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SUBSURFACE ASSESSMENT OF THE F-18 CRASH SITE NAS CECIL FIELD FL
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BECHTEL ENVIRONMENTAL INC

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SUBSURFACE ASSESSMENT OF THE F-18 CRASH SITE

NAVAL AIR STATION, CECIL FIELD

JACKSONVILLE, FLORIDA

Prepared for

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND

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Prepared by

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1.0 INTRODUCTION

The following report contains the results of implementing the Remediation Work Plan for the F-18 Crash Site, Naval Air Station, Cecil Field, Addendum 1, (Appendix A). Details on the investigative methodology (i.e., well installation, well construction, sampling methods, etc.) are included in the Remediation Work Plans, Addendum 1 and Revision 0 (Bechtel, 1994).

Recommendations on additional work are included to fulfill the remedial action objective.

2.0 HISTORY

The Crash Site is located in the Ocala National Forest approximately 120 miles south of Naval Air Station (NAS) Cecil Field, Jacksonville, Florida (Figure 1). The Site resulted from an F-18 aircraft crash on June 21, 1994. United States Navy (USN) personnel determined that approximately 1,285 gallons of JP-5 jet fuel was on board at the time of impact.

As part of an Interim Remedial Action conducted between September 12, 1994 and November 8,1994 approximately 2,693 yd^3 of excessively contaminated soil (soil with an OVA reading greater than 50 ppm) was excavated from the Crash Site. Approximately 2650 yd^3 was disposed of off-site in accordance with FDEP regulations. The dimensions of the excavation including the depth are approximately 165 x 96 x 12 (depth) feet. Three temporary monitoring wells were installed within the excavation area.

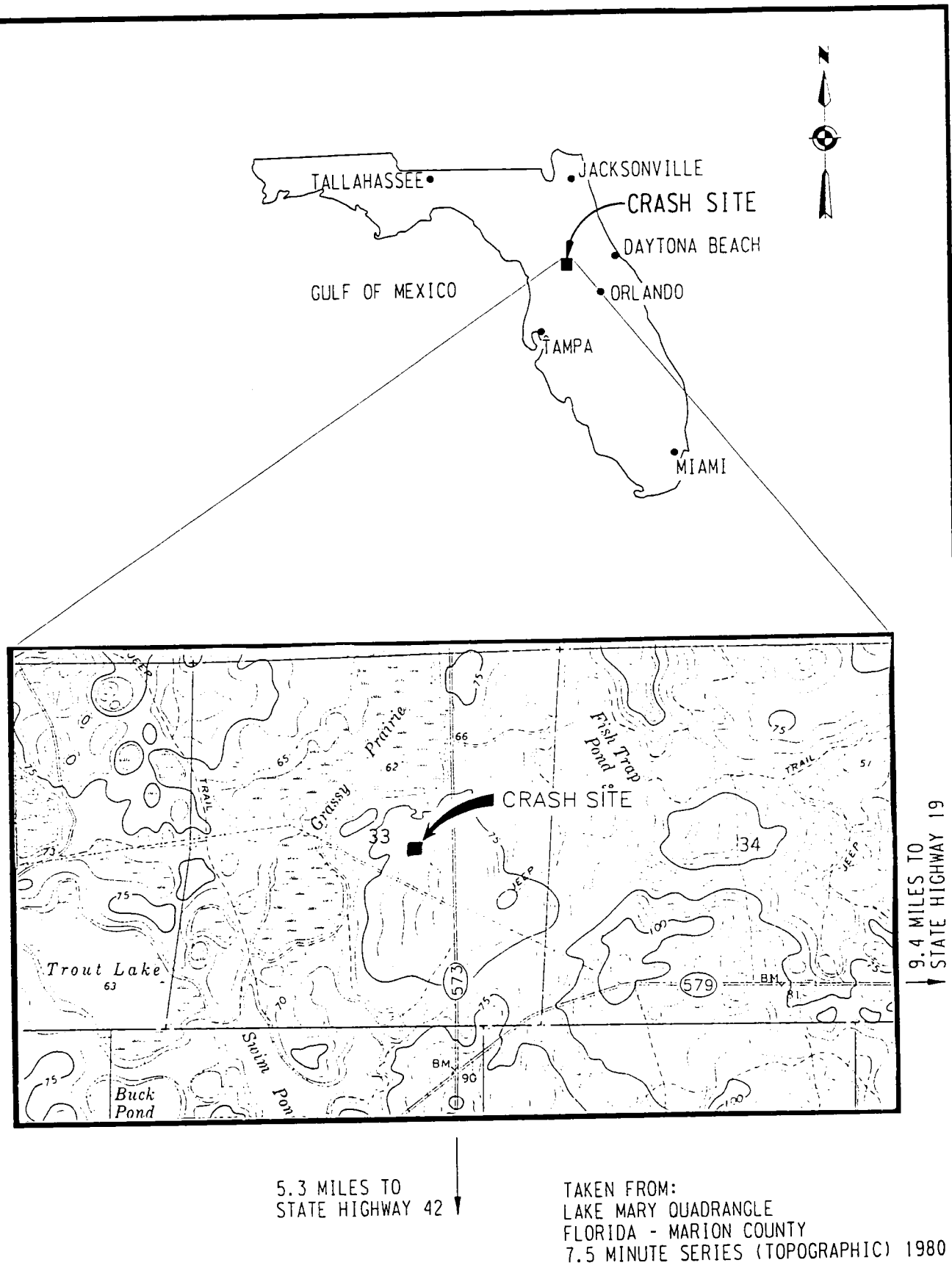
In December 1994 a supplemental subsurface assessment was conducted to 1) determine the remaining areal and vertical extent of potential JP-5 jet fuel contamination in and around the actual impact zone, and 2) to install one permanent groundwater monitoring well in the actual impact zone. This report documents the supplemental subsurface activities.

3.0 SITE HYDROGEOLOGY

Marion County, Florida, which includes the Crash Site, is located in the Southeast Coastal Plain. The Southeast Coastal Plain area is characterized by a relatively flat, low-lying area in which altitudes range from sea level at the coast to about 320 feet down the center of the Florida peninsula. Much of the area is a nearly flat plain less than 32 feet above sea level. The Southeast Coastal Plain is underlain by unconsolidated deposits consisting of sand, gravel, clay, and shell beds. In the vicinity of the Crash Site, the topography is characterized by gently rolling hills which are approximately 80-90 feet above mean sea level (MSL) consisting primarily of sand with minor amounts of interbedded clayey sand lenses. Bedrock at the Crash Site, prior to excavation, is approximately 80 to 90 feet below ground level (BGL). The bedrock consists of limestone and is considered the primary reservoir rock of the Floridan Aquifer. The Crash Site is located in the recharge zone of the Floridan aquifer.

The stratigraphy at the Crash Site, based on boring logs, consists of coastal sediments. A surficial layer of fine to coarse grained sand approximately 12 feet in thickness, was observed at the Crash Site excavation. Below this sand layer, a very fine to medium coarse grained, clayey, silty sand was observed to be varying in thickness from approximately 0.2 to 4-feet thick. Below this clayey sand a fine to coarse grained sand was encountered to the top of the local surficial aquifer. A minor amount of gravel was observed throughout the sands encountered at the Crash Site.

The Crash Site is located in the St. Johns River Water Management District. Surface drainage flows across the Crash Site to the west toward Grassy Prairie, a shallow grassy pond. Based on the potentiometric surface of the upper Floridan aquifer in the St. Johns River Water Management District, the Crash Site is



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FLORIDA - MARION COUNTY
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FIGURE 1
LOCATION MAP

SUBSURFACE ASSESSMENT
OF F-18 CRASH SITE

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

located along a groundwater divide which flows to either the west towards Silver Spring, or to the east toward Alexander Spring. The elevation of the Floridan aquifer at the location of the Crash Site is approximately 50 feet above MSL, approximately 35 feet (BGL), prior to excavation, of the Crash Site (Tibbals, 1994). The Floridan has a porosity of approximately 20 percent, a horizontal flow rate of approximately 0.01 to 0.5 feet per year, and a vertical flow component of approximately 2 feet per year (Tibbals, 1994). The surficial aquifer is in direct communication with the Floridan Aquifer. Preliminary observations, based on surface water elevations noted on the 7.5 minute series topographic map, Lake Mary Quadrangle, Marion County, Florida indicated that the apparent regional surficial aquifer flow direction is to the northeast. This observation is directly related to near by surface water elevations at Long Pond and Fish Trap Pond which are located to the northeast of Grassy Prairie.

Water level elevations were measured in three temporary monitoring wells installed at the Crash Site (see Section 5.3 and associated figures for well locations PZ001, PZ002 and PZ003). The water level elevations varied by less than 4 inches in the temporary wells (Table 1). The Lake Mary Quadrangle Map illustrates that in the vicinity of the Crash Site the surface level elevations descend to the northwest, with the Crash Site surface elevation at approximately 85 feet above MSL, prior to excavation, descending to 62 feet above MSL at Grassy Prairie, approximately 500 yards to the northwest. Based upon the water level elevations in the temporary wells and surface topography it is estimated that the localized flow direction in the specific vicinity of the Crash Site to be to the northwest with a very gentle gradient of 0.009 feet per foot. Because water level elevations were measured in three temporary wells installed in an area less than 40 X 60 feet, the flow direction and gradient determined by these measurements are valid only in the vicinity of the Crash Site. With only one water level measuring event there is not enough historical data to determine if seasonal fluctuations will affect the gradient and flow direction.

4.0 TEMPORARY GATE INSTALLATION

A temporary gate, 24 ft. long and 4 foot high was installed on the gravel access road leading to the Crash Site. The gate was erected at the intersection of the access road with Ocala National Forest Road 579.

5.0 INVESTIGATORY RESULTS

The following section contains the results of implementing Section 2.0, Investigation Methodology, from the Remediation Work Plan for the F-18 Crash Site, Addendum 1 (Appendix A).

5.1 RESULTS OF EXCAVATION ACTIVITIES

Prior to commencing the subsurface assessment 100 yd^3 of stockpiled soil was removed and screened from the center of the excavation area. The soil was removed in approximately 1 yd^3 increments and screened with an Organic Vapor Analyzer (OVA). Approximately 60 yd^3 were moved to the "clean" (OVA readings under 50 ppm) soil stockpile and 40 yd^3 were moved to the "petroleum contaminated" (OVA reading over 50 ppm) soil stockpile.

The soil pile adjacent to the excavation area, from prior remediation efforts, was also screened and segregated into the clean and petroleum contaminated soil stockpiles. The soil pile contained approximately 70 yd^3 with 40 yd^3 going to the clean soil stockpile and 30 yd^3 moved to the petroleum soil stockpile.

Appendix B includes copies of the field notes containing the OVA readings taken during the screening process.

Table 1
Well Elevation Data

Well Number	Elevation Top of Casing (feet NGVD)	Total Depth of Well from Top of Casing (feet)	Screened Interval (feet from top of casing)	Depth to Groundwater (feet)	Groundwater Elevation (feet NGVD)
PZ001	73.755	25.5	15.00-25.00	14.27	59.49 (1)
PZ002	69.401	24.5	14.00-24.00	9.65	59.75 (1)
PZ003	75.466	20.5	10.00-20.00	15.76	59.71 (1)
CSF-CS1-1	73.336	26.0	15.50-25.50	13.75	59.59 (2)

NOTES: (1) 10-26-94
(2) 1-5-95
NGVD National Geodetic Vertical Datum

5.2 RESULTS OF SUBSURFACE ASSESSMENT

Sixty four soil borings (SBs) were completed at the Crash Site to identify the areal and vertical extent of potential JP-5 fuel contamination. The SB's were taken on 5 foot grid intervals within the impact zone and 10 foot grid intervals outside of the impact zone. SB's were taken in the center of each grid block as illustrated in Figure C-1, Appendix C. The grid was tied to the Florida State Plane Coordinate System.

Each soil boring was taken to the vadose/saturated zone interface and screened with an OVA in accordance with the Florida Annotated Code 62-770 on 2 foot intervals. Figure C-2, Appendix C illustrates the maximum depth in each boring with an OVA reading over 50 ppm. The OVA readings for each soil boring are included in Table 2. The volume of contaminated soil, if it were to be excavated, was estimated at 1370 yd^3. Appendix C includes the field log sheets.

Figures 2 to 8 contour the OVA readings at the surface and in 2 foot depth increments below the excavated surface. The contours depicted in these figures are interpolated from the data. In the 12 foot contour figure, selected SB's (indicated on the Figure) with no OVA reading (because groundwater was already reached at this SB) were assumed to have the same OVA reading as at 10 foot.

5.3 RESULTS OF WELL INSTALLATION SAMPLING

Well CEF-CS1-1 and temporary monitoring well PZ001 were installed at the locations shown in Figures 2 to 8. Well PZ001 was reinstalled at the same location of the prior temporary monitoring well (also designated at PZ001), which had collapsed. Well elevation data and state plane coordinates of the wells are given in Tables 1 and 3, respectively.

During the installation of well CEF-CS1-1 OVA readings were taken every two feet down to the vadose/saturated zone interface (Table 4), to approximately 15 feet below the excavated surface.

5.4 RESULTS OF GROUNDWATER SAMPLING

Monitoring wells CEF-CS1-1, PZ001, PZ002 and PZ003 were sampled in accordance with the Remediation Work Plan for the F-18 Crash Site, Addendum 1. Table 5 summarizes the results for the monitoring well sampling, Appendix D provides the laboratory data sheets. Monitoring well purging information is included in Appendix E.

A data assessment review was completed entailing the examination of holding times, surrogate and internal standard recoveries and method blanks. Based on this evaluation no data was eliminated from consideration. Appendix F provides a summary of the data assessment.

6.0 RECOMMENDATIONS

The objective at the Crash Site is to prevent the JP-5 fuel contaminated soil from being a continuing source of groundwater contamination. In accordance with FAC 17-770.300 (Initial Remedial Actions):

> if excessively contaminated soil exists at a site, the initial remedial action at the option of the person responsible for conducting site rehabilitation may include excavation of those soils for treatment or disposal such that these soils are not a continuing source of contamination,.....

It is not anticipated that the JP-5 soil contamination at the Crash Site poses an immediate threat to human health, the cleanup of contaminated soils would be completed to prevent it from being a continuing source of groundwater

Table 2
Soil Sample Organic Vapor Analyses Results

Soil Boring Location	Depth (ft)	Unfiltered Concentration (ppm)	Filtered Concentration (ppm)
A01	0	80	x
A01	2	690	x
A01	4	950	x
A01	6	220	x
A01	8	340	x
A01	10	460	x
A01	12	1000	x
A02	0	56	x
A02	2	770	x
A02	4	1000	x
A02	6	460	x
A02	8	850	x
A02	10	840	x
A02	12	820	x
A03	0	0	x
A03	2	540	x
A03	4	300	x
A03	6	870	x
A03	8	920	x
A03	10	340	x
A03	12	200	x
A04	0	3	x
A04	2	1000	x
A04	4	260	x
A04	6	90	x
A04	8	180	x
A04	10	1000	x
A05	0	10	x
A05	2	860	x
A05	4	650	x
A05	6	270	x
A05	8	160	x
A05	10	220	x
A06	0	0	x
A06	2	770	x
A06	4	410	x
A06	6	190	x
A06	8	80	x
A06	10	150	x
A06	12	250	x
A07	0	0	x
A07	2	5	x
A07	4	2	x
A07	6	1000	x
A07	8	1000	x
A07	10	1000	x
A07	11	700	x
A08	0	17	x
A08	2	90	x
A08	4	25	x
A08	6	300	x
A08	8	180	x

Table 2
Soil Sample Organic Vapor Analyses Results
(continued)

Soil Boring Location	Depth (ft)	Unfiltered Concentration (ppm)	Filtered Concentration (ppm)
A08	10	21	x
A09	0	4	x
A09	2	1000	x
A09	4	260	x
A09	6	200	x
A09	8	300	x
A09	10	190	x
A10	0	180	x
A10	2	600	x
A10	4	160	x
A10	6	20	x
A10	8	26	x
A10	10	20	x
A11	0	150	x
A11	2	100	x
A11	4	85	x
A11	6	22	x
A11	8	21	x
A11	10	21	x
A12	0	340	x
A12	2	1000	x
A12	4	230	x
A12	6	340	x
A12	8	260	x
A12	10	740	x
A13	0	0	x
A13	2	6	x
A13	4	0	x
A13	6	0	x
A13	8	0	x
A13	10	0	x
A14	0	0	x
A14	2	0	x
A14	4	0	x
A14	6	0	x
A14	8	0	x
A14	10	0	x
A14	12	0	x
A15	0	0	x
A15	2	0	x
A15	4	0	x
A15	6	0	x
A15	8	0	x
A15	10	0	x
A16	0	0	x
A16	2	1	x
A16	4	0	x
A16	6	0	x
A16	8	0	x
A16	10	0	x
A16	12	0	x
A16	13	0	x

Table 2
Soil Sample Organic Vapor Analyses Results
(continued)

Soil Boring Location	Depth (ft)	Unfiltered Concentration (ppm)	Filtered Concentration (ppm)
A17	0	0	x
A17	2	1	x
A17	4	0	x
A17	6	0	x
A17	8	0	x
A17	10	0	x
A18	0	0	x
A18	2	0	x
A18	4	0	x
A18	6	0	x
A18	8	0	x
A18	9	0	x
A19	0	4	x
A19	2	400	x
A19	4	500	x
A19	6	100	1
A19	8	36	x
A19	10	69	0
A19	11	44	0
A20	0	3	x
A20	2	7	x
A20	4	0	x
A20	6	0	x
A20	8	0	x
A20	10	0	x
A21	0	0	x
A21	2	0	x
A21	4	0	x
A21	6	0	x
A21	8	0	x
A21	9	0	x
A22	0	0	x
A22	2	7	x
A22	4	0	x
A22	6	0	x
A22	8	0	x
A23	0	0	x
A23	2	0	x
A23	4	0	x
A23	6	0	x
A23	8	0	x
A23	10	0	x
A24	0	10	x
A24	2	68	0
A24	4	4	x
A24	6	1	x
A24	8	1	x
A24	10	1	x
A25	0	6	x
A25	2	0	x
A25	4	0	x
A25	6	0	x

Table 2
Soil Sample Organic Vapor Analyses Results
(continued)

Soil Boring Location	Depth (ft)	Unfiltered Concentration (ppm)	Filtered Concentration (ppm)
A25	8	0	x
A25	10	0	x
A26	0	0	x
A26	2	0	x
A26	4	0	x
A26	6	0	x
A26	8	0	x
A27	0	0	x
A27	2	0	x
A27	4	0	x
A27	6	0	x
A27	8	0	x
A27	10	0	x
A27	11	0	x
A28	0	0	x
A28	2	0	x
A28	4	0	x
A28	6	0	x
A28	8	0	x
A28	10	0	x
A29	0	0	x
A29	2	0	x
A29	4	0	x
A29	6	0	x
A29	8	0	x
A29	10	0	x
A29	12	0	x
A29	14	0	x
A29	16	0	x
A30	0	0	x
A30	2	0	x
A30	4	0	x
A30	6	0	x
A30	8	0	x
A30	10	0	x
A30	12	0	x
A30	13	0	x
B01	0	65	x
B01	2	320	x
B01	4	460	x
B01	6	1000	x
B01	8	300	x
B01	10	620	x
B01	12	80	x
B02	0	230	x
B02	2	105	x
B02	4	1000	x
B02	6	280	x
B02	8	770	x
B02	10	1000	x
B02	12	20	x
B03	0	5	x

Table 2
Soil Sample Organic Vapor Analyses Results
(continued)

Soil Boring Location	Depth (ft)	Unfiltered Concentration (ppm)	Filtered Concentration (ppm)
B03	2	220	x
B03	4	1000	x
B03	6	300	x
B03	8	280	x
B03	10	20	x
B03	12	10	x
B03	13	30	x
B04	0	18	x
B04	2	620	x
B04	4	860	x
B04	6	510	x
B04	8	420	x
B04	10	280	x
B04	12	120	x
B04	13	38	x
B05	2	55	x
B05	4	80	x
B05	6	86	x
B05	8	24	x
B05	10	4	x
B05	12	2	x
B05	13	0	x
B06	0	26	x
B06	2	4	x
B06	6	0	x
B06	8	0	x
B06	10	0	x
B06	12	0	x
B06	13	0	x
B07	0	59	x
B07	2	48	x
B07	4	6	x
B07	6	3	x
B07	8	1	x
B07	10	1	x
B07	12	1	x
B07	13	0	x
B08	0	24	x
B08	2	0	x
B08	4	0	x
B08	6	0	x
B08	8	0	x
B08	10	0	x
B08	12	0	x
B08	13	0	x
B09	0	10	x
B09	2	75	x
B09	4	0	x
B09	6	0	x
B09	8	0	x
B09	10	0	x
B09	12	2	x

Table 2
Soil Sample Organic Vapor Analyses Results
(continued)

Soil Boring Location	Depth (ft)	Unfiltered Concentration (ppm)	Filtered Concentration (ppm)
B09	13	2	x
B10	0	0	x
B10	2	720	x
B10	4	740	x
B10	6	570	x
B10	8	570	x
B10	10	500	x
B10	12	220	x
B11	0	2	x
B11	2	900	x
B11	4	750	x
B11	6	390	x
B11	8	200	x
B11	10	80	x
B11	12	260	x
B11	13	100	x
B12	0	10	x
B12	2	980	x
B12	4	640	x
B12	6	800	x
B12	8	630	x
B12	10	190	x
B12	12	110	x
B12	13	27	x
B13	0	10	x
B13	2	1000	x
B13	4	10	x
B13	6	280	x
B13	8	310	x
B13	10	25	x
B13	11	25	x
B14	0	10	x
B14	2	20	x
B14	4	270	x
B14	6	40	x
B14	8	25	x
B14	10	15	x
B14	12	20	x
B15	0	3	x
B15	2	0	x
B15	4	0	x
B15	6	0	x
B15	8	0	x
B15	10	0	x
B15	12	0	x
B16	0	0	x
B16	2	14	x
B16	4	0	x
B16	6	0	x
B16	8	0	x
B16	10	0	x
B16	12	0	x

Table 2
Soil Sample Organic Vapor Analyses Results
(continued)

Soil Boring Location	Depth (ft)	Unfiltered Concentration (ppm)	Filtered Concentration (ppm)
B17	0	20	x
B17	2	82	x
B17	4	9	x
B17	6	3	x
B17	8	2	x
B17	10	3	x
B17	12	3	x
B18	0	0	x
B18	2	25	x
B18	4	0	x
B18	6	0	x
B18	8	0	x
B18	10	0	x
B18	12	0	x
B18	13	0	x
B19	0	1	x
B19	2	1	x
B19	4	0	x
B19	6	0	x
B19	8	0	x
B19	10	0	x
B19	12	0	x
B20	0	0	x
B20	2	0	x
B20	4	0	x
B20	6	0	x
B20	8	0	x
B20	10	0	x
B20	12	0	x
B21	0	0	x
B21	2	0	x
B21	4	0	x
B21	6	0	x
B21	8	0	x
B21	10	0	x
B21	12	0	x
B22	0	8	x
B22	2	0	x
B22	4	9	x
B22	6	17	x
B22	8	27	x
B22	10	6	x
B22	12	4	x
B23	0	0	x
B23	2	0	x
B23	4	0	x
B23	6	0	x
B23	8	0	x
B23	10	0	x
B23	12	0	x
B24	0	0	x
B24	2	0	x

