Ethylbenzene was the only volatile organic aromatic detected in well KYW-A-127-MW-20. Naphthalene was detected at  $11\ \mu\text{g/L}$ , well below its GTCL of  $200\ \mu\text{g/L}$ . No constituents in the KAG were detected above GTCLs in the sample collected from perimeter well KYW-A-127-MW-20.

Based on results of the first quarterly sampling event, TtNUS recommends continuation of quarterly sampling for the KAG parameters for an additional three quarters (nine months), a total monitoring period of one year.

**TABLE 1-1**  
**GROUNDWATER MONITORING WELL ANALYTICAL SUMMARY**  
**UST SITE 9**  
**NAVAL AIR STATION**  
**KEY WEST, FLORIDA**

Sample		Benzene	Ethyl-benzene	Toluene	Total Xylenes	Naphthalene	TRPH	Lead
Location	Date							
KYW-A-127-MW-6	10/5/00	20	280	7	44	92	1,500	<7
KYW-A-127-DUP (MW-6)	10/5/00	21	250	7	46	110	1,500	<7.5
KYW-A-127-MW-20	10/5/00	<5	3*	<5	<5	11	<500	<5.9
Cleanup Target Level (1)		10	300	400	200	200	50	150

NOTES:

1) GCTLs as specified in Table VIII of Chapter 62-770, F.A.C.

TRPH = Total Recoverable Petroleum Hydrocarbons.

\* Denotes values less than the laboratory's Practical Quantitation Level



## REFERENCES

ABB-ES (Environmental Services, Inc.), 1997. Remedial Action Plan, Flying Club Site (UST Site 9), Naval Air Station, Key West, Florida, prepared for Southern Division Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), Charleston, South Carolina, August.

FDEP (Florida Department of Environmental Protection), 2000. Re: Annual Groundwater Monitoring Report for Flying Club Site, Key West, Florida, August 9.

McKenzie, D.J. , 1990. Water Resources Potential of the Freshwater Lens at Key West, Florida: U.S. Geological Survey Water-Resources Investigations Report 90-4115.

TtNUS, (Tetra Tech NUS, Inc.), 2000. Annual Groundwater Monitoring Plan Report for Flying Club UST Site 9, Naval Air Station, Key West, Florida, prepared for Southern Division Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), Charleston, South Carolina, July.

**APPENDIX A**  
**LABORATORY REPORT**

**CTO007-NAS KEY WEST**

**WATER DATA**

**KAS**

**SDG: NASKW10**

SAMPLE NUMBER:	FC1-DUP-01	FCMW-20-2Q1	FCMW-6-2Q1	PMP3-DUP-01
SAMPLE DATE:	10/05/00	10/05/00	10/05/00	10/05/00
LABORATORY ID:	WQ3034-6	WQ3034-5	WQ3034-4	WQ3034-2
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:	FCMW-6-2Q1			S1MW-8-PMP3

	RESULT	QUAL	CODE									
<b>VOLATILES</b>												
1,1,1,2-TETRACHLOROETHANE	5	U		5	U		5	U		5	U	
1,1,1-TRICHLOROETHANE	5	U		5	U		5	U		5	U	
1,1,2,2-TETRACHLOROETHANE	5	U		5	U		5	U		5	U	
1,1,2-TRICHLOROETHANE	5	U		5	U		5	U		5	U	
1,1-DICHLOROETHANE	5	U		5	U		5	U		5	U	
1,1-DICHLOROETHENE	5	U		5	U		5	U		5	U	
1,2,3-TRICHLOROPROPANE	5	U		5	U		5	U		5	U	
1,2-DIBROMO-3-CHLOROPROPANE	5	U		5	U		5	U		5	U	
1,2-DIBROMOETHANE	0.05	U		0.051	U		0.051	U		5	U	
1,2-DICHLOROETHANE	5	U		5	U		5	U		5	U	
1,2-DICHLOROPROPANE	5	U		5	U		5	U		5	U	
2-BUTANONE	10	U										
2-CHLOROETHYL VINYL ETHER	5	U		5	U		5	U		5	U	
2-HEXANONE	10	U										
4-METHYL-2-PENTANONE	10	U										
ACETONE	10	U										
ACETONITRILE	50	UR	C									
ACROLEIN	50	UR	C									
ACRYLONITRILE	10	U		10	UR	C	10	U		10	U	
ALLYL CHLORIDE	10	U										
BENZENE	21			5	U		20			4	J	P
BROMODICHLOROMETHANE	5	U		5	U		5	U		5	U	
BROMOFORM	5	U		5	U		5	U		5	U	
BROMOMETHANE	5	U		5	U		5	U		5	U	
CARBON DISULFIDE	5	U		5	U		5	U		5	U	
CARBON TETRACHLORIDE	5	U		5	U		5	U		5	U	
CHLOROBENZENE	5	U		5	U		5	U		4	J	P
CHLOROETHANE	5	U		5	U		5	U		5	U	
CHLOROFORM	5	U		5	U		5	U		5	U	
CHLOROMETHANE	5	U		5	U		5	U		5	U	
CHLOROPRENE	10	U										
CIS-1,3-DICHLOROPROPENE	5	U		5	U		5	U		5	U	
DIBROMOCHLOROMETHANE	5	U		5	U		5	U		5	U	

