N60200.AR.008856
NAS CECIL FIELD
5090.3a

CONTAMINATION ASSESSMENT REPORT ADDENDUM SAL TAYLOR CREEK BANK SITES

NAS CECIL FIELD FL

7/28/1997

ABB ENVIRONMENTAL

ABB

8544-3191a

July 28, 1997

Mr. Mike Deliz
Florida Department of Environmental Protection
Twin Towers Office Building
2600 Blairstone Road
Tallahassee, Florida 32399-2400

SUBJECT: Contamination Assessment Report Addendum
Sal Taylor Creek Bank Sites
Naval Air Station Cecil Field, Jacksonville, Florida
Contract No. N62467-89-D-0317/090

INTRODUCTION

The recommendation of the North Fuel Farm Area JP-5 Spill Site and Sal Taylor Creek Bank Sites Contamination Assessment Report (CAR) Addendum (ABB Environmental Services, Inc. [ABB-ES], 1996a) was that a Remedial Action Plan (RAP) for the JP-5 spill site should be prepared and that the excessively contaminated soil detected at the Sal Taylor Creek bank sites be allowed to naturally biodegrade. In response to this recommendation, the Florida Department of Environmental Protection, in a letter dated April 26, 1996, requested that as part of the RAP, two water table monitoring wells be installed in the immediate vicinity of soil borings 95I-58 and 95I-86 (Figures 1 and 2 in Attachment A) and be sampled and analyzed for the Kerosene Analytical Group (KAG) parameters.

Soil boring 95I-58 is located at bank site 93I-10 and soil boring 95I-86 is located at bank site 93I-20. Nine bank sites (93I-6, 93I-10, 93I-18, 93I-20, 93I-36, 93I-37, 93I-45, 93I-51, and 93I-53) were identified along the banks of Sal Taylor Creek and are located among the various spill containment sites (Aviation Ordnance [AVORD] Dam, North Containment Pond, AVORD-Perimeter Road, Gate-10 Dam, Alpha Dam, Possum Dam, and Gate-14 Dam). The locations of the bank and spill containment sites are presented in Figure 3 (Attachment A). Details of the seven spill containment sites contamination assessments are presented in a separate CAR (ABB-ES, 1996b).

FIELD INVESTIGATION

Two monitoring wells, CEF-STC-PZ1 and CEF-STC-PZ2, were hand installed using bucket augers and sampled on January 17, 1997. The monitoring wells were installed to a depth of 4 feet below land surface with the screen located approximately 1 foot below the water table (the borehole would not stay open below this due to the flowing sands). Subsequently, little groundwater could be purged before the

well was pumped dry. This resulted in the collection of turbid groundwater samples. Monitoring well construction is summarized in Table 1.

Table 1
Monitoring Well Construction Summary

Contamination Assessment Report Addendum
Sal Taylor Creek Bank Sites
NAS Cecil Field, Jacksonville, Florida

Well Number	Date Installed	Total Depth (ft bls)	Screened Interval (ft bls)
CEF-STC-PZ1	1-16-97	4	3 to 4
CEF-STC-PZ2	1-16-97	4	3 to 4

Notes: NAS = Naval Air Station.
ft bls = feet below land surface.

RESULTS

No organic compounds were detected in the two groundwater samples. Lead was detected in both samples at concentrations of 133 micrograms per liter ($\mu g/\ell$) in CEF-STC-PZ1 and 8.6 $\mu g/\ell$ in CEF-STC-PZ2. The presence of lead is most likely the result of turbid groundwater samples and is not of concern because it is not a component of JP-5 fuel. A copy of the analytical results is presented in Attachment B.

RECOMMENDATIONS

Based on these groundwater results, it is recommended that no further remedial action be conducted at the Sal Taylor Creek bank sites. The RAP for the JP-5 spill site will continue as part of the North Fuel Farm RAP.

REFERENCES

ABB Environmental Services, Inc. (ABB-ES). 1996a. *Contamination Assessment Report Addendum, North Fuel Farm Area JP-5 Spill Site and Sal Taylor Creek Bank Sites, Naval Air Station Cecil Field, Jacksonville, Florida.* Prepared for Southern Division, Naval Facilities Engineering Command, North Charleston, South Carolina.

ABB-ES. 1996b. *Contamination Assessment Report Addendum, North Fuel Farm Area Sites, Sal Taylor Creek JP-5 Spill Containment Areas, Naval Air Station Cecil Field, Jacksonville, Florida.* Prepared for Southern Division, Naval Facilities Engineering Command, North Charleston, South Carolina.

Very truly yours,

ABB ENVIRONMENTAL SERVICES, INC.

Eric Blomberg, P.G. 1695
Principal Scientist

Rao Angara
Installation Manager

Attachments

cc: B. Kizer, SDIV
D. Kruzicki, NASCF
H. Bauer, BEI
file
L. Routhier, ABB-ES
Debbie Vaughn-Wright, USEPA
Lewis Shields, City of Jacksonville

ATTACHMENT A

FIGURES

Figure 1 Soil Contamination (March 1995) and Monitoring Well Location Map, Site 931-10

Figure 2 Soil Contamination (April 1995) and Monitoring Well Location Map, Site 931-20

Figure 3 Location Map of JP-5 Spill Site, and Sal Taylor Creek Sites

ATTACHMENT B

ANALYTICAL RESULTS

ABB

8544-3186a

July 28, 1997

Mr. Mike Deliz
Florida Department of Environmental Protection
Twin Towers Office Building
2600 Blairstone Road
Tallahassee, Florida 32399-2400

SUBJECT: Contamination Assessment Report Addendum II
Sal Taylor Creek JP-5 Spill Containment Areas
Naval Air Station Cecil Field, Jacksonville, Florida
Contract No. N62467-89-D-0317/090

INTRODUCTION

The Sal Taylor Creek JP-5 Fuel Spill Containment Areas Contamination Assessment Report Addendum (ABB Environmental Services, Inc. [ABB-ES], 1996) included the following recommendations: (1) no further action at the North Containment Pond and the aviation ordnance (AVORD) Perimeter Road dam sites, and (2) either biomonitoring or sediment remediation at the AVORD, Gate-10, Alpha, Possum, and Gate-14 dam sites. To assess whether or not sediment quality has improved since the initial sampling in May 1995 and thus potentially eliminate future biomonitoring or sediment remediation, the Naval Air Station (NAS) Cecil Field Partnering Team agreed to resample sediment at the locations where biomonitoring or remediation had been recommended. This decision was made at the August 22, 1996, partnering meeting in Tallahassee, Florida.

FIELD INVESTIGATION

Resampling of the sediment for toxicity testing and analysis of lead and total petroleum hydrocarbons (TPH) was conducted on December 31, 1996. Sampling locations are presented on Figures 1 through 5, in Attachment A. Sediment toxicity testing included survival and growth for the amphipod *Hyalella azteca* and the midge larve *Chironomus tentans*. The sediment samples were collected from the same locations as the May 1995 sampling event unless the creek conditions had changed (e.g., lower creek level in which samples were collected below the nearest area below water).

