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SEMI-ANNUAL GROUNDWATER MONITORING LETTER REPORT YEAR 2 EVENT 1 FOR  
OCALA F-18 CRASH SITE NAS CECIL FIELD FL  
5/20/2008  
TETRA TECH NUS INC



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Reference: CLEAN III Contract Number N62467-94-D-0888  
Contract Task Order 0209

Subject: Semi-Annual Groundwater Monitoring Report, Year 2, Event 1 – February 2007  
Ocala F-18 Crash Site  
Naval Air Station Cecil Field  
Jacksonville, Florida

Dear Mr. Grabka:

Tetra Tech NUS, Inc. (TtNUS) is pleased to submit this Semi-Annual Groundwater Monitoring Report for the referenced Contract Task Order (CTO) for the Ocala F-18 Crash Site. This report was prepared for the United States Navy, Naval Facilities Engineering Command Southeast (NAVFAC SE) under the Comprehensive Long-Term Environmental Action Navy (CLEAN) III Contract Number N62467-94-D-0888. This report summarizes the field work and laboratory analytical results for the first semi-annual sampling event for Year 2 conducted on February 8, 2007 in accordance with the Natural Attenuation Monitoring Plan Approval Order (NAMPAO) issued by the Florida Department of Environmental Protection (FDEP), and Chapter 62-770, Florida Administrative Code (F.A.C.). Groundwater sampling activities were performed in general accordance with FDEP Standard Operating Procedures (SOPs) 1001 and FS 2002 and TtNUS SOP SA-1.1.

**BACKGROUND**

The Ocala F-18 Crash Site is located in the Ocala National Forest approximately 82 miles south of Naval Air Station Cecil Field, Jacksonville, Florida and approximately 22 miles southeast of Ocala, Florida. The general site location is depicted on Figure 1.

In June 1994, a Navy F-18 jet crashed in the Ocala National Forest. A site assessment and initial remedial action were conducted by Bechtel Environmental, Inc. In September 1997, Harding Lawson Associates (HLA) sampled monitoring wells CEF-CS1A, CEF-CS2, and CEF-CS3 to evaluate the groundwater quality at the site. Concentrations of benzene, ethylbenzene, total xylenes, and naphthalene detected in monitoring well CEF-CS1A exceeded Groundwater Cleanup Target Levels (GCTLs) cited in Chapter 62-777, F.A.C. An additional monitoring well (CEF-CS7) was installed on November 20, 1997, to assess downgradient groundwater quality. Following approval of monitoring only natural attenuation (MONA), HLA recommended semi-annual monitoring. HLA submitted a MONA plan to FDEP dated January 20, 1998. The MONA plan was subsequently revised to include quarterly groundwater sampling events and approved in April 1998. HLA performed quarterly groundwater monitoring from May 4, 1998,



through February 22, 1999. TtNUS resumed sampling after the February 1999 sampling event. During the third year of monitoring in October 2002, TtNUS recommended preparation of a treatability study to use an innovative technology to remediate the site because the concentrations of contaminants of concern (COCs) had not decreased during the monitoring periods. However, during a BCT meeting, members decided to continue with the monitoring instead of the treatability study, so the treatability study was not initiated at the site. The COCs, as defined in the MONA, were benzene, toluene, ethylbenzene, xylenes, methyl tert-butyl ether, and polynuclear aromatic hydrocarbons (PAHs). Monitoring continued in April 2003, and the COCs appeared to be within milestones set by the MONA order. Therefore, continued monitoring was recommended. However, FDEP reviewed the Monitoring Only Plan Report and stated that 5 years had transpired without a decrease in COCs to concentrations less than GCTLs. The response from FDEP required an additional well directly downgradient of the source well and also required sampling, reporting, and recommendations. Considering the remoteness of the site and the need for a more refined delineation of the plume centered on well CEF-CS1A, TtNUS mobilized to the site to install three perimeter wells (CS-8, CS-9, and CS-10).

Results of the sampling event conducted after the installation of the new monitoring wells in 2005 showed concentrations of benzene, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, 1-methylnaphthalene, 2-methylnaphthalene, and naphthalene in exceedance of GCTLs at CEF-CS1A. Isopropyl benzene was also detected in the source well. In addition, benzo(a)anthracene and benzo(b)fluoranthene were detected in exceedance of GCTLs in monitoring well CEF-CS8. Based on the new sampling data, a revised MONA was proposed with new milestone objectives for different COCs and different wells: benzene, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, 1-methylnaphthalene, 2-methylnaphthalene, and naphthalene. FDEP approved the recommendation for a Natural Attenuation Monitoring Plan Approval Order (NAMPAO) in October 2005 (see Attachment A). A summary of groundwater results for the first semi-annual Year 2 sampling event based on the revised NAMPAO is provided below.

