

N60508.AR.000708
NAS WHITING FIELD
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SUMMARY OF PIEZOCONE PENETROMETER FOR PHASE 2A REMEDIAL
INVESTIGATIONS AT NAS WHITING FIELD FL
11/30/1993
ABB ENVIRONMENTAL

**SUMMARY OF PIEZOCONE PENETROMETER (PCPT)/BAT
PHASE II-A RI
NAS WHITING FIELD
MILTON, FLORIDA**

1.0 Introduction

A PCPT exploration and BAT groundwater sampling program was conducted at NAS Whiting Field between October 12 and November 2, 1993. Williams Earth Sciences of Clearwater, Florida, under the supervision of ABB-ES personnel, performed the PCPT soundings and collected the groundwater samples.

2.0 PCPT Exploration and BAT Groundwater Sampling Objectives

The objective of the PCPT exploration program at NAS Whiting Field was to define the stratigraphy and determine shallow and deep BAT groundwater sampling depths at each sounding location.

Groundwater samples were collected to determine whether observed groundwater contamination in the industrial area is migrating toward Clear Creek and Sites 15 and 16.

3.0 PCPT Explorations

3.1 PCPT Methodology

PCPT explorations were performed in accordance with ASTM Designation: D3441-86 Standard ASTM Method for Deep, Quasi-Static, Cone and Friction-Cone Penetration Tests of Soils. Specifically, a stainless-steel cone tip (equipped with electronic sensors) connected to stainless-steel rods was hydraulically driven into the overburden soils. Measurements of end-bearing resistance, friction resistance, and pore pressure were recorded throughout each sounding to define the lithology and locate the water table.

Analog signals from four sensors in the cone tip were digitized for data logging. Analysis of the digital data was done in the field using a data acquisition software system. Based on the cone readings a lithologic description of the soils was computed with the aid of the software package.

3.2 Summary of PCPT Explorations

A total of seven PCPT soundings were conducted in the southwestern portion of the installation (Figure 1). Depths of the soundings are summarized in Table 1. PCPT sounding lithologic logs are presented in Appendix A.

During the PCPT exploration program, the cone tip met refusal in very dense sands at various depths at all sounding locations. In order to gain lithologic data beyond the dense sands, a drill rig bored through the dense sand collecting split-spoon samples at 5-