**CTO007-NAS KEY WEST  
WATER DATA  
KAS  
SDG: NASKW10**

SAMPLE NUMBER:	FC1-DUP-01	FCMW-20-2Q1	FCMW-6-2Q1	PMP3-DUP-01
SAMPLE DATE:	10/05/00	10/05/00	10/05/00	10/05/00
LABORATORY ID:	WQ3034-6	WQ3034-5	WQ3034-4	WQ3034-2
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:	FCMW-6-2Q1			S1MW-8-PMP3

	RESULT	QUAL	CODE									
<b>VOLATILES</b>												
DIBROMOMETHANE	5	U		5	U		5	U		5	U	
DICHLORODIFLUOROMETHANE	5	U		5	U		5	U		5	U	
ETHYL METHACRYLATE	10	U										
ETHYLBENZENE	250			3	J	P	280			4	J	P
IODOMETHANE	10	U										
ISOBUTYL ALCOHOL	100	UR	C									
M+P-XYLENES	44			5	U		42			5	U	
METHYL METHACRYLATE	10	U										
METHYLACRYLONITRILE	50	U										
METHYLENE CHLORIDE	5	U		5	U		5	U		5	U	
O-XYLENE	2	J	P	5	U		2	J	P	5	U	
PENTACHLOROETHANE	10	U										
PROPIONITRILE	50	UR	C									
STYRENE	5	U		5	U		5	U		5	U	
TETRACHLOROETHENE	5	U		5	U		5	U		5	U	
TOLUENE	7			5	U		7			5	U	
TRANS-1,2-DICHLOROETHENE	5	U		5	U		5	U		5	U	
TRANS-1,3-DICHLOROPROPENE	5	U		5	U		5	U		5	U	
TRANS-1,4-DICHLORO-2-BUTENE	10	U										
TRICHLOROETHENE	5	U		5	U		5	U		5	U	
TRICHLOROFLUOROMETHANE	5	U		5	U		5	U		5	U	
VINYL ACETATE	5	U		5	U		5	U		5	U	
VINYL CHLORIDE	2	U		2	U		2	U		2	U	

**CTO007-NAS KEY WEST**

**WATER DATA**

**KAS**

**SDG: NASKW10**

SAMPLE NUMBER:  
 SAMPLE DATE:  
 LABORATORY ID:  
 QC\_TYPE:  
 % SOLIDS:  
 UNITS:  
 FIELD DUPLICATE OF:

FC1-DUP-01  
 10/05/00  
 WQ3034-6  
 NORMAL  
 0.0 %  
 UG/L  
 FCMW-6-2Q1

FCMW-20-2Q1  
 10/05/00  
 WQ3034-5  
 NORMAL  
 0.0 %  
 UG/L

FCMW-6-2Q1  
 10/05/00  
 WQ3034-4  
 NORMAL  
 0.0 %  
 UG/L

//  
 100.0 %

	RESULT	QUAL	CODE									
<b>PETROLEUM HYDROCARBONS</b>												
TOTAL PETROLEUM HYDROCARBONS	1500			500	U		1500					

**CTO007-NAS KEY WEST  
WATER DATA  
KAS  
SDG: NASKW10**

SAMPLE NUMBER:	FC1-DUP-01	FCMW-20-2Q1	FCMW-6-2Q1	PMP3-DUP-01
SAMPLE DATE:	10/05/00	10/05/00	10/05/00	10/05/00
LABORATORY ID:	WQ3034-6	WQ3034-5	WQ3034-4	WQ3034-2
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:	FCMW-6-2Q1			S1MW-8-PMP3

