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31 May 1994

Mr. James Colter
Northern Division
Environmental Division (Code 1821/JC)
Naval Facilities Engineering Command
10 Industrial Highway, Mail Stop No. 82
Lester, Pennsylvania 19113-2090

Attn: Jim Colter

RE: Contract No. N62472-92-D-1296; CTO No. 0023
Pre-Design Sampling and Analysis of Soil Piles at NAS Willow Grove

Dear Mr. Colter:

Under Contract No. N62472-92-D-1296, Northern Division, Naval Facilities Engineering Command, issued Contract Task Order (CTO) No. 0023 for pre-design sampling and analysis of soil piles at the Navy Fuel Farm at Naval Air Station (NAS), Willow Grove, Pennsylvania, to EA Engineering, Science, and Technology. This letter report is prepared as specified by the Implementation Plan dated 23 March 1994.

The objective of this project was to sample the soil piles and compare the analytical results with PADER interim (December 1993) guidance for contaminated soil. Based on these results, a remedial alternative will be selected and an action memorandum will be prepared.

The Navy Fuel Farm is located along the north side of Privet Road, immediately south of the Air National Guard Facility. From 1950 to 1991, two partially buried 210,000-gal JP-4/JP-5 aviation fuel tanks were located at the site. In 1991, the storage tanks were removed. Based on visual inspection, soil and concrete excavated during the tank removal were segregated into three stockpiles: "contaminated" soil, "clean" soil, and "contaminated" concrete (Figure 1). Approximately 3500 yd^3 of soil were categorized as "contaminated" (Pile A) and 3,000 yd^3 "clean" (Piles B+C). Approximately 240 yd^3 of petroleum-impacted soil has been added to the "clean" stockpile since 1991 (Piles D+E). In addition, approximately 250 yd^3 of concrete were considered to be "contaminated." No sampling or analysis of the "contaminated" soil pile or the concrete pile was

conducted. Four soil samples were collected from the "clean" pile in December 1992 and analyzed for TPH as JP-4 by EPA Method 8015 modified. Results ranged from not detectable to 76 mg/kg.

METHODS

The five soil piles and one concrete pile were sampled on 25-30 April 1994. The soil piles were divided into grids of approximately 250 yd^3 and two to five hand auger borings were advanced into each grid (Figures 2-10). Soil was then collected at intervals for each boring and screened for Volatile Organic Compounds (VOC) using a photo-ionization detector (PID). A sample of the soil was placed in a clean jar, capped, and shaken to induce volatilization. The PID was then used to measure the VOC concentration in the headspace of the jar. For each grid, five soil samples were collected. Typically, one sample was collected from the top 2 ft of the pile, and a second sample was collected from the center of the pile. A third, fourth, and fifth sample were collected, one each with a high, moderate, and low headspace concentration. In some instances subsurface obstructions were encountered and the borehole was offset or terminated at that depth, depending on how far it had been advanced. Table 1 summarizes the PID measurements and sample depths for each grid. Attachment A contains the soil boring logs.

The samples were then placed on ice and shipped under chain-of-custody to GP Environmental Services of Gaithersburg, MD where the samples were composited and analyzed for BTEX and TPH. The auger was cleaned with Alconox and a brush, and rinsed with deionized water between sampling grids. Rinsate blanks were collected by pouring deionized water over the auger and into the sample container. Field blanks were collected by pouring the deionized water directly into the sample container in the field. Deionized water was purchased from a local convenience store.

Twenty-eight soil samples were analyzed for Total Petroleum Hydrocarbons (TPH) (modified Method 8015) and benzene, toluene, ethylbenzene, xylene (BTEX), acetone, methylene chloride, and methyl-ethyl-ketone(MEK) by Method 8240. In addition three duplicates, three equipment rinsate blanks, and 4 trip blanks were collected and analyzed. Attachment B contains the laboratory reports.