RESULTS AND CONCLUSIONS

Results of the December 31, 1996, toxicity testing and laboratory analysis are presented in Table 1. The laboratory report for toxicity analysis of sediment samples is included as Attachment B. In general, there

Table 1
Comparison of Toxicity Testing Results and Analytical Results
Sal Taylor Creek JP-5 Fuel Spill Containment Areas

Contamination Assessment Report Addendum II
Sal Taylor Creek JP-5 Spill Containment Areas
NAS Cecil Field, Jacksonville, Florida

Site	Sample	Lead	TPH	Hyalella Azteca		Chironomus Tentans	
	1995/1996	(mg/kg)	(mg/kg)	Mortality	Growth	Mortality	Growth
AVORD Dam	TOX4/TOX4A	14/11	238/160	17/1	0.33	92/20	0.05/0.82
	TOX5/TOX5A	7.7/5.4	143/160	20/2	0.37	77/10	0.21/1.01
Gate-10 Dam	TOX4/TOX4A	4.9/3.9	3,510/130	100/4	0.31	100/15	0/0.79
	TOX5/TOX5A	ND/2.5	76.9/25	52/0	0.32	7/17	0.45/1.04
Control		NA	NA	7/2	0.33	10/28	0.5/0.86
Alpha Dam	TOX4/TOX4A	24.1/2.3	361/16	47/4	0.36	90/30	0.21/1.05
	TOX5/TOX5A	3.6/2.5	129/15	100/5	0.32	100/18	0/0.88
Possum Dam	TOX4/TOX4A	ND/3.2	116/200	100/25	0.23	100/82	0/0.45
	TOX5/TOX5A	ND/5	30.4/29	57/5	0.31	17/20	0.5/0.83
Gate-14 Dam	TOX4/TOX4A	ND/5.3	309/36	12/0	0.41	52/20	0.22/1.12
	TOX5/TOX5A	5.8/2.8	20.2/46	65/6	0.43	40/8	0.48/1.08

Notes: No *Hyalella azteca* growth tests were conducted on the 1995 samples.

NAS = Naval Air Station.
TPH = total petroleum hydrocarbons.
mg/kg = milligrams per kilogram.
AVORD = Aviation Ordnance.
NA = not applicable.
ND = not detected.

was a significant decrease in mortality and an increase in growth rates for both test species at all sampling locations with the exception of sample CEF-POS-SD/TOX 4A from the Possum Dam site. Mortality decreased and growth rates increased at this location compared to the May 1995 results, but to a lesser degree than the other sampling locations. A significant decrease in the TPH concentration was also observed at all sampling locations with the exception of samples CEF-POS-SD/TOX-4A and CEF-G14-SD/TOX-5A. The complete analytical data set is in Attachment C. The results of the toxicity testing and laboratory analysis were presented to the NAS Cecil Field Partnering Team on April 15, 1997. The team came to the conclusion that sediment quality has greatly improved and future biomonitoring or remediation of Sal Taylor Creek is not warranted, with the exception of Possum Dam location CEF-POS-SD/TOX 4A.

RECOMMENDATIONS

The NAS Cecil Field partnering team recommended that no further action take place at Alpha Dam, Gate-10 Dam, Avord Dam, and Gate-14 Dam and that one more round of biomonitoring be conducted in December 1997 at Possum Dam location CEF-POS-SD/TOX 4A. The biomonitoring will include resampling sediment from location CEF-POS-SD/TOX 4A and analyzing for TPH as well as lead and conducting growth and survival toxicity tests using test species *Hyalella azteca* and *Chironomus tentans*.

REFERENCES

ABB Environmental Services, Inc. 1996. *Contamination Assessment Report Addendum, Sal Taylor Creek JP-5 Fuel Spill Containment Areas, Naval Air Station Cecil Field, Jacksonville, Florida*. Prepared for Southern Division, Naval Facilities Engineering Command, North Charleston, South Carolina.

Very truly yours,

ABB ENVIRONMENTAL SERVICES, INC.

Eric Blomberg, P.G. 1695
Principal Scientist

Rao Angara
Installation Manager

Attachments

cc: B. Kizer, SDIV
D. Porter, SDIV
M. Davidson, SDIV
D. Kruzicki, NASCF
file
H. Bauer, BEI
L. Routhier, ABB-ES
D. Vaughn-Wright, USEPA
L. Shields, City of Jacksonville

ATTACHMENT A

FIGURES

ATTACHMENT B

TOXICITY ANALYSIS REPORT

CONTAMINATION ASSESSMENT REPORT ADDENDUM
S-3 CRASH SITE

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

UNIT IDENTIFICATION CODE: N60200
CONTRACT NO. N62467-89-D-0317/090

AUGUST 1995

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
29419-9010

PRINTED ON RECYCLED PAPER

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

CONTAMINATION ASSESSMENT REPORT ADDENDUM
S-3 CRASH SITE
AUGUST 1995

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
29419-9010

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

CONTAMINATION ASSESSMENT REPORT ADDENDUM
S-3 CRASH SITE
AUGUST 1995

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
29419-9010

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

CONTAMINATION ASSESSMENT REPORT ADDENDUM
S-3 CRASH SITE
AUGUST 1995

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
29419-9010

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

CONTAMINATION ASSESSMENT REPORT ADDENDUM
S-3 CRASH SITE
AUGUST 1995

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
29419-9010

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

CONTAMINATION ASSESSMENT REPORT ADDENDUM
S-3 CRASH SITE
AUGUST 1995

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
29419-9010

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

CONTAMINATION ASSESSMENT REPORT ADDENDUM
S-3 CRASH SITE
AUGUST 1995

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
29419-9010

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

CONTAMINATION ASSESSMENT REPORT ADDENDUM
S-3 CRASH SITE
AUGUST 1995

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
29419-9010

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

CONTAMINATION ASSESSMENT REPORT ADDENDUM
S-3 CRASH SITE
AUGUST 1995

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
29419-9010

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

CONTAMINATION ASSESSMENT REPORT ADDENDUM
S-3 CRASH SITE
AUGUST 1995

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
29419-9010

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

CONTAMINATION ASSESSMENT REPORT ADDENDUM
S-3 CRASH SITE
AUGUST 1995

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
29419-9010

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

CONTAMINATION ASSESSMENT REPORT ADDENDUM
S-3 CRASH SITE
AUGUST 1995

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
29419-9010

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

CONTAMINATION ASSESSMENT REPORT ADDENDUM
S-3 CRASH SITE
AUGUST 1995

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
29419-9010

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

CONTAMINATION ASSESSMENT REPORT ADDENDUM
S-3 CRASH SITE
AUGUST 1995

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
29419-9010

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

CONTAMINATION ASSESSMENT REPORT ADDENDUM
S-3 CRASH SITE
AUGUST 1995

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
29419-9010

CONTAMINATION ASSESSMENT REPORT ADDENDUM
S-3 CRASH SITE

NAVAL AIR STATION CECIL FIELD
JACKSONVILLE, FLORIDA

Unit Identification Code: N60200

Contract No. N62467-89-D-0317/090

Prepared by:

ABB Environmental Services, Inc.
2590 Executive Center Circle, East
Tallahassee, Florida 32301

Prepared for:

Department of the Navy, Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29418

Bryan Kizer, Code 1842, Engineer-in-Charge

August 1995

This document that describes the Contamination Assessment of the S-3 Crash Site, Naval Air Station Cecil Field, Jacksonville, Florida has been prepared under the direction of a Florida-Registered Professional Geologist. The work and professional opinions rendered in this report were conducted or developed in accordance with commonly accepted procedures consistent with applicable standards of practice.