## FIELD ACTIVITIES

Groundwater samples were collected on February 8, 2007, using low-flow methods from the source monitoring well (CEF-CS1A) and three perimeter wells (CEF-CS3, CEF-CS8, and CEF-CS10). Locations of the monitoring wells are shown on Figure 2. Following collection, the groundwater samples were placed on ice and shipped under chain of custody to Accutest Laboratories in Orlando, Florida for analysis. All samples were analyzed for volatile organic compounds (VOCs) using United States Environmental Protection Agency (USEPA) Method SW-846 8260B and for PAHs using USEPA Method SW-846 8310.

Prior to obtaining groundwater samples, water level measurements and total well depths were measured and recording on a site-specific groundwater level measurement sheet (see Attachment B). The depth to water ranged from 23.52 feet below top of casing (btoc) (CEF-CS4) to 27.07 feet btoc (CEF-CS2). General protocols were in accordance with FDEP SOPs and TtNUS SOP SA-1.1. The data were recorded on groundwater sample log sheets and low-flow purge data sheets (see Attachment B). The depth-to-water measurements, top-of-casing elevations, and groundwater elevations are presented in Table 1.

## RESULTS

The groundwater elevation data indicate that flow is to the north-northwest, as shown on Figure 2. This estimate is consistent with historical groundwater flow measurements.

Analytical results from the February 2007 sampling event indicated benzene (2.0 µg/L); 1,2,4-trimethylbenzene (49.2 µg/L); naphthalene (20.1 µg/L); 1-methylnaphthalene (32.8 µg/L); and 2-methylnaphthalene (37.2 µg/L) were detected in CEF-CS1A at concentrations greater than their respective GCTLs. 1,3,4-Trimethylbenzene was detected at less than its respective GCTL in CEF-CS1A. Benzo(a)pyrene was not detected at above the method detection limit in the source well, CEF-CS1A. The laboratory results for samples collected from perimeter monitoring wells CEF-CS3, CEF-CS8, and



CEF-CS10 indicated that all target analytes were not detected at concentrations greater than their associated detection limits. Laboratory analytical results from the February 2007 sampling event are presented on Figure 3 and summarized in Table 2.

The historical laboratory analytical results and milestone objectives are summarized in Table 3. The laboratory analytical report is provided as Attachment C.

### CONCLUSIONS AND RECOMMENDATIONS

For the February 2007 sampling event, 1,2,4-trimethylbenzene, benzene, 1-methylnaphthalene, and 2-methylnaphthalene concentrations in source well CEF-CS1A were greater than the End of Year 2 milestone objectives for the source well specified in the NAMP AO, as well as their respective GCTLs. Naphthalene was detected in excess of its GCTL of 14 µg/L, but was less than its End of Year 2 milestone objectives for the source well specified in the NAMP AO. 1,3,5-Trimethylbenzene was detected in CEF-CS1A at a concentration less than its GCTL of 10 µg/L as well as less than its End of Year 2 milestone. All contaminants detected in perimeter wells were at concentrations less than their respective GCTLs and milestone objectives for perimeter wells specified in the NAMP AO. GCTL exceedances in source well CEF-CS1A included 1,2,4-trimethylbenzene, benzene, naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene.

Naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene concentrations slightly increased in the source well, CEF-CS-1A since the previous sampling event in September 2006. The naphthalene concentration significantly decreased since the previous concentration from the last sampling event to less than the End of Year 1 milestone of 50 µg/L but was still greater than its GCTL. The benzene concentration did not change significantly from the previous sampling event. Overall, the concentrations for 1,2,4-trimethylbenzene showed a decreasing trend; however, the remainder of the COCs that exceeded their GCTLs (benzene, naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene) showed an increase from previous sampling events. In prior sampling events, the COCs were either below or very close to their respective GCTLs.

At this time, it is recommended that groundwater sampling continues per the NAMP AO, including isopropyl benzene as a COC for the source well CEF-CS1A for the Year 2, Event 2 only. The next sampling event is scheduled for August 2007.

If you have any questions regarding this submittal, please feel free to contact Kara Wimble at (904) 730-4669, extension 214, or via e-mail at Kara.Wimble@ttnus.com.

Sincerely,

Mark A. Peterson, P.G.  
Task Order Manager  
Florida License Number PG-001852

Kara F. Wimble  
Project Scientist

MAP/KW

#### Attachments (9)

- c: B. Nwokike, NAVFAC SE (CD only)
- J. Thorsen, Seminole Ranger District
- M. Perry, TtNUS (unbound and CD)
- R. Simcik, TtNUS (bookcase file)
- D. Humbert, TtNUS (cover letter only)
- CTO 209 Project File
- J. Johnson, TtNUS (Information Repository)

**CERTIFICATION**

The information contained herein is based on the geologic investigation and associated information detailed in the text and appended to this report. If conditions are determined to exist that differ from those described, the undersigned geologist should be notified to evaluate the effects of any additional information on the information described in this report. This Semi-Annual Groundwater Monitoring Report, Year 2, Event 1 – February 2007, was developed for the Ocala F-18 Crash Site and should not be construed to apply to any other site.



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May 20, 2008

Mark A. Peterson, P.G.

Florida License Number PG-0001852