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GROUNDWATER MONITORING WORK PLAN FOR BOCA CHICA FLYING CLUB WITH  
TRANSMITTAL LETTER NAS KEY WEST FL

6/3/2003

TETRA TECH NUS



TETRA TECH NUS, INC.

AIK-03-0121

June 3, 2003

Project Number HK 5658

*via email*

Commander  
Department of the Navy  
SOUTHDIV NAVFACENGCOM  
ATTN: Byas Glover (Code ES24)  
P.O. Box 190010  
North Charleston, South Carolina 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888  
Contract Task Order No. 0301

Subject: Groundwater Monitoring Work Plan, Rev. 0,  
Naval Air Station, Key West, Florida

Dear Mr. Glover:

TtNUS is pleased to submit the enclosed PDF file for the final Groundwater Monitoring Work Plan Work Plan for Boca Chica Flying Club, Rev. 0, Naval Air Station, Key West, Florida. This plan is based on monitoring plans previously prepared under CTOs 110 and 207. I am not planning on receiving comments on this document; however, I will be pleased to consider any comments or suggestions that are offered to me prior to commencing field activities. We are planning to begin executing the work under this plan during the 11 August 2003 field shift at NAS Key West.

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

Sincerely,

C. M. Bryan  
Project Manager

CMB:spc

Enclosure

c: Ms. Debbie Wroblewski (Cover Letter Only)  
Mr. R. Courtright, NAS Key West (hard copy)  
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Mr. M. Perry/File  
File 5658-7.1.1

**Groundwater Monitoring  
Work Plan**  
for  
**Boca Chica Flying Club**

**Naval Air Station  
Key West, Florida**



**Southern Division  
Naval Facilities Engineering Command**

**Contract Number N62467-94-D-0888  
Contract Task Order 0301**

June 2003

**GROUNDWATER MONITORING WORK PLAN  
FOR  
BOCA CHICA FLYING CLUB**

**NAVAL AIR STATION  
KEY WEST, FLORIDA**

**COMPREHENSIVE LONG-TERM  
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT**

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

**Submitted by:  
Tetra Tech NUS  
661 Andersen Drive  
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Pittsburgh, Pennsylvania 15220**

**CONTRACT NUMBER N62467-94-D-0888  
CONTRACT TASK ORDER 0301**

**JUNE 2003**

**PREPARED UNDER THE SUPERVISION OF:**

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**APPROVED FOR SUBMITTAL BY:**

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## ACRONYMS

ABB	ABB Environmental Services, Inc.
AST	Aboveground storage tanks
AS/SVE	Air Sparging/Soil Vapor Extraction
AVGAS	Aviation gasoline
BEI	Bechtel Environmental, Inc.
BTEX	Benzene, toluene, ethylbenzene, and xylenes
CLEAN	Comprehensive Long-Term Environmental Action Navy
CTO	Contract Task Order
EDB	Ethylene dibromide
EGIS	Environmental Geographic Information System
EPA	United States Environmental Protection Agency
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FL-PRO	Florida Petroleum Range Organics
GCTL	Groundwater Cleanup Target Level
HASP	Health and Safety Plan
KAG	Kerosene Analytical Group
MS/MSD	Matrix spike/matrix spike duplicate
MTBE	Methyl-tertiary butyl ether
MW	Monitoring well
µg/L	micrograms per liter
NAS	Naval Air Station
OVA	Organic Vapor Analyzer
PAH	Polynuclear Aromatic Hydrocarbon
PPL	Priority Pollutant List
ppm	parts per million
QA/QC	Quality Assurance/Quality Control
RAP	Remedial Action Plan
SOP	Standard Operating Procedure
TRPH	Total recoverable petroleum hydrocarbons
TiNUS	Tetra Tech NUS, Inc.
UST	Underground storage tank
VOA	Volatile organic aromatic
VOH	Volatile organic halocarbon

## 1.0 INTRODUCTION

This Groundwater Monitoring Work Plan has been prepared by Tetra Tech NUS, Inc. (TtNUS) under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract Number N62467-94-D-0888, Contract Task Order (CTO) 0301. This Work Plan describes monitoring activities to take place at Naval Air Station (NAS) Key West Flying Club since completion of a treatability study using an Air Sparging/Soil Vapor Extraction (AS/SVE) system in January 2003.

### 1.1 SITE HISTORY OVERVIEW

The former Flying Club area is located at NAS Key West along the northwest boundary of Taxiway H on Boca Chica Key (Figure 1-1). The former Flying Club area includes a former motor pool refueling point that used underground storage tanks (USTs) to store and dispense gasoline. An aviation gasoline (AVGAS) aboveground storage tank (AST) area was located approximately 50 feet south of the former motor pool refueling area. The area is currently used as an electrical repair and vehicle maintenance facility (Building A126) and a storage area (Building A133).