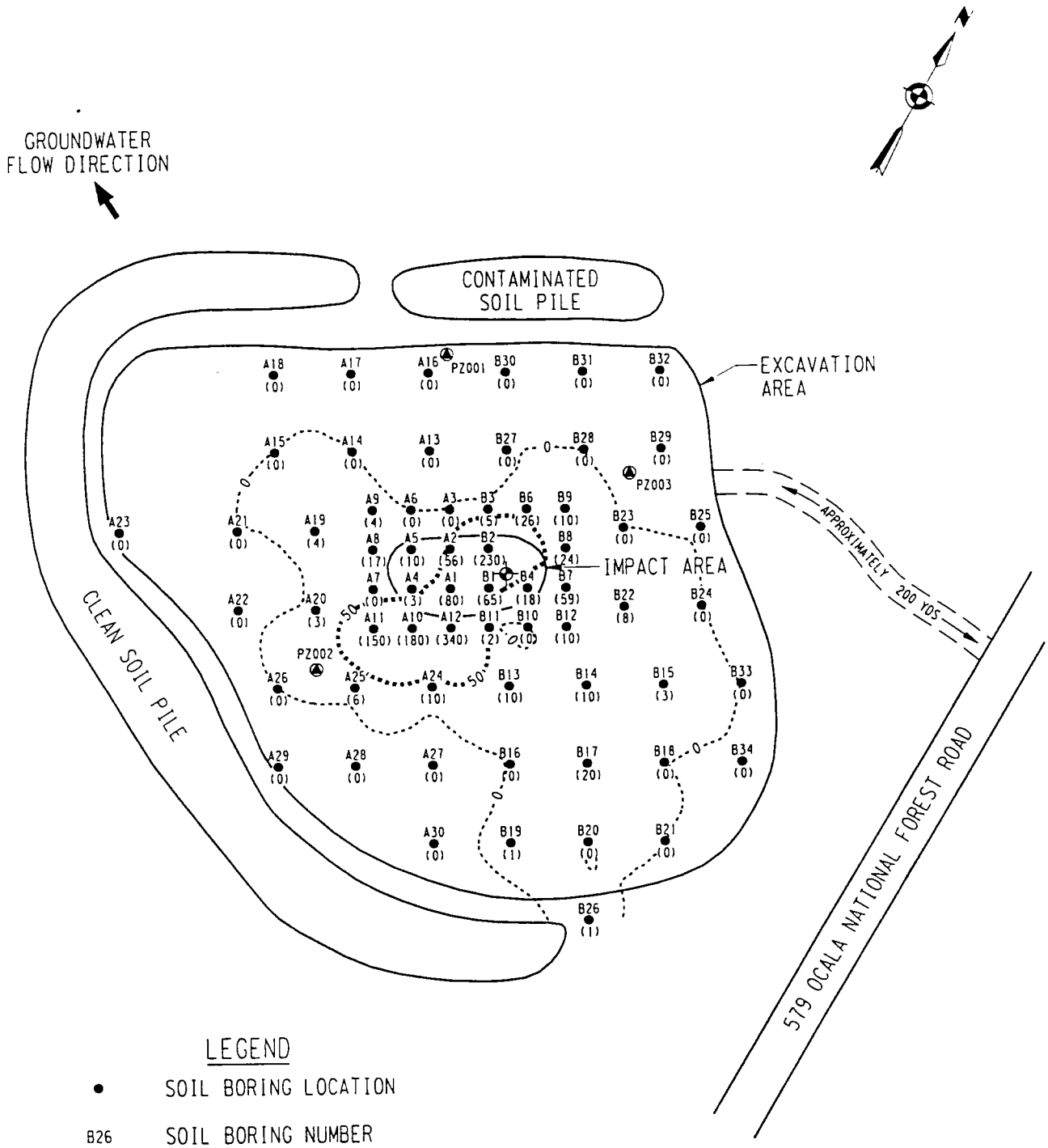
Table 2
Soil Sample Organic Vapor Analyses Results
(continued)

Soil Boring Location	Depth (ft)	Unfiltered Concentration (ppm)	Filtered Concentration (ppm)
B24	4	0	x
B24	6	0	x
B24	8	0	x
B24	12	0	x
B25	0	0	x
B25	2	0	x
B25	4	0	x
B25	6	0	x
B25	8	0	x
B25	10	0	x
B25	12	0	x
B26	0	1	x
B26	2	0	x
B26	4	0	x
B26	6	0	x
B26	8	0	x
B26	10	0	x
B26	12	0	x
B26	14	0	x
B26	16	0	x
B26	18	1	x
B26	20	0	x
B27	0	0	x
B27	2	0	x
B27	4	0	x
B27	6	0	x
B27	8	0	x
B27	10	0	x
B28	0	0	x
B28	2	0	x
B28	4	0	x
B28	6	0	x
B28	8	0	x
B28	10	0	x
B29	0	0	x
B29	2	0	x
B29	4	14	x
B29	6	0	x
B29	8	0	x
B29	10	0	x
B30	0	0	x
B30	2	0	x
B30	4	0	x
B30	6	0	x
B30	8	0	x
B30	10	0	x
B31	0	0	x
B31	2	0	x
B31	4	0	x
B31	6	0	x
B31	8	0	x
B31	10	0	x

Table 2
Soil Sample Organic Vapor Analyses Results
(continued)

Soil Boring Location	Depth (ft)	Unfiltered Concentration (ppm)	Filtered Concentration (ppm)
B32	0	0	x
B32	2	0	x
B32	4	0	x
B32	6	0	x
B32	8	0	x
B32	10	0	x
B33	0	0	x
B33	2	10	x
B33	4	14	x
B33	6	1	x
B33	8	0	x
B33	10	0	x
B33	12	0	x
B34	0	0	x
B34	2	0	x
B34	4	0	x
B34	6	0	x
B34	8	0	x
B34	10	0	x
B34	12	0	x

Notes: x no filtered concentrations analyzed, filtering during screening showed no significance difference between filtered and unfiltered samples

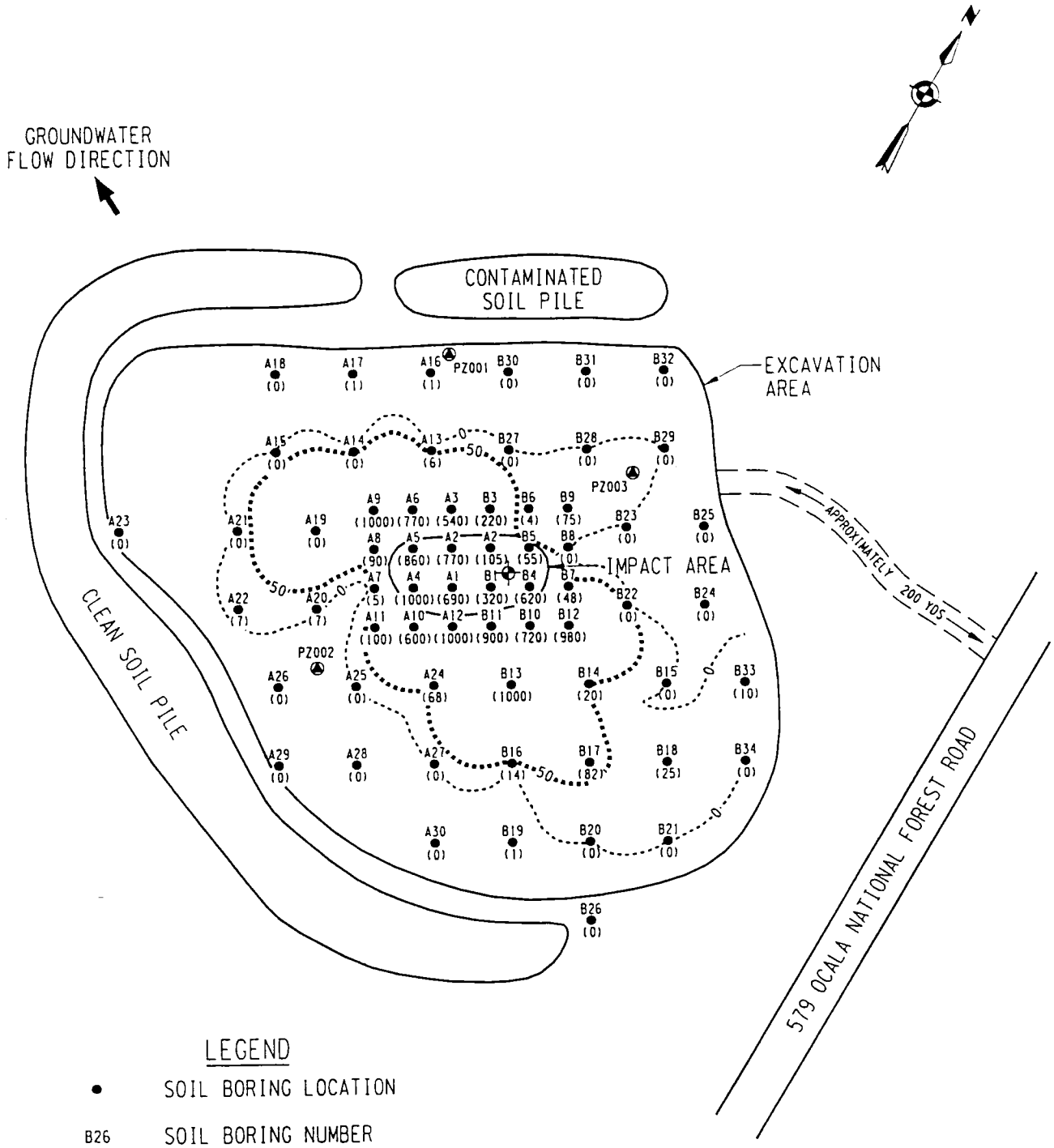


22567 222 CF100.DGN

FIGURE 2
GROUND SURFACE
OVA READINGS
FOR SOIL BORINGS

SUBSURFACE ASSESSMENT
OF F-18 CRASH SITE

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

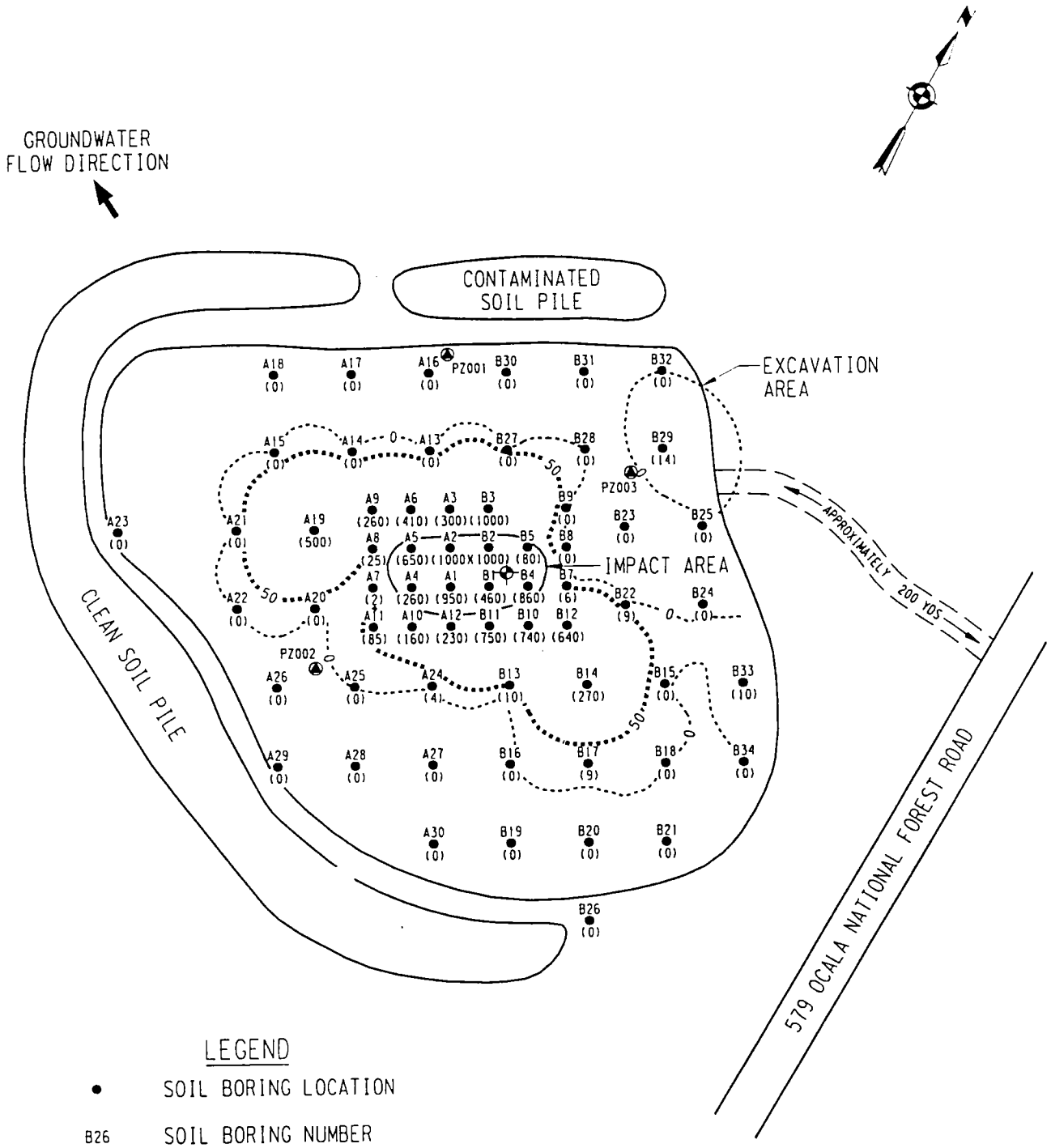


22567 222 CFIC2.DGN

FIGURE 3
2 FOOT DEPTH
OVA READINGS
FOR SOIL BORINGS

SUBSURFACE ASSESSMENT
OF F-18 CRASH SITE

NAS CECIL FIELD
JACKSONVILLE, FLORIDA



22567 222 CFIG4.DGN

FIGURE 4
4 FOOT DEPTH
OVA READINGS
FOR SOIL BORINGS

SUBSURFACE ASSESSMENT
OF F-18 CRASH SITE

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

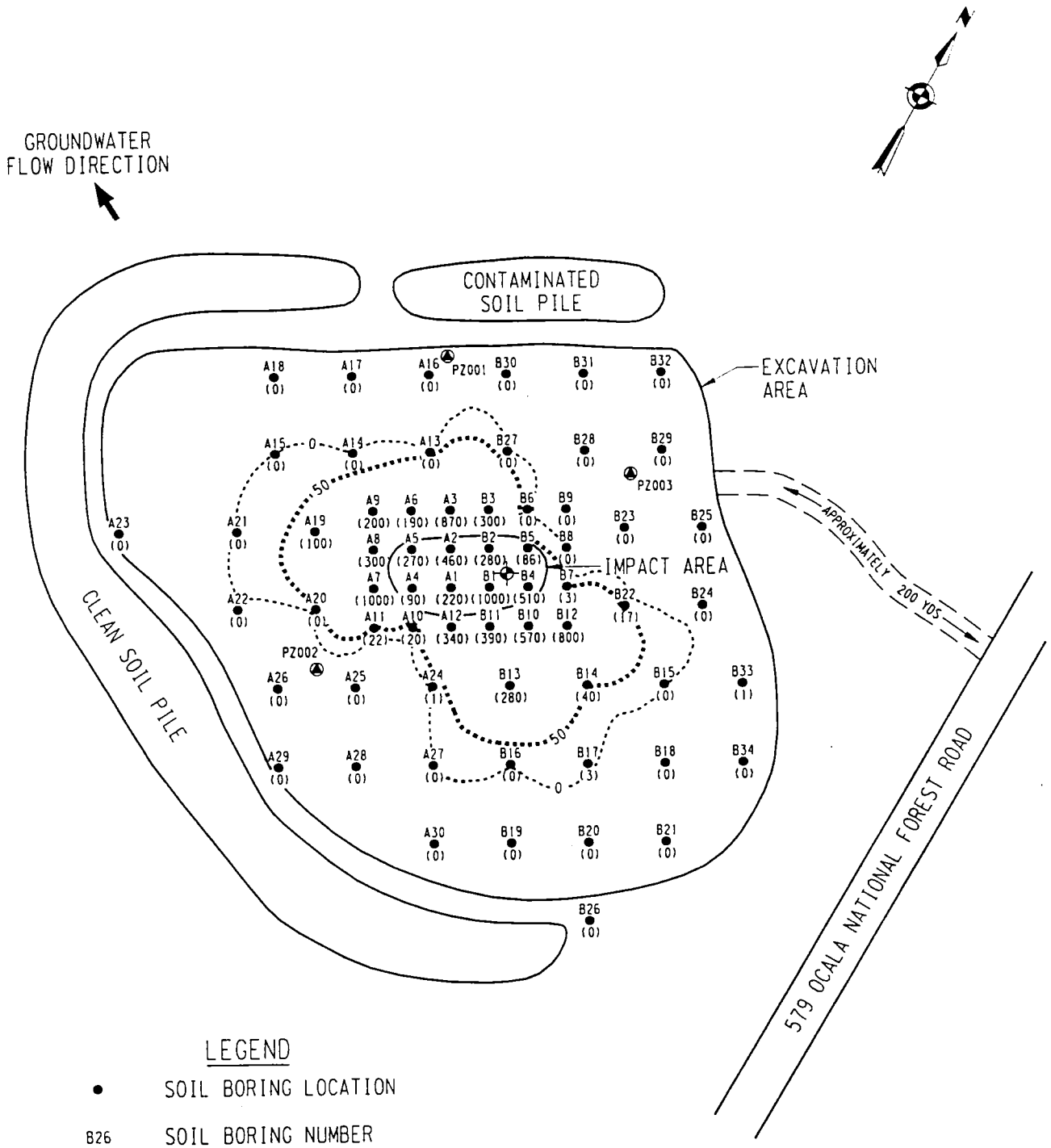
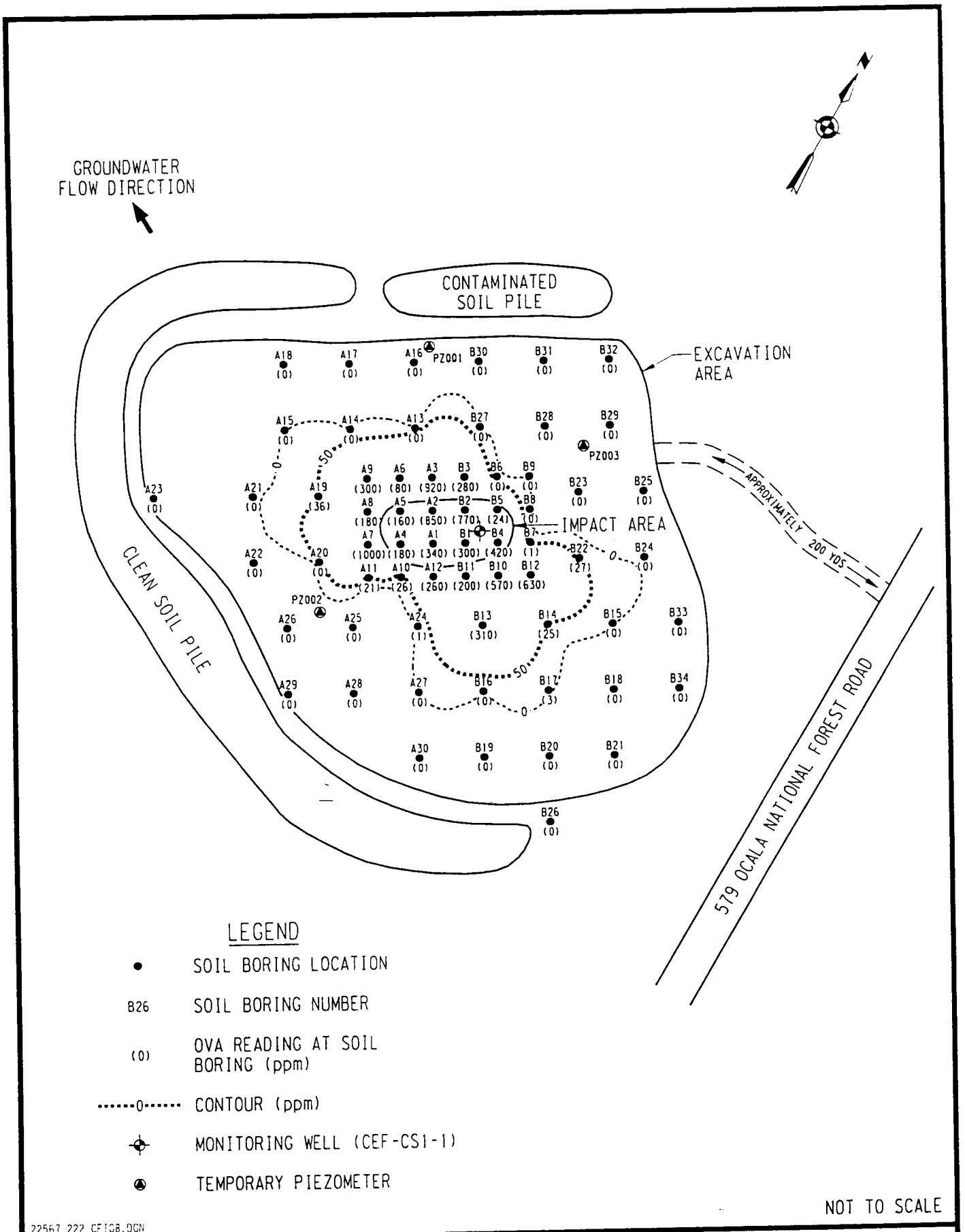


