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NAS CECIL FIELD, FL  
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SAMPLING AND ANALYSIS REPORT FOR BUILDING 500 BASE REALIGNMENT AND  
CLOSURE ZONE H UNDEVELOPED EASTERN AREA GROUP 7 NAS CECIL FIELD FL  
11/1/1997  
ABB ENVIRONMENTAL SERVICES INC

**SAMPLING AND ANALYSIS REPORT**  
**BUILDING 500**  
**BASE REALIGNMENT AND CLOSURE**  
**ZONE H, UNDEVELOPED EASTERN AREA**  
**GROUP VII**  
**NAVAL AIR STATION CECIL FIELD**  
**JACKSONVILLE, FLORIDA**

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GLOSSARY

ABB-ES	ABB Environmental Services, Inc
BCT	Base Realignment and Closure cleanup team
ELCR	excess lifetime cancer risk
FDEP	Florida Department of Environmental Protection
HI	hazard index
HQ	hazard quotient
GGC	groundwater guidance concentrations
$\mu\text{g}/\ell$	micrograms per liter
PRE	preliminary risk evaluation
RBC	Risk-Based Concentrations
SAO	sampling and analysis outline
USEPA	U.S. Environmental Protection Agency

## 1.0 INTRODUCTION

ABB Environmental Services, Inc. (ABB-ES), under contract to the Southern Division, Naval Facilities Engineering Command, has completed the Phase II Sampling and Analysis program for Building 500 at Naval Air Station Cecil Field. This report summarizes the related field operations, results, conclusions, and recommendations of the Phase II investigation.

Building 500, the Security Detective Division Building, is located along perimeter road, approximately 1 1/2 miles east of Avenue A. Potential environmental concerns identified for the facility involve the presence of a septic system south of the building. The Base Realignment and Closure cleanup team (BCT) regards septic tank and leachfield systems as potential pathways for contaminants to enter the groundwater, if improperly used. A Sampling and Analysis Outline (SAO) for the assessment of groundwater was prepared by ABB-ES and approved by the BCT (ABB-ES, 1996). The results of the Phase II Sampling and Analysis program developed in the SAO are discussed below.