#### 1.1.1 History of Assessment Activities

Soils in the site area were field-screened with an Organic Vapor Analyzer (OVA) to assess for the presence of contaminated soil during the contamination assessment conducted in April 1994. A total of 71 soil borings were advanced, each to 6 feet deep. Screening results indicated the presence of excessively contaminated soils [greater than 50 parts per million (ppm)] in four areas. The largest of these areas measured approximately 70 feet long by 40 feet wide. OVA readings greater than 500 ppm were observed in 20 samples [ABB Environmental Services, Inc. (ABB), 1994].

Groundwater samples were collected from all existing wells and analyzed for Kerosene Analytical Group (KAG) parameters during the contamination assessment that was conducted in April 1994. The applicable Class G-III aquifer cleanup goals were exceeded for the compounds of benzene and total volatile organic aromatics (VOAs). Two areas of VOAs were identified; one near the former AVGAS ASTs and dispenser, and the other near the former motor pool USTs. The highest total VOA concentration found [1,300 micrograms per liter ( $\mu\text{g/L}$ )], was at FC-MW-04 near the former AVGAS dispenser. Total VOA concentrations in samples from FC-MW-06 and FC-MW-20, near the former motor pool gasoline USTs, were 305  $\mu\text{g/L}$  and 156  $\mu\text{g/L}$ , respectively (ABB, 1994).

The monitoring wells were resampled in August 1996, as part of the Remedial Action Plan (RAP) preparation. The 1996 data indicated significant changes in the degree and extent of contamination

found during the contamination assessment. Total VOAs in the area of the former AVGAS dispenser were measured at 133 µg/L, putting within the Class G-III guidelines. The total VOA concentrations for FC-MW-06 and FC-MW-20 were 1,470 µg/L and 35 µg/L, respectively. Based on the 1996 sampling results, the RAP recommended the excavation of contaminated soil (an estimated amount of 2,126 cubic yards). The largest area recommended for excavation was in the vicinity of the former motor pool USTs near Building A133 (ABB, 1997).

In 1998, excavations of contaminated soil took place, based on recommendations in the RAP. Approximately 983 cubic yards of soil were excavated from the Flying Club site. The ion collider process was used to treat a portion of the contaminated soil. The excavated areas at the Flying Club site were then backfilled [Bechtel Environmental, Inc. (BEI), 1999].

A quarterly groundwater monitoring plan was implemented in August 1999 and continued through April 2001. Total VOA concentrations for FC-MW-06 and FC-MW-20 were 51 µg/L and 11 µg/L, respectively, in April 2001. These VOA concentrations are below the applicable cleanup guidelines. Naphthalene and total recoverable petroleum hydrocarbons (TRPH) concentrations, however, increased in FC-MW-20. Due to the lack of substantial decreases in the concentrations of some contaminants following several quarters of groundwater monitoring, TtNUS recommended a treatability study be performed to investigate the efficacy of enhancing the degradation of contaminants under aerobic conditions (TtNUS, 2001).

An AS/SVE system was installed in June 2002 to address subsurface soil and groundwater VOA contamination. The system operated from June 2002 through January 2003, with approximately one week of downtime for equipment maintenance. On September 17, 2002 and January 31, 2003, TtNUS collected groundwater samples from monitoring wells FC-MW-05, FC-MW-06, and FC-MW-22 (replacement for destroyed well FC-MW-20). The full data set from these monitoring events is presented in the AS/SVE Treatability Study Evaluation Report for Boca Chica Flying Club, June 2002 to January 2003 (TtNUS, 2003). A subsequent sampling event was conducted in May 2003 under CTO 0110, results are pending from the laboratory. Because some contaminant concentrations remain above Groundwater Cleanup Target Levels (GCTLs) at the Flying Club, four quarterly monitoring events are scheduled to take place, beginning in August 2003.



NO.	DATE	REVISIONS	DRAWN BY	DATE		TREATABILITY STUDY INSTALLATION		CONTRACT NO.		
			CM	07/11/2002		REPORT FOR BOCA CHICA FLYING CLUB FIGURE 1-1. LOCATION MAP NAVAL AIR FACILITY KEY WEST, FLORIDA	N4087		APPROVED BY	DATE
			CHECKED BY	DATE			CMB	07/11/2002	APPROVED BY	DATE
			EMH	07/11/2002					DRAWING NO.	REV.
			COST/SCHED-AREA					FIGURE 1-1	0	
			SCALE	AS NOTED						