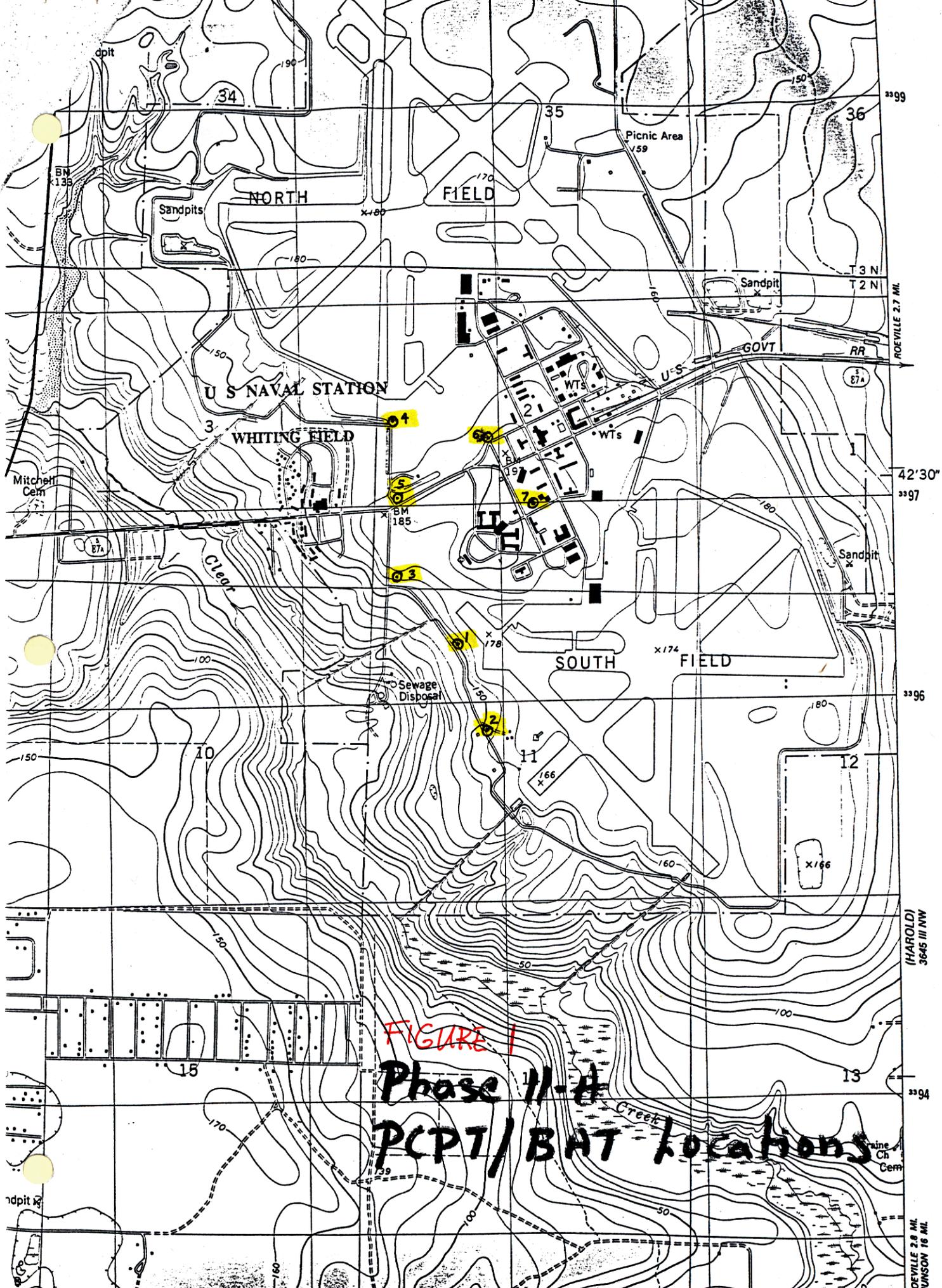


FIGURE 1
Phase II-A
PCPT/BAT locations

00174BOIV

(HAROLD)
 3645 III NW

ROEVILLE 2.8 MI
 MUNSON 16 MI

TABLE 1
SUMMARY OF PCPT SOUNDINGS
PHASE II-A RI
NAS WHITING FIELD
MILTON, FLORIDA

DATE	PCPT SOUNDING	PROPOSED DEPTH (FEET BLS)	ACTUAL DEPTH (FEET BLS)
10-12-92	WHF-2A-CPT-01	180	111
10-12-92	WHF-2A-CPT-02	180	130
10-13-92	WHF-2A-CPT-03	180	96
10-14-92	WHF-2A-CPT-04	180	75
10-14-92	WHF-2A-CPT-05	180	110
10-15-92	WHF-2A-CPT-06	180	99
10-15-92	WHF-2A-CPT-07	180	85

foot intervals until less dense material was encountered. Once the less dense material was encountered, 2-inch ID steel casing was placed into the borehole to provide additional support for the piezocone rod. The PCPT sounding continued until refusal. This method was employed successfully at only one location (WHF-CPT-01). At the remaining six locations the soil was too dense to push the PCPT rod through.

4.0 BAT Groundwater Sampling

4.1 BAT Methodology

The BAT groundwater sampling technique was used to collect groundwater samples for VOC analysis. The following paragraphs describe the methodology used during the NAS Whiting Field Phase II-A RI field program.