FIGURE 5
6 FOOT DEPTH
OVA READINGS
FOR SOIL BORINGS

SUBSURFACE ASSESSMENT
OF F-18 CRASH SITE

NAS CECIL FIELD
JACKSONVILLE, FLORIDA



22567 222 CFIG8.DGN

FIGURE 6
8 FOOT DEPTH
OVA READINGS
FOR SOIL BORINGS

SUBSURFACE ASSESSMENT OF F-18 CRASH SITE

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

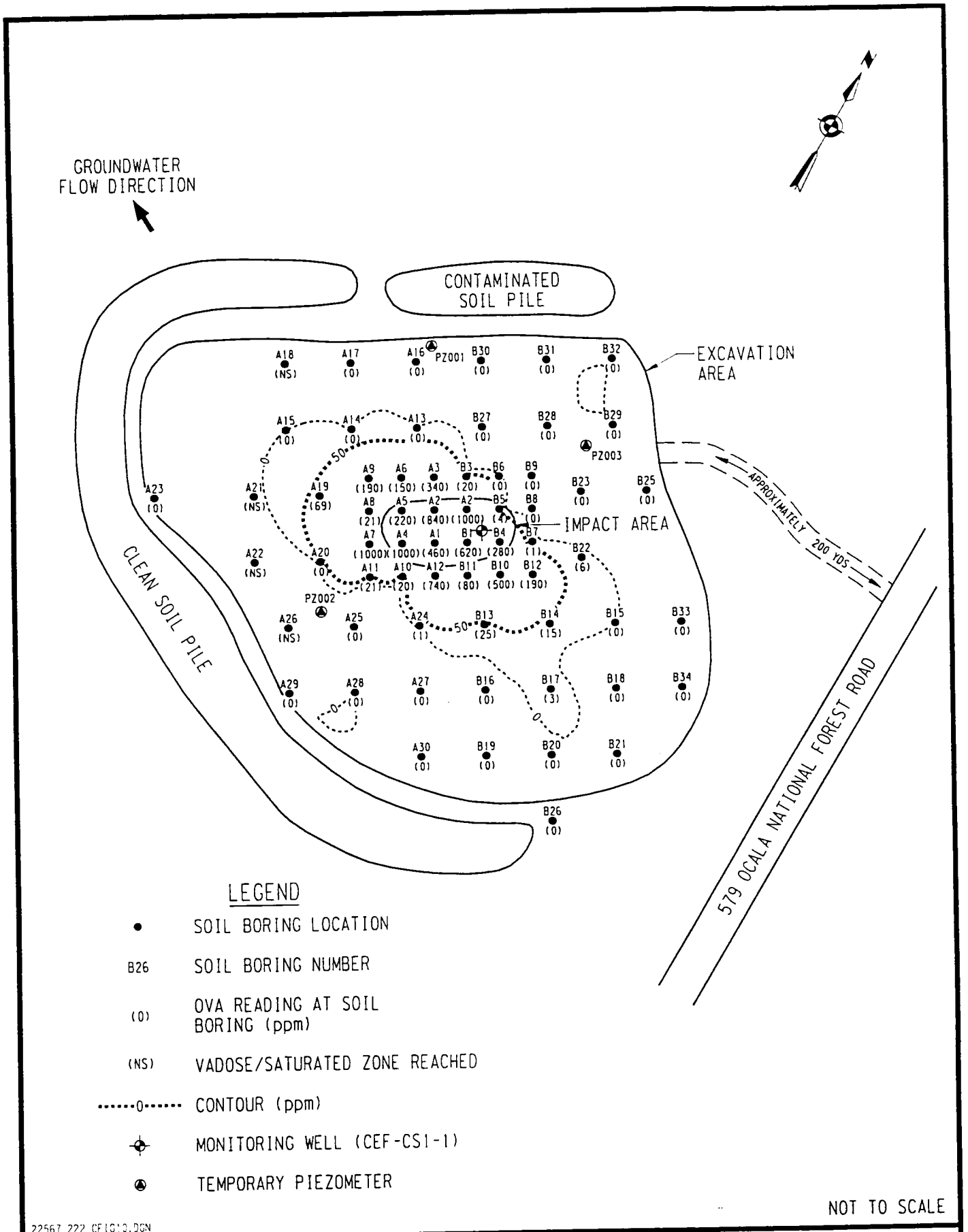
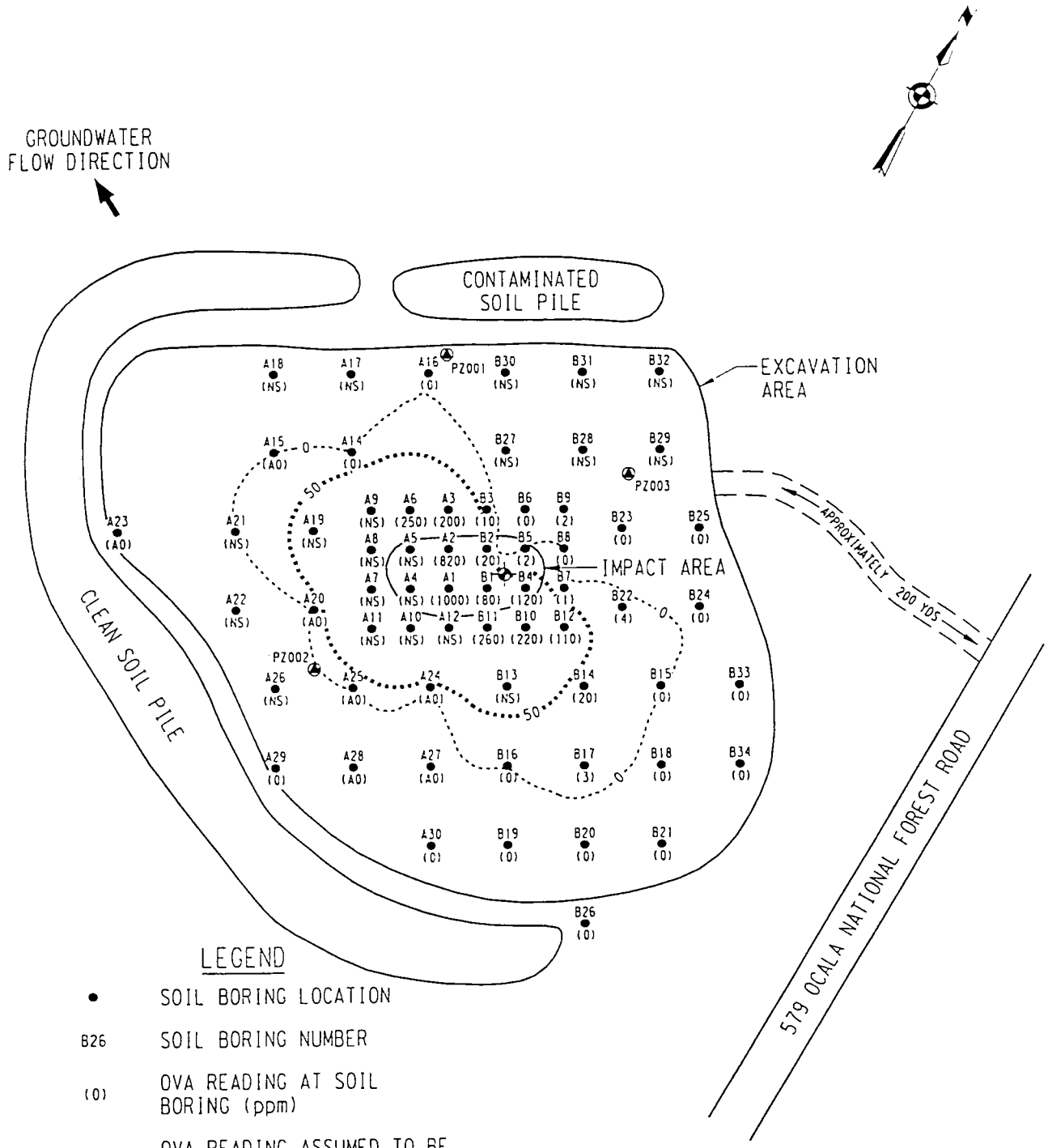


FIGURE 7
10 FOOT DEPTH
OVA READINGS
FOR SOIL BORINGS

SUBSURFACE ASSESSMENT
OF F-18 CRASH SITE

NAS CECIL FIELD
JACKSONVILLE, FLORIDA



22567 222 CFIG12.DGN

FIGURE 8
12 FOOT DEPTH
OVA READINGS
FOR SOIL BORINGS

SUBSURFACE ASSESSMENT
OF F-18 CRASH SITE

NAS CECIL FIELD
JACKSONVILLE, FLORIDA

Table 3
Florida State Plane Coordinates of Wells

Well Number	Florida State Plane Coordinate	
	Northing (feet)	Easting (feet)
CEF-CS1-1	1717449.433	397036.313
PZ001	1717472.270	397015.129
PZ002	1717427.846	397021.279
PZ003	1717468.497	397043.198

Table 4
OVA Readings for Well CEF-CS1-1

Depth Below Excavated Surface (feet)	OVA reading (ppm)
surface	47
1.1	62
3.7	>1000
5.2	>1000
7.6	460
9.4	240
10.2	>1000
12.0	370
12.9	>1000
15.0	>1000

[1] OVA readings taken in the soil boring during the installation of well CEF-CS1-1

Table 5
Monitoring Well Sampling Results

Parameter	Florida Regulatory Level[1]	Location	Result	Is Florida Regulatory Level Exceeded? [6]
Polynuclear Aromatic Hydrocarbons (PAHs)[2]	10 µg/l[5]	CEF-CS1-1	ND	No
		PZ001	ND	No
		PZ002	ND	No
		PZ003	ND	No
Total Naphthalenes[3]	100 µg/l	CEF-CS1-1	ND	No
		PZ001	ND	No
		PZ002	ND	No
		PZ003	ND	No
Benzene	1 µg/l	CEF-CS1-1	71.6 µg/l	Yes
		PZ001	85.0 µg/l	Yes
		PZ002	ND	No
		PZ003	ND	No
1,2-Dibromoethane (EDB)	.02 µg/l	CEF-CS1-1	ND	No
		PZ001	ND	No
		PZ002	ND	No
		PZ003	ND	No
Methyl Tert-Butyl (MTBE)	40 µg/l	CEF-CS1-1	ND	No
		PZ001	ND	No
		PZ002	ND	No
		PZ003	ND	No
Total VOA[4]	50 µg/l	CEF-CS1-1	956.4 µg/l	Yes
		PZ001	508.4 µg/l	Yes
		PZ002	ND	No
		PZ003	ND	No
Lead	50 µg/l	CEF-CS1-1	85.1 µg/l	Yes
		PZ001	49.5 µg/l	No
		PZ002	72.5 µg/l	Yes
		PZ003	20.6 µg/l	No

Table 5
Monitoring Well Sampling Results (continued)

Parameter	Florida Regulatory Level[1]	Location	Result	Is Florida Regulatory Level Exceeded? [6]
Total Recoverable Petroleum Hydrocarbons	5 mg/l	CEF-CS1-1	4.8 mg/l	No
		PZ001	5.58 mg/l	Yes
		PZ002	ND	No
		PZ003	ND	No

[1] Regulatory values from FAC 62-770
[2] Excluding Naphthalenes
[3] The total of naphthalene and methylnaphthalenes
[4] The total of benzene, chlorobenzene, ethylbenzene, toluene, xylene, (1,4) dichlorobenzene, (1,2) dichlorobenzene and (1,3) dichlorobenzene.
[5] Detection limits of method or best achievable detection limit given conditions of the sample, 10 μg/l maximum
[6] Not detected

contamination for the long-term protection of human health and the environment. The source of the JP-5 jet fuel, as identified in this subsurface assessment, is soil from the F-18 impact zone.

To remove the remaining soil in excess of 50 ppm (on the OVA) would require excavation of approximately 1370 yd^3 of soil. During field work the limits of excavation would be further delineated through the usage of an OVA in accordance with FAC 62-770. All excavation would be by backhoe and or excavator where practical. During excavation, clean soil (less than 50 ppm) would be removed and segregated from petroleum contaminated soil (greater than 50 ppm) and stockpiled. Excavation would be in accordance with the Remediation Work Plan for the F-18 Crash Site (BEI 1994). The clean soil would be used as backfill after excavation of all excessively petroleum contaminated soil is complete. Confirmatory soil sampling would be completed using an OVA in 5 to 10 foot grid intervals, 5% of the confirmatory samples will be analyzed by EPA Method 8100 as recommended in the FDEP Guidelines for Assessment and Remediation of Petroleum Contaminated Soil (May 1994).

The petroleum contaminated stockpile would be processed by one of the two following methods:

1) Land Farming. In accordance to FDEP Guidelines for Assessment and Remediation of Petroleum Contaminated Soil (May 1994), land farming for an Interim Remedial Action would entail:

1. Safety measures, such as fencing around the excavation, will be implemented and maintained.

2. The soil will be spread in a thin layer (6 to 12 inches thick) next to the Crash Site excavation.

3. The area beneath the soil layer will be covered with an impermeable barrier (such as black plastic that is at least 10 mils thick)

4. Berms would be constructed for surface water control to prevent water from entering or leaving the area.

5. The soil will be tilled every one to two weeks.

6. A monitoring program will be established to evaluate the progress and effectiveness of the process. An OVA will be used for initial monitoring of the remediation process. Soil cleanup completion will be defined by the clean soil criteria outlined in FAC 62-775.400 (in accordance with the FDEP Guideline for Assessment and Remediation of Petroleum Contaminated Soil). Soil sampling frequency will be completed in accordance with FAC 62-775.

7. Once the soil has met clean soil criteria requirements it will be used to backfill the excavation.

2) Thermal Treatment. The soil will be transported to a Soil Thermal Treatment Facility permitted to operate under FAC 62-775. The excavation will be backfilled with soil imported from a clean source. The thermally treated soil will not be used for backfill. Pre- and post- thermal treatment soil sampling will be completed in accordance with FAC 62-775.

The results of the existing groundwater monitoring at the Crash Site indicated that several parameters, benzene and total volatile organic aromatics (VOA) were over the Florida regulatory level in monitoring wells CEF-CS1-1 and PZ001. The Florida regulatory level for total recoverable petroleum hydrocarbons (TRPH) was

slightly exceeded only in monitoring well PZ001. Lead concentrations in monitoring well CEF-CS1-1 and PZ002 exceeded the Florida regulatory criteria.

In accordance with FAC 62-770.600 (7) a "monitoring only" proposal may be submitted to the FDEP for approval pursuant to FAC 62-770(3) or (4), if the site is contaminated by products from the Kerosene Analytical Group and provided the appropriate analytical procedures described in FAC 62-770(8) are completed. The groundwater sampling performed as part of the subsurface assessment was completed in accordance with FAC 62-770(8). In accordance with FDEP's No Further Action and Monitoring Only Guidelines (FDEP 1990) the sampling results should be compared to the Florida criteria, as was completed in Table 5. To qualify for a monitoring only status the contaminant concentrations should be "relatively low and not be widespread".

The FDEP's No Further Action and Monitoring Only Guidelines provides a table which is to facilitate a better understanding of the maximum levels of contamination that the Department commonly considers appropriate for monitoring only determinations. Table 6 provides a comparison of the contaminant concentrations detected at the Crash Site with the Table in the stated guideline. The contaminant concentrations in all wells are under the source well concentrations. The concentrations in (perimeter) monitoring wells PZ001 and PZ002 are in excess of the stated perimeter well concentrations from the Guideline, but are within the same order of magnitude. As stated in the Guideline the contaminant levels should be used as a guide and should not be considered binding.

The applicability of these values at any particular site still depends largely on the site specific circumstances and local conditions controlling the contaminant migration. Of note for the Crash Site, is its remote location in the Ocala National Forest and gentle flow gradient (Section 3.0). However, in accordance with FAC 62-770.630 (5) a risk assessment/justification proposal shall be submitted if the FDEP deems the risk assessment is necessary to support the monitoring only determination.

Therefore it is recommended that a "monitoring only" option be proposed to the FDEP in accordance with FAC 62-770 for the Crash Site. The analytical parameters for sampling would be as defined in FAC 62-770. Monitoring frequency will be quarterly for a minimum period of one year. In order to comply with 62-770.660 a minimum of three wells would be used. These wells will meet FDEP requirements, insuring that there will be an upgradient well, downgradient well and a well within the prior contaminated soil zone.

After a period of one year and if analytical data confirms that the site has been cleaned up, the Navy will submit a Site Rehabilitation Completion Report in accordance with Rule 62-770.760.

The approximate cost for the excavation, land farming and backfilling is $92,000. The approximate cost for the excavation, thermal treatment and backfilling is $90,000. Additional cost for Phases 4 and 5 including the monitoring only proposal, installing the groundwater monitoring wells, groundwater monitoring and the Site Rehabilitation Report is approximately $34,000.

The land farming option, including excavation, land farming and backfilling, will take approximately 8 weeks, with an additional year of groundwater monitoring. The thermal treatment option, including excavation and backfilling, will take approximately 2 weeks, with an additional year of monitoring.

Table 6
Crash Site Contaminant Concentrations vs. Monitoring Only Criteria[1,2]

Parameter	Location	Result	Monitoring Only Concentrations for G-II Class (No Wells in Vicinity)	
			Source Wells	Perimeter Wells
Benzene	CEF-CS1-1	71.6 µg/l	500 µg/l	50 µg/l
	PZ001	85.0 µg/l	500 µg/l	50 µg/l
Total VOA[3]	CEF-CS1-1	956.4 µg/l	[4]	[4]
	PZ001	508.4 µg/l	[4]	[4]
Lead	CEF-CS1-1	85.1 µg/l	1000 µg/l	50 µg/l
	PZ001	49.5 µg/l	1000 µg/l	50 µg/l
	PZ002	72.5 µg/l	1000 µg/l	50 µg/l
	PZ003	20.6 µg/l	1000 µg/l	50 µg/l
Total Recoverable Petroleum Hydrocarbons	CEF-CS1-1	4.8 mg/l	100 mg/l	5 mg/l
	PZ001	5.58 mg/l	100 mg/l	5 mg/l

[1] From FDEP's No Further Action and Monitoring Only Guidelines (FDEP 1990)
[2] Chart is intended to be used as a guide to facilitate a better understanding of maximum levels of contamination that the FDEP commonly considers appropriate for monitoring only determinations. The levels should not be considered binding, but values open for consideration.
[3] The total of benzene, chlorobenzene, ethylbenzene, toluene, xylene, (1,4) dichlorobenzene, (1,2) dichlorobenzene and (1,3) dichlorobenzene.
[4] Guidelines do not have a value for total VOAs

7.0 REFERENCES

Bechtel Environmental Inc. Remediation Work Plan for the F-18 Crash Site. August 1994.

Florida Department of Environmental Protection. 1990. No Further Action and Monitoring Only Guidelines. FDER-10/90.

Florida Department of Environmental Protection. 1994. Guidelines for Assessment and Remediation of Petroleum Contaminated Soil. Division of Waste Management. Bureau of Waste Cleanup. Engineering Support Section. May 1994.

Tibbals, Charlie. 1994. Personal conversation with Charlie Tibbals of the U.S. Geological Survey with Paul Linley of Bechtel in October 1994.

APPENDIX A:
Remediation Work Plan for the F-18 Crash Site,
Naval Air Station, Cecil Field, Addendum 1

REMEDIATION WORK PLAN FOR THE
F-18 CRASH SITE, NAVAL AIR STATION, CECIL FIELD
ADDENDUM 1
SUBSURFACE ASSESSMENT
JANUARY 1995

1.0 INTRODUCTION

This Work Plan Addendum has been developed to provide a description of the Subsurface Assessment (SA) activities proposed for the F-18 Crash Site located in the Ocala National Forest, Florida. The purpose of the SA is 1) to determine the aerial and vertical extent of potential JP-5 fuel contamination in and around the actual impact zone, and 2) to install one permanent groundwater monitoring well in the actual impact zone. This work will be completed in accordance with the Remediation Work Plan for the F-18 Crash Site, August 1994.

2.0 INVESTIGATION METHODOLOGY

2.1 Controlled Access

A temporary gate, approximately 24 ft. long and 4 ft. high, will be installed to block public access to the F-18 Crash Site. The location of the gate will be determined in the field.

2.2 Excavation Activities

Prior to commencing the SA approximately 2000 cubic yards of stock-piled soil will be removed from the center of the excavation and from a previous stockpile (located adjacent to the excavation from previous efforts). The soil will be removed in approximately 1 yd^3 increments and screened with an Organic Vapor Analyzer (OVA). The field screening will be completed in accordance with Florida Annotated Code 62-770. Soils will be segregated into two piles, one with OVA readings greater then 50 parts per million (ppm) and one with readings under 50 ppm.

Visquene will be placed under the stockpile containing the soil with OVA readings greater than 50 ppm. Daily after completion of site operations the contaminated soil stockpile will be covered and with visquene. Once removal operations of the stockpile are complete the visquene cover will be placed over the contaminated soil pile and secured in place. Storage and disposal of the soil will be in accordance with the FAC and associated guidelines.

2.3 Subsurface Assessment

The subsurface will be investigated by the placement of soil borings (SBs) and the collection and field screening of soil

samples with an OVA. Soil samples will be collected from each SB and field screened with the OVA in accordance with the FAC 62-770. Soil borings will be completed to the vadose/saturated zone interface (i.e., to the water table).

The SBs will be located on a grid commencing from the center of the impact zone surveyed in by a licensed Surveyor (Figure 1). The grid will be tied to the state plane coordinate system. The grid will be on 5-foot centers out to the limits of the actual impact zone, afterward on a 20-foot grid until clean soil is encountered, as described below. Samples will be collected using a standard 3 inch stainless steel hand auger.

Soil borings will continue on the 20-foot grid system until a SB location with an OVA reading of less than 50 ppm is obtained. When this occurs another SB will be completed between the last OVA reading above 50 ppm and the SB with the reading of less than 50 ppm (at 10 feet). If the SB has an OVA reading of greater than 50 ppm then an additional SB will be located 10 feet out (from the impact zone) from the last OVA reading of less than 50 ppm.

For example, if the SB located on the 20-foot grid is field screened with the OVA less than 50 ppm then the next SB will be located 10-feet back towards the impact zone to tighten the grid for the determination of the aerial extent. If this SB had elevated OVA readings (i.e., greater than 50 ppm) then the next SB would be located 10-feet out from the initial "clean" SB identified previously.

2.4 Monitoring Well Installation

One permanent groundwater monitoring well (MW), CEF-CS1-1, will be installed in the center of the impact zone. A temporary monitoring well will be installed, if necessary, if wells PZ001, PZ002 or PZ003 have collapsed. Wells will be installed in accordance with Southern Division "Specifications for Groundwater Monitoring Well Installation and Sampling" guidelines. The proposed MW will be completed with a hollow stem auger rig using 4.25-inch inside diameter augers. Soil samples will be collected continuously with a standard 2-inch by 24-inch stainless steel split spoon from ground surface to the vadose/saturated zone interface. The soil samples will be field screened with the OVA as described above.

After contact with groundwater, a 2-inch polyvinylchloride (PVC) schedule 40 monitoring well will be installed. The screened length will be 10-feet with 0.10 slot screened interval. The procedures of the permanent MW completion is outlined in Appendix A. Upon completion of MW, the MW will be developed until sediment free water is produced and the parameters of pH, temperature, and conductivity have stabilized over three consecutive measurements. After development activities are complete a groundwater sample will be collected for off-site laboratory analysis.

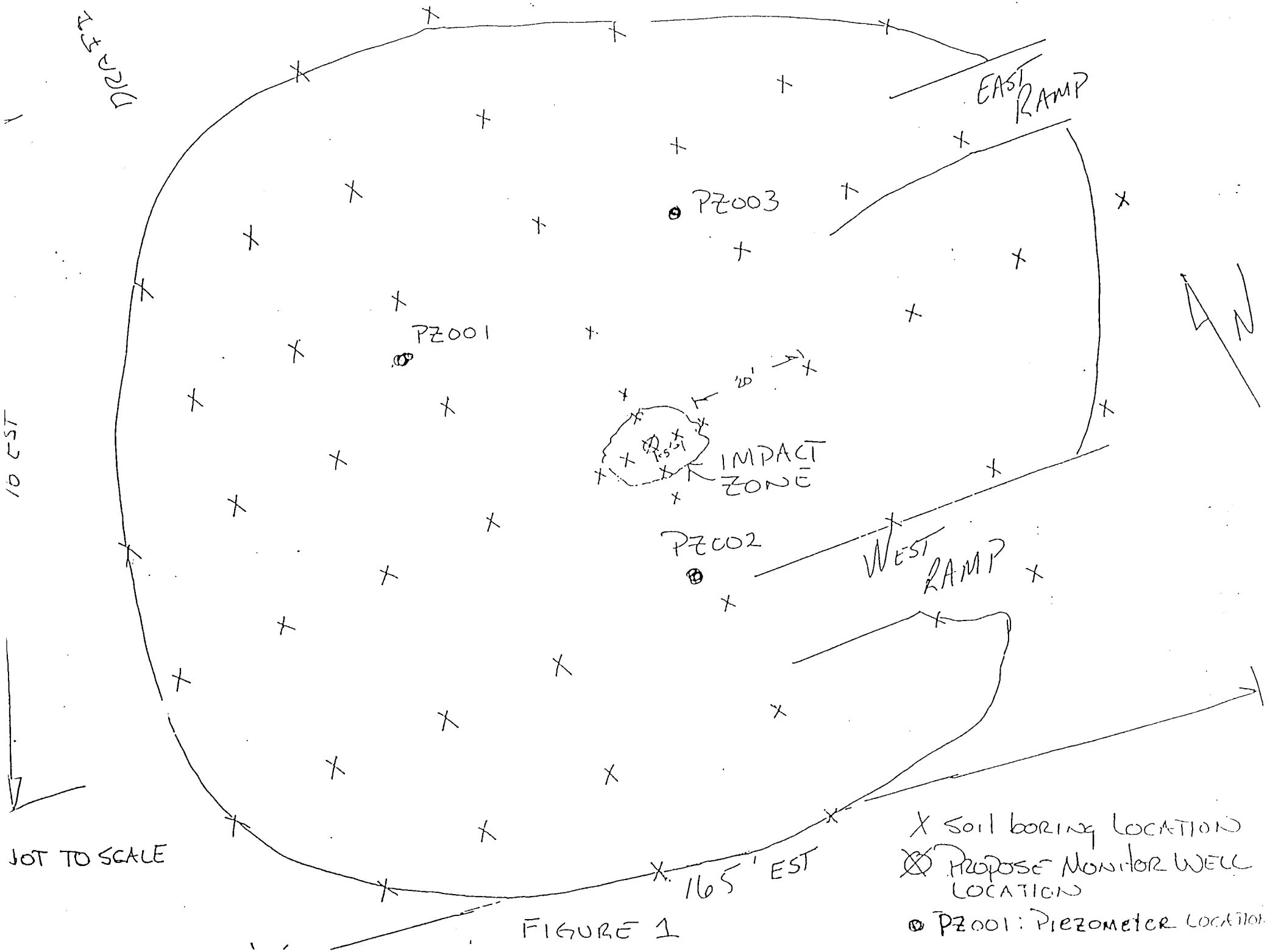

EAST RAMP
PZ003
PZ001
20'
IMPACT ZONE
PZ002
WEST RAMP
N
10 EST
165' EST
NOT TO SCALE
X Soil boring LOCATION
Propose Monitor WELL LOCATION
PZ001: Piezometer LOCATION

FIGURE 1

The temporary monitoring well will be constructed in the same manner as described above, but will not be permanently completed (i.e., no bentonite seal, annular grout and permanent surface completion).