Approximately 250 yd^3 of potentially contaminated concrete were also sampled. These samples were collected by pulverizing five pieces of concrete and submitting them to the laboratory where they were composited. The concrete was analyzed for total and TCLP-metals (Method 6010), BTEX, acetone, methylene chloride, and MEK (Method 8240), Total Organic Halogens (TOX) (Method 9020), TPH (modified Method 8015), PCB (Method 8080), and corrosivity (EPA Method 9040). The purpose of these analyses was to characterize the concrete as hazardous or non-hazardous with regard to waste disposal regulations.

RESULTS

Analytical results for the soil samples are presented in Table 2. Total BTEX concentrations were all below the laboratory detection limit except for grid 23 of soil pile A, which was 8.81 μg/kg. TPH as JP-4, acetone, and MEK were below laboratory detection limits for all of the soil samples. Concentrations of acetone were detected in the field and rinsate blanks at 52-123 μg/L. MEK was detected in the blanks for the 25 and 26 of April 1994 but was not detected in any of the soil samples.

Methylene chloride was detected in samples from all of the piles at low concentrations. Methylene chloride is sometimes considered to be a laboratory contaminant but is not found at detectable levels in 3 of the 4 trip blanks. All of the methylene chloride concentrations are below the 50 μg/kg guideline set by PADER. Table 3 summarizes the PADER interim guidelines for contaminated soil. All soil samples were below these levels.

Results of the concrete analysis are presented in Table 4. The concrete sample was below the laboratory detection limit for TPH, BTEX, acetone, and MEK. Methylene chloride was detectable in small amounts, 6.09 μg/kg (0.006 mg/kg). As shown in Table 4, all results are below the PADER interim guidance level or the TCLP regulatory limit, whichever is appropriate.

Sincerely,

Carl Reitenbach
CTO Manager

Charles W. Houlik, Ph.D., CPG
Program Manager

cc: D. Rule, Code 0223 (w/o encl.)
R. Boucher, Code 1832 (w/o encl.)
F:\2960023\3411\COLTER.LTR