Eric A. Blomberg
Professional Geologist No. 1695

Date: _____

CERTIFICATION OF TECHNICAL
DATA CONFORMITY (MAY 1987)

The Contractor, ABB Environmental Services, Inc., hereby certifies that, to the best of its knowledge and belief, the technical data delivered herewith under Contract No. N62467-89-D-0317/090 are complete and accurate and comply with all requirements of this contract.

DATE: August 18, 1995

NAME AND TITLE OF CERTIFYING OFFICIAL: Rao Angara
Task Order Manager

NAME AND TITLE OF CERTIFYING OFFICIAL: Eric Blomberg
Project Technical Lead

(DFAR 252.227-7036)

TABLE OF CONTENTS

Contamination Assessment Report Addendum
S-3 Crash Site
Naval Air Station Cecil Field
Jacksonville, Florida

Chapter	Title	Page No.
1.0	INTRODUCTION	1
1.1	PURPOSE	1
1.2	SCOPE	3
2.0	FIELD INVESTIGATION	3
3.0	CONTAMINATION ASSESSMENT RESULTS	3
4.0	SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS	3
4.1	SUMMARY	3
4.2	CONCLUSIONS	5
4.3	RECOMMENDATIONS	5

APPENDICES

Appendix A: Florida Department of Environmental Protection (FDEP) Comments
Appendix B: Lithologic Log and Well Construction Diagram
Appendix C: Monitoring Well Development and Groundwater Sampling Logs
Appendix D: Laboratory Analytical Data

LIST OF FIGURES

Figure	Title	Page No.
1-1	S-3 Crash Site Location	2
2-1	Soil Boring and Temporary Monitoring Well Locations	4

GLOSSARY

ABB-ES	ABB Environmental Services, Inc.
CA	contamination assessment
CAR	contamination assessment report
ESE	Environmental Science and Engineering, Inc.
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FID	flame ionization detector
ICP	inductively coupled plasma
NAS	Naval Air Station
NTU	nephelometric turbidity units
OVA	organic vapor analyzer
ppb	parts per billion
ppm	parts per million
PVC	polyvinyl chloride
SOUTHNAV-FACENGCOM	Southern Division, Naval Facilities Engineering Command

1.0 INTRODUCTION

The S-3 Crash Site is located in a wooded area in the northern part of Naval Air Station (NAS) Cecil Field on the east side of A Avenue (Figure 1-1). The site was identified in December 1991 when an S-3 aircraft lost control during "touch and go" maneuvers and crashed in a wooded area along A Avenue. The aircraft ignited on impact and most of the fuel on board was believed to have been burned. The crash site covers an area of approximately 65 feet by 200 feet.

A contamination assessment (CA) was conducted at the S-3 Crash Site by Environmental Science and Engineering, Inc. (ESE) in August and September 1993 to determine if soil and groundwater had been impacted by petroleum contamination. A contamination assessment report (CAR) was prepared in February 1994 by ESE and submitted to Florida Department of Environmental Protection (FDEP) for review.

The CA included the completion of 20 soil borings and the installation of one temporary monitoring well. Two soil samples were collected from each soil boring, and headspace analysis was performed on each sample using an organic vapor analyzer (OVA) with a flame ionization detector (FID). Only two of the 20 soil borings had OVA readings above 50 parts per million (ppm), which is considered to be excessively contaminated per Chapter 62-770, Florida Administrative Code (FAC). One groundwater sample was collected from the temporary monitoring well and analyzed for the kerosene analytical group parameters. The results of the groundwater analysis indicated that lead was the only analyte detected above the Florida groundwater guidance criteria. The concentration of lead was 120 parts per billion (ppb), which exceeded the Florida groundwater guidance criteria concentration of 50 ppb. The CAR recommended that the excessively contaminated soil be excavated for proper disposal as required in Chapter 62-770 FAC. No recommendations were made to address the elevated lead concentration in groundwater.

In a letter from FDEP (see Appendix A) dated May 6, 1994, additional field investigation was requested before the CAR could be approved. The requested field investigation included the installation of one shallow temporary groundwater monitoring well and collection of one groundwater sample for the analysis of lead.

ABB-ES was contracted by Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM) to conduct additional field investigations and develop an addendum to the CAR for the S-3 Crash Site.

1.1 PURPOSE. The purpose of this addendum is to report the results of the additional field investigations requested by FDEP in their comments on the S-3 Crash Site CAR. Based on the results of the investigation, a recommendation will be made for remedial actions at the S-3 Crash Site.