Produced groundwater from well development and purging will be contained in 55-gallon DOT approved drums. Each drum well be sampled and analyzed for the parameters listed in Table 1. After receipt of the analytical results a proper disposal method will be determined and the drummed water properly disposed.

2.5 Well Abandonment

The integrity of wells PZ001, PZ002 and PZ003 will be examined, if collapsed, the well will be abandoned by grouting inplace and will be replaced with a temporary monitoring well. For well abandonment, neat cement-bentonite grout will be placed from the bottom of the well to the surface using the tremie method. A pipe or hose will be placed at the bottom of the well and grout will be pumped into the well. When grout is observed reaching the top of the well the pipe or hose will be slowly removed. Grout will be added to fill the space left by removal of the pipe or hose. Grout will be added to the well until the grout level remains at the top of the well.

2.6 Groundwater Sampling Activities

The newly installed monitoring well, CEF-CS1-1, new temporary monitoring well (if necessary), and the existing wells, PZ001, PZ002 and PZ003, if integrity permits, will be sampled. The procedure described in Section 2.4 will be completed before sampling monitoring well CEF-CS1-1.

Existing wells PZ001, PZ002 and PZ003 will be purged before sampling. A minimum of three well volumes will be removed from the well. The purged water will be monitored for pH, conductivity and temperature. When three consecutive readings of the parameters remain the same, the well will be considered ready to be sampled.

One groundwater sample will be collected in duplicate and an equipment rinsate blank will be obtained, if necessary, and submitted for laboratory analysis.

Groundwater samples will be analyzed in accordance with Florida Petroleum Contamination Clean-up Criteria Regulation, 62-770. Parameters to be analyzed are Total Recoverable Petroleum Hydrocarbons (TRPH) by EPA Method 418.1; Lead by EPA Method 7000 series; Purgeable Aromatic Hydrocarbons by EPA Method 8270; Halogenated Volatile Organics by EPA Method 8010; Benzene, Toluene, Ethylbenzene, Total Xylene, and Methy Tert Butyl Ether by EPA Method 8020; and Ethylene Dibromide by EPA Method 8260. These parameters are also included in Table 1.

Table 1
Analytical Requirements

Parameter	Analytical Method	DQO Level	Sample[2] Volume	Sample Container	Preservative	Holding Time	QC Samples Required
Field Screening Sampling							
TVOC	Head Space	II	fill jar ½ full	16 oz. canning jar	None	Analyze immediately following temperature equilibrium.	Dup: 1/20
Groundwater Sampling							
TRPH	EPA 418.1	III	1 liter	1 liter amber jug	H_2SO_4 pH<2 Cool @ 4° C	14 days	Dup: 1/20
Lead	EPA 7000 Series	III	500 mls	500 mls HDPE	HNO_3 pH<2 Cool @ 4° C	6 months	Dup: 1/20
PAH and 2-methylnaphthalene and 1-methylnaphthalene	EPA 8270	III	1 liter	1 liter amber jug	Cool @ 4° C	7 days til extraction 40 days til analysis	Dup: 1/20
Halogenated Volatile Organics	EPA 8010	III	120 mls	40 ml VOA vial	HCL pH<2 Cool @ 4° C	14 days	Dup: 1/20
BTEX and MTBE	EPA 8020	III	120 mls	40 ml VOA vial	HCL pH<2 Cool @ 4° C	14 days	TB: 1/cooler Dup: 1/20
Ethylene Dibromide	EPA 8260	III	120 mls	40 ml VOA vial	HCL pH<2 Cool @ 4° C	14 days	TB: 1/cooler Dup: 1/20

APPENDIX A

SOUTHERN DIVISION NAVAL FACILITIES
ENGINEERING COMMAND

GUIDELINES FOR GROUNDWATER MONITORING
WELL INSTALLATION

Rev; 4
Date: 27 MAR 89

SOUTHERN DIVISION NAVAL FACILITIES
ENGINEERING COMMAND

GUIDELINES FOR GROUNDWATER MONITORING WELL INSTALLATION

PART 1: GENERAL

1.1 Introduction

Groundwater monitoring wells shall be located at sites approved by the Southern Division Engineer-In-Charge (EIC) and the Activity Environmental Coordinator (EC). All applicable local, state and federal regulations concerning well installations or soil borings shall be followed.

1.2 Applicable Publications

The publications listed below form a part of this guideline to the extent referenced. The publications are referred to in this text by designation only. The latest revision of the specifications shall be followed.

1.2.1 American Association of State Highway and Transportation Officials (AASHTO)

Document No.	Title
M 220	Epoxy Coatings Specifications

1.2.2 American Society of Testing and Materials (ASTM)

Document No.	Title
A 120	Pipe, Steel, Black and Hot-dipped, Zinc coated, welded and seamless
A 312	Seamless and Welded Austenitic Stainless Steel Pipe
B 209	Aluminum and Aluminum-alloy Sheet and Plate
C 150	Portland Cement
C 778	Standard Sand
D 1457	Polytetrafluoroethylene (PTFE) Molding and Extrusion Materials

Document No.	Title
D 1785	Standard Specification of Polyvinyl Chloride Pipe (PVC Pipe, Schedules 40, 80, 120)
D 1586	Method for Penetration Test and Split Barrel Sampling of Soils
D 1587	Practice for Thin Wall Tube Sampling of Soils.
D 2113	Diamond Core Drilling for Site Investigation
F 480	Thermoplastic Water Well Casing, Pipe and Couplings Made in Standard Dimension Ratios
F 883	Padlocks

1.2.3 American Petroleum Institute (API)

Document No.	Title
13-A	Oil Well Drilling Fluid Specifications

1.3 Submittals

1.3.1 A completed "Southern Division Naval Facilities Engineering Command Groundwater Monitoring Well Installation Report" will be submitted for each well installation.

1.3.2 Certificates of Conformance: A certificate of conformance shall be provided to the EIC for any of the items below that are used in a well installation. The certificate shall describe in detail how the material meets or exceeds the required specifications for the following, as appropriate:

a) Casing
b) Screen
c) Grout
d) Drilling Mud
e) Gravel Pack
f) Caps and Plugs
g) Centralizers
h) Surface Casing
i) Well Protective Cover
j) Flush Mount Protective Cover
k) Padlock
l) Protective Post
m) Well Designation Sign
o) Epoxy Paint

1.4 Delivery and Storage

All materials shall be delivered in undamaged condition, stored in accordance with manufacturer's recommendations (off the ground) and protected from the weather in an area designated by the EC. All defective or damaged material will be replaced with new material at no cost to the government.

PART 2: PRODUCTS

2.1 All materials shall conform to the respective specifications and other requirements as specified herein.

2.1.1 Well Casing

Material type will be approved by the EIC. The material provided will have adequate strength to resist external forces both during and after installation. The casing threads shall be compatible with the screen listed in 2.2.2. Markings, writing or paint strips are not allowable on any of the materials. The casing shall conform to the specifications listed below.

a. PVC, flush threaded joints (schedule 40) ASTM F480 and ASTM D1785

All PVC flush threaded joints will meet or exceed the water pressure ratings (at 73 degrees Fahrenheit) for the size and schedule of PVC pipe used in the project, as listed in ASTM D1785: Table XI.2.

b. Polytetrafluoroethylene (PT-E), flush threaded joints, ASTM D1457

Virgin materials shall be used to meet the ASTM specification. Certification of compliance and joint evaluation are required. Shall be shipped in sealed containers that are capable of preventing contact with any foreign substances. PTEF "O" rings are required to seal all joints.

c. 316 stainless steel, flush threaded joints, ASTM A312
d. 304 stainless steel, flush threaded joints, ASTM A312

End fittings shall be double entry flush screw threads. The casing shall be cleaned prior to delivery in the following manner: 5-minute immersion in static bath of dilute acid, pressure -ash with detergent and cool water, rinse with warm water and allow to air dry.

2.1.2 Well Screen

Material type will be approved by the EIC. The material provided will have adequate strength to resist external forces both during and after installation. Water velocity through the screen openings shall not exceed 0.1 feet/sec. The opening size will be determined from an analysis of the material in geologic formation to be screened and/or the size of the filter pack material. Markings, writing or paint strips are not allowable on any of the materials. The screens shall conform to the specifications listed below.

a. PVC, flush threaded joints (schedule 40), slotted, ASTM F480 and ASTM D1785

Two inch I.D. screens will have 3 rows of slots with a spacing of 1/8 inch between slots. Four inch I.D. screens will have six rows of slots with a spacing of 1/8 inch between slots. All PVC flush threaded joints will meet or exceed the

water pressure ratings (at 73 degrees Fahrenheit) for the size and schedule of PVC pipe as listed in ASTM D1785, Table XI.2.

b. Polytetrafluoroethylene (PTFE), flush threaded joints, slotted, ASTM D1457

Virgin materials shall be used to meet the ASTM specification. Certification of compliance and joint evaluation are required. Shall be shipped in sealed containers. PTEF "O" rings will be used to seal all joints.

c. 316 stainless steel, wire wrapped, flush threaded joints, ASTM A312
d. 304 stainless steel, wire wrapped, flush threaded joints, ASTM A312

The well screen shall be of a continuous slot, wire wound design. It shall be fabricated by circumferentially wrapping a triangularly shaped wire around a circular array of internal rods. The configuration must produce sharp outer edges, widening inward. PTFE "O" rings will be used to seal all joints. End fittings will be welded to the screen body.

2.1.3 End Plugs

The end plug shall be flush threaded and shall be constructed of the same type of material selected for the screen or casing above. All ASTM specifications that apply to the screen and casing materials shall apply to the end plugs. Markings, writing or paint strips are not allowable on any of the above materials.

2.1.4 Well Caps

The well cap shall be flush threaded and be constructed of the same type of material selected for the casing above. All ASTM specifications that apply to the casing materials shall apply to the well caps. Markings, writing or paint strips are not allowable on any of the above materials.

2.1.5 Adjustable Centralizers

The centralizer shall be capable of maintaining the casing and screen straight and plumb in the borehole during well installation. The material type shall be the same type of material selected for the casing/screen above. No solvents or glues will be used.

2.1.6 Annular Space Fill Materials

a. Filter pack shall be 98% pure silica, cleaned with potable water, have a uniformity coefficient of 1-3, and a specific gravity of 2.6 - 2.7. The filter pack shall meet ASTM C 775 standard sand specifications.

b. 1/4-inch bentonite pellets shall be 90- montmorillonite clay, with a bulk dry density 80 lbs/cu ft, a specific gravity 1.2, and a pH of 8.5-10.5.

c. Granular bentonite shall conform to API std 13-A for bentonite.

d. Portland Cement shall conform to ASTM C 150 Type I.

2.1.7 Surface Casing: shall be constructed of steel meeting ASTM A 120 and shall have a wall thickness as specified below.

a. 24 inch diameter 0.25 inch wall thickness
b. 20 inch diameter 0.25 inch wall thickness
c. 16 inch diameter 0.25 inch wall thickness
d. 10.75 inch diameter 0.25 inch wall thickness
e. 24 inch diameter 0.50 inch wall thickness
f. 20 inch diameter 0.50 inch wall thickness
g. 16 inch diameter 0.50 inch wall thickness
h. 10.75 inch diameter 0.365 inch wall thickness

2.1.8 Surface Completion: all materials provided for a well surface completion shall conform to the specifications listed below.

a. Locking 16-gauge steel protective well cover, round or square and 5-ft in length

b. Flush mount 22-gauge steel, water resistant welded box with 3/8-inch steel lid, locking device and padlock guard

c. Concrete pad at ground surface (3' X 4' X 6") ASTM C 150

d. Padlock (brass, corrosion resistant, keyed alike) ASTM F 883

e. Steel protective post (4-inch diameter, 6-ft length, 1/4-inch thickness, concrete filled) ASTM A 120.

f. Well designation sign, sheet aluminum, ASTM B 209, 1/8 inch by 18 inch by 6 inch, anchors and fasteners compatible with sign, designation to be provided by EIC, the designation shall be stamped into the plate with 4-inch letters and numbers.

g. High visibility yellow epoxy paint AASHTO M220.

PART 3: EXECUTION

3.1 Drilling Method

The proposed drilling method must be approved by the EIC. Hollow-stem auger methods will be given first preference, rotary methods second and any other methods will require detailed evaluation by the EIC and written approval.

3.2 Well Installation

Well depths, length of screen and sump will be determined on a site specific basis with approval of the EIC. Screen lengths will be limited to 10 feet unless longer lengths are specifically approved in writing by the EIC. Two inch well diameters will be specified for shallow well installations. Deeper well installations or wells that will be converted to recovery wells may require four inch wells. Recovery well specifications will be approved by the EIC.

Well installation shall follow commonly accepted professional drilling procedures. The borehole will be logged by a qualified geologist/hydrogeologist as drilling proceeds. The minimum qualifications are those describing a "Geologist-in-Training", as described in Article 1, Chapter 23, Title 1, Code of Laws of South Carolina: Rules of the South Carolina State Board of Registration for Geologists. Soil samples shall be collected according to one of the following methods: ASTM D 1586-Method for Penetration Test and Split Barrel Sampling of Soils or ASTM D 1587-Practice for Thin Wall Tube Sampling of Soils. Consolidated Rock will be sampled according to ASTM D2113 Diamond Core Drilling for Site Investigation.

Gravel pack, seals, and grout will be installed using tremie methods. Bentonite seals shall be allowed to hydrate the time period specified by the manufacturer. Accurate measurements shall be made to the top of the gravel pack and seals with a weighted steel tape and adjusted to reflect the top of casing.

If water is used in the drilling process, a sample shall be collected from the source and analyzed for the parameters specified in the investigation. Results will be included in the investigation report.

3.3 Well Development

Well development shall commence no sooner than 24 hours after placement of the grout. The development method shall be approved by the EIC. The selected method shall be capable of removing all drilling fluids and cuttings from inside the well, within the gravel pack and from within the formation. The development method shall not introduce any type of contamination into the aquifer. Introduction of outside water to the well shall be minimized. Any water introduced into the well shall be recovered to the maximum extent possible. A written report will be required describing the reasons why any introduced water could not be recovered.

The development process should result in wells that are sediment free. A well that produces turbid water (as defined by the Safe Drinking Water Act PL 93-523) may be rejected by the EIC.

3.4 Material Disposal

All borehole cuttings and development water will be contained in - DOT 17-C Open-top 55-gallon drums, permanently labeled by well number and stored in a location designated by the EC. The material will be handled as hazardous waste until laboratory results are reviewed and certification of the waste is submitted to

the Navy. This requirement may be waived if approval is given in writing by the EIC. The material may then be disposed of as normal solid waste if it does not exceed any state or federal regulatory limits for the type of waste in question. The Navy will be responsible for disposal of all waste unless other direction is given by the EIC.

3.5 Decontamination

All down-hole drilling equipment the drill rig, tools, etc.) will be decontaminated according to the approved Quality Control Plan prior to beginning work, between each well location and after the last well is completed. The drill rig will be placed on 10-mil polyethylene sheeting at each drilling site to contain any spillage or leaking of hydraulic fluid or fuel. All of the decontamination waste will be handled according to section 3.4 above.

3.6 Well Protection

A steel, hinged, locking protective casing will be installed within a 3-ft by 4-ft by 6-inch thick concrete pad. The pad will be set level and 4-inches below grade. The pad shall be installed so that surface runoff does not pond around the well casing and protective cover. The concrete mix shall obtain a minimum 28-day compressive strength of 3000 pounds per square inch.

If designated by the EIC, four steel protective posts will be installed 0.5 ft from the corners of the pad but not set within the pad. The post will be 6-ft in length, 4-inch in diameter and have a wall thickness of 0.25-inch. The post will be filled with concrete and set three feet below grade in a 10-inch diameter hole with concrete backfill (as above).

The protective casing and any protective post installed shall be cleaned, primed and then painted with two coats of high visibility yellow epoxy paint that meets the specifications of AASHTO M 200. The protective casing will be locked with a Type Pol (Key Operated), Option E (Corrosion Resistant) padlock that conforms to ASTM F 883. When multiple wells are installed, the padlocks for each well at an activity shall be keyed alike. The original and two copies of all keys shall be delivered to the EIC and two copies shall be delivered to the EC. All keys shall be tested to ensure performance prior to delivery.

3.7 Well Designation

A permanent well designation sign will be attached to the protective casing. The sign shall be a 18-inch by 6-inch by 1/8-inch thick sheet aluminum plate, bolted to 1/4-inch studs welded to the casing. The sign shall be stamped with 4-inch letters and numbers in accordance with the numbering system in section 4.0 of this specification.

PART 4. INSTALLATION RESTORATION PROGRAM WELL NUMBERING SYSTEM

The purpose of this well numbering system is to locate a particular well by activity, key it to the Initial Assessment Study (IAS) and sequentially number each well at each site. The EIC will provide designations for sites not included in the IAS.

Example:	CEF-1-1	Cecil Field, Site 1, Well number 1
	KYW-5-8	Key West, Site 5, Well Number 8

FLORIDA

Cecil Field	CEF
Ft. Lauderdale	FLD
Key West	KYW
NavHosp Key West	KWH
Homestead	HST
Jacksonville	JAX
Mayport	MPT
Panama City	PCY
Whiting Field	WHF
Andros Island	AIS
Pensacola	PEN
Saufley	SFY
Correy Station	CRY
Orlando	OLD

GEORGIA

Albany	ALB
Atlanta	ATL
Kings Bay	KBA
Athens	ATH

SOUTH CAROLINA

Parris Island	PAI
Beaufort	BFT
NavHosp Beaufort	BFH
NWS Charleston	NWS
NS Charleston	CSY

LOUISIANA

NAS New Orleans	NOA
NSA New Orleans	NOS

MISSISSIPPI

Gulfport	GPT
NavHome Gulfport	GPH
Meridian	MRD

TENNESSEE

Memphis	MPH
Bristol	BRT

TEXAS

Corpus Christi	CCT
Chase Field	CAF
Kingsville	KVE
NAS Dallas	DNA
NWIRP Dallas	DWP
McGregor	MGR

APPENDIX B:
OVA Screening of Stockpiled Soil and of Soil Pile Adjacent to the Excavation Area

10

Navy RAC Field Screening Form

Site ID: F-18
Facility ID: + 221
SEIR ID: NA
Date: 12-28-94
Analyst: Tom Rountree

Analysis: Head Space
Manufacturer: Foxboro
Instrument ID (#1): A42287
Date of Calibration (#1): 12-28-94
Instrument ID (#2): N/A
Date of Calibration (#2): N/A

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result	Units Filtered	Carbon (y/n)
A	GRAB	Open Area	Soil			0834	0.8 ppm	N	N
B	↓	↓	↓			↓	0 ppm	N	N
C	↓	↓	↓			↓	0 ppm	N	N
Bucket # 1	#1	Spoils Pile					0 ppm HS - 4.3 PPM		
+	#2						0 ppm HS - 2.9 PPM		
+ 3	#3						52 ppm HS - 25 PPM		
+ 3	#4						0 ppm HS - 5 PPM		
	#5						3 ppm HS - 9.8 PPM		
	#6						26 ppm HS 9 PPM		
	#7						15 ppm HS - 4 PPM		
	#8						500 ppm HS 280 PPM		
	#9						11 ppm HS - 12 PPM		
	#10						60 ppm HS - 150 PPM		
	#11						95 ppm HS - 320 PPM		
	#12					0915	240 ppm HS - 295 PPM		
	#13						58 PPM HS 51 ppm		5 ppm
	#14						180 PPM HS 300		4 ppm
↓	#15						3 ppm HS 8 ppm		

Date: 12-1-94 Analyst Signature: [signature]

1.112 5097.1

Navy RAC Field Screening Form

Site ID: F-18
Facility ID: T 221
SEIR ID: NA
Date: 12/28/94
Analyst: TOM ROWATREE

Analysis: HEADSPACE
Manufacturer: FOXBORO
Instrument ID (#1): A92287
Date of Calibration (#1): 12/28/94
Instrument ID (#2): NA
Date of Calibration (#2): N/A

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result	Units Filtered	Carbon (y/n)
BUCKET #3	#16	Stock Pile	SOIL		HO	1020	12 ppm HS 8.6		
3	#17						78 ppm HS 160		<4 ppm
3	#18						75 ppm HS 65		
3	#19						70 ppm HS 100		<4 ppm
	#20						85 ppm HS 20 ppm		4 ppm
	#21						110 ppm HS 35		
	#22						120 ppm HS 160		<4 ppm
	#23						58 HS 73		<4 ppm
	#24						55 HS 67		<4 ppm
	25						0 ppm HS = 0		
	26						0 ppm HS = 0		
	27						15 ppm HS 0		
	28						8 ppm HS 0		
	29						6 ppm HS 0		
	30						30 ppm HS 0		
	31						4 ppm HS 0		
	32						16 ppm HS 0		
	33						80 ppm HS 68		

Date: 12-28-94 Analyst Signature:

1.112 5097.1

Navy RAC Field Screening Form

Site ID _____ Analysis _____

Facility ID _____ Manufacturer _____

SEIR ID _____ Instrument ID (#1) _____

Date _____ Date of Calibration (#1) _____

Analyst _____ Instrument ID (#2) _____

Date of Calibration (#2) _____

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result	Units Filtered	Carbon (y/n)
	34	Spoils Pile					15 ppm HS - 10		
	35						65 ppm HS - 12		
	36						280 ppm HS - 130		
	37						100 HS - 55		
	38						90 HS - 47		
	39						75 HS - 120		
	40						50 HS - 55		
	41						85 HS - 32		
	42						150 HS - 440		
	43						200 HS - 400		
	44						100 HS - 160		
	45						115 HS - 780		
	46						220 HS - 90		
	47						2 HS - 0		
	48						0 HS		
	49								
	50								
	51								

Date: _____ Analyst Signature: _____

1.112 5097.1

Navy RAC Field Screening Form

Site ID: F-18
Facility ID: 821
SEIR ID: NA
Date: 12-29-94
Analyst: Tom Rountree

Analysis: Head space
Manufacturer: Foxboro
Instrument ID (#1): A42287
Date of Calibration (#1): 12-29-94
Instrument ID (#2): NA
Date of Calibration (#2): NA

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result	Units Filtered	Carbon (y/n)
# 49	#4	Spoils pile pit					0ppm HS 5 ppm		
50							5ppm HS 0 ppm		
51							16 ppm HS 10 ppm		
52							44 ppm HS 29 ppm		
53							20 ppm HS 11 ppm		
54							100 ppm HS 290 ppm		
55							25 ppm HS 22 ppm		
56							38 ppm HS 16 ppm		
57							28 ppm HS 30 ppm		
58							50 ppm HS 20 ppm		
59							22 ppm HS 16 ppm		
60							36 ppm HS 14 ppm		
61							0 ppm HS 0 ppm		
62							42 ppm HS 0 ppm		
63							35 ppm HS 4 ppm		
64							64 ppm HS 14 ppm		
65							18 ppm HS 28 ppm		
66							0 ppm HS 0 ppm		

Date: 12-29-94 Analyst Signature: [illegible]