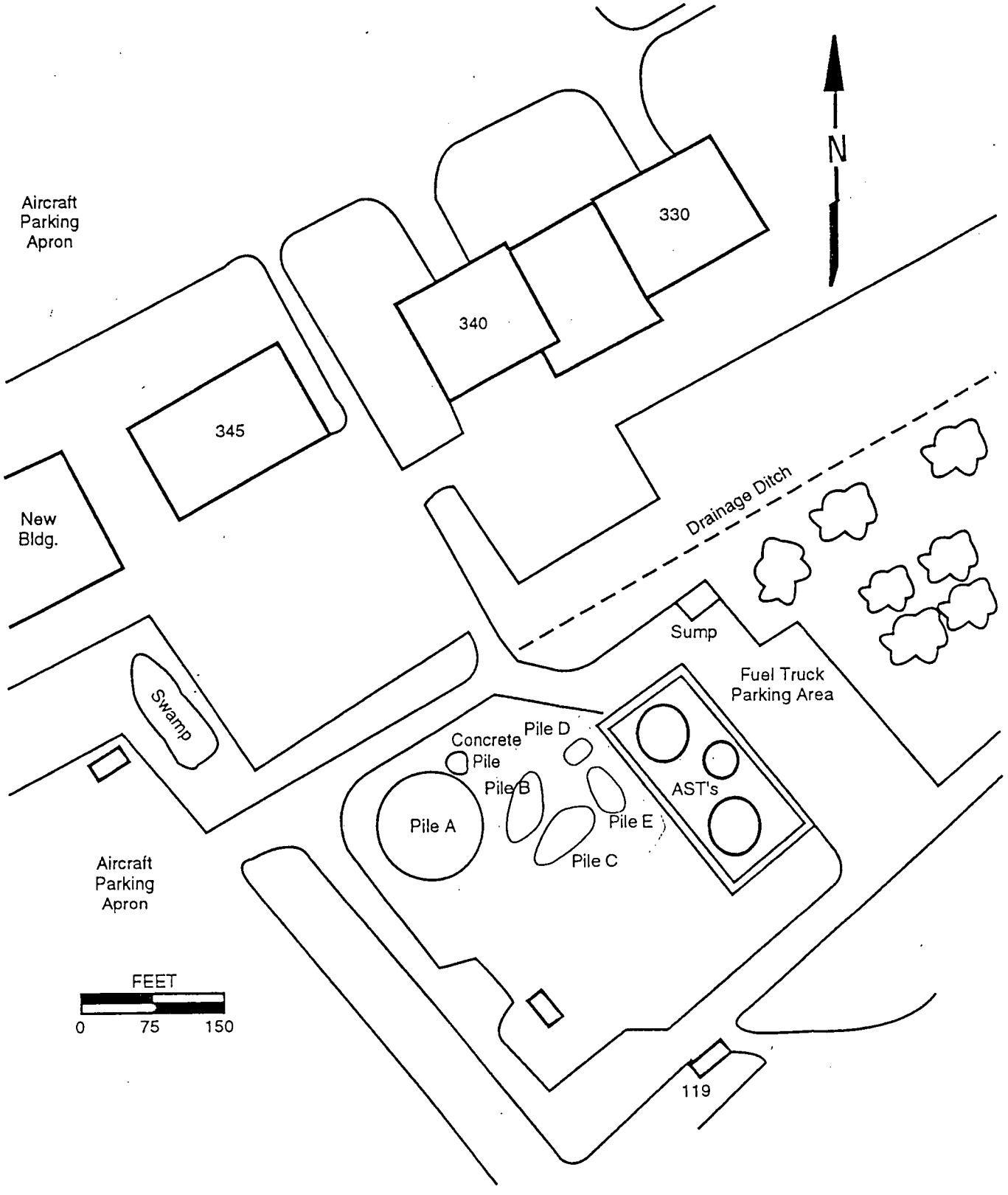
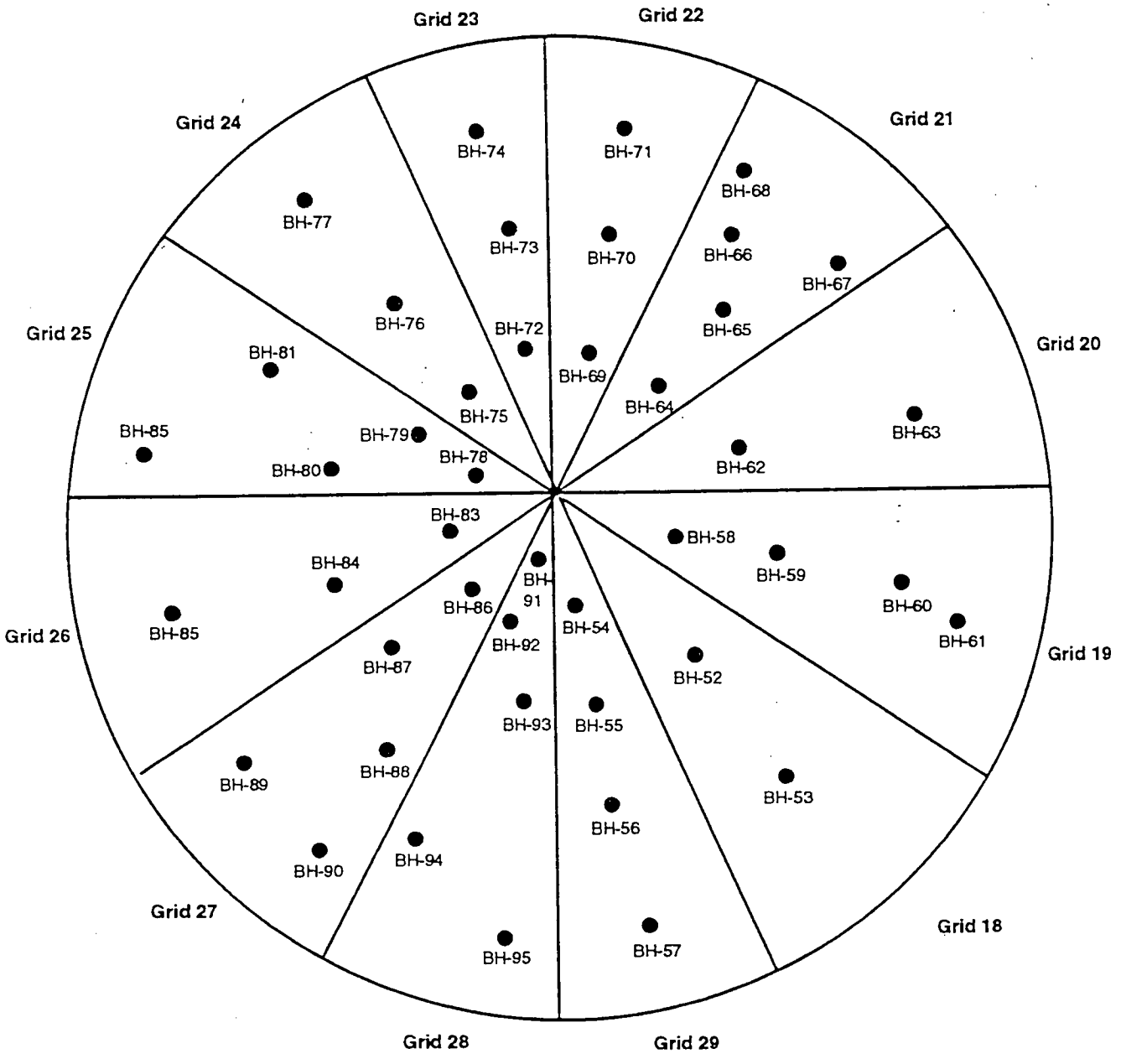