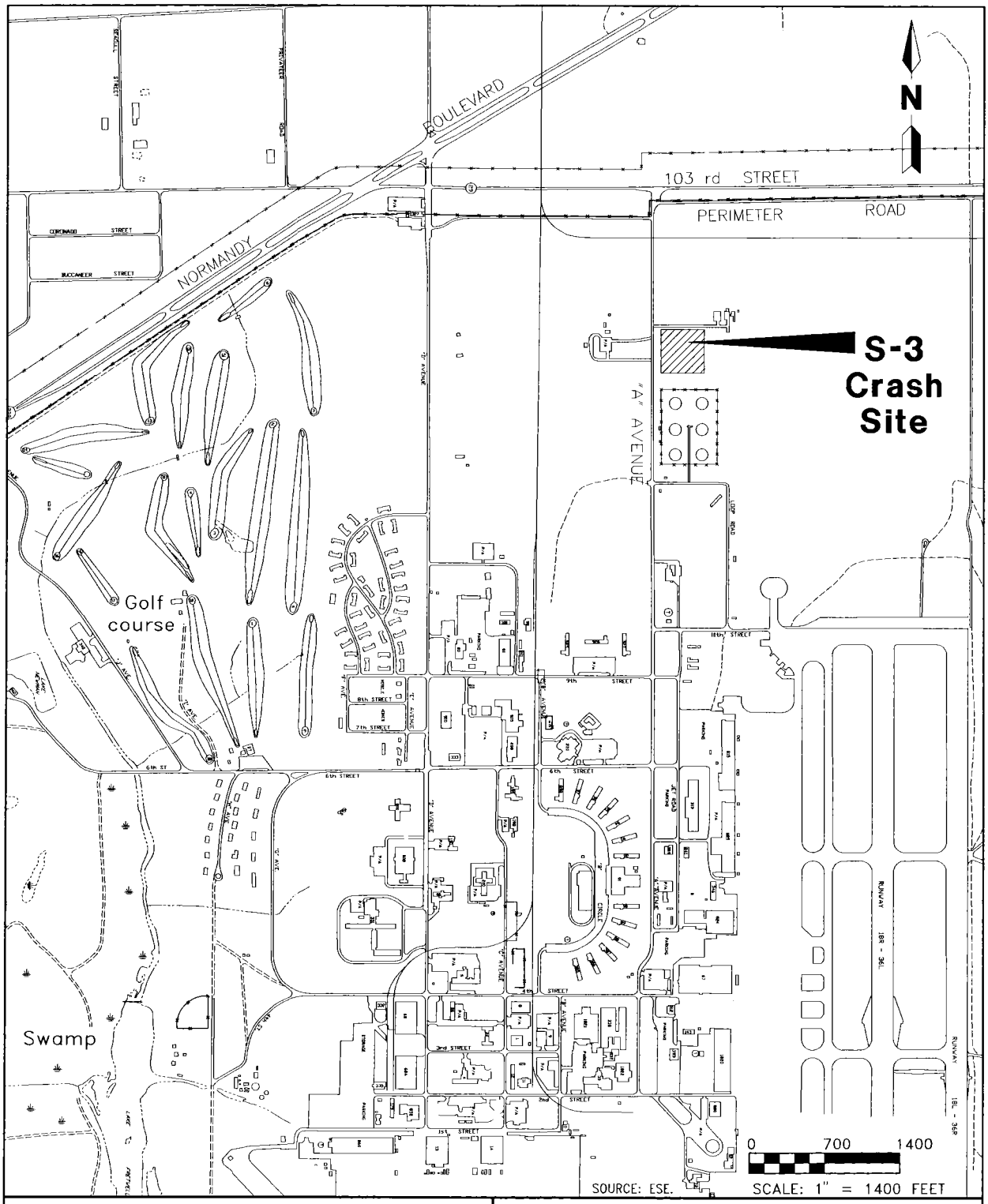

FIGURE 1-1
S-3 CRASH SITE LOCATION

H:/CECIL/CRASHSTE/NP/08-15-95

CONTAMINATION ASSESSMENT REPORT ADDENDUM
S-3 CRASH SITE

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

1.2 SCOPE. The scope of the additional investigations requested by FDEP included:

- installation of one shallow temporary groundwater monitoring well and
- collection of filtered and unfiltered groundwater samples for the analysis of total and dissolved lead.

2.0 FIELD INVESTIGATION

Monitoring Well Installation and Sampling. One temporary monitoring well (CEF-USTS3-1) was installed by ABB Environmental Services, Inc. (ABB-ES) on March 2, 1995, approximately 8 feet northeast of the previous location of temporary monitoring well TMW-1A (Figure 2-1). The well was installed using 6.25-inch inside diameter hollow stem augers. The well was constructed of 2-inch inside diameter, flush-threaded, schedule 40, polyvinyl chloride (PVC) screen and riser. The screen was composed of 0.010 inch slotted PVC and was installed between 1.5 and 11.5 feet below land surface. A 20/30 grade silica sand filter pack and a bentonite seal were installed around the well. The well was not grouted to the surface so it could be easily abandoned after sampling. The lithologic log and monitoring well construction diagram for well CEF-USTS3-1 are presented in Appendix B. The newly installed well was purged under low-flow conditions (to minimize turbidity) and sampled for lead on April 30, 1995. The well was purged with a peristaltic pump for 4 hours and the lowest measured turbidity was 80 nephelometric turbidity units (NTUs). Since the turbidity could not be reduced after extensive purging, both filtered and unfiltered groundwater samples were collected. Monitoring well development and groundwater sampling logs can be found in Appendix C.

FDEP requested that the groundwater sample be analyzed for lead by USEPA method 239.2; however, due to a miscommunication, the groundwater sampled was analyzed for lead by USEPA trace inductively coupled plasma (ICP) method 6010. Although this was not the requested analysis, the detection limit was 3.0 ppb which was well below the Florida groundwater guidance criteria of 50 ppb.

3.0 CONTAMINATION ASSESSMENT RESULTS

The results of the groundwater analysis indicated a lead concentration of 5.2 ppb in the unfiltered sample and a lead concentration of 4.3 ppb in the filtered sample. Both lead concentrations are below the Florida groundwater guidance criteria of 50 ppb. Laboratory analytical data are included in Appendix D.