1.112 5097.1

Navy RAC Field Screening Form

Pg # 34

Site ID: F-18
Facility ID: B21
SEIR ID: NA
Date: 12-29-94
Analyst: Tom Bourtree

Analysis: Head space
Manufacturer: Foxboro
Instrument ID (#1): A42287
Date of Calibration (#1): 12-29-94
Instrument ID (#2):
Date of Calibration (#2):

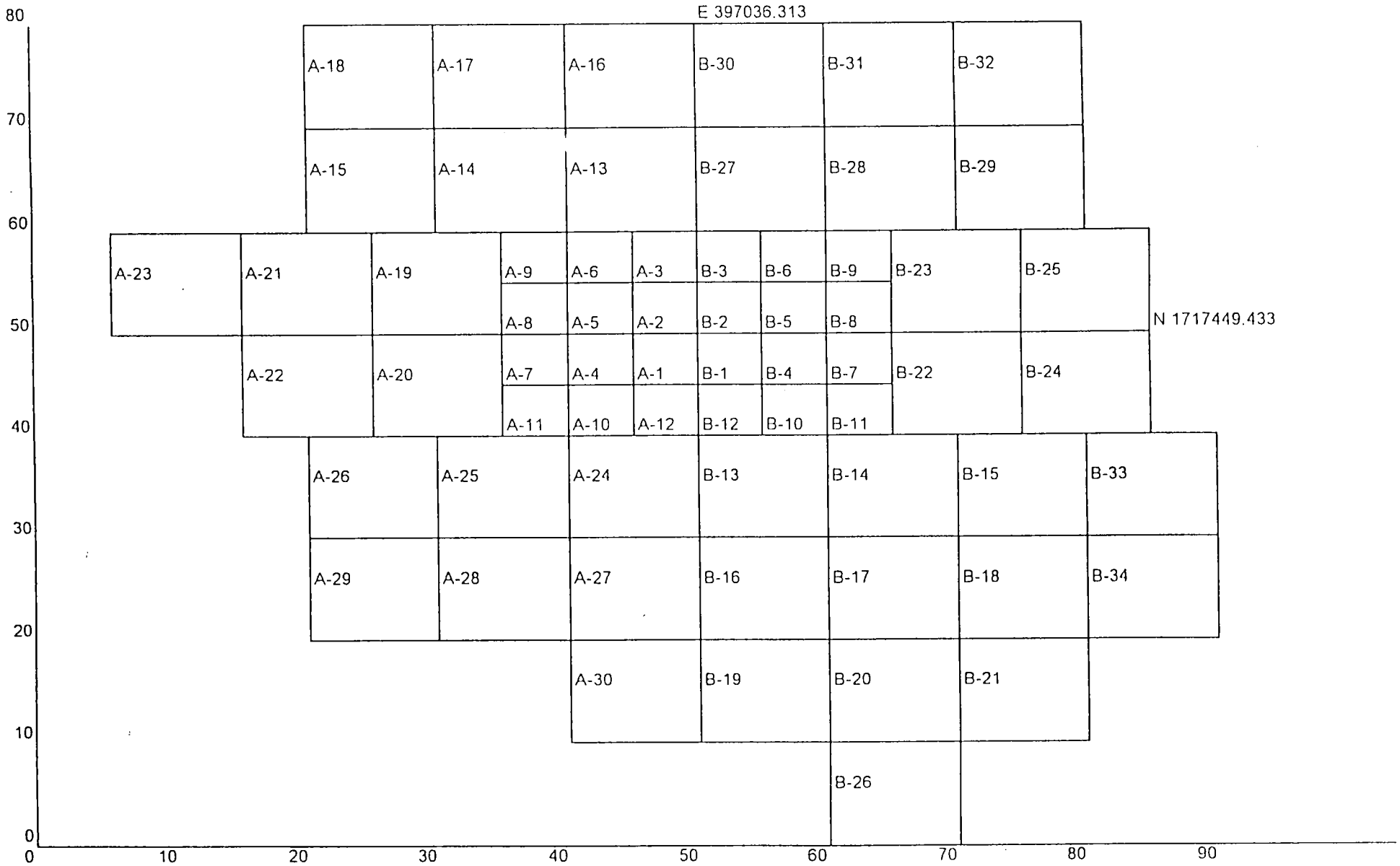
Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result	Units Filtered	Carbon (y/n)
67		SPOILS PILE ON TOP		23			10 ppm HS 0ppm		
68				22			35 HS 60ppm		
69				20			62 HS 35ppm		
70				21			66 HS 0ppm		
71				22			0 HS 6ppm		
72				24			0 HS 4ppm		
73				2			40 HS 200		
74				21			0 HS 0ppm		
75				20			60 HS 66ppm		
76				21			45 HS 30ppm		
77				22			90 HS 380ppm		
78				23			0 HS 0ppm		
79				23			10 HS 10ppm		
80		Surface A1		20			65ppm		
81		2' B1		21			320ppm		
82		4'		23			460ppm		
83		6'		24			>1000ppm		
84		8'		23			300 ppm		

Date: 12-29-94 Analyst Signature: [signature]

1.112 5097.1

APPENDIX C:
Site Information and Field Log Sheets

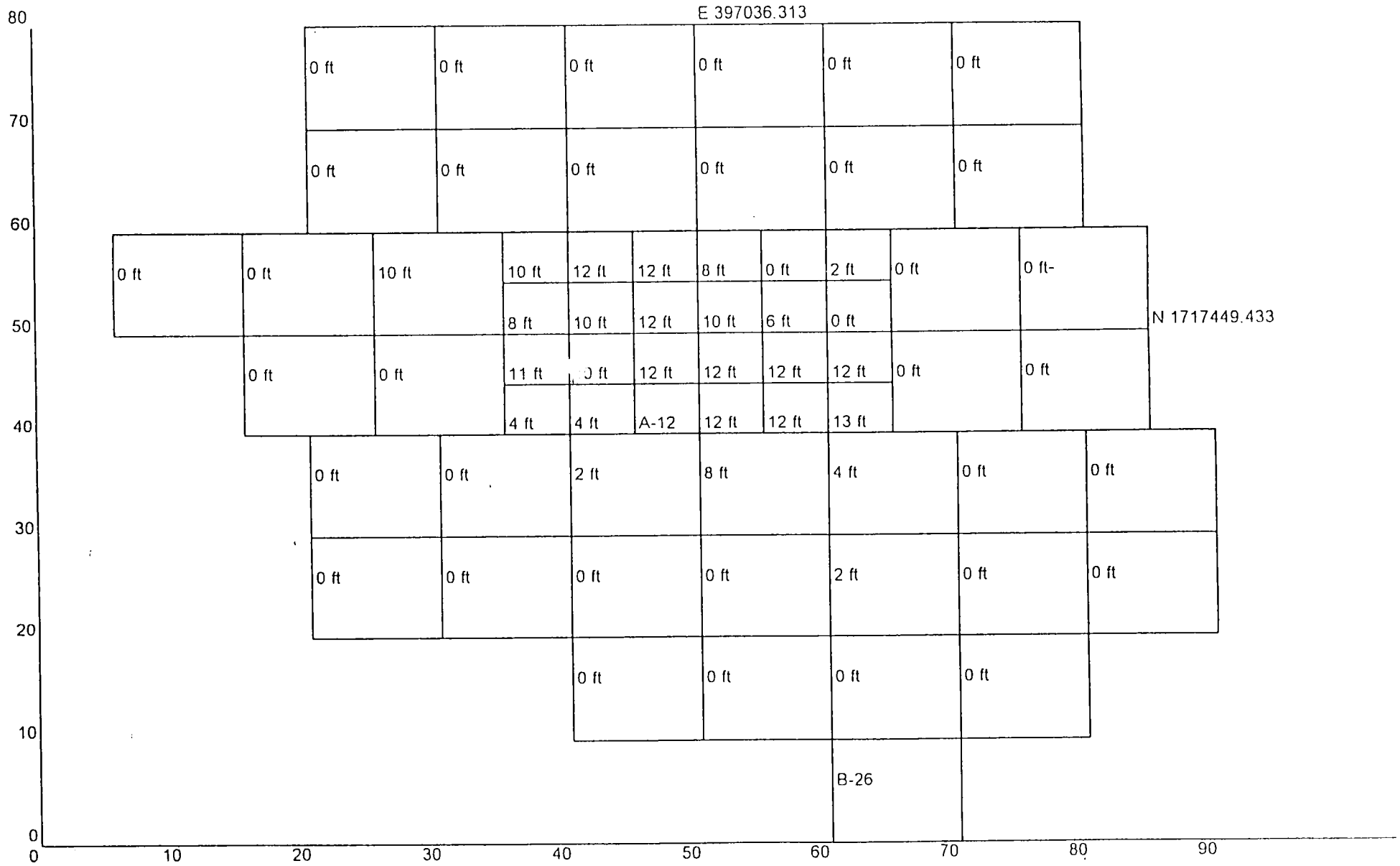
Figure 1
Grid and Locations of SBs



NOTE: Sampling locations are from the center of grid blocks
Grid is in feet

Figure 2

Maximum Depth of Each SB over 50 PPM



NOTE: Sampling locations are from the center of grid blocks
Grid is in feet

Navy RAC Field Screening Form

Site ID: E18

Facility ID: ~~NA~~ 22567-221

SEIR ID: NA

Date: 12-29-94

Analyst: Tom Rowtree

Analysis: Head Space

Manufacturer: —

Instrument ID (#1): A42287

Date of Calibration (#1): 12-29-94

Instrument ID (#2): —

Date of Calibration (#2): —

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result	Units Filtered	Carbon (y/n)
85		B-1 10'		22			620 ppm		
86		12'		21			80 ppm		
87		surface B2 ~~14'~~	12-29-94	22			230 ppm		
88		2' ~~16'~~	✓	23			105 ppm		
89		4' 8'		21			>1000 ppm		
90		6' 8'	✓	20			280 ppm		
91		8' 10'	✓	21			770 ppm		
92		10' 12'	✓	22			>1000 ppm		
93		12' 14	✓	23			20 ppm		
94		~~14~~ ✓							
95									
96									
97									

Date: 12-29-94 Analyst Signature: [signature]

1.112 5097.1

Navy RAC Field Screening Form

Site ID: 1-18
Facility ID: 221
SEIR ID: NA
Date: 12-30-94
Analyst: Tom Rounthe

Analysis: Head space
Manufacturer: Foxboro
Instrument ID (#1): A 42287
Date of Calibration (#1): 12-30-94
Instrument ID (#2): NAN
Date of Calibration (#2): NA

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result w/o filter	Result w/filter	Result net	Units Filtered	Carbon (y/n)
94	Grab	NW surface	Soil				47 ppm	w/0	net 47	N	N/Y
95		CEF-CS1-1 1.1'					62 ppm	w/0	62		
96		3.7'					>1000 ppm	w/2	>1000		
97		5.2'					>1000 ppm	w/0	>1000		
98		7.6'					460 ppm	w/0	460		
99		9.4'					240 ppm	w/10	230		
100		10.2'					>1000 ppm	w/0	>1000		
101		12'					370 ppm	w/0	370		
102		12.9'					>1000 ppm	w/75	>925		
103		15'					>1000 ppm	9	>990		
104											
105											
106											
107											
108											

Date: 12-30-94 Analyst Signature: [signature]

1.112 5097.1

Navy RAC Field Screening Form

Site ID: F-18
Facility ID: 231
SEIR ID: NA
Date: 1-3-95
Analyst: Tom Routtree

Analysis: Headspace
Manufacturer: —
Instrument ID (#1): A42282
Date of Calibration (#1): 1-3-94
Instrument ID (#2): —
Date of Calibration (#2): —

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result w/o Filter	Result w/ Filter	Result DEA	Units Filtered	Carbon (y/n)
		B5 Surface	SOIL				—	—	—	N	N
		2'					55 ppm	—	—		
		4'					80 ppm	—	—		
		6'					86 ppm	—	—		
		8'					24 ppm	—	—		
		10'					<4 ppm	—	—		
		12'					<2 ppm	—	—		
		B4 Surface					180 ppm	—	—		
		2'					620 ppm	—	—		
		4'					860 ppm	—	—		
		6'					510 ppm	—	—		
		8'					420 ppm	—	—		
		10'					280 ppm	—	—		
		12'					120 ppm	—	—		
		13'					38 ppm	—	—		
		F6 Surface					26 ppm	—	—		
		2'					<4 ppm	—	—		
		4'					Not Sampled	—	—		

Date: 1-3-95 Analyst Signature: [illegible]

1.112 5097.1

Navy RAC Field Screening Form

Site ID: F-18

Facility ID: 22567-221

SEIR ID: NA

Date: 1-3-95

Analyst: Tom Rountree

Analysis: Head Space

Manufacturer: –

Instrument ID (#1): A 42287

Date of Calibration (#1): 1-3-95

Instrument ID (#2): –

Date of Calibration (#2): –

Sample ID	Sample Type	Location		Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result w/o Filter	Result w/ Filter	Result pwd	Units Filtered	Carbon (y/n)
	GRAB	B6	6'	SOIL				0ppm	–	–	N	N
			8'					0ppm	–	–		
			10'					0ppm	–	–		
			12'					0ppm	–	–		
			13'					0ppm	–	–		
		B7	Surface					59ppm	–	–		
			2'					48ppm	–	–		
			4'					<6ppm	–	–		
			6'					3ppm	–	–		
			8'					1ppm	–	–		
			10'					1ppm	–	–		
			12'					1ppm	–	–		
			13'					0ppm	–	–		
		B8	Surface					24ppm	–	–		
			2'					0ppm	–	–		
			4'					0ppm	–	–		
			6'					0ppm	–	–		
			8'					0ppm	–	–		

Date: 1-3-95 Analyst Signature: [signature]

1.112 5097.1

Navy RAC Field Screening Form

Site ID: F-18

Facility ID: 22567 · 221

SEIR ID: NA

Date: 1-3-95

Analyst: Tom Bountree

Analysis: Headspace

Manufacturer: -

Instrument ID (#1): A42287

Date of Calibration (#1): 1-3-95

Instrument ID (#2): --

Date of Calibration (#2): -

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result w/o filter	Result w/filter	Result not	Units Filtered	Carbon (y/n)
	GRAB	B8 10'	SOIL				0ppm	-	-	N	N
		12'					0ppm	-	-		
		13'					0ppm	-	-		
		B3 surface					5ppm	-	-		
		2'					220ppm	-	-		
		4'					1000 ppm	-	-		
		6'					300 ppm	-	-		
		8'					280 ppm	-	-		
		10'					20 ppm	-	-		
		12'					10 ppm	-	-		
		13'					30 ppm	-	-		
		B12 surface					10 ppm	-	-		
		2'					980 ppm	-	-		
		4'					640 ppm	-	-		
		6'					800 ppm	-	-		
		8'					630 ppm	-	-		
		10'					190 ppm	-	-		
		12'					110 ppm	-	-		

Date: 1-3-95 Analyst Signature: [illegible]

1.112 5097.1

Navy RAC Field Screening Form

Site ID: F-18

Facility ID: 22567-221

SEIR ID: NA

Date: 1-3-95

Analyst: Tom Rountree

Analysis: Head space

Manufacturer: –

Instrument ID (#1): AA 2287

Date of Calibration (#1): 1-3-95

Instrument ID (#2): –

Date of Calibration (#2): –

Sample ID	Sample Type	Location		Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result w/o Filter	Result w/ Filter	Result net	Units Filtered	Carbon (y/n)
	GRAB	B12	13'	SOIL				27 ppm	–	–	N	N
		B10	surface					0 ppm	–	–		
			2'					720 ppm	–	–		
			4'					740 ppm	–	–		
			6'					570 ppm	–	–		
			8'					510 ppm	–	–		
			10'					500 ppm	–	–		
			12'					220 ppm	–	–		
		B9	surface					10 ppm	–	–		
			2'					75 ppm	–	–		
			4'					10 ppm	–	–		
			6'					0 ppm	–	–		
			8'					0 ppm	–	–		
			10'					0 ppm	–	–		
			12'					2 ppm	–	–		
			13'					2 ppm	–	–		
		B11	surface					2 ppm	–	–		
			2'					400 ppm	–	–		

Date: 1-3-95 Analyst Signature: [signature]

1.112 5097.1

Navy RAC Field Screening Form

Site ID: F-18

Facility ID: 22567-221

SEIR ID: NA

Date: 1-3-95

Analyst: Tom Rountree

Analysis: Head Space

Manufacturer: -

Instrument ID (#1): A 42287

Date of Calibration (#1): 1-3-95

Instrument ID (#2): -

Date of Calibration (#2): -

Sample ID	Sample Type	Location		Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result %/Filter	%/Filter	Unit	Units Filtered	Carbon (y/n)
	GRAB	B11	4'	SOIL				750 ppm	-	-	N	N
			6'					390 ppm	-	-		
			8'					200 ppm	-	-		
			10'					80 ppm	-	-		
			12'					260 ppm	-	-		
			13'					100 ppm	-	-		
		A12	surface					340 ppm	-	-		
			2'					> 1000 ppm	-	-		
			4'					230 ppm	-	-		
			6'					340 ppm	-	-		
			8'					260 ppm	-	-		
			10'					740 ppm	-	-		
		A10	surface					180 ppm	-	-		
			2'					600 ppm	-	-		
			4'					160 ppm	-	-		
			6'					20 ppm	-	-		
			8'					26 ppm	-	-		
			10'					20 ppm	-	-		

Date: 1-3-94 Analyst Signature: J E R

1.112 5097.1

Navy RAC Field Screening Form

Site ID: F-18
Facility ID: 22567-22'
SEIR ID: NA
Date: 1-3-95
Analyst: Tom Rountree

Analysis: Head Space
Manufacturer: —
Instrument ID (#1): A4 22387
Date of Calibration (#1): 1-3-95
Instrument ID (#2): —
Date of Calibration (#2): —

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result w/o Filter	Result w/ Filter	Result Net	Units Filtered	Carbon (y/n)
	GRAB	A7 surface	SOIL				0ppm	–	–	N	N
		2'					5ppm	–	–		
		4'					2ppm	–	–		
		6'					>1000ppm	–	–		
		8'					>1000ppm	–	–		
		10'	Forget 1-3-95				>1000ppm	–	–		
		11'					700ppm	–	–		
		A11 surface					150ppm	–	–		
		2'					100ppm	–	–		
		4'					85ppm	–	–		
		6'					22ppm	–	–		
		8'					21ppm	–	–		
		10'					21ppm	–	–		
		A8 surface					17ppm	–	–		
		2'					90ppm	–	–		
		4'					25ppm	–	–		
		6'					300ppm	–	–		
		8'					180ppm	–	–		

Date: 1-3-95 Analyst Signature: [signature]

1.112 5097.1

Navy RAC Field Screening Form

Site ID: F-18

Facility ID: 22567-221

SEIR ID: NA

Date: 1-3-95

Analyst: Tom Rountree

Analysis: headspace

Manufacturer: –

Instrument ID (#1): A42287

Date of Calibration (#1): 1-3-95

Instrument ID (#2): –

Date of Calibration (#2): –

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result w/o Filter	Result w/ Filter	Result net	Units Filtered	Carbon (y/n)
	GRAB	A8 10'	SOIL				21 ppm	–	–	N	N
		A9 surface					4 ppm	–	–		
		2'					>1000 ppm	–	–		
		4'					260 ppm	–	–		
		6'					200 ppm	–	–		
		8'					300 ppm	–	–		
		10'					190 ppm	–	–		
		A6 surface					0 ppm	–	–		
		2'					170 ppm	–	–		
		4'					40 ppm	–	–		
		6'					190 ppm	–	–		
		8'					80 ppm	–	–		
		10'					150 ppm	–	–		
		12'					250 ppm	–	–		
		A1 surface					80 ppm	–	–		
		2'					690 ppm	–	–		
		4'					950 ppm	–	–		
		8'					220 ppm	–	–		

Date: 1-3-95 Analyst Signature: T E Rountree

1.112 5097.1

Navy RAC Field Screening Form

Site ID: F-18

Facility ID: 22567-221

SEIR ID: NA

Date: 1-3-95

Analyst: Tom Rountree

Analysis: Head space

Manufacturer: —

Instrument ID (#1): A 42287

Date of Calibration (#1): 1-3-95

Instrument ID (#2): —

Date of Calibration (#2): —

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result w/o Filter	Result w/ Filter	Result Net	Units Filtered	Carbon (y/n)
	GRAB	A1 8'					340 ppm	-	-	N	N
		10'					460 ppm	-	-		
		12'					> 1000 ppm	-	-		
		A3 surface					0 ppm	-	-		
		2'					540 ppm	-	-		
		4'					300 ppm	-	-		
		6'					870 ppm	-	-		
		8'					920 ppm	-	-		
		10'					340 ppm	-	-		
		12'					200 ppm	-	-		
		A2 surface					56 ppm	-	-		
		2'					770 ppm	-	-		
		4'					> 1000 ppm	-	-		
		6'					460 ppm	-	-		
		8'					850 ppm	-	-		
		10'					840 ppm	-	-		
		12'					820 ppm	-	-		
		A4 surface					3 ppm	-	-		

Date: 1-3-95 Analyst Signature: T E Rountree

1.112 5097.1

Navy RAC Field Screening Form

Site ID: F-18

Facility ID: 22567-221

SEIR ID: NA

Date: 1-3-95

Analyst: Tom Rountree

Analysis: Headspace

Manufacturer: —

Instrument ID (#1): A422871

Date of Calibration (#1): 1-3-95

Instrument ID (#2): —

Date of Calibration (#2): —

Sample ID	Sample Type	Location		Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result w/o Filter	Result w/filter	Result net	Units Filtered	Carbon (y/n)
	GRAB	A4	2'	SOIL				>1000 ppm	-	-	N	N
			4'					260 ppm	-	-		
			6'					90 ppm	-	-		
			8'					180 ppm	-	-		
			10'					>1000 ppm	-	-		
		A5	surface					< 10 ppm	-	-		
			2'					860 ppm	-	-		
			4'					650 ppm	-	-		
			6'					270 ppm	-	-		
			8'					160 ppm	-	-		
			10'					220 ppm	-	-		
		B17	surface					20 ppm	-	-		
			2'					82 ppm	-	-		
			4'					9 ppm	-	-		
			6'					< 3 ppm	-	-		
			8'					< 2 ppm	-	-		
			10'					3 ppm	-	-		
			12'					3 ppm	-	-		

Date: 1-3-95 Analyst Signature: [illegible]

1.112 5097.1

Navy RAC Field Screening Form

Site ID: F-1B
Facility ID: 22567-221
SEIR ID: NA
Date: 1-3-95
Analyst: Tom Rountree

Analysis: Headspace
Manufacturer: —
Instrument ID (#1): A42287
Date of Calibration (#1): 1-3-95
Instrument ID (#2): —
Date of Calibration (#2): —

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result w/o Filter	Result w/filter	Result Net	Units Filtered	Carbon (y/n)
	GRAB	B16 Surface	SOIL				0ppm	—	—	N	N
		2'					14ppm	—	—		
		4'					0ppm	—	—		
		6'					0ppm	—	—		
		8'					0ppm	—	—		
		10'					0ppm	—	—		
		12'					0ppm	—	—		
		B20 Surface					0ppm	—	—		
		2'					0ppm	—	—		
		4'					0ppm	—	—		
		6'					0ppm	—	—		
		8'					0ppm	—	—		
		10'					0ppm	—	—		
		12'					0ppm	—	—		
		B13 Surface					10ppm	—	—		
		2'					SEE Pg 47				
		4'									
		6'									

Date: 1-3-95 Analyst Signature: [signature]