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
<b>INORGANICS</b>										25.9	U	A
ALUMINUM										8.9	U	
ANTIMONY										17.2		
ARSENIC										31.5		
BARIUM										0.30	U	
BERYLLIUM										15.7	U	
CADMIUM										471000		
CALCIUM										25.1		
CHROMIUM										3.5	U	
COBALT										1.9	U	
COPPER										12.5	U	A
IRON										12.5	U	A
LEAD	7.5	U	A	5.9	U	A	7.0	U	A	5.6	U	
MAGNESIUM										1320000		
MANGANESE										46.4		
MERCURY										0.03	U	
NICKEL										20.6		
POTASSIUM										448000		
SELENIUM										7.2	U	
SILVER										3.1	U	
SODIUM										11900000		
THALLIUM										15.4	U	
TIN										7.4	U	
VANADIUM										6.8		
ZINC										1.7	U	A



340 County Road No. 5  
 P.O. Box 720  
 Westbrook, ME 04092  
 Tel: (207) 874-2400  
 Fax: (207) 775-4029

# CHAIN of CUSTODY

PLEASE BEAR DOWN AND  
 PRINT LEGIBLY IN PEN

Client: Tetra Tech NUS Contact: Emily Harrison Phone #: (803) 649-7963 Fax #: (803) 642-8451  
 Address: 900 Trail Ridge Rd. City: Aiken State: SC Zip Code: 29803  
 Purchase Order #: \_\_\_\_\_ Proj. Name / No.: \_\_\_\_\_ Katahdin Quote #: \_\_\_\_\_

Bill (if different than above) Address \_\_\_\_\_

Sampler (Print / Sign) Nathan Reed Copies To: \_\_\_\_\_

LAB USE ONLY WORK ORDER #: \_\_\_\_\_  
 KATAHDIN PROJECT MANAGER \_\_\_\_\_

ANALYSIS AND CONTAINER TYPE PRESERVATIVES

REMARKS: \_\_\_\_\_  
 SHIPPING INFO:  FED EX  UPS  CLIENT  
 AIRBILL NO: \_\_\_\_\_  
 TEMP °C \_\_\_\_\_  TEMP BLANK  INTACT  NOT INTACT

| Filt. |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| OY    | ON    |

* Sample Description	Date / Time coll'd	Matrix	No. of Cntrs.	TAL	metals	APPX VOL	APPX SVOL	APPX PEST	EOB	PAHS	Lead (Total)	TPH	TPID	BLANK
SIMW-8-PMP3	10-5/1150	GW	8	X	X	X	X							
PMP3-DUP-01	10-5-00/xxxx	GW	8	X	X	X	X							
SIMW-8-PMP3-MS	10-5-00/1150	GW	8	X	X	X	X							
SIMW-8-PMP3-MSD	10-5-00/1150	GW	8	X	X	X	X							
SIKMW-7-PMP3	10-5-00/1138	GW	4	X	X									
FCMW-6-2Q1	10-5-09/1630	GW	11		X				X	X	X	X		
FCMW-20-2Q1	10-5-09/1635	GW	11		X				X	X	X	X		
FCI-DUP-01	10-5-00/xxxx	GW	11		X				X	X	X	X		
SIMW-8-DS1	10-5-09/930	GW	3		X									
SIMW-8-DS2	10-5-00/935	GW	3		X									
SIMW-8-DS3	10-5-00/940	GW	1		X									
SIMW-8-DS4	10-5-00/945	GW	3		X									
SIKMW-7-DS1	10-5-09/950	GW	3		X									
SIKMW-7-DS2	10-5-00/955	GW	3		X									
SIKMW-7-DS3	10-5-09/1000	GW	3		X									
TB-01-PMP3	9-28-00/1648	DI	2											X

COMMENTS \_\_\_\_\_

Relinquished By: (Signature) <u>[Signature]</u>	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)