4.0 SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

4.1 SUMMARY. The following is a summary of the additional field investigation conducted by ABB-ES at the S-3 Crash Site.

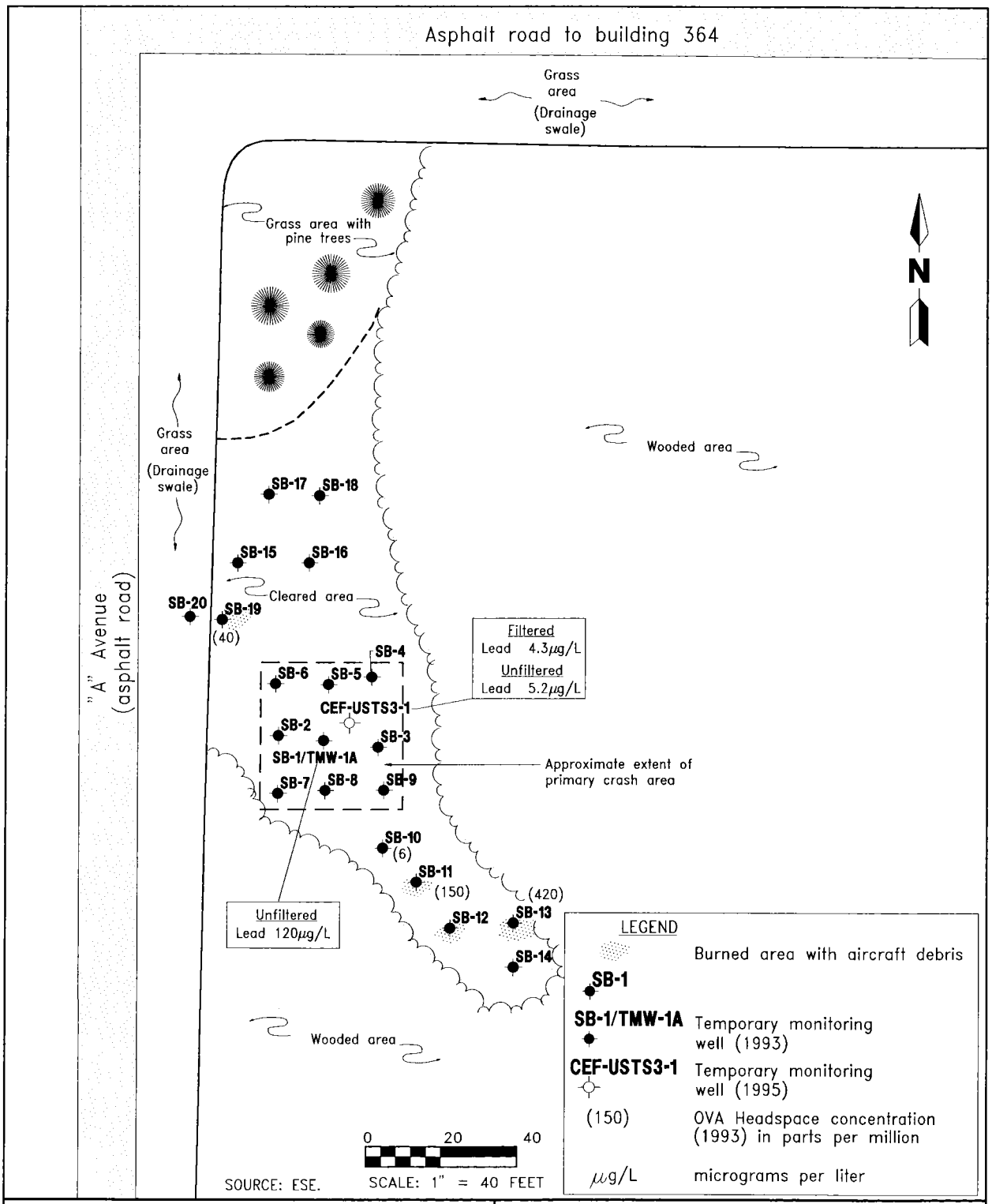

FIGURE 2-1
SOIL BORING AND TEMPORARY MONITORING WELL LOCATIONS

H:/CECIL/S-3/NP-NAB/08-18-95

CONTAMINATION ASSESSMENT REPORT ADDENDUM
S-3 CRASH SITE

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

- One temporary monitoring well (CEF-USTS3-1) was installed near the former temporary monitoring well location TMW-1A.

- Groundwater from the newly installed temporary monitoring well was sampled and analyzed for lead.

4.2 CONCLUSIONS. The additional field investigation at the S-3 Crash Site indicates lead concentration in both filtered and unfiltered groundwater samples is below Florida groundwater guidance criteria concentration of 50 ppb.

4.3 RECOMMENDATIONS. Based on the results of the additional investigation, the Navy recommends a "No Further Action Proposed" for the S-3 Crash Site after the soil excavation recommended in the February 1994 CAR has been completed. The CAR recommended that the upper one foot of soil be excavated from the two isolated areas (SB-11 and SB-13) where the OVA readings were greater than 50 ppm. It is the Navy's opinion that, during the two years since the CA field investigation, the amount of excessively contaminated soil has been further reduced through biodegradation. Therefore, the Navy recommends that these two areas be screened with an OVA prior to the soil excavation to assess if excessively contaminated soil still warrants removal.

APPENDIX A

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION (FDEP) COMMENTS

Florida Department of
Environmental Protection

Lawton Chiles
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Virginia B. Wetherell
Secretary

May 11, 1994

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Basit Ghori
Environmental Department
Box 126
Cecil Field, FL 32215

Dear Mr. Ghori:

Department personnel have completed the technical review of the Contamination Assessment Report, S-3 Crash Site, NAS Cecil Field. I have enclosed a memorandum addressed to me from Mr. Michael J. Deliz. It documents our comments on the referenced report.

If I can be of any further assistance with this matter, please contact me at 904/488-3935.

Sincerely,

L. J. Stah for ESN

Eric S. Nuzie
Federal Facilities Coordinator

ESN/st

Enclosure

cc: Mike Deliz
Bryan Kizer
Alan Shoultz
Brian Cheary
Bart Reedy
Jerry Young
John Mitchell

RECEIVED
ENVIRONMENTAL DEPT.
1994 MAY 19 AM 11:35

Recycled Paper

Florida Department of

Environmental Protection

Memorandum

TO: Eric S. Nuzie, Federal Facilities Coordinator
Bureau of Waste Cleanup

THROUGH: Dr. James J. Crane, Administrator
Technical Review Section JJC

Tim J. Bahr, P.G., Professional Geologist II
Technical Review Section TB

FROM: Michael J. Deliz, P.G., Technical Review Section
Bureau of Waste Cleanup MJD

DATE: May 6, 1994

SUBJECT: Contamination Assessment Report, dated February 1994
S-3 Crash Site, Naval Air Station Cecil Field, Florida

I have completed the review of the Contamination Assessment Report (CAR) and No Further Action (NFA) proposal dated February 1994 (received March 21, 1994), submitted for the above-referenced facility. The NFA cannot be approved at this time because of the presence of excessive lead in temporary monitoring well TMW-1A. The amount of lead, 120 parts per billion exceeds the allowable limit for a NFA. I agree with the proposed excavation and proper disposal of excessively contaminated soils as required by Chapter 17-770, Florida Administrative Code (F.A.C.), and that confirmatory headspace samples be taken following excavation. Therefore, in order to fully meet the requirements of Rule 17-770.600(7), F.A.C., the following supplemental data is requested:

1. A shallow groundwater monitoring well should be installed in the approximate location of TMW-1A. This well should designed to bracket the water table and be sampled and analyzed by EPA Methods 239.2. Care should be taken in trying to obtain a turbid-free sample. In order to achieve a non-turbid sample, a quiescent sampling technique is suggested.

2. The results of the supplemental assessment should be submitted to the Department within 90 days. An expedited assessment is desirable, so that this site can become a Category 4 Site (Dark Green) under the BRAC Cleanup Plan (BCP) and the Environmental Baseline Survey (EBS) and be considered suitable for transfer.