1.112 5097.1

Navy RAC Field Screening Form

Site ID: F-18

Facility ID: 22567-221

SEIR ID: NA

Date: 1-3-95

Analyst: Tom Rowtree

Analysis: Headspace

Manufacturer: –

Instrument ID (#1): A42287

Date of Calibration (#1): 1-3-95

Instrument ID (#2): –

Date of Calibration (#2): –

Sample ID	Sample Type	Location		Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result w/o filter	Result w/filter	Result net	Units Filtered	Carbon (y/n)
	GRAB	B13	2'	SOIL				>1000ppm	–	–	N	N
			4'					10ppm	–	–		
			6'					280 ppm	–	–		
			8'					310 ppm	–	–		
			10'					25 ppm	–	–		
			11'					25 ppm	–	–		
		B19	surface					1ppm	–	–		
			2'					<1ppm	–	–		
			4'					0ppm	–	–		
			6'					0 ppm	–	–		
			8'					0 ppm	–	–		
			10'					0 ppm	–	–		
			12'					0ppm	–	–		
		B14	surface					10 ppm	–	–		
			2'					20ppm	–	–		
			4'					270 ppm	–	–		
			6'					40 ppm	–	–		
			8'					25 ppm 1-3-95	–	–		
			10'					15 ppm	–	–		
			12'					15 ppm	–	–		

Date: 1-3-95 Analyst Signature: [illegible]

1.112 5097.1

Navy RAC Field Screening Form

Site ID: F-18

Facility ID: 22567-201

SEIR ID: NA

Date: 1-4-95

Analyst: Tom Rountree

Analysis: Headspace

Manufacturer: —

Instrument ID (#1): A422287

Date of Calibration (#1): 1-4-95

Instrument ID (#2): —

Date of Calibration (#2): —

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result w/o Filter	Result w/ Filter	Result Net	Units Filtered	Carbon (y/n)
	GRAB	B26 Surface	Soil	23			1 ppm	—	—	N	N
		2'					0 ppm TR 2-7-95	—	—		
		4'					0 ppm	—	—		
		6'					0 ppm	—	—		
		8'					0 ppm	—	—		
		10'					0 ppm	—	—		
		12'					0 ppm	—	—		
		14'					0 ppm	—	—		
		16'					0 ppm	—	—		
		18'					1 ppm	—	—		
		20'					0 ppm	—	—		
		B15 Surface					3 ppm	—	—		
		2'					0 ppm	—	—		
		4'					0 ppm	—	—		
		6'					0 ppm	—	—		
		8'					0 ppm	—	—		
		10'					0 ppm	—	—		
		12'					0 ppm	—	—		

Date: 1-4-95 Analyst Signature: [signature] 2-7-95

1.112 5097.1

Navy RAC Field Screening Form

Pg # 49

Site ID: F-18
Facility ID: 221
SEIR ID: NA
Date: 1-9-95
Analyst: Tom Rountree

Analysis: Headspace
Manufacturer: –
Instrument ID (#1): A42287
Date of Calibration (#1): 1-9-95
Instrument ID (#2): –
Date of Calibration (#2): –

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result w/o Filter	Result w/ Filter	Result net	Units Filtered	Carbon (y/n)
	SOIL	B18 surface		21			0 ppm	–	–	N	N
		2'					25 ppm	–	–		
		4'					0 ppm	–	–		
		6'					0 ppm	–	–		
		8'					0 ppm	–	–		
		10'					0 ppm	–	–		
		12'					0 ppm	–	–		
		13'					0 ppm	–	–		
1' South of B17		B17A 2'	Confirmation				2 ppm	–	–		
		B29 surface					0 ppm	–	–		
		2'					0 ppm	–	–		
		4'					0 ppm	–	–		
		6'					0 ppm	–	–		
		8'					0 ppm	–	–		
		10'	missed sample				–	–	–		
		12'					0 ppm	–	–		
		B17A 3'	Confirmation				20 ppm	–	–		
		A29 surface					0 ppm	–	–		

Date: 1-9-95 Analyst Signature: TER

1.112 5097.1

Navy RAC Field Screening Form

Site ID: F-18

Facility ID: 22567-221

SEIR ID: NA

Date: 1-4-95

Analyst: Tom Rountree

Analysis: Headspace

Manufacturer: —

Instrument ID (#1): A42287

Date of Calibration (#1): 1-4-95

Instrument ID (#2): —

Date of Calibration (#2): —

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result w/o filter	Result w/filter	Result net	Units Filtered	Carbon (y/n)
	GRAB	A29 2'	SOIL	20			0 ppm	-	-	N	N
		4"					0 ppm	-	-		
		6'					0 ppm	-	-		
		8'					0 ppm	-	-		
		10'					0 ppm	-	-		
		12'					0 ppm	-	-		
		14'					0 ppm	-	-		
		16'					0 ppm	-	-		
		B23 Surface					8 ppm	-	-		
		2'					0 ppm	-	-		
		4'					9 ppm	-	-		
		6'					17 ppm	-	-		
		8'					27 ppm	-	-		
		10'					66 ppm	-	-		
		12'					4 ppm	-	-		
		A26 Surface					0 ppm	-	-		
		2"					0 ppm	-	-		
		4"					0 ppm	-	-		

Date: 1-4-95 Analyst Signature: [illegible]

1.112 5097.

Navy RAC Field Screening Form

Site ID: F-18

Facility ID: 221

SEIR ID: NA

Date: 1-4-95

Analyst: Tom Rountree

Analysis: Headspace

Manufacturer: —

Instrument ID (#1): A42287 42287

Date of Calibration (#1): 1-4-95

Instrument ID (#2): —

Date of Calibration (#2): —

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result w/o Filter	Result w/ Filter	Result Net	Units Filtered	Carbon (y/h)
	GRAB	A26 6'	SOIL	22			0 ppm	–	–	N	N
		8'					0	–	–		
		B23 surface					0	–	–		
		2'					0 ppm	–	–		
		4"					0 ppm	–	–		
		6"					0	–	–		
		8'					0	–	–		
		10'					0 ppm	–	–		
		12'					0	–	–		
		A28 surface					0	–	–		
		2'					0	–	–		
		4'					0	–	–		
		6'					0	–	–		
		8'					0 ppm	–	–		
		10'					0 ppm	–	–		
		A25 surface					6 ppm	–	–		
		2'					0 ppm	–	–		
		4'					0 ppm	–	–		

Date: 1-4-95 Analyst Signature: J E R

1.112 5097.1

Navy RAC Field Screening Form

Site ID: F-18
Facility ID: 221
SEIR ID: NA
Date: 1-4-95
Analyst: Tom Rountree

Analysis: Head space
Manufacturer: —
Instrument ID (#1): 12287
Date of Calibration (#1): 1-4-95
Instrument ID (#2): —
Date of Calibration (#2): —

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result W/o Filter	Result W/ Filter	Result Net	Units Filtered	Carbon (y/n)
	GRAB	A25 6'	SOIL	21			0 PPM	-	-	N	N
		8'					0 PPM	-	-		
		10"					0 PPM	-	-		
		A28 Surface					10 PPM	-	-		
		2"					68 PPM	0	68		Y
		4'					4 PPM	-	-		N
		6'					1 PPM	-	-		
		8'					1 PPM	-	-		
		10'					1 PPM	-	-		
		A27 Sur					0 PPM	-	-		
		2'					0 PPM	-	-		
		4'					0 PPM	-	-		
		6'					0 PPM	-	-		
		8'					0 PPM	-	-		
		10'					0 PPM	-	-		
		11					0 PPM	-	-		

Date: 1-4-95 Analyst Signature: T E Rountree

1.112 5097.1

Navy RAC Field Screening Form

Site ID: F-18

Facility ID: 221

SEIR ID: NA

Date: 1-4-95

Analyst: T. ROWTREE

Analysis: HEADSPACE

Manufacturer: –

Instrument ID (#1): A42287

Date of Calibration (#1): 1-4-95

Instrument ID (#2): –

Date of Calibration (#2): –

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result w/o Filter	Result w/Filter	Result net	Units Filtered	Carbon (y/n)
	GRAB	B21 Sur	SOIL				0 PPM	–	–	N	N
		2'					0 PPM	–	–		
		4'					0 PPM	–	–		
		6'					0 PPM	–	–		
		8'					0 PPM	–	–		
		10'					0 PPM	–	–		
		12'					0 PPM	–	–		
		B28 Sur.					0 PPM	–	–		
		2'					0 PPM	–	–		
		4'					0 PPM	–	–		
		6'					0 PPM	–	–		
		8'					0 PPM	–	–		
		10'					0 PPM	–	–		
		A20 30-TBR 1-4-95 Sur					0 PPM	–	–		
		2'					0 PPM	–	–		
		4'					0 PPM	–	–		
		6'					0 PPM	–	–		
		8'					0 PPM	–	–		

Date: 1-4-95 Analyst Signature: [illegible]

1.112 5097.1

Navy RAC Field Screening Form

Site ID: F-18
Facility ID: 221
SEIR ID: NA
Date: 1-4-95
Analyst: T. ROWTREE

Analysis: HEADSPACE
Manufacturer: –
Instrument ID (#1): A42287
Date of Calibration (#1): 1-4-95
Instrument ID (#2): –
Date of Calibration (#2): –

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result w/o Filter	Result w/ Filter	Result Net	Units Filtered	Carbon (y/n)
	GRAB	~~A28~~ 30 ft 1-4-95 10'	SOIL				0 PPM	–	–	N	N
		12'					0 PPM	–	–		
		13'					0 PPM	–	–		
		B34 Surf					0 PPM	–	–		
		2'					0 PPM	–	–		
		4'					0 PPM	–	–		
		6'					0 PPM	–	–		
		8'					0 PPM	–	–		
		10'					0 PPM	–	–		
		12'					0 PPM	–	–		
		A20 Surf.					3 PPM	–	–		
		[illegible]					1 PPM	–	–		
		[illegible]					0 PPM	–	–		
		[illegible]					0 PPM	–	–		
		[illegible]					0 PPM	–	–		
		10'					0 PPM	–	–		

Date: 1-4-95 Analyst Signature: [signature]

1.112 5097.1

Navy RAC Field Screening Form

Site ID: F-18
Facility ID: 221
SEIR ID: NA
Date: 1-4-95
Analyst: T. Rowtree

Analysis: HEADSPACE
Manufacturer: –
Instrument ID (#1): A 42287
Date of Calibration (#1): 1-4-95
Instrument ID (#2): –
Date of Calibration (#2): –

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result w/o filter	Result w/ filter	Result Net	Units Filtered	Carbon (y/n)
	GRAB	A22 Sue	SOIL				0 PPM	–	–	N	N
		2'					7 PPM	–	–		
		4'					0 PPM	–	–		
		6'					0 PPM	–	–		
		8'					0 PPM	–	–		
		A21 Sue					0 PPM	–	–		
		2'					0 PPM	–	–		
		4'					0 PPM	–	–		
		6'					0 PPM	–	–		
		8'					0 PPM	–	–		
		9'					0 PPM	–	–		
		B33 Sue					0 PPM	–	–		
		2'					10 PPM	–	–		
		4'					14 PPM	–	–		
		6'					1 PPM	–	–		
		8'					0 PPM	–	–		
		10'					0 PPM	–	–		
		12'					0 PPM	–	–		

Date: 1-4-95 Analyst Signature: [signature]

1.112 5097.1

Navy HAC Field Screening Form

Site ID: F-18
Facility ID: 22567-221
SEIR ID: NA
Date: 1-4-95
Analyst: Tom Rawtree

Analysis: Head space
Manufacturer: –
Instrument ID (#1): A42287
Date of Calibration (#1): 1-4-95
Instrument ID (#2): –
Date of Calibration (#2): –

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result w/o FILTER	Result w/FILTER	Result NET	Units Filtered	Carbon (y/n)
	GRAB	A19 Surface	SOIL				4ppm	–	–	NA	N
		2'					400ppm	–	–		N
		4'					500ppm	–	–		N
		6'					100ppm	1ppm	99ppm		Y
		8'					36ppm	–	–		N
		10'					69ppm	0ppm	69ppm		Y
		11'					44ppm	0ppm	44ppm		N
		A14 Surface					0ppm	–	–		N
		2'					0ppm	–	–		N
		4'					0ppm	–	–		N
		6'					0ppm	–	–		N
		8'					0ppm	–	–		N
		10'					0ppm	–	–		N
		12'					0ppm	–	–		N
		B 25 Sur.					0ppm	–	–		N
		2'					0ppm	–	–		N
		4'					0ppm	–	–		N
		6'					0ppm	–	–		N

Date: 1-4-95 Analyst Signature: T E R

1.112 5097.1

Navy RAC Field Screening Form

Site ID: F-18
Facility ID: 22567-221
SEIR ID: NA
Date: 1-4-95
Analyst: Tom Rountree

Analysis: Head space
Manufacturer: -
Instrument ID (#1): A42287
Date of Calibration (#1): 1-4-95
Instrument ID (#2): -
Date of Calibration (#2): -

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result w/o Filter	Result w/ Filter	Result Net	Units Filtered	Carbon (y/n)
	GRAB	B25 8'	SOIL				0ppm	-	-	N	N
		10'					0ppm	-	-		
		12'					0ppm	-	-		
		B29 surface					0ppm	-	-		
		2'					0ppm	-	-		
		4'	* Very wet clay, previous location of standing water				14ppm	- During Sept. work.	-		
		6'	SOIL				0ppm	-	-		
		8'					0ppm	-	-		
		10'					0ppm	-	-		
		B27 surface					0ppm	-	-		
		2'					0ppm	-	-		
		4'					0ppm	-	-		
		6'					0ppm	-	-		
		8'					0ppm	-	-		
		10'					0ppm	-	-		
		A23 surface					0ppm	-	-		
		2'					0ppm	-	-		
		4'					0ppm	-	-		

Date: 1-4-95 Analyst Signature: T E Rountree

1.112 5097.1

Navy RAC Field Screening Form

Site ID: F-18
Facility ID: 22567.221
SEIR ID: NA
Date: 1-4-95
Analyst: Tom Rountree

Analysis: Head space
Manufacturer: –
Instrument ID (#1): AA 2287
Date of Calibration (#1): 1-4-95
Instrument ID (#2): –
Date of Calibration (#2): –

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result w/o filter	Result w/filter	Result net	Units Filtered	Carbon (y/n)
	Grab	A23 6'	SOIL				0 ppm	–	–	N	N
		8'					0 ppm	–	–		
		10'					0 ppm	–	–		
		B31 surface					0 ppm	–	–		
		2'					0 ppm	–	–		
		4'					0 ppm	–	–		
		6'					0 ppm	–	–		
		8'					0 ppm	–	–		
		10'					0 ppm	–	–		
		A15 surface					0 ppm	–	–		
		2'					0 ppm	–	–		
		4'					0 ppm	–	–		
		6'					0 ppm	–	–		
		8'					0 ppm	–	–		
		10'					0 ppm	–	–		
		B30 surface					0 ppm	–	–		
		2'					0 ppm	–	–		
		4'					0 ppm	–	–		

Date: 1-4-95 Analyst Signature: T E Rountree

1.112 5097.1

Navy RAC Field Screening Form

Site ID: F-18

Facility ID: 22567.221

SEIR ID: NA

Date: 1-4-95

Analyst: Tom Rountree

Analysis: Headspace

Manufacturer: —

Instrument ID (#1): 442287

Date of Calibration (#1): 1-4-95

Instrument ID (#2): —

Date of Calibration (#2): —

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result w/o Filter	Result w/ Filter	Result Net	Units Filtered	Carbon (y/n)
	GRAB	1330 6'	SOIL				0 ppm	—	—	N	N
	↓	8'	↓				0 ppm	—	—	↓	↓
	↓	10'	↓				0 ppm	—	—	↓	↓

Date: 1-4-95 Analyst Signature: TE R

1.112 5097.1

Navy RAC Field Screening Form

Site ID: F-18
Facility ID: 22567-221
SEIR ID: NA
Date: 1-5-95
Analyst: Tom Rountree

Analysis: Head space
Manufacturer: –
Instrument ID (#1): A4 22287
Date of Calibration (#1): 1-5-95
Instrument ID (#2): –
Date of Calibration (#2): – ,

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result w/o Filter	Result w/Filter	Result net	Units Filtered	Carbon (y/n)
	Grab	A18 surface	soil				0 ppm	–	–	N	N
		2'					0 ppm	–	–		
		4'					0 ppm	–	–		
		6'					0 ppm	–	–		
		8'					0 ppm	–	–		
		9'					0 ppm	–	–		
		A17 surface					0 ppm	–	–		
		2'					1 ppm	–	–		
		4'					0 ppm	–	–		
		6'					0 ppm	–	–		
		8'					0 ppm	–	–		
		10'					0 ppm	–	–		
		A16 surface					0 ppm	–	–		
		2'					1 ppm	–	–		
		4'					0 ppm	–	–		
		6'					0 ppm	–	–		
		8'					0 ppm	–	–		
		10'					0 ppm	–	–		

Date: 1-5-95 Analyst Signature: [signature]

1.112 5097.1

Navy RAC Field Screening Form

Site ID: F-18

Facility ID: 22567-221

SEIR ID: NA

Date: 1-5-95

Analyst: Tom Rountree

Analysis: Headspace

Manufacturer: –

Instrument ID (#1): A42287

Date of Calibration (#1): 1-5-95

Instrument ID (#2): –

Date of Calibration (#2): –

Sample ID	Sample Type	Location	Matrix	Temp (°F) Reference #	Instr. ID (Military)	Time	Result w/o filter	Result w/filter	Result w/filter	Units Filtered	Carbon (y/n)
	Grab	A16 12'	SOIL				0 ppm	–	–	N	N
		A16 13'					0 ppm	–	–		
		A13 surface					0 ppm	–	–		
		2'					6 ppm	–	–		
		4'					0 ppm	–	–		
		6'					0 ppm	–	–		
		8'					0 ppm	–	–		
		10'					0 ppm	–	–		
		B32 surface					0 ppm	–	–		
		2'					0 ppm	–	–		
		4'					0 ppm	–	–		
		6'					0 ppm	–	–		
		8'					0 ppm	–	–		
		10'					0 ppm	–	–		

Date: 1-5-95 Analyst Signature: T E R

1.112 5097.1

APPENDIX D:
Groundwater sampling results

22567-222-SC-0001-0020-001-01

CERTIFICATE OF ANALYSIS

22567-222-SC-001-0022-001-01

GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

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FL	E87156/87294	E87472/87455
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	999885779	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350

Contact: Ms. Lori Keller

Project Description: Cecil Field/CF

cc: BBCH00494

Report Date: February 08, 1995

Sample ID : Monitoring Well 1
Lab ID : 9501109-01
Matrix : GroundH2O
Date Collected : 01/05/95
Date Received : 01/06/95
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M	C
Volatile Organics												
BTEX - 4 items												
Benzene		96.9	37.5	50.0	ug/l	25.	GJG	01/10/95	1904	59653	1	1
Ethylbenzene		131	37.5	50.0	ug/l	25.						
Toluene	U	0.00	37.5	50.0	ug/l	25.						
Xylenes (TOTAL)		723	50.0	100	ug/l	25.						
Method 8010 Volatiles - 29 items												
1,1,1-Trichloroethane	U	0.00	37.5	50.0	ug/l	25.	GJG	01/11/95	1814	59721	2	N
1,1,2,2-Tetrachloroethane	U	0.00	37.5	50.0	ug/l	25.						
1,1,2-Trichloroethane	U	0.00	37.5	50.0	ug/l	25.						
1,1-Dichloroethane	U	0.00	37.5	50.0	ug/l	25.						
1,1-Dichloroethylene	U	0.00	37.5	50.0	ug/l	25.						
1,2-Dichlorobenzene	U	0.00	37.5	50.0	ug/l	25.						
1,2-Dichloroethane	U	0.00	37.5	50.0	ug/l	25.						
1,2-Dichloropropane	U	0.00	37.5	50.0	ug/l	25.						
1,2-trans-Dichloroethylene	U	0.00	37.5	50.0	ug/l	25.						
1,3-Dichlorobenzene	U	0.00	37.5	50.0	ug/l	25.						
1,4-Dichlorobenzene	U	0.00	37.5	50.0	ug/l	25.						
2-Chloroethylvinyl ether	U	0.00	37.5	50.0	ug/l	25.						
Bromoform	U	0.00	37.5	50.0	ug/l	25.						
Carbon Tetrachloride	U	0.00	37.5	50.0	ug/l	25.						
Chlorobenzene	U	0.00	37.5	50.0	ug/l	25.						
Chlorodibromomethane	U	0.00	37.5	50.0	ug/l	25.						
Chloroethane	U	0.00	37.5	50.0	ug/l	25.						
Chloroform	U	0.00	37.5	50.0	ug/l	25.						
Dichlorobromomethane	U	0.00	37.5	50.0	ug/l	25.						
Dichlorodifluoromethane	U	0.00	50.0	50.0	ug/l	25.						
Methyl Bromide	U	0.00	37.5	50.0	ug/l	25.						
Methyl Chloride	U	0.00	37.5	50.0	ug/l	25.						

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SC	10120	10532
TN	02934	
VA	00151	
WI	99985779	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350
Contact: Ms. Lori Keller
Project Description: Cecil Field/CF

cc: BECH00494 Report Date: February 08, 1995

Sample ID : Monitoring Well 1

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M	C
Methylene Chloride	U	0.00	37.5	50.0	ug/l	25.						
Tetrachloroethylene	U	0.00	37.5	50.0	ug/l	25.	GJG	01/11/95	1814	59721	2	N
Trichloroethylene	U	0.00	37.5	50.0	ug/l	25.						
Trichlorofluoromethane	U	0.00	37.5	50.0	ug/l	25.						
Vinyl chloride	U	0.00	37.5	50.0	ug/l	25.						
cis-1,3-Dichloropropylene	U	0.00	37.5	50.0	ug/l	25.						
trans-1,3-Dichloropropylene	U	0.00	37.5	50.0	ug/l	25.						
Methyl Tert Butyl Ether	U	0.00	125	1250	ug/l	25.	GJG	01/10/95	1904	59653	1	1
Ethylene Dibromide	U	0.00	0.0150	0.0500	ug/l	1.0	MKP	01/12/95	1626	59804	3	2
Extractable Organics												
Polynuclear Aromatic Hydrocarbons - 18 items												
1-Methylnaphthalene	U	0.00	0.200	100	ug/l	10.	JCB	01/16/95	2303	59614	4	3
2-Methylnaphthalene	U	0.00	15.4	100	ug/l	10.						
Acenaphthene	U	0.00	15.7	100	ug/l	10.						
Acenaphthylene	U	0.00	16.8	100	ug/l	10.						
Anthracene	U	0.00	17.1	100	ug/l	10.						
Benzo(a)anthracene	U	0.00	21.5	100	ug/l	10.						
Benzo(a)pyrene	U	0.00	14.2	100	ug/l	10.						
Benzo(b)fluoranthene	U	0.00	14.0	100	ug/l	10.						
Benzo(ghi)perylene	U	0.00	12.7	100	ug/l	10.						
Benzo(k)fluoranthene	U	0.00	8.70	100	ug/l	10.						
Chrysene	U	0.00	9.50	100	ug/l	10.						
Dibenzo(a,h)anthracene	U	0.00	11.9	100	ug/l	10.						
Fluoranthene	U	0.00	10.2	100	ug/l	10.						
Fluorene	U	0.00	19.1	100	ug/l	10.						
Indeno(1,2,3-c,d)pyrene	U	0.00	8.90	100	ug/l	10.						
Naphthalene	U	0.00	17.8	100	ug/l	10.						
Phenanthrene	U	0.00	17.2	100	ug/l	10.						
Pyrene	U	0.00	11.7	100	ug/l	10.						
Metals Analysis												
Lead		85.1	2.00	5.00	ug/l	1.0	RMJ	01/17/95	0914	59931	5	4
General Chemistry												
Total Rec. Petro. Hydrocarbons		4.81	1.00	1.00	mg/l	1.0	DAG2	01/20/95	1600	60304	6	N

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SC	10120	10587
TN	02934	
VA	00151	
WI	99985779	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350
Contact: Ms. Lori Keller
Project Description: Cecil Field/CF

cc: BECH00494 Report Date: February 08, 1995

Sample ID : Monitoring Well 1

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M	C

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	JPB	01/10/95	1500	59614	7	
Graphite Furnace	BBJ	01/16/95	1400	59931	8	

Comments:

See Case Narrative.