Once the groundwater sampling depth was determined from the PCPT soundings, a drill rig was used to advance a borehole to approximately 2 to 3 feet above the desired sampling location. A sampling device connected to a pushrod was lowered to the bottom of the borehole and was manually driven 2 to 3 feet to the sampling interval. The sampling device was driven beyond the bottom of the borehole to prevent drilling mud from being sampled. Once the sampling depth was reached, the pushrod was retracted from the borehole approximately 6 inches, opening the sampling device to the formation fluids.

A hermetically sealed evacuated vial was then lowered into the pushrod through the use of a weighted, sampling assembly. The assembly mechanism contained a double-ended hypodermic needle, which first pierced the sampling device chamber seal, followed immediately thereafter by the vial seal, located in the vial screw cap. Formation fluids were drawn into the vial until the pressure in the vial was equivalent to the formation pore fluid pressure. When the sampling assembly was pulled from the rod tip, the needle was pulled from both seals, and both the vial and tip were resealed.

Thus, a sample was obtained in a closed system, with little opportunity for cross contamination, human contact, volatilization, or changes resulting from exposure to surface pressures of the atmosphere. Although some headspace existed in the vial, this headspace is equivalent to the pore fluid pressure and research has shown that the sample integrity is greater than if sampled by more conventional methods, such as a bailer.

4.2 Summary of BAT Groundwater Sampling Program

A total of 14 groundwater samples were collected from the 7 exploration locations. One sample was collected from the water table and one sample was collected from deeper in the sand and gravel aquifer where the installation obtains its potable water. The deeper sample was collected from a zone that would be

representative of the installation water supply wells screened interval. Groundwater sample identification and sampling depths are summarized in Table 2.

The groundwater samples were shipped to CH2MHILL Laboratory, Montgomery, Alabama for VOC analysis. Samples were collected, analyzed and reported in accordance with NEESA Level E DQOs.

5.0 Interpretation of Results

Because the BAT groundwater sampling method is not an USEPA approved method the data are appropriate for preliminary screening but would not support risk assessment conclusions or decision making relative to response actions. Although direct comparison of this Level E screening data to Florida and Federal MCLs cannot be made (to support risk assessment conclusions), reference to MCLs will be made for comparison purposes.

5.1 Results of the VOC Analysis

Results of the VOC analysis will be presented in two groups, the water table group and the production zone. A summary of the VOCs detected in the 14 groundwater samples is presented in Table 3.

5.1.1 VOC Results in the Water Table Samples

A total of six VOC compounds were detected in the water table groundwater samples collected from the seven sampling locations. The detected compounds included methylene chloride, acetone, carbon disulfide, 1,2-dichloroethene, and xylene.

Methylene chloride was detected in six of the seven samples at concentrations ranging from 2 to 11 ug/l. Acetone was detected in three samples at concentrations ranging from 7 to 11 ug/l. Both methylene chloride and acetone were detected at low concentrations (< 6 ug/l) in the laboratory preparation blanks, trip blanks and field blanks. Methylene chloride was also detected in the rinsate blanks. However, acetone, which is a common artifact of the decontamination process (when isopropanol is used), was not detected in the rinsate blanks. Due to the presence of these two VOCs in the laboratory blanks at a concentration of less than five times the blank concentration and the other QC blanks, it appears that both methylene chloride and acetone are artifacts of laboratory analysis.

Carbon disulfide was detected in six of the seven samples at concentrations ranging from 2 to 49 ug/l. The source of the carbon disulfide, as believed during the Phase I RI, is the BAT sampling system. The septum of the collection vials is composed of butyl rubber, which is required to hold a vacuum against water pressure, be able to be perforated easily and yet seal completely after sampling is complete. Less pliable inert septa, such as Teflon TM, are not acceptable. Carbon disulfide was also detected in the rinsate blanks, trip blanks and the field blanks.