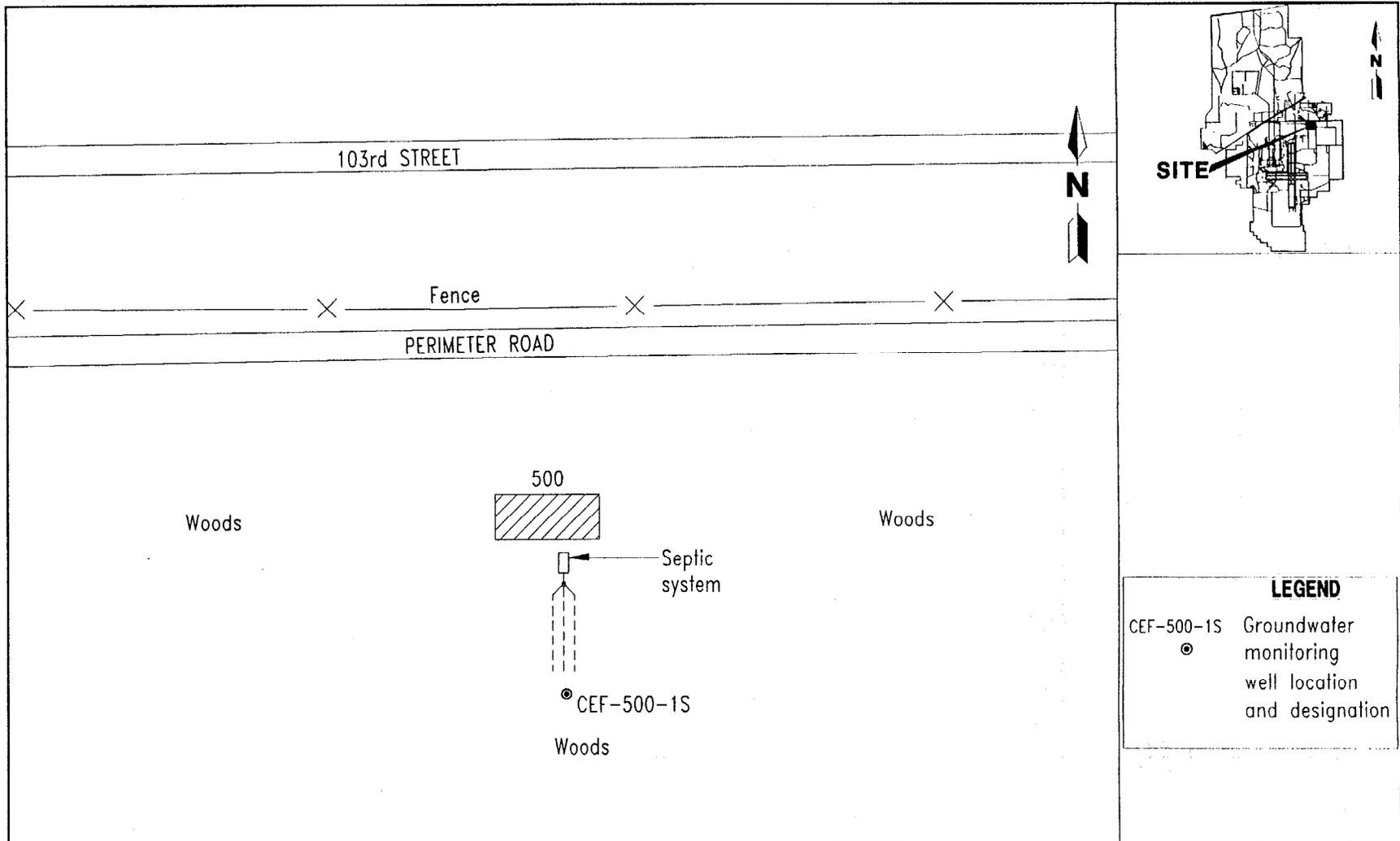
## 2.0 PHASE II INVESTIGATION

Field activities were undertaken in general conformance with the Project Operations Plan (ABB-ES, 1994a). The Phase II investigation included the installation of one groundwater monitoring well to a depth of 17 feet below land surface, downgradient (south) of the septic system. A general site plan indicating the location of the monitoring well is presented on Figure 1. The soil boring log is included in Appendix A. One groundwater sample was collected and analyzed for the full Contract Laboratory program suite of target compound list organics and target analyte list inorganics.

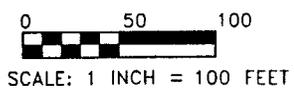
## 3.0 PRELIMINARY RISK EVALUATION (PRE)

A PRE was conducted to assess potential risks to human and ecological receptors posed by contaminants in groundwater. Primary exposure pathways were evaluated to determine which potentially contribute to human health and ecological risks. The evaluation was conducted in general conformance with methodology provided in the U.S. Environmental Protection Agency (USEPA) Region IV Memorandum "Amended Guidance on Preliminary Risk Evaluations (PREs) for the Purpose of Reaching a Finding of Suitability to Lease (FOSL)" (USEPA, 1994a), USEPA Region IV Bulletin on Ecological Risk Assessment (USEPA, 1995), and minutes of meetings with the USEPA and the Florida Department of Environmental Protection (FDEP) concerning PREs (ABB-ES, 1995). Site background information and rationale for sample collection and analysis are detailed in the Environmental Baseline Survey Report (ABB-ES, 1994b) and the SAO (ABB-ES, 1996).

**3.1 PUBLIC HEALTH PRE.** All detected analytes were compared to readily available risk-based screening values to assess the likelihood of adverse human health effects associated with potential exposure to groundwater. Risk-based screening values were obtained from USEPA Region III Risk-Based Concentrations (RBCs) (USEPA, 1996) and FDEP Groundwater Guidance Concentrations (GGC) (FDEP,



**LEGEND**  
CEF-500-1S Groundwater monitoring well location and designation



**FIGURE 1**  
**BUILDING 500**  
**SECURITY - DETECTIVE DIVISION BUILDING**  
**SAMPLE LOCATION PLAN**



**PHASE II SAMPLING AND ANALYSIS REPORT**  
**NAS CECIL FIELD**  
**JACKSONVILLE, FLORIDA**

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1994). Most screening values published in the references listed above are based on toxicity constants and standard human exposure scenarios, and correspond to fixed levels of risk. The designated level of risk for noncarcinogenic chemicals is based on a hazard quotient (HQ) of 1. The level of risk for carcinogenic chemicals is based on an excess lifetime cancer risk (ELCR) of  $1 \times 10^{-6}$ . Cancer and noncancer risks associated with industrial and residential land use are estimated by dividing the maximum detected analyte concentration by the corresponding USEPA Region III RBC value at the designated level of risk (HQ of 1 or ELCR of  $1 \times 10^{-6}$ ). For noncarcinogens, the HQ are summed to determine the cumulative noncancer risk or hazard index (HI).

Nineteen analytes, including one pesticide compound and 18 inorganic analytes, were detected in the groundwater sample collected in the study area. A comparison among concentrations of detected analytes in groundwater, RBCs for tap water, and FDEP GGC is presented in Appendix A.