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610-BECH	0.00	(51.0 - 114.)
Nitrobenzene-d5	M610-BECH	0.00	(35.0 - 114.)
p-Terphenyl-d14	M610-BECH	0.00	(33.0 - 141.)
n-propylbenzene	BTEX-GC	141.	(51.5 - 139.)
2,2-Dichloropropane	M8010	91.0	(55.6 - 135.)
n-propylbenzene	MTBE-GC	141.	(51.5 - 139.)
1,4-Dichlorobenzene-d4	EDB-MSV2	110.	(11.2 - 131.)
Dibromofluoromethane	EDB-MSV2	91.8	(58.8 - 128.)
Toluene-d8	EDB-MSV2	99.4	(88.2 - 117.)

M = Method	Method-Description
M 1	EPA 8020
M 2	EPA 8010
M 3	EPA 8260
M 4	EPA 8270
M 5	EPA 7421
M 6	EPA 418.1
M 7	EPA 3500/3520
M 8	EPA 3020

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SC	10120	10582
TN	02934	
VA	00151	
WI	99986779	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350

Contact: Ms. Lori Keller

Project Description: Cecil Field/CF

cc: BECH00494

Report Date: February 08, 1995

Sample ID : Monitoring Well 1

C = Container	Lab. Container ID	Reference ID
C 1	9501109-01.04	30152243
C 2	9501109-01.06	30152244
C 3	9501109-01.12	30153403
C 4	9501109-01.14	30153398

Notes:
The qualifiers in this report are defined as follows:
J indicates presence of analyte < RL (Report Limit)
J indicates presence of analyte < DL (Detect Limit)

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Winter Seibert at (803) 769-7388.

Analytical Report Specialist

NAVY RAC PROJECT 22567

BECHTEL ID NUMBER:

SC/PO	SEQ	SHT	SUBMTL

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SC	10120	10582
TN	02934	
VA	00151	
WV	99988779	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350
Contact: Ms. Lori Keller
Project Description: Cecil Field/CF

cc: BECH00494 Report Date: February 08, 1995

Sample ID : Monitoring Well 2
Lab ID : 9501109-02
Matrix : GroundH2O
Date Collected : 01/05/95
Date Received : 01/06/95
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M	C
Volatile Organics												
BTEX - 4 items												
Benzene	J	36.2	30.0	40.0	ug/l	20.	GJG	01/11/95	1110	59653	1	1
Ethylbenzene		65.4	30.0	40.0	ug/l	20.						
Toluene	U	0.00	30.0	40.0	ug/l	20.						
Xylenes (TOTAL)		329	40.0	80.0	ug/l	20.						
Method 8010 Volatiles - 29 items												
1,1,1-Trichloroethane	U	0.00	30.0	40.0	ug/l	20.	GJG	01/11/95	1905	59721	2	N
1,1,2,2-Tetrachloroethane	U	0.00	30.0	40.0	ug/l	20.						
1,1,2-Trichloroethane	U	0.00	30.0	40.0	ug/l	20.						
1,1-Dichloroethane	U	0.00	30.0	40.0	ug/l	20.						
1,1-Dichloroethylene	U	0.00	30.0	40.0	ug/l	20.						
1,2-Dichlorobenzene	U	0.00	30.0	40.0	ug/l	20.						
1,2-Dichloroethane	U	0.00	30.0	40.0	ug/l	20.						
1,2-Dichloropropane	U	0.00	30.0	40.0	ug/l	20.						
1,2-trans-Dichloroethylene	U	0.00	30.0	40.0	ug/l	20.						
1,3-Dichlorobenzene	U	0.00	30.0	40.0	ug/l	20.						
1,4-Dichlorobenzene	U	0.00	30.0	40.0	ug/l	20.						
2-Chloroethylvinyl ether	U	0.00	30.0	40.0	ug/l	20.						
Bromoform	U	0.00	30.0	40.0	ug/l	20.						
Carbon Tetrachloride	U	0.00	30.0	40.0	ug/l	20.						
Chlorobenzene	U	0.00	30.0	40.0	ug/l	20.						
Chlorodibromomethane	U	0.00	30.0	40.0	ug/l	20.						
Chloroethane	U	0.00	30.0	40.0	ug/l	20.						
Chloroform	U	0.00	30.0	40.0	ug/l	20.						
Dichlorobromomethane	U	0.00	30.0	40.0	ug/l	20.						
Dichlorodifluoromethane	U	0.00	40.0	40.0	ug/l	20.						
Methyl Bromide	U	0.00	30.0	40.0	ug/l	20.						
Methyl Chloride	U	0.00	30.0	40.0	ug/l	20.						

NAVY RAC PROJECT 22567

BECHTEL ID NUMBER:

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NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	99985779	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350
Contact: Ms. Lori Keller
Project Description: Cecil Field/CF

cc: BECH00494 Report Date: February 08, 1995

Sample ID : Monitoring Well 2

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M	C
Methylene Chloride	U	0.00	30.0	40.0	ug/l	20.						
Tetrachloroethylene	U	0.00	30.0	40.0	ug/l	20.	GJG	01/11/95	1905	59721	2	N
Trichloroethylene	U	0.00	30.0	40.0	ug/l	20.						
Trichlorofluoromethane	U	0.00	30.0	40.0	ug/l	20.						
Vinyl chloride	U	0.00	30.0	40.0	ug/l	20.						
cis-1,3-Dichloropropylene	U	0.00	30.0	40.0	ug/l	20.						
trans-1,3-Dichloropropylene	U	0.00	30.0	40.0	ug/l	20.						
Methyl Tert Butyl Ether	U	0.00	100	1000	ug/l	20.	GJG	01/11/95	1110	59653	1	1
Ethylene Dibromide	U	0.00	0.0750	0.250	ug/l	5.0	MKP	01/12/95	1817	59804	3	2
Extractable Organics												
Polynuclear Aromatic Hydrocarbons - 18 items												
1-Methylnaphthalene	U	0.00	0.200	100	ug/l	10.	JCB	01/17/95	0046	59614	4	3
2-Methylnaphthalene	U	0.00	15.4	100	ug/l	10.						
Acenaphthene	U	0.00	15.7	100	ug/l	10.						
Acenaphthylene	U	0.00	16.8	100	ug/l	10.						
Anthracene	U	0.00	17.1	100	ug/l	10.						
Benzo(a)anthracene	U	0.00	21.5	100	ug/l	10.						
Benzo(a)pyrene	U	0.00	14.2	100	ug/l	10.						
Benzo(b)fluoranthene	U	0.00	14.0	100	ug/l	10.						
Benzo(ghi)perylene	U	0.00	12.7	100	ug/l	10.						
Benzo(k)fluoranthene	U	0.00	8.70	100	ug/l	10.						
Chrysene	U	0.00	9.50	100	ug/l	10.						
Dibenzo(a,h)anthracene	U	0.00	11.9	100	ug/l	10.						
Fluoranthene	U	0.00	10.2	100	ug/l	10.						
Fluorene	U	0.00	19.1	100	ug/l	10.						
Indeno(1,2,3-c,d)pyrene	U	0.00	8.90	100	ug/l	10.						
Naphthalene	U	0.00	17.8	100	ug/l	10.						
Phenanthrene	U	0.00	17.2	100	ug/l	10.						
Pyrene	U	0.00	11.7	100	ug/l	10.						
Metals Analysis												
Lead		49.5	2.00	5.00	ug/l	1.0	RMJ	01/17/95	0919	59931	5	4
General Chemistry												
Total Rec. Petro. Hydrocarbons		5.58	2.00	2.00	mg/l	2.0	DAG	01/20/95	1600	60304	6	N

NAVY RAC PROJECT 22567

BECHTEL ID NUMBER:

SC/PO SEQ SHT SUBMTL

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FL	E87156/87294	E87472/87456
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	99985779	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350

Contact: Ms. Lori Keller

Project Description: Cecil Field/CF

cc: BECH00494

Report Date: February 08, 1995

Sample ID : Monitoring Well 2

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M	C
The following prep procedures were performed:												
GC/MS Base/Neutral Compounds							JPB	01/10/95	1500	59614	7	
Graphite Furnace							BBJ	01/16/95	1400	59931	8	

Comments:

See Case Narrative.

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610-BECH	0.00	(51.0 - 114.)
Nitrobenzene-d5	M610-BECH	0.00	(35.0 - 114.)
p-Terphenyl-d14	M610-BECH	0.00	(33.0 - 141.)
n-propylbenzene	BTEX-GC	83.2	(51.5 - 139.)
2,2-Dichloropropane	M8010	80.6	(55.6 - 135.)
n-propylbenzene	MTBE-GC	83.2	(51.5 - 139.)
1,4-Dichlorobenzene-d4	EDB-MSV2	123.	(11.2 - 131.)
Dibromofluoromethane	EDB-MSV2	95.8	(58.8 - 128.)
Toluene-d8	EDB-MSV2	97.4	(88.2 - 117.)

M = Method	Method-Description
M 1	EPA 8020
M 2	EPA 8010
M 3	EPA 8260
M 4	EPA 8270
M 5	EPA 7421
M 6	EPA 418.1
M 7	EPA 3500/3520
M 8	EPA 3020

NAVY RAC PROJECT 22567

BECHTEL ID NUMBER:

SC/PO SEQ SHT SUBMTL

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GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87455
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	99988779	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350

Contact: Ms. Lori Keller

Project Description: Cecil Field/CF

cc: BECH00494

Report Date: February 08, 1995

Sample ID : Monitoring Well 2

C = Container	Lab. Container ID	Reference ID
C 1	9501109-02.08	30152238
C 2	9501109-02.04	30152254
C 3	9501109-02.12	30153406
C 4	9501109-02.10	30152261

Notes:
The qualifiers in this report are defined as follows:
J indicates presence of analyte < RL (Report Limit)
U indicates presence of analyte < DL (Detect Limit)

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Winter Seibert at (803) 769-7388.

Analytical Report Specialist

NAVY RAC PROJECT 22567

BECHTEL ID NUMBER:

SC/PO SEQ SHT SUBMTL

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GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WV	99985779	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350
Contact: Ms. Lori Keller
Project Description: Cecil Field/CF

cc: BECH00494 Report Date: February 08, 1995

Sample ID : Monitoring Well 3
Lab ID : 9501109-03
Matrix : GroundH2O
Date Collected : 01/05/95
Date Received : 01/06/95
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M	C
Volatile Organics												
BTEX - 4 items												
Benzene	U	0.00	1.50	2.00	ug/l	1.0	GJG	01/10/95	2104	59653	1	1
Ethylbenzene	U	0.00	1.50	2.00	ug/l	1.0						
Toluene	U	0.00	1.50	2.00	ug/l	1.0						
Xylenes (TOTAL)	U	0.00	2.00	4.00	ug/l	1.0						
Method 8010 Volatiles - 29 items												
1,1,1-Trichloroethane	U	0.00	1.50	2.00	ug/l	1.0	GJG	01/11/95	1542	59721	2	N
1,1,2,2-Tetrachloroethane	U	0.00	1.50	2.00	ug/l	1.0						
1,1,2-Trichloroethane	U	0.00	1.50	2.00	ug/l	1.0						
1,1-Dichloroethane	U	0.00	1.50	2.00	ug/l	1.0						
1,1-Dichloroethylene	U	0.00	1.50	2.00	ug/l	1.0						
1,2-Dichlorobenzene	U	0.00	1.50	2.00	ug/l	1.0						
1,2-Dichloroethane	U	0.00	1.50	2.00	ug/l	1.0						
1,2-Dichloropropane	U	0.00	1.50	2.00	ug/l	1.0						
1,2-trans-Dichloroethylene	U	0.00	1.50	2.00	ug/l	1.0						
1,3-Dichlorobenzene	U	0.00	1.50	2.00	ug/l	1.0						
1,4-Dichlorobenzene	U	0.00	1.50	2.00	ug/l	1.0						
2-Chloroethylvinyl ether	U	0.00	1.50	2.00	ug/l	1.0						
Bromoform	U	0.00	1.50	2.00	ug/l	1.0						
Carbon Tetrachloride	U	0.00	1.50	2.00	ug/l	1.0						
Chlorobenzene	U	0.00	1.50	2.00	ug/l	1.0						
Chlorodibromomethane	U	0.00	1.50	2.00	ug/l	1.0						
Chloroethane	U	0.00	1.50	2.00	ug/l	1.0						
Chloroform	U	0.00	1.50	2.00	ug/l	1.0						
Dichlorobromomethane	U	0.00	1.50	2.00	ug/l	1.0						
Dichlorodifluoromethane	U	0.00	2.00	2.00	ug/l	1.0						
Methyl Bromide	U	0.00	1.50	2.00	ug/l	1.0						
Methyl Chloride	U	0.00	1.50	2.00	ug/l	1.0						

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Laboratory Certifications

STATE	CSL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	999885779	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350
Contact: Ms. Lori Keller
Project Description: Cecil Field/CF

cc: BECH00494 Report Date: February 08, 1995

Sample ID : Monitoring Well 3

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M	C
Methylene Chloride	U	0.00	1.50	5.00	ug/l	1.0						
Tetrachloroethylene	U	0.00	1.50	2.00	ug/l	1.0	GJG	01/11/95	1542	59721	2	N
Trichloroethylene	U	0.00	1.50	2.00	ug/l	1.0						
Trichlorofluoromethane	U	0.00	1.50	2.00	ug/l	1.0						
Vinyl chloride	U	0.00	1.50	2.00	ug/l	1.0						
cis-1,3-Dichloropropylene	U	0.00	1.50	2.00	ug/l	1.0						
trans-1,3-Dichloropropylene	U	0.00	1.50	2.00	ug/l	1.0						
Methyl Tert Butyl Ether	U	0.00	5.00	50.0	ug/l	1.0	GJG	01/10/95	2104	59653	1	1
Ethylene Dibromide	U	0.00	0.0150	0.0500	ug/l	1.0	MKP	01/12/95	1916	59804	3	2
Extractable Organics												
Polynuclear Aromatic Hydrocarbons - 18 items												
1-Methylnaphthalene	U	0.00	0.0200	20.0	ug/l	1.0	JCB	01/17/95	0120	59614	4	3
2-Methylnaphthalene	U	0.00	1.54	20.0	ug/l	1.0						
Acenaphthene	U	0.00	1.57	20.0	ug/l	1.0						
Acenaphthylene	U	0.00	1.68	20.0	ug/l	1.0						
Anthracene	U	0.00	1.71	20.0	ug/l	1.0						
Benzo(a)anthracene	U	0.00	2.15	20.0	ug/l	1.0						
Benzo(a)pyrene	U	0.00	1.42	20.0	ug/l	1.0						
Benzo(b)fluoranthene	U	0.00	1.40	20.0	ug/l	1.0						
Benzo(ghi)perylene	U	0.00	1.27	20.0	ug/l	1.0						
Benzo(k)fluoranthene	U	0.00	0.870	20.0	ug/l	1.0						
Chrysene	U	0.00	0.950	20.0	ug/l	1.0						
Dibenzo(a,h)anthracene	U	0.00	1.19	20.0	ug/l	1.0						
Fluoranthene	U	0.00	1.02	22.0	ug/l	1.0						
Fluorene	U	0.00	1.91	20.0	ug/l	1.0						
Indeno(1,2,3-c,d)pyrene	U	0.00	0.890	20.0	ug/l	1.0						
Naphthalene	U	0.00	1.78	20.0	ug/l	1.0						
Phenanthrene	U	0.00	1.72	20.0	ug/l	1.0						
Pyrene	U	0.00	1.17	20.0	ug/l	1.0						
Metals Analysis												
Lead		284	40.0	40.0	ug/l	20.	RMJ	01/17/95	1042	59931	5	4
General Chemistry												
Total Rec. Petro. Hydrocarbons	U	0.160	1.00	1.00	mg/l	1.0	DAG	01/20/95	1600	60304	6	N

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SC	10120	10582
TN	02934	
VA	00151	
WI	99983779	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350

Contact: Ms. Lori Keller

Project Description: Cecil Field/CF

cc: BECH00494

Report Date: February 08, 1995

Sample ID : Monitoring Well 3

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M	C
The following prep procedures were performed:												
GC/MS Base/Neutral Compounds							JPB	01/10/95	1500	59614	7	
Graphite Furnace							BBJ	01/16/95	1400	59931	8	

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610-BECH	78.0	(51.0 - 114.)
Nitrobenzene-d5	M610-BECH	76.0	(35.0 - 114.)
p-Terphenyl-d14	M610-BECH	62.0	(33.0 - 141.)
n-propylbenzene	BTEX-GC	74.7	(51.5 - 139.)
2,2-Dichloropropane	M8010	83.5	(55.6 - 135.)
n-propylbenzene	MTBE-GC	74.7	(51.5 - 139.)
1,4-Dichlorobenzene-d4	EDB-MSV2	66.6	(11.2 - 131.)
Dibromofluoromethane	EDB-MSV2	95.8	(58.8 - 128.)
Toluene-d8	EDB-MSV2	104.	(88.2 - 117.)

M = Method	Method-Description
M 1	EPA 8020
M 2	EPA 8010
M 3	EPA 8260
M 4	EPA 8270
M 5	EPA 7421
M 6	EPA 418.1
M 7	EPA 3500/3520
M 8	EPA 3020

C = Container	Lab. Container ID	Reference ID
C 1	9501109-03.07	30153415
C 2	9501109-03.05	30152241
C 3	9501109-03.13	30152236
C 4	9501109-03.14	30153397

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GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

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FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	99988779	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350

Contact: Ms. Lori Keller

Project Description: Cecil Field/CF

cc: BECH00494

Report Date: February 08, 1995

Sample ID : Monitoring Well 3

C = Container	Lab. Container ID	Reference ID

Notes:
The qualifiers in this report are defined as follows:
J indicates presence of analyte < RL (Report Limit)
U indicates presence of analyte < DL (Detect Limit)

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Winter Seibert at (803) 769-7388.

Analytical Report Specialist

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FL	E87156/87394	E87472/87458
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	99988779	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350
Contact: Ms. Lori Keller
Project Description: Cecil Field/CF

cc: BECH00494

Report Date: February 08, 1995

Sample ID : Trip Blank
Lab ID : 9501109-04
Matrix : GroundH2O
Date Collected : 12/30/94
Date Received : 01/06/95
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M	C
Volatile Organics												
Benzene	U	0.00	1.50	2.00	ug/l	1.0	GJG	01/11/95	1447	59727	1	N
Ethylene Dibromide	U	0.00	0.0150	0.0500	ug/l	1.0	MKP	01/12/95	1420	59804	2	1

Surrogate Recovery	Test	Percent%	Acceptable Limits
n-propylbenzene	C6-GC	106.	(51.5 - 139.)
1,4-Dichlorobenzene-d4	EDB-MSV2	57.0	(11.2 - 131.)
Dibromofluoromethane	EDB-MSV2	103.	(58.8 - 128.)
Toluene-d8	EDB-MSV2	109.	(88.2 - 117.)

M = Method	Method-Description
M 1	EPA 8020
M 2	EPA 8260

C = Container	Lab. Container ID	Reference ID
C 1	9501109-04.02	30153425

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87455
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	999885779	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350

Contact: Ms. Lori Keller

Project Description: Cecil Field/CP

cc: BECH00494

Report Date: February 08, 1995

	Sample ID	: Trip Blank
C = Container	Lab. Container ID	Reference ID

Notes:
The qualifiers in this report are defined as follows:
J indicates presence of analyte < RL (Report Limit)
U indicates presence of analyte < DL (Detect Limit)

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, ster Seibert at (803) 769-7388.

Barbara A. Sigon

Analytical Report Specialist

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GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

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FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	99988779	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350
Contact: Ms. Lori Keller
Project Description: Cecil Field/CF

cc: BECH00494

Report Date: February 08, 1995

Sample ID : Trip Blank
Lab ID : 9501109-05
Matrix : GroundH2O
Date Collected : 12/27/94
Date Received : 01/06/95
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M	C
Volatile Organics												
Benzene	U	0.00	1.50	2.00	ug/l	1.0	GJG	01/11/95	1738	59727	1	N
Ethylene Dibromide	U	0.00	0.0150	0.0500	ug/l	1.0	MKP	01/12/95	1559	59804	2	1

Comments:

See Case Narrative.

Surrogate Recovery	Test	Percent%	Acceptable Limits
n-propylbenzene	C6-GC	102.	(51.5 - 139.)
1,4-Dichlorobenzene-d4	EDB-MSV2	96.8	(11.2 - 131.)
Dibromofluoromethane	EDB-MSV2	97.4	(58.8 - 128.)
Toluene-d8	EDB-MSV2	106.	(88.2 - 117.)

M = Method	Method-Description
M 1	EPA 8020
M 2	EPA 8260

C = Container	Lab. Container ID	Reference ID
C 1	9501109-05.01	30152259

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87453
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	999885779	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350

Contact: Ms. Lori Keller

Project Description: Cecil Field/CF

cc: BECH00494

Report Date: February 08, 1995

	Sample ID	: Trip Blank
C = Container	Lab. Container ID	Reference ID

Notes:
The qualifiers in this report are defined as follows:
J indicates presence of analyte < RL (Report Limit)
U indicates presence of analyte < DL (Detect Limit)

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Winter Seibert at (803) 769-7388.

Analytical Report Specialist

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GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	DEL	EPA
FL	[illegible]	[illegible]
NC	233	
SC	10120	10002
TN	2934	
VA	131	
WI	[illegible]	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, TN 37831-0350
Contact: Ms. Lori Keller

Project Description: Cecil Field/CF

cc: BECH00494 Report Date: February 8, 1995

Sample ID : Monitoring Well #1
Lab ID : 9501109-01
Matrix : GroundH2O
Date Collected : 01/05/95
Date Received : 01/06/95
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method	C
Volatile Organics												
Benzene		74.9	0.017	0.5	ug/l	1	MKP	01/12/95	1626	59804	EPA 8260	2

Comments:
This is an estimated concentration as the result was above the instrument's calibration range. Because this parameter was not requested on the initial analysis, the analyst did not re-analyze to achieve a result within range.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Winter Seibert at (803) 769-7388.

Barbara Simon
Analytical Report Specialist

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GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	Cert.	Exp.
FL	E87156/87294	6/14/95/1/95
NC	233	
SC	10120	10/95
TN	2934	
VA	151	
WI	999887719	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, TN 37831-0350
Contact: Ms. Lori Keller

Project Description: Cecil Field/CF

cc: BECH00494 Report Date: February 8, 1995

Sample ID : Monitoring Well #2
Lab ID : 9501109-02
Matrix : GroundH2O
Date Collected : 01/05/95
Date Received : 01/06/95
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M	C
Volatile Organics												
Benzene		87.1	0.085	2.5	ug/l	5	MKP	01/12/95	1817	59804	EPA 8260	2

Comments:

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Winter Seibert at (803) 769-7388.