P:\GOVERNMENT\KEY WEST\EGIS\FLYINGCLUB\_AS-SVE\_REV2.APR 07/11/2002 BY: CEM LAYOUT: LOCATION MAP

## 2.0 SAMPLING AND ANALYSIS PLAN

Groundwater sampling activities, including quality assurance/quality control (QA/QC), and field documentation will be performed at the Flying Club following Florida Department of Environmental Protection (FDEP) Standard Operating Procedures (SOPs) (FDEP, 2002), and TtNUS' Florida Regional Quality Assurance Program Manual (TtNUS, 2002). The following applicable SOPs will be followed during field and laboratory activities:

- FC 1000 Field Decontamination
- FD 1000 Documentation
- FM 1000 Field Mobilization
- FQ 1000 Quality Control
- FS 1000 General Sampling
- FS 2000 General Water Sampling
- FS 2200 Groundwater Sampling
- FT 1000 Field Testing General
- LD 1000 Laboratory Documentation
- LQ 1000 Laboratory Quality Control

Health and safety policies and procedures to be followed during groundwater sampling activities at the Flying Club are presented in the Health and Safety Plan (HASP, provided under separate cover.

### 2.1 GROUNDWATER SAMPLING

Three monitoring wells, FC-MW-05, FC-MW-06, and FC-MW-22 (replacement for damaged well FC-MW-20), will be sampled quarterly for one year at the Flying Club site. Monitoring wells to be sampled each quarter are shown in Figure 2-1. Groundwater sampling will be conducted in accordance with FDEP SOP FS 2200 – Groundwater Sampling (FDEP, 2002). Samples collected from the three monitoring wells will be analyzed for KAG constituents, as listed in Florida Administrative Code (FAC) 62-770, Table B. Table 2-1 presents analyses to be performed on groundwater samples collected from the Flying Club site.

QA/QC samples will be collected in accordance with FDEP's QC SOP (FC 1000) and will include one duplicate, one matrix spike/matrix spike duplicate (MS/MSD), one equipment blank, and one trip blank. Purge and decontamination water will be returned to the ground based on previous sampling results.

## **2.2 REPORTING**

A sample tracking system will be implemented prior to the field effort. The laboratory will submit electronic reports and the data will be loaded into the TtNUS data management system in order to preserve the referential integrity of the data. Data validation review of parameters will include holding time compliance, calibration compliance, and laboratory and field blank contamination. A QA review and manipulation of the analytical data files will be performed. An Environmental Geographic Information System (EGIS) will be prepared to tie all environmental samples to their respective sample locations.

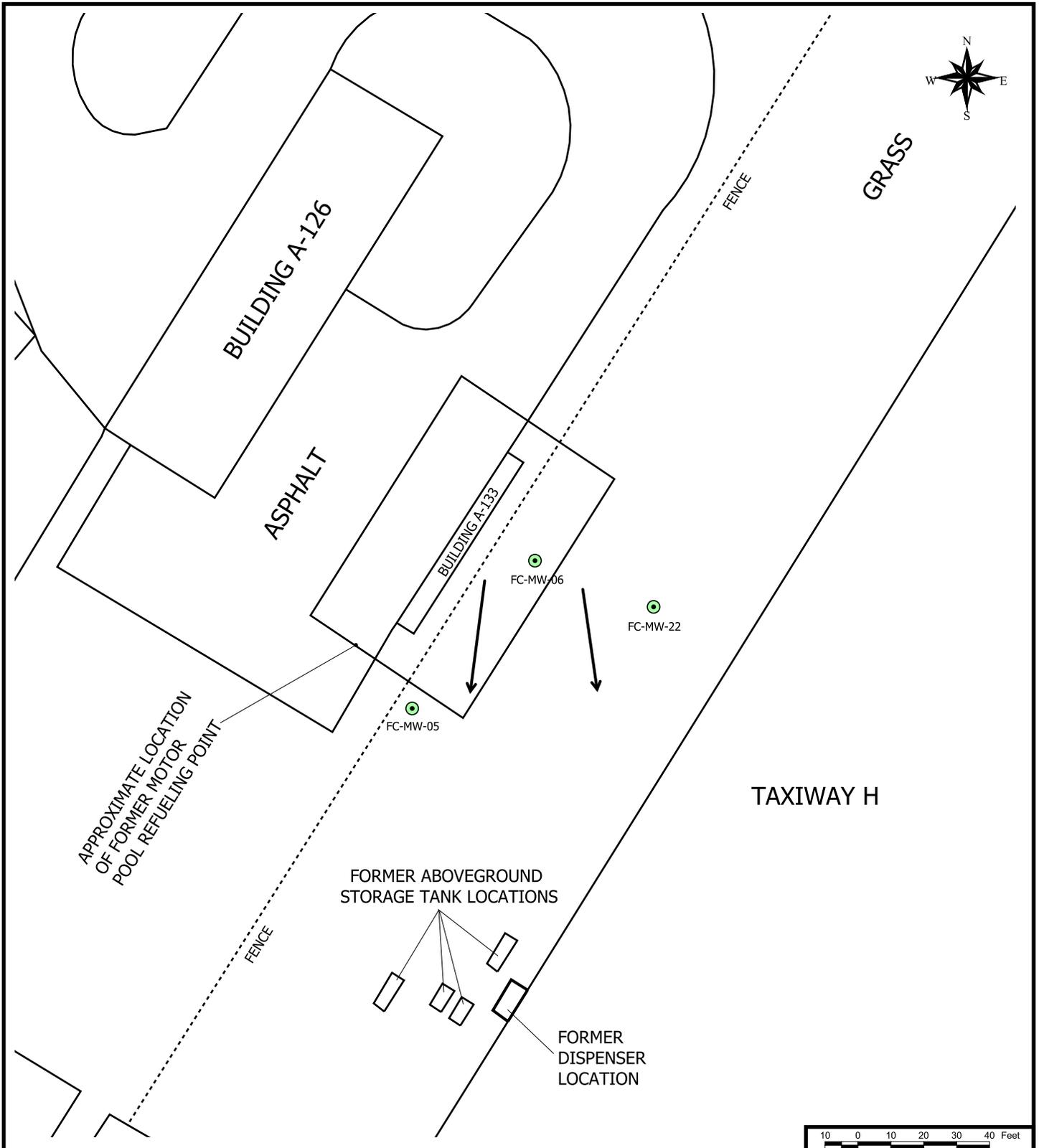
Quarterly reports will be prepared presenting the results of the groundwater sampling events. The first, second, and third quarterly reports will be prepared in final form only. An Annual Report will be prepared following the fourth quarterly event in draft and final versions.