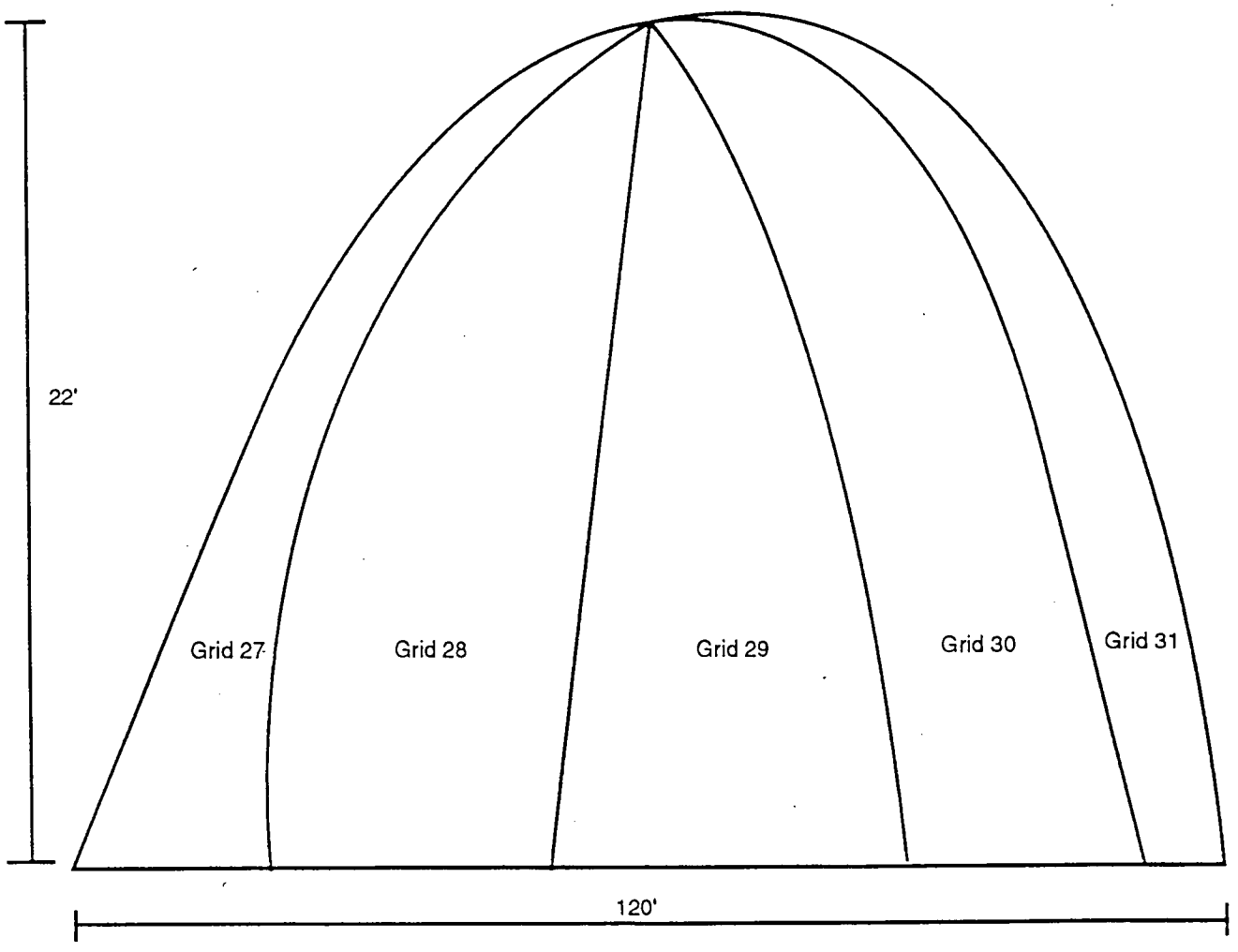