APPENDIX B

LITHOLOGIC LOG AND WELL CONSTRUCTION DIAGRAM

PROJECT: NAS Cecil Field RI OUs 3,4,5,6		**LOG of WELL:** CEF-USTS3-1	**BORING NO.**
CLIENT: SOUTHDIVNAVFACENGCOM	**PROJECT NO:** 8500-08	**DATE STARTED:** 03-02-95	**COMPLETED:** 03-02-95
DRILLING SUBCONTRACTOR: Groundwater Protection Inc.		**SITE:** Site 3	**MONITOR INST.** Microtip-PID
METHOD: Mobile Drill B-59/4.25"HSA	**WELL CASE DIAM.:** 2"	**SCREEN INT.:** 1.5-11.5 FT.	**SCREEN SLOT SIZE:** 0.010"
TOC ELEVATION: FT. NGVD	**GROUND ELEV.:** FT. NGVD	**NORTHING:**	**EASTING:**
WELL DEVELOP. DATE: 03-02-95	**TOTAL DEPTH:** 12.5 FT. BLS	**DEPTH TO ∇** 2 FT. BLS	**LOGGED BY:** B. McGuffee

DEPTH FT.	SAMPLE INTERVAL	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
				0-12.5 *Sand (SP)*, 100%, quartz, dark brown to light brown, fine-grained, sub-angular to sub-rounded, poorly sorted, silty.		SP	groundwater encountered	
							post hole to 4'bls.	
5								
10								
				End of boring: 12.5'bls.				
15								
20								

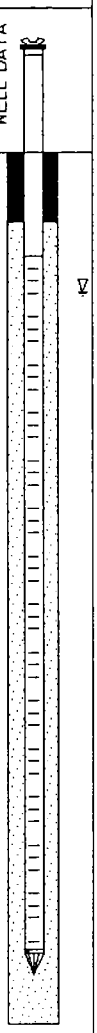

 ABB ENVIRONMENTAL SERVICES, INC.

APPENDIX C

MONITORING WELL DEVELOPMENT AND GROUNDWATER SAMPLING LOGS

MONITORING WELL DEVELOPMENT DATA

WELL: CEF-UST53-1
DATE: 3 MAR 95
STATIC WATER LEVEL (ft): ~1.5' BIS
WELL DESIGN DEPTH (ft): 11.5' BIS
WELL VOLUME (gal): ~1.4 gal

TIME BEGAN: 0738 3/3/95
TIME ENDED: 0950 3/3/95
NUMBER OF DRUMS: N/A
DRUM DESIGNATIONS: N/A

SITE NAME: NAS Cecil Field
PROJECT: RI OU5 3,4,5,6
PROJECT NUMBER: 8520.22
FIELD PERSONNEL: [illegible]
SHEET NO. 1 OF 1

TIME	ACTIVITY (swab/surge, bailing, pumping)	EST'D SEDIMENT THICKNESS (feet)	CUMMULATIVE WATER VOLUME (gallons)	TEMPERATURE (deg. C/F)	pH	CONDUCTIVITY (microsiemens)	TURBIDITY (NTU)	REMARKS
								Centrifugal pump
0738	pumping	1.0	5	58.1°	7.86	161	7200	7.86 Dark Brown Turbid
0753		0	15	60.2	6.47	338	7200	
0805			30	62.3	5.58	297	7200	
0810			35	63.2	6.03	381	7200	Medium brown Turbid
~~0920~~			—	—	—	—	—	Try new pump
0935			40	64.3	5.38	263	7200	
0950			45	64.1	5.61	241	7200	Very turbid low flow

MONITORING WELL DEVELOPMENT DATA

WELL: CEF-UST53-1
DATE: 29 APR 95
STATIC WATER LEVEL (ft): 5.08' btoc
WELL DESIGN DEPTH (ft): ~~11.5~~ 14.44 TOC 11.5 BLS
WELL VOLUME (gal): 1.31 ~ 1 CCU

TIME BEGAN: 0830 24APR
TIME ENDED: 1800 30APR
NUMBER OF DRUMS: N/A
DRUM DESIGNATIONS: N/A

SITE NAME: NAS Cecil Field
PROJECT: RI OU's 3456
PROJECT NUMBER: 8520.22
FIELD PERSONNEL: [illegible]
SHEET NO. 1 OF 2

7/13/95

Post-it® Fax Note 7671	Date 3 # of pages
To Eric	From Maria
Co./Dept.	Co.
Phone #	Phone #
Fax #	Fax #

					URE	pH	CONDUCTIVITY (microsiemans)	TURBIDITY (NTU)	REMARKS
									peristaltic
0830	pumping	0	Initial	67.1		6.10	233	7200	
0900			2	67.0		6.12	240	7200	well slow recovery rate
0930			4	68.4		6.07	241	7200	
0940			—	—		—	—	—	Pump failure
1015			4	71.0		6.11	241	7200	Resume development
1045			6	71.5		5.96	246	7200	Hose on Bottom
1115			8	71.6		5.95	247	7200	
1145			10	72.3		5.93	244	7200	
1215			12	73.1		5.84	233	7200	
1245			14	73.2		5.80	227	7200	
1315			16	74.1		5.81	218	7200	
1345			18	74.2		5.83	215	7200	
1415			20	74.4		5.79	209	7200	
1500			22	74.4		5.70	195	7200	
1530			24	74.6		5.73	190	7200	Clearing
1600			26	74.6		5.65	187	138.5	
1630			28	74.5		5.66	170	111.8	
1700			30	75.0		5.65	173	102.8	
1730			32	74.8		5.64	170	98.1	
1800			34	74.6		5.61	169	93.8	STOP Purge
				~~74.3~~					
30 APR 0845			Initial	71.3		5.67	146	135	
0915			36	70.9		5.66	140	7200	
0945			38	71.1		5.62	144	7200	
1015			40	71.3		5.69	152	7200	
1045			42	72.2		5.66	138	7200	
1130			44	73.1		5.69	124	7200	Clearing

MONITORING WELL DEVELOPMENT DATA

WELL: CEF-UST 53-1
DATE: 30 APR95
STATIC WATER LEVEL (ft): 5.08' btoc
WELL DESIGN DEPTH (ft): 14.44 btoc
WELL VOLUME (gal): 1.3 gal

TIME BEGAN: 0830 29APR95
TIME ENDED: 1800 30 APR95
NUMBER OF DRUMS: N/A
DRUM DESIGNATIONS: N/A

SITE NAME: NAS Cecil Field
PROJECT: AFOUE 3456
PROJECT NUMBER: 95-20.22
FIELD PERSONNEL: [illegible]
SHEET NO. 2 OF 2

TIME	ACTIVITY (swab/surge, bailing, pumping)	EST'D SEDIMENT THICKNESS (feet)	CUMMULATIVE WATER VOLUME (gallons)	TEMPERATURE (deg. C)	pH	CONDUCTIVITY (microsiemens)	TURBIDITY (NTU)	REMARKS
1200	pumping	0	46	73.6	5.69	129	151.8	Peristaltic pump
1230	"	"	48	73.7	5.60	128	170.1	
1300	"	"	50	74.1	5.64	121	141.2	
1330	"	"	52	74.3	5.61	119	97.1	
1400	"	"	54	74.8	5.62	120	80.6	
1430	"	"	56	74.9	5.65	123	81.3	
1500	"	"	58	74.9	5.60	126	80.6	
1530	"	"	60	74.8	5.57	120	82.0	
1600	"	"	62	75.0	5.62	119	81.8	
1630	"	"	64	74.8	5.62	119	80.8	
1700	"	"	66	74.6	5.59	122	82.3	
1730	"	"	68	74.5	5.67	124	81.2	
1800	"	"	70	74.4	5.62	123	82.1	End purge / Sample