Aluminum, iron, and thallium were detected at concentrations exceeding FDEP guidance concentrations. The GGC for aluminum and iron are based upon secondary water quality standards. The GGC for thallium is a primary standard. The detected concentrations of thallium and Heptachlor epoxide were in excess of their RBCs.

The cumulative noncancer risk or hazard index (HI) calculated for the detected analytes is 1.7, based upon RBCs for tap water and is primarily attributable to thallium. Thallium was detected in groundwater at a maximum concentration of 3.1 micrograms per liter ( $\mu\text{g}/\ell$ ), exceeding the Federal and State drinking water standard of  $2 \mu\text{g}/\ell$ . The analytical result for thallium was less than the contract-required detection limit of  $10 \mu\text{g}/\ell$  and was, therefore, qualified as an estimated concentration. There is no RBC for thallium; therefore, the RBC for thallium sulfate was used as a surrogate. There is some uncertainty concerning the detections of thallium in groundwater above the State and Federal MCLs. Thallium has been observed, below the laboratory detection level, at similar concentrations ( $2$  to  $6 \mu\text{g}/\ell$ ) at many sites throughout NAS Cecil Field, including upgradient groundwater samples at OUs 3 and 6. The detection of thallium may be from its presence as a naturally occurring element or from interelemental interference with iron or other cations during the analysis for thallium. Due to the widespread occurrence of thallium at similar concentrations and potential for interelemental interference, it does not appear that thallium is site related.

Heptachlor epoxide was the only carcinogenic analyte detected. The ELCR calculated based upon the concentration of heptachlor epoxide in groundwater is  $1.6 \times 10^{-5}$ . The maximum detected heptachlor epoxide concentration was  $0.019 \mu\text{g}/\ell$  and is below Federal and State drinking water standards of  $0.2 \mu\text{g}/\ell$ . Heptachlor epoxide is a breakdown product of commonly used termiticide, which may account for its presence in the groundwater in the vicinity of Building 500.

**3.2 ECOLOGICAL PRE.** Potential exposure pathways and ecological habitat associated with Building 500 were characterized by ABB-ES ecological risk assessors in June 1996. Building 500 was demolished and removed prior to the site visit. The immediate vicinity of the site is vegetated with grass and large oak trees. Perimeter Road bound the site to the north. The remainder of the site is bound by moderately to densely wooded areas. No complete exposure

pathways to groundwater were identified within the study area. Therefore, no further ecological risk evaluation was conducted.

#### 4.0 CONCLUSIONS AND RECOMMENDATIONS

Aluminum, iron, and thallium were detected in groundwater at concentrations exceeding FDEP guidance concentrations. Aluminum and iron are regulated as secondary water quality standards. The detected concentrations of thallium and heptachlor epoxide were in excess of their respective RBCs for tap water.

A cumulative HI of 1.7 and an ELCR of  $1.6 \times 10^{-5}$  were calculated for the detected analytes in groundwater. The noncarcinogenic HI is primarily attributable to thallium, and the ELCR is attributable to heptachlor epoxide. However, due to the widespread occurrence of thallium (a naturally occurring element) at NAS Cecil Field, and the potential for inter-elemental interference during analysis, it does not appear that thallium is site related.

No exposure pathways to human or ecological receptors have been identified for groundwater in the study area. No risk to human health is anticipated in the event of a future residential land-use exposure scenario. Therefore, based upon the findings of this evaluation, reclassification of the color code for Building 500 from Gray to Light Green is recommended.

#### REFERENCES

- ABB Environmental Services, Inc. (ABB-ES). 1994a. *Project Operations Plan for Cecil Field and Health and Safety Plan*. Prepared for Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), North Charleston, South Carolina (December).
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- ABB-ES. 1995. Minutes of September 25, 1995, conference call to discuss preliminary risk evaluations.
- Florida Department of Environmental Protection. 1994. *Groundwater Guidance Concentrations*. Bureau of Drinking Water and Groundwater Resources, Tallahassee, Florida (June).
- U.S. Environmental Protection Agency (USEPA). 1994a. *USEPA Region IV, Amended Guidance on Preliminary Risk Evaluations (PREs) for the Purpose of Reaching a Finding of Suitability to Lease (FOSL)*. Atlanta, Georgia, (December 20).

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USEPA. 1994b. *Drinking Water Regulations and Health Advisories*, Office of Water, Washington, D.C. (February).

USEPA. 1995. *Region IV Waste Management Division Preliminary Risk Evaluation, Ecological Risk Assessment, Supplemental Guidance to RAGS*. Region IV Bulletin No. 1 (November).