Figure 1. Site map depicting approximate location of soil stockpiles, Navy Fuel Farm at NAS Willow Grove, Horsham Township, PA.



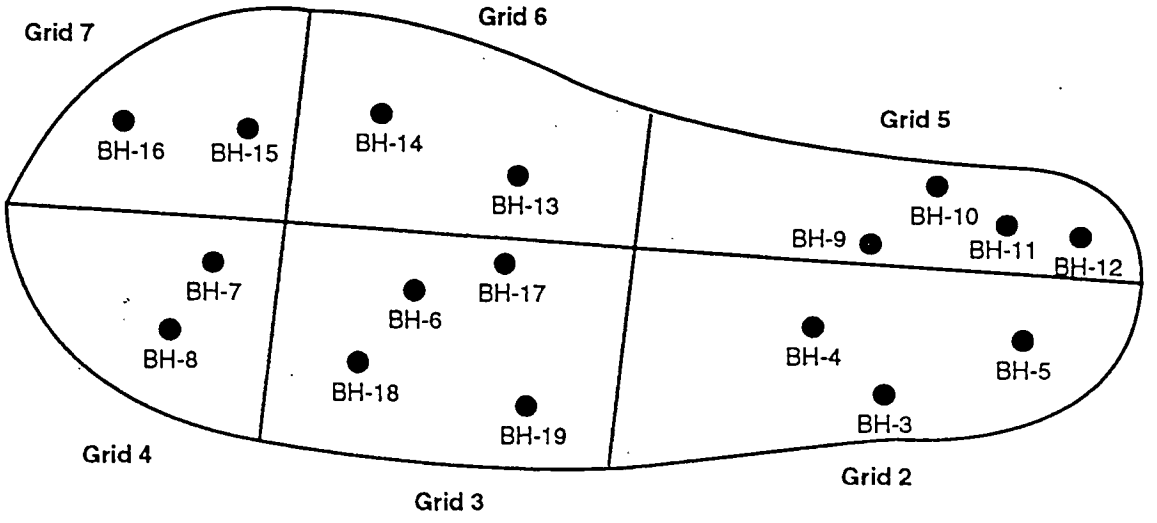
Not to scale.

Figure 2. Plan view of Soil Pile A depicting borehole and grid locations, Navy Fuel Farm at NAS Willow Grove, Horsham Township,PA.