TABLE 2
BAT GROUNDWATER SAMPLING SUMMARY
PHASE II-A RI
NAS WHITING FIELD
MILTON, FLORIDA

DATE	GROUNDWATER SAMPLE	SAMPLING DEPTH (FEET BLS)
10-13-92	WHF-2A-WP-01-01	107
10-13-92	WHF-2A-WP-02-01	113
10-17-92	WHF-2A-WP-01-02	170
10-19-92	WHF-2A-WP-02-02	178
10-20-92	WHF-2A-WP-03-01	129
10-20-92	WHF-2A-WP-03-01A	129
10-26-92	WHF-2A-WP-03-02	183
10-27-92	WHF-2A-WP-04-01	128
10-28-92	WHF-2A-WP-04-02	183
10-30-92	WHF-2A-WP-05-01	128
10-30-92	WHF-2A-WP-05-02	198
10-31-92	WHF-2A-WP-06-01	134
10-31-92	WHF-2A-WP-06-02	178
11-1-92	WHF-2A-WP-07-01	133
11-1-92	WHF-2A-WP-07-02	188

1,2-DCE was detected at one location (WP-06-01 at 96 ug/l). WP-06 is located 1100 feet downgradient of Site 3 where 1,2-DCE was detected in the shallow water table BAT samples (118 ft bls) during the Phase I RI. It has not yet been determined that Site 3 is the source of the 1,2-DCE. Similar to the detection of 1,2-DCE, TCE was detected at WP-06-01 (80 ug/l) and at the Phase I Site 3 water table locations.

1,2-DCE (1 ug/l) and TCE (9 ug/l) were also detected at location WP-02-01. Both concentrations were below the CRDL. WP-02-01 is located along the southwest perimeter road approximately 1000 feet from the South Field Runway 27. WP-02-01 is located downgradient of the South Field Maintenance Hanger (Site 30) where TCE has been detected in both subsurface soil and groundwater samples.

Xylene (2 ug/l) was detected below the CRDL in the water table sample collected from location WP-01-01. WP-01-01 is located downgradient of the South AVGAS Tank Sludge Disposal Area (Site 7) where xylene was detected in monitoring well WHF-7-1 at 1000 ug/l.

No VOCs, that would be expected (BTEX and solvents) from site related releases within the industrial area, were detected at sampling locations WP-03, 04, 05, 06, and 07.

5.1.2 VOC Results from the Production Zone Groundwater Samples

A total of seven VOCs were detected from the seven deeper (production) zone samples of the sand and gravel aquifer. The detected compounds included methylene chloride, acetone, carbon disulfide, TCE, benzene, 1,2-dichloroethane (DCA), and bromoethane.

As mentioned in Section 5.1.1, methylene chloride and acetone appear to be artifacts of laboratory analysis because of their presence in the associated QC blanks. The detection of carbon disulfide can be attributed to the butyl rubber septa in the collection vials (see Section 5.1.1).

TCE (WP-03-02, 4 ug/l), 1,2-DCA (WP-03-02, 3 ug/l) and bromoethane (WP-04-02, 1 ug/l) were all detected below the detection limits.

Benzene was detected at WP-01-02 at 160 ug/l. The location of WP-01-02 is downgradient of Site 7 where benzene was detected in monitoring well WHF-7-1 at 8800 ug/l during the Verification Study. The lack of any benzene in the water table sample WP-01-01 may be an indication that the contaminated groundwater at Site 7 is being driven deeper into the aquifer under dipping clay layers or by infiltrating groundwater, therefore not being detected in the water table component of the aquifer. The detection of benzene deeper in the aquifer and not at the water table was also encountered (further downgradient, west of Site 16) during the Phase I BAT sampling program. These data suggest that the source of the VOC contamination is the southern industrial area. Confirmation monitoring wells will be installed upgradient and downgradient of

Site 16 during the Phase IIA RI.

Bromomethane was reported below the detection limit at 1 ug/l in the BAT sampler from WP-04-02.