GROUNDWATER SAMPLING LOG

CLIENT ABB-ES
SITE UST
WELL NUMBER CEF-UST53-1
JOB NUMBER 8520.22

TOTAL WELL DEPTH 14.44 TOC
WELL DIAMETER 2"
BOREHOLE DIAMETER 6¼-INCH

MIN NUMBER WELL VOL TO BE PURGED 5
VOL PER VERTICAL FT CASING (GAL) .14
VOL PER FT BOREHOLE (LESS CASING)(GAL) N/A

STATIC WATER LEVEL (FT) 5.08
STANDING WATER COLUMN (FT) 9.36

AMT ONE WELL VOL (GAL) 1.31
TOTAL GAL TO BE PURGED 6.55

PURGING SYSTEM peristaltic
SAMPLING SYSTEM bailer

DATE	TIME	AMOUNT PURGED (GAL)	FIELD PARAMETERS MEASURED						COMMENTS	SAMPLER
			EC(µmhos)	pH	TEMP(°C)	TURBIDITY(NTU)	PID(ppm)			
30AP195	1400	Initial 0	120	5.62	74.8	80.6	0			BM
	1430	2	123	5.65	74.9	81.3				
	1500	4	126	5.60	74.9	80.6				
	1530	6	120	5.57	74.8	82.0				
	1600	8	119	5.62	75.0	81.8				
	1630	10	119	5.63	74.8	80.8				
	1700	12	122	5.59	74.6	82.3				
	1730	14	124	5.67	74.5	81.2				
	1800	16	123	5.62	74.4	82.1			End purge / Sample well	

NOTES:

TURBIDITY:

JUL-13-95 THU 01:55 PM P.01

APPENDIX D

LABORATORY ANALYTICAL DATA

NAS CECIL FIELD -- S-3 CRASH SITE
LEAD

Lab Sample Number:	A5E0200070			A5E0200070			A5E0200070		
Site	CECIL8			CECIL8			CECIL8		
Locator	CEF-UST-H31			CEF-UST-H31			CEF-UST-H31		
Collect Date:	30-APR-95			30-APR-95			30-APR-95		
	VALUE QUAL	UNITS	DL	VALUE QUAL	UNITS	DL	VALUE QUAL	UNITS	DL
Lead	.0052	mg/l	.003	93.79	PERCE		96.17	PERCE	
Lead -DISS	.0043	mg/l	.003	86.61	PERCE		98.04	PERCE	

U = NOT DETECTED J = ESTIMATED VALUE
UJ = REPORTED QUANTITATION LIMIT IS QUALIFIED AS ESTIMATED
R = RESULT IS REJECTED AND UNUSABLE

FILE

DEPARTMENT OF REGULATORY &
ENVIRONMENTAL SERVICES
Water Quality Division

CITY OF JACKSONVILLE, FLORIDA

WELL PERMIT

GRANTED TO: Commanding Officer
Environmental Dept. - Code 2000
NAS - Cecil Field
P. O. Box 126, Building 190
Jacksonville, Florida 32205

PERMIT #: 95-0350

WELL LOCATION: NAS-Cecil Field

WELL #: J-9112

CONTRACTOR: Scott Davidson

LICENSE/BOND #: 7018

Permission has been granted to construct, repair, alter or plug well(s) at the above location in accordance with information supplied on the Application for Permit form and with the authority of Chapter 366, City of Jacksonville Municipal Code. Water shall not be used for purpose(s) other than that indicated without prior approval from this Office. This well shall be subject to the following additional provisions:

APPLICABLE IF CHECKED

____1. This well may not be constructed or located within ____ feet of any possible source of pollution, including, but not limited to a sewage disposal system.
__X__2. A legible and completed copy of the St. Johns River Water Management District (SJRWMD) well completion report shall be filed with the Groundwater Resource Management Branch (GRMB) within 30 days after completion of this well.
____3. Water from this well ____ may ____ may not be used for once-through cooling purposes (ie., water-cooled heat pump).
____4. The well contractor and owner shall be responsible for notifying the GRMB at least 24 hours prior to starting work and receive an authorization number.
__X__5. A copy of this permit is given to any future property owner when the property is sold.
____6. Water taken from this well shall not be used to create or maintain surface water level or quality (ie., ponds, pools, streams, etc.).
__X__7. See attached proviso(s) ____9.____ Please review these proviso(s) carefully. There may be a difference between the items requested in the application and the requirements of this permit. Appeals must follow the requirements of EPB Rule 8 and Chapter 366, City Ordinance Code (OC).

WELL APPROVED FOR:

____ Irrigation and recreation use only
____ Construction of a potable water supply
____ Non-potable water supply
__X__ Monitoring
____ Public Supply
____ Recovery
____ Abandonment/Plugging
____ Industrial Use Only
____ Injection
____ Other _____

ISSUED BY: _____ **DATE:** _____
Manager, Groundwater Resource Management Branch

ALL-AMERICA CITY
421 West Church Street - Suite 412
Jacksonville, Florida 32202-4111
Area Code 904/630-3666

8. Recovery Well Proviso:

a. Issuance of a permit to construct a well for contamination removal and/or product recovery does not relieve the applicant, representative or well contractor from obtaining all applicable State and local permits for the withdrawal and/or offsite discharge of groundwater from the well and/or any associated groundwater treatment system; and/or for the discharge of any emissions to the atmosphere.

b. Recovery wells shall be constructed in accordance with those standards established in Chapter 40C-3, Florida Administrative Code (FAC).

c. The upper terminus of the well shall extend either to land surface or to finished grade, whichever is higher, or where a potential physical or traffic hazard exists, the well must:

(1) be placed in an appropriate enclosure terminating at land surface or finished grade, whichever is higher, that allows vertical access to the casing and proper drainage, and that protects the well head from the entrance of contaminants, or

(2) be completed to a point 18 inches or less below land surface or finished grade, whichever is higher. A tee and nipple must be affixed so that the casing extends to land surface or finished grade while permitting a below grade water line to extend to a designated location remote to the water well.

9. Monitoring Well Proviso:

Monitoring and/or assessment well(s), excluding those constructed pursuant to Chapter 62-761, FAC, shall be constructed in accordance with Chapter 40C-3, FAC, and shall include, but not be limited to the following provisions:

a. Wells shall be located, constructed, cased, grouted, plugged, capped, or sealed to prevent uncontrolled surface flow, uncontrolled movement of water from one aquifer or water bearing zone to another, contamination of groundwater or surface water resources, or other adverse impacts.

b. If confining units are penetrated by a well, construction shall include a casing and grout seal to the confining unit to protect underlying aquifers of better quality groundwater.

c. Bentonite grout shall not be used on well(s) constructed in any identified contamination site.

d. Well(s) shall be constructed with a locking cap or other security device(s) meeting the Florida Department of Environmental Protection (FDEP) and SJRWMD specifications.

e. Those standards established in Chapter 40C-3.502(1)(a)1-7., FAC, and Chapter 40C-3.517(7)(b), FAC, for construction of monitoring wells shall also apply for well construction under this provision.

f. Wells permitted or constructed as a monitoring well shall not be used for contamination removal and/or product recovery without first obtaining a permit from this Office to modify the use of the well(s).