Barbara A Sigmon
Analytical Report Specialist

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GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	99988779	

CERTIFICATE OF ANALYSIS

Rec'd 2/3/95

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350

Contact: Ms. Lori Keller

Project Description: Cecil Field/CF

cc: BECH00494

Report Date: February 02, 1995

Sample ID	: CF220033 GWT
Lab ID	: 9501265-01
Matrix	: GroundH2O
Date Collected	: 01/12/95
Date Received	: 01/13/95
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M	C
Volatile Organics												
BTEX - 4 items												
Benzene	U	~~0.00~~ <DL	1.50	2.00	ug/l	1.0	RDD	01/24/95	1608	60409	1	N
Ethylbenzene	U	0.00	1.50	2.00	ug/l	1.0						
Toluene	U	0.00	1.50	2.00	ug/l	1.0						
Xylenes (TOTAL)	U	0.00	2.00	4.00	ug/l	1.0						
Method 8010 Volatiles - 29 items												
1,1,1-Trichloroethane	U	0.00	1.50	2.00	ug/l	1.0	GJG	01/20/95	2007	59910	2	N
1,1,2,2-Tetrachloroethane	U	0.00	1.50	2.00	ug/l	1.0						
1,1,2-Trichloroethane	U	0.00	1.50	2.00	ug/l	1.0						
1,1-Dichloroethane	U	0.00	1.50	2.00	ug/l	1.0						
1,1-Dichloroethylene	U	0.00	1.50	2.00	ug/l	1.0						
1,2-Dichlorobenzene	U	0.00	1.50	2.00	ug/l	1.0						
1,2-Dichloroethane	U	0.00	1.50	2.00	ug/l	1.0						
1,2-Dichloropropane	U	0.00	1.50	2.00	ug/l	1.0						
1,2-trans-Dichloroethylene	U	0.00	1.50	2.00	ug/l	1.0						
1,3-Dichlorobenzene	U	0.00	1.50	2.00	ug/l	1.0						
1,4-Dichlorobenzene	U	0.00	1.50	2.00	ug/l	1.0						
2-Chloroethylvinyl ether	U	0.00	1.50	2.00	ug/l	1.0						
Bromoform	U	0.00	1.50	2.00	ug/l	1.0						
Carbon Tetrachloride	U	0.00	1.50	2.00	ug/l	1.0						
Chlorobenzene	U	0.00	1.50	2.00	ug/l	1.0						
Chlorodibromomethane	U	0.00	1.50	2.00	ug/l	1.0						
Chloroethane	U	0.00	1.50	2.00	ug/l	1.0						
Chloroform	U	0.00	1.50	2.00	ug/l	1.0						
Dichlorobromomethane	U	0.00	1.50	2.00	ug/l	1.0						
Dichlorodifluoromethane	U	0.00	2.00	2.00	ug/l	1.0						
Methyl Bromide	U	0.00	1.50	2.00	ug/l	1.0						
Methyl Chloride	U	0.00	1.50	2.00	ug/l	1.0						

Report no values less than DL

GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	99988779	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350

Contact: Ms. Lori Keller

Project Description: Cecil Field/CF

cc: BECH00494

Report Date: February 02, 1995

Sample ID : CF220033 GWT

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M	C
Methylene Chloride	U	0.00	1.50	5.00	ug/l	1.0						
Tetrachloroethylene	U	0.00	1.50	2.00	ug/l	1.0	GJG	01/20/95	2007	59910	2	N
Trichloroethylene	U	0.00	1.50	2.00	ug/l	1.0						
Trichlorofluoromethane	U	0.00	1.50	2.00	ug/l	1.0						
Vinyl chloride	U	0.00	1.50	2.00	ug/l	1.0						
cis-1,3-Dichloropropylene	U	0.00	1.50	2.00	ug/l	1.0						
trans-1,3-Dichloropropylene	U	0.00	1.50	2.00	ug/l	1.0						
Methyl Tert Butyl Ether	U	0.00	5.00	50.0	ug/l	1.0	RDD	01/24/95	1608	60409	1	N
Ethylene Dibromide	U	0.00	0.0150	0.0500	ug/l	1.0	JGS	01/23/95	1505	60293	3	N
Extractable Organics												
Polynuclear Aromatic Hydrocarbons - 18 items												
1-Methylnaphthalene	U	0.00	0.0100	20.0	ug/l	1.0	JCB	01/28/95	1616	59982	4	1
2-Methylnaphthalene	U	0.00	1.54	20.0	ug/l	1.0						
Acenaphthene	U	0.00	1.57	20.0	ug/l	1.0						
Acenaphthylene	U	0.00	1.68	20.0	ug/l	1.0						
Anthracene	U	0.00	1.71	20.0	ug/l	1.0						
Benzo(a)anthracene	U	0.00	2.15	20.0	ug/l	1.0						
Benzo(a)pyrene	U	0.00	1.42	20.0	ug/l	1.0						
Benzo(b)fluoranthene	U	0.00	1.40	20.0	ug/l	1.0						
Benzo(ghi)perylene	U	0.00	1.27	20.0	ug/l	1.0						
Benzo(k)fluoranthene	U	0.00	0.870	20.0	ug/l	1.0						
Chrysene	U	0.00	0.950	20.0	ug/l	1.0						
Dibenzo(a,h)anthracene	U	0.00	1.19	20.0	ug/l	1.0						
Fluoranthene	U	0.00	1.02	20.0	ug/l	1.0						
Fluorene	U	0.00	1.91	20.0	ug/l	1.0						
Indeno(1,2,3-c,d)pyrene	U	0.00	0.890	20.0	ug/l	1.0						
Naphthalene	U	0.00	1.78	20.0	ug/l	1.0						
Phenanthrene	U	0.00	1.72	20.0	ug/l	1.0						
Pyrene	U	0.00	1.17	20.0	ug/l	1.0						
Metals Analysis												
Lead		72.5	4.00	5.00	ug/l	2.0	RMJ	01/26/95	1337	60277	5	2
General Chemistry												
Total Rec. Petro. Hydrocarbons	U	0.0700	1.00	1.00	mg/l	1.0	DAG2	01/20/95	1600	60304	6	N

22567-22-SC-001-0026-001-01

GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	999885779	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350
Contact: Ms. Lori Keller
Project Description: Cecil Field/CF

cc: BECH00494 Report Date: February 02, 1995

Sample ID : CF220033 GWT

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M	C

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	JPB	01/17/95	1500	59982	7
Graphite Furnace	FGD	01/23/95	1530	60277	8

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610-BECH	88.0	(51.0 - 114.)
Nitrobenzene-d5	M610-BECH	80.0	(35.0 - 114.)
p-Terphenyl-d14	M610-BECH	60.0	(33.0 - 141.)
n-propylbenzene	BTEX-GC	106.	(54.6 - 140.)
2,2-Dichloropropane	M8010	85.3	(-1240 - 1810) ?
n-propylbenzene	MTBE-GC	106.	(54.6 - 140.)
1,4-Dichlorobenzene-d4	EDB-MSV2	61.0	(-1.64 - 150.) ?
Dibromofluoromethane	EDB-MSV2	91.8	(69.9 - 116.)
Toluene-d8	EDB-MSV2	101.	(82.8 - 126.)

M = Method	Method-Description
M 1	EPA 8020
M 2	EPA 8010
M 3	EPA 8260
M 4	EPA 8270
M 5	EPA 7421
M 6	EPA 418.1
M 7	EPA 3500/3520
M 8	EPA 3020

C = Container	Lab. Container ID	Reference ID
C 1	9501265-01.11	CF22003304
C 2	9501265-01.10	CF22003305

22567-232-SC-001-0026-001-01

GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	99988779	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350

Contact: Ms. Lori Keller

Project Description: Cecil Field/CF

cc: BECH00494

Report Date: February 02, 1995

Sample ID : CF220033 GWT

C = Container	Lab. Container ID	Reference ID

Notes:
The qualifiers in this report are defined as follows:
J indicates presence of analyte < RL (Report Limit)
U indicates presence of analyte < DL (Detect Limit)

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Winter Seibert at (803) 769-7388.

Barbara A. Signor
Analytical Report Specialist

22567-223-SC-001-0026-001-01

GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	99988779	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350
Contact: Ms. Lori Keller
Project Description: Cecil Field/CF

cc: BECH00494 Report Date: February 02, 1995

Sample ID : CF220034 GWT
Lab ID : 9501265-02
Matrix : GroundH2O
Date Collected : 01/12/95
Date Received : 01/13/95
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M	C
Volatile Organics												
BTEX - 4 items												
Benzene	U	0.00	1.50	2.00	ug/l	1.0	RDD	01/24/95	1850	60409	1	N
Ethylbenzene	U	0.00	1.50	2.00	ug/l	1.0						
Toluene	U	0.00	1.50	2.00	ug/l	1.0						
Xylenes (TOTAL)	U	0.00	2.00	4.00	ug/l	1.0						
Method 8010 Volatiles - 29 items												
1,1,1-Trichloroethane	U	0.00	1.50	2.00	ug/l	1.0	GJG	01/20/95	1914	59910	2	N
1,1,2,2-Tetrachloroethane	U	0.00	1.50	2.00	ug/l	1.0						
1,1,2-Trichloroethane	U	0.00	1.50	2.00	ug/l	1.0						
1,1-Dichloroethane	U	0.00	1.50	2.00	ug/l	1.0						
1,1-Dichloroethylene	U	0.00	1.50	2.00	ug/l	1.0						
1,2-Dichlorobenzene	U	0.00	1.50	2.00	ug/l	1.0						
1,2-Dichloroethane	U	0.00	1.50	2.00	ug/l	1.0						
1,2-Dichloropropane	U	0.00	1.50	2.00	ug/l	1.0						
1,2-trans-Dichloroethylene	U	0.00	1.50	2.00	ug/l	1.0						
1,3-Dichlorobenzene	U	0.00	1.50	2.00	ug/l	1.0						
1,4-Dichlorobenzene	U	0.00	1.50	2.00	ug/l	1.0						
2-Chloroethylvinyl ether	U	0.00	1.50	2.00	ug/l	1.0						
Bromoform	U	0.00	1.50	2.00	ug/l	1.0						
Carbon Tetrachloride	U	0.00	1.50	2.00	ug/l	1.0						
Chlorobenzene	U	0.00	1.50	2.00	ug/l	1.0						
Chlorodibromomethane	U	0.00	1.50	2.00	ug/l	1.0						
Chloroethane	U	0.00	1.50	2.00	ug/l	1.0						
Chloroform	U	0.00	1.50	2.00	ug/l	1.0						
Dichlorobromomethane	U	0.00	1.50	2.00	ug/l	1.0						
Dichlorodifluoromethane	U	0.00	2.00	2.00	ug/l	1.0						
Methyl Bromide	U	0.00	1.50	2.00	ug/l	1.0						
Methyl Chloride	U	0.00	1.50	2.00	ug/l	1.0						

GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87453
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	99988779	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350
Contact: Ms. Lori Keller
Project Description: Cecil Field/CF

cc: BECH00494 Report Date: February 02, 1995

Sample ID : CF220034 GWT

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M	C
Methylene Chloride	U	0.00	1.50	5.00	ug/l	1.0						
Tetrachloroethylene	U	0.00	1.50	2.00	ug/l	1.0	GJG	01/20/95	1914	59910	2	N
Trichloroethylene	U	0.00	1.50	2.00	ug/l	1.0						
Trichlorofluoromethane	U	0.00	1.50	2.00	ug/l	1.0						
Vinyl chloride	U	0.00	1.50	2.00	ug/l	1.0						
cis-1,3-Dichloropropylene	U	0.00	1.50	2.00	ug/l	1.0						
trans-1,3-Dichloropropylene	U	0.00	1.50	2.00	ug/l	1.0						
Methyl Tert Butyl Ether	U	0.00	5.00	50.0	ug/l	1.0	RDD	01/24/95	1850	60409	1	N
Ethylene Dibromide	U	0.00	0.0150	0.0500	ug/l	1.0	JGS	01/23/95	1738	60293	3	N
Extractable Organics												
Polynuclear Aromatic Hydrocarbons - 18 items												
1-Methylnaphthalene	U	0.00	0.0100	20.0	ug/l	1.0	JCB	01/28/95	1756	59982	4	1
2-Methylnaphthalene	U	0.00	1.54	20.0	ug/l	1.0						
Acenaphthene	U	0.00	1.57	20.0	ug/l	1.0						
Acenaphthylene	U	0.00	1.68	20.0	ug/l	1.0						
Anthracene	U	0.00	1.71	20.0	ug/l	1.0						
Benzo(a)anthracene	U	0.00	2.15	20.0	ug/l	1.0						
Benzo(a)pyrene	U	0.00	1.42	20.0	ug/l	1.0						
Benzo(b)fluoranthene	U	0.00	1.40	20.0	ug/l	1.0						
Benzo(ghi)perylene	U	0.00	1.27	20.0	ug/l	1.0						
Benzo(k)fluoranthene	U	0.00	0.870	20.0	ug/l	1.0						
Chrysene	U	0.00	0.950	20.0	ug/l	1.0						
Dibenzo(a,h)anthracene	U	0.00	1.19	20.0	ug/l	1.0						
Fluoranthene	U	0.00	1.02	20.0	ug/l	1.0						
Fluorene	U	0.00	1.91	20.0	ug/l	1.0						
Indeno(1,2,3-c,d)pyrene	U	0.00	0.890	20.0	ug/l	1.0						
Naphthalene	U	0.00	1.78	20.0	ug/l	1.0						
Phenanthrene	U	0.00	1.72	20.0	ug/l	1.0						
Pyrene	U	0.00	1.17	20.0	ug/l	1.0						
Metals Analysis												
Lead		20.6	2.00	5.00	ug/l	1.0	RMJ	01/26/95	1236	60277	5	2
General Chemistry												
Total Rec. Petro. Hydrocarbons	U	0.0140	1.00	1.00	mg/l	1.0	DAG2	01/20/95	1600	60304	6	N

22567-222-SC-001-0026-001-01

GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	99988779	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350
Contact: Ms. Lori Keller
Project Description: Cecil Field/CF

cc: BECH00494 Report Date: February 02, 1995

Sample ID : CF220034 GWT

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M	C

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	JPB	01/17/95	1500	59982	7
Graphite Furnace	FGD	01/23/95	1530	60277	8

Surrogate Recovery	Test	Percent%	Acceptable Limits	
2-Fluorobiphenyl	M610-BECH	82.0	(51.0 - 114.)	
Nitrobenzene-d5	M610-BECH	72.0	(35.0 - 114.)	
p-Terphenyl-d14	M610-BECH	54.0	(33.0 - 141.)	
n-propylbenzene	BTEX-GC	106.	(54.6 - 140.)	?
2,2-Dichloropropane	M8010	91.3	(-1240 - 1810)	
n-propylbenzene	MTBE-GC	106.	(54.6 - 140.)	?
1,4-Dichlorobenzene-d4	EDB-MSV2	83.2	(-1.64 - 150.)	
Dibromofluoromethane	EDB-MSV2	93.0	(69.9 - 116.)	
Toluene-d8	EDB-MSV2	102.	(82.8 - 126.)	

M = Method	Method-Description
M 1	EPA 8020
M 2	EPA 8010
M 3	EPA 8260
M 4	EPA 8270
M 5	EPA 7421
M 6	EPA 418.1
M 7	EPA 3500/3520
M 8	EPA 3020

C = Container	Lab. Container ID	Reference ID
C 1	9501265-02.14	CF22003401
C 2	9501265-02.10	CF22003405

GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87453
NC	233	
SC	10120	10532
TN	02934	
VA	00151	
WI	99988779	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350

Contact: Ms. Lori Keller

Project Description: Cecil Field/CF

cc: BECH00494

Report Date: February 02, 1995

Sample ID : CF220034 GWT

C = Container	Lab. Container ID	Reference ID

Notes:
The qualifiers in this report are defined as follows:
J indicates presence of analyte < RL (Report Limit)
U indicates presence of analyte < DL (Detect Limit)

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Winter Seibert at (803) 769-7388.

Barbara A. Sigmon

Analytical Report Specialist

22567-223-SC-001-0026-001-01

GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	99988779	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350
Contact: Ms. Lori Keller
Project Description: Cecil Field/CF

cc: BECH00494 Report Date: February 02, 1995

Sample ID : CF220035 GWT
Lab ID : 9501265-03
Matrix : GroundH2O
Date Collected : 01/09/95
Date Received : 01/13/95
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M	C
Volatile Organics												
Benzene	U	0.00	1.50	2.00	ug/l	1.0	GJG	01/20/95	1634	59910	1	N
Ethylene Dibromide	U	0.00	0.0150	0.0500	ug/l	1.0	JGS	01/23/95	1708	60293	2	N

Surrogate Recovery	Test	Percent%	Acceptable Limits
n-propylbenzene	C6-GC	91.0	(54.6 - 140.)
1,4-Dichlorobenzene-d4	EDB-MSV2	36.0	(-1.64 - 150.) ? incorrect limits
Dibromofluoromethane	EDB-MSV2	90.2	(69.9 - 116.)
Toluene-d8	EDB-MSV2	98.6	(82.8 - 126.)

M = Method	Method-Description
M 1	EPA 8020
M 2	EPA 8260

Notes:
The qualifiers in this report are defined as follows:
J indicates presence of analyte < RL (Report Limit)
U indicates presence of analyte < DL (Detect Limit)

GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	
VA	00151	
WI	99988779	

CERTIFICATE OF ANALYSIS

Client: Bechtel
PO Box 350
Oak Ridge, Tennessee 37831-0350
Contact: Ms. Lori Keller
Project Description: Cecil Field/CF

cc: BECH00494 Report Date: February 02, 1995

Sample ID : CF220035 GWT

M = Method	Method-Description

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Winter Seibert at (803) 769-7388.

Analytical Report Specialist

APPENDIX E:
Monitoring well purging results

GROUNDWATER FIELD DATA LOG

PROJECT INFORMATION

Project & Task #: 22561 WELL DEVELOPMENT F-18 CASA SITE Date: 1-5-95

GENERAL INFO			WATER LEVEL		PURGING INFORMATION						FIELD MEASUREMENTS			
Seq #	Sample Location	Sample Time	Tal Well Dpth (ft)	Depth to Water (ft)	Water Col. Height (ft)	Well Dia. (ft)	Purge Vol. (Gal)[1]	Purge Time Begin	Purge Time End	Gallons Removed[2]	pH (Std Units)	Cond. (uS/cm)	Temp. (°C/F)	DO (mg/L, ppm)
	PZ001		2'-7"	14'-4"	10'-3"	2"	8.4	10:06		3 GAL	6.89	163.1	19.2	
								10:12		3 GAL	7.02	111.6	19.4	
								10:21		3 GAL	7.06	85.6	19.5	
								10:29		3 GAL	7.13	71.1	19.4	
								10:43		3 GAL	7.15	72.6	19.5	
								10:55		3 GAL	7.22	72.2	19.6	
	CEF-CSI-1		2'-0"	13'-9"	6'-3"	2"	5.12	11:00		4 GAL	7.26	172.2	19.2	
								11:10		4 GAL	7.32	146.0	19.0	
								11:21		4 GAL	7.44	172.6	18.6	
								11:29		4 GAL	7.40	167.2	21.2	
								11:35		4 GAL	7.31	142.6	18.9	
								11:45		4 GAL	7.30	155.1	20.0	

[1]Denotes calculated 5 volumes based on the formula $\pi r^2 h$.

[2]Actual volume of water removed by purging method.

Comments (weather, etc.):

Sample Collection Sequence Followed. (1) VOCs, (2) Extr. Organics, (3) Total Metals, (4) Diss. Metals, (5) Microbiology, (6) Inorganics, (7) Radionuclides? Y or N If no, why?

Fuel Powered Units? Y or N If ss, where?

Purging Eqpt:	Sampling Eqpt:	pH Meter:	Cond. Meter:	Temp:	DO Meter:

SIGNATURES (Signed/Initials)

Recorded By: E.J. Napolitano Date: 1-5-95 Purged/Sampled By: T. Rowtree Date: 1-5-95

Reviewed By: Date: Reviewed By (optional): Date:

GROUNDWATER FIELD DATA LOG

PROJECT INFORMATION

Project & Task #: 22567 GROUNDWATER SAMPLING F-18 CRASH SITE Date: 1-12-95

GENERAL INFO			WATER LEVEL		PURGING INFORMATION						FIELD MEASUREMENTS			
Seq #	Sample Location	Sample Time	Total Well Depth (ft)	Depth to Water (ft)	Water Col. Height (ft)	Well Dia. (ft)	Purge Vol. (Gal)[1]	Purge Time Begin	Purge Time End	Gallons Removed[2]	pH (Std. Units)	Cond. (µS/cm)	Temp. (°C/°F)	DO (mg/L, ppm)
	PZ 003		25'-0"	16'-0"	9'-0"	2"	1.47	10:30		2.1 GAL				
								10:35		2.1 GAL				
								10:40		2.1 GAL				
								10:44		2.1 GAL				
								10:50		2.1 GAL				
	PZ002		23'-0"	9'-10"	1'-2"	2"	2.16	11:30		2.1 GAL				
								11:34		2.1 GAL				
								11:41		2.1 GAL				
								11:45		2.1 GAL				
								11:49		2.1 GAL				

THIS DATA NOT REQUIRED 5 WELL VOLUMES EXTRACTED PER F.S.O.P. A.2.5.1.E.2 ATTACHED

[1]Denotes calculated 5 volumes based on the formula $\pi r^2 h$.

[2]Actual volume of water removed by purging method.

Comments (weather, etc.):

Sample Collection Sequence Followed: (1) VOCs, (2) Extr. Organics, (3) Total Metals, (4) Diss. Metals, (5) Microbiology, (6) Inorganics, (7) Radionuclides? Y or N If no, why?

Fuel Powered Units? Y or N If yes, where?

Purging Eqpt: Sampling Eqpt: pH Meter: Cond. Meter: Temp: DO Meter:

SIGNATURES (Signed Initials)

Recorded By: RJ Mazurola Date: 1-12-95 Purged/Sampled By: T. Rountree Date: 1-12-95

Reviewed By: Date: Reviewed By (optional): Date:

Appendix F:
Data Assessment Summary

CECIL FIELD CRASH SITE GROUNDWATER MONITORING DATA ASSESSMENT

INTRODUCTION

This is a summary of the analytical results from the Cecil Field Crash Site groundwater monitoring activities. Table 1 includes a listing of all samples collected, the location of the sample, the sample type, matrix, and a brief description of the sample. All of this data was submitted from General Engineering Laboratory in two data packages.

A cursory review of the analytical data was performed. This review was not a validation of the data. This review involved the examination of holding times, surrogate and internal standard recoveries (where applicable), and method blanks. To a limited extent, laboratory control samples and matrix spike analyses were also examined. This information was taken from summary forms provided in the data packages. Raw data were not included in the data package and were therefore not reviewed.

DATA REPORTING

Sample results are presented on a certificate of analysis. This certificate presents the Bechtel sample ID, the laboratory sample ID, the sample matrix, the date of sample collection, and the date the sample was received by the laboratory. The analytical results are presented by parameter. The result field is the actual value reported for the compound from the analytical measurement process. The "DL", or detection limit, is the minimum concentration of a substance that can be identified, measured, and reported with 99% confidence that the analyte concentration is above zero. Sample specific preparation and dilution factors are applied to these limits. The "RL", or reporting limit, is the lowest level at which a chemical may be accurately and reproducibly quantitated. Sample specific preparation and dilution factors are also incorporated in this value. Any result which is less than the DL is considered a non-detected compound and is qualified with a "U". Values detected greater than the DL, but less than the RL, are considered detected, but estimated and will be accompanied by a "J" laboratory qualifier. Values detected above the RL are considered detects. The "DF" indicates the dilution factor for the sample result.

ANALYTICAL RESULTS

Volatile Organic Compounds

All samples were analyzed within the recommended 14 day SW-846 holding time for preserved liquids. Samples MW001 and MW002 were diluted due to matrix interferences. As a result of these dilutions, surrogates were diluted out of the

sample. Benzene results for samples MW001 and MW002 were reported by method 8260 and 8020. The results from the 8260 analyses were used because there were no dilutions on the samples and the required detection limit was achieved.

Polynuclear Aromatic Hydrocarbons (PAH)

All samples for PAH analysis were extracted and analyzed within the recommended holding time. MW001 and MW002 were diluted due to matrix interferences. This dilution caused the surrogates to be diluted out of the sample.

Metals

All samples were prepared and analyzed within the proper holding times. Duplicate precision was poor for the original analysis. The samples were re-digested and re-analyzed and the relative percent difference (RPD) between the sample and the duplicate was still 21% suggesting that the samples were not homogeneous.

Wet Chemistry

All samples were analyzed within the recommended holding time. No problems were encountered in the analyses of Total Recoverable Petroleum Hydrocarbons.

TABLE 1

Sample ID	Location	Sample Type/Matrix	Description
MW001	CEF-CS1-1	ENV / GWT	Environmental Groundwater
MW002	PZ001	ENV / GWT	Environmental Groundwater
MW003	CEF-CS1-1 Duplicate	ENV / GWT	Environmental Groundwater
Trip Blank		TPB / OFW	Trip Blank - Organic Free Water
CF220033	PZ002	ENV / GWT	Environmental Groundwater
CF220034	PZ003	ENV / GWT	Environmental Groundwater
CF22035		TPB / OFW	Trip Blank - Organic Free Water