USEPA. 1996. *Region III Risk-Based Screening Table, Region III, Technical Guidance Manual*. Risk Assessment. EPA/903/R-93-001 (May).

**APPENDIX A**

**SOIL BORING LOGS AND TABLE**

<b>Project:</b> NAS Cecil Field BRAC		<b>Well ID:</b> CEF-500-IS	<b>Boring ID:</b> CEF-500-IS
<b>Client:</b> SOUTHDIVNAVFACENCOM		<b>Contractor:</b> Alliance Environmental, Inc.	<b>Job No.:</b> 08520-85
<b>Northng/Easting:</b> 2150305.501/383358.988		<b>Date started:</b> 12-11-95	<b>Compltd:</b> 12-11-95
<b>Method:</b> Auger	<b>Casing dia.:</b> 2 in.	<b>Screened Int.:</b> 8 - 18 Ft.	<b>Protection level:</b> D
<b>TOC elev.:</b> 81.17 Ft.	<b>Type of OVM:</b> PID	<b>Total dpth:</b> 17.0Ft.	<b>Dpth to √</b> 8.0 Ft.
<b>ABB Rep.:</b> R. Holloway	<b>Well development date:</b> 1-8-98		<b>Site:</b> 70 - 500 Security Det. Bldg.

Depth Ft.	Laboratory Sample ID.	Sample Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diag.
0				SILTY SAND (SM): 100%, dark grayish brown to dark gray, quartz, fine- to very fine-grained, subrounded to subangular, well sorted.		SM	posthole	
0							posthole	
5				CLAYEY SAND (SC): 100%, dark brown, quartz, very fine-grained, subrounded, well sorted, tightly compacted.		SC	3,4,100+	
0							75,100,75,88	∇
0				SILTY SAND (SM): 100%, dark brown, quartz, fine- to very fine- grained, subrounded to subangular, well sorted.		SM	8,12,30,40	
10								
15								
20								
25								
30								

**Table A-1  
BRAC Preliminary Risk Evaluation Table for Analytes Detected  
in Groundwater**

Sampling and Analysis Report, Building 500  
Base Realignment and Closure  
Zone H, Undeveloped Eastern Area Group VII  
NAS Cecil Field, Jacksonville, Florida

Analyte	Sample		Screening Values		Calculated Risk Values	
	70G00101	70G00101F	FDEPGGC	RBC(T)	ELCR	HQ
<b><u>Pesticides and PCBs</u></b>						
Heptachlor epoxide	0.019		0.2 p	0.0012 c	1.6E-05	
<b><u>Inorganic Analytes</u></b>						
Aluminum	5,180	284	200 s	37,000 n		0.1
Antimony		4.5	6 p	15 n		0.3
Barium	9.5	5.7	2,000 p	2,600 n		0.00.0
Calcium	13,500	13,700				
Chromium	5.7		100 e	180 n		0.0
Cobalt	1.5			2,200 n		0.0
copper	3.5		1,000 s	1,500 n		0.0
Iron	829	261	300 s*	11,000 n		0.1
Magnesium	1,200	1,150				
Manganese	5.5	6.4	50 s	840 n		0.0
Nickel	2.6		100 p	730 n		0.0
Potassium	279	201				
Selenium	4.3		50 p	180 n		0.0
Sodium	6,750	5,440	160,000 p			
Thallium	3.1		2 p	2.9 n		1.1
Vanadium	7.2	3.1	49 st	260 n		0.0
Zinc	16.4		5,000 s	11,000 n		0.0
Cyanide	4.3	10	200 p	730 n		0.0
				<b>Sum</b>	<b>1.6E-05</b>	<b>1.7</b>

Notes: All analytes are reported in micrograms per liter.  
Sample suffixes indicate the following: F = filtered sample, DL = laboratory diluted sample, RE = laboratory reextracted, D = field duplicate.  
There is no RBC for thallium; the RBC for thallium sulfate was used as a surrogate.  
The RBC for free cyanide was used for calculation of the HQ.

BRAC = Base Realignment and Closure (Act).

NAS = Naval Air Station.

FDEPGGC = FDEP Groundwater Guidance Concentration, June 1994.

RBC(T) = Risk-based concentration (tap water), USEPA Region III, May 1996.

ELCR = calculated excess lifetime cancer risk; ELCR = detected concentration/RBC(T)\* 10E-06.

HQ = calculated hazard quotient for noncarcinogenic analytes; HQ detected concentration/RBC(T).

PCB = polychlorinated biphenyl.

p = primary standard (MCL).

c = carcinogenic risk.

s = secondary standard (related to taste, odor, color, or other nonaesthetic effects).

\* = values that exceed FDEPGGC.

n = noncarcinogenic risk.

e =

st = systematic toxicant.