If this well is to be used as a public water supply (community, non-community, or other public) as defined by the Florida Administrative Code, Chapter 17-22, or Chapter 10-D-4, the following well construction standards must be adhered to:

a) Well construction standards will be in accordance with those set in 17-22.106(1) and (2), 17-21(2)(d) and 40C-3 for public well construction.

(b) For wells less than 4 inch in diameter a minimum 1 inch thick annulus of grout full length is required. Larger wells require 2 inch grout annulus.

Construction Methods

Drilling method:		Cable tool		Jetted		Rotary	X	Other	Explanation HSA
Casing material:		Galvanized		Steel	X	PCV		Other	
Casting joined by:	X	Threaded coupling		Weld		Coupling & weld		Other	
Type of seal between casing:		Neoprene	X	Cement		Bell reducer		Other	
Annular material:	X	Grout		Gravel	X	Sand		Other	

Total depth to be drilled from well flange: 35 ft. Height of well flange: 0 ft. X above X below X land surface mean sea level

35 ft. of 2 in. casing weigh. .70 lb/ft seated at 35 ft. below well flange

____ ft. of ____ in. casing weigh. ____ lb/ft seated at ____ ft. below well flange

____ ft. of ____ in. casing weigh. ____ lb/ft seated at ____ ft. below well flange

For Well Abandonment

Date and time of intended abandonment ____

Diameter of casing ____ Depth to be sealed ____ Depth cased ____

Total depth of well ____ Is well unobstructed throughout its lengty? ____ Yes ____ No

How determined? ____ When was well drilled? ____

If date is not available, estimate minimum age of well ____ If well is obstructed, what action is proposed? ____

How do you intend to seal the well? ____

Public Water Supply

If the well is to be used as a public water supply as defined by the Florida Administrative Code, Chapter 17-22, or Chapter 10D-4, the following provisions are applicable:

(a) This is not a permit to drill a public supply well as defined in Ch. 17-22. Prior to construction, a public supply well permit must be obtained from the St. John River Water Management District in Palatka (1-904-328-8231) in addition to this City Permit.

(b) This form will serve as the application for other Public Supply ststems (10D-4).

(c) An on-site inspection of the proposed well location will be performed prior to approval by the Sanitary Engineering Branch when action under (A or B) is taken (633-3910).

(d) After construction, bacteriological clearance is required. Technical advice and assistance may be obtained from the Sanitary Engineering Branch.

(e) A chemical analysis of a sample of the well water must be made by a certified, commercial laboratory with a copy of the report to be submitted to the Sanitary Engineering Branch. The analysis shall indicate the content of all those chemical elements and compounds listed in Ch. 17-22 of the Floridan Administrative Code. For wells defined in Ch. 10D-4, analysis of nitrates only is required.

Signatures

I understand I may not use any deep, artesian well to serve a once-through heat exchange such as a water-cooled heat pump, or for any other purpose prohibited by the City Code or well permit provision. I also understand as a well owner I have a responsibility, under Ch. 306.307 (a), to have this well plugged when the conditions of Ch. 306.302 (b) occur. I certify that the enclosed information is accurate and agree to comply with all provisions of the permit and Ch. 306 of the Duval County Municipal Ordinance Code, with the requirements of the Rules and Regulations of the St. Johns River Water Management District, Florida Division of Health, and Department of Environmental Regulation. Attached is a check made out to the City Tax Collector for the required permit fee.

Signature of well owner ____ Date ____

[signature] ATEC Associates Inc 11/10/95

Signature of agent authorized to apply for, and execute, the permit Date

I agree to furnish a drilling log within 30 days after drilling operations cease to the Bio-Environmental Services Division.

[signature] 7018 11/10/95

Signature of well contractor Date

Florida Division of Health: ____ Approved ____ Disapproved

Report attached ____ by ____

Date Name

630-4900

CITY OF JACKSONVILLE
APPLICATION FOR PERMIT TO CONSTRUCT, REPAIR OR ABANDON A WELL
Bio-Environmental Services Division - Water Conservation Program Manager
421 W. Church St., Suite 412 - Jacksonville, FL. 32202 - Telephone [redacted]

Office Use

Technician _____ Work Order No. 4950 Permit NO. 95-0350 Well No. J 9112

PLEASE TYPE OR PRINT IN INK

Well Contractor

Name of well contractor Davidson (Last) Scott (First) A (Middle) State license 7018

Mailing Address 6600-1 Younger Men Circle Jax 32244 (Street or box / City / State / zip) Phone No. (904) 771 3055

Permit for: X New well ____ Repair well ____ Abandon well ____ Test well ____ Other

Well Owner (Applicant)

Name of owner United States Department of Navy (Last / First / Middle)

Mailing address NAS Cecil Field Jax FL (Street or box / City / State / Zip) Phone No. ____

Name of applicant (if other than owner) ABB Environmental Services Inc (Last / First / Middle)

Mailing address 2590 Executive Center Circle East (Street or box / City / State / Zip) Phone No. (904) 656-1293
Tallahassee FL 32301

Well Use

Type of Use: ____ Public Supply (17-22) Place of Business 25 people or more and/or 15 residential connections or more.
____ Public Supply (10D-4) Place of Business less than 25 people and/or 5 to 14 residential connections.
____ Domestic (4 or less living units) ____ Industrial ____ Irrigation
Petro. Assessment Monitoring Well Other (Specify)

Amt. of Use: 0 Gallons/day Estimated average withdrawal 0 Gallons/min. Expected well capacity

What is the previous source of water? ____ Utility ____ Sand well ____ Rock well ____ Artesian well ✓ No previous source. If the source is presently a well, why is it being replaced N/A

Well Location

Complete both #1 & #2
1. Well location 22 / 3S / 24E and
~~Lot~~ Section / ~~Block~~ Township / ~~Subdivision~~ Range / Street address

If the above information is not available, supply section, township, range data or real estate numbers or latitude/longitude to the nearest second. Other location data

2. Submit a sketch locating: The proposed well and all known wells within 300 ft radius: Show points of reference such as roads, buildings etc.; show possible contamination sources like septic tanks, retention ponds: include a distance measurement to the nearest known cross street. Use this space or attach a sketch.

See Attached Site Map for Monitoring Well Location

NORTH

RECEIVED
NOV 13 1995
GROUNDWATER RESOURCE MANAGEMENT ACTIVITY

WCA 12-85