**TABLE 2-1**

**GROUNDWATER SAMPLES  
BOCA CHICA FLYING CLUB  
NAVAL AIR STATION  
KEY WEST, FLORIDA**

<b>Monitoring Well</b>	<b>Sample ID<sup>(1)</sup></b>	<b>PPL VOHs, BTEX, MTBE<sup>(2)</sup></b>	<b>PAHs<sup>(3)</sup></b>	<b>TRPH<sup>(4)</sup></b>	<b>Lead<sup>(5)</sup></b>	<b>EDB<sup>(6)</sup></b>
FC-MW-05	FC-MW-05-MMY	X	X	X	X	X
FC-MW-06	FC-MW-06-MMY	X	X	X	X	X
FC-MW-22	FC-MW-22-MMY	X	X	X	X	X

- (1) Sample ID includes monitoring well identification plus month and year that sample is collected (MMYY)
- (2) Priority Pollutant List (PPL) Volatile Organic Halocarbons (VOHs) plus benzene, toluene, ethylbenzene, xylenes (BTEX), and methyl-tertiary butyl ether (MTBE) using SW-846 8260.
- (3) Polynuclear Aromatic Hydrocarbons, plus 1- and 2-methylnaphthalene using SW-846 8270C.
- (4) Total Recoverable Petroleum Hydrocarbons, using Florida Petroleum Range Organics (FL-PRO)
- (5) Using SW-846 6010B.
- (6) Ethylene dibromide using United States Environmental Protection Agency (EPA) 504.1



NO.			DATE			REVISIONS			DRAWN BY MB		DATE 04/24/2003				CONTRACT NO. 4087			
									CHECKED BY EJH		DATE 04/24/2003				APPROVED BY CMB		DATE 04/24/2003	
									COST/SCHED-AREA						APPROVED BY		DATE	
									SCALE AS NOTED						DRAWING NO. FIGURE 2-1		REV. 0	
GROUNDWATER MONITORING WORK PLAN MONITORING WELL LOCATIONS FLYING CLUB SITE, BLDG. A-127 NAVAL AIR STATION KEY WEST, FLORIDA																		

P:\GOVERNMENT\KEY WEST\EGIS\FLYINGCLUB\_AS-SVE\_EVALUATION\_REPORT.APR 05/30/2003 BY: MB LAYOUT: 1Q GROUNDWATER ELEVATION CONTOUR MAP

## REFERENCES

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BEI (Bechtel Environmental, Inc.), 1999. Project Completion Report for Delivery Order No. 0094, Flying Club Site, Petroleum Remediation at Naval Air Station, Key West, Florida. Prepared for Department of the Navy, Southern Division, Naval Facilities Engineering Command, Oak Ridge, Tennessee. January.

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FDEP (Florida Department of Environmental Protection), 2002. SOPs for Field Activities, DEP – SOP-001/01; Tallahassee, Florida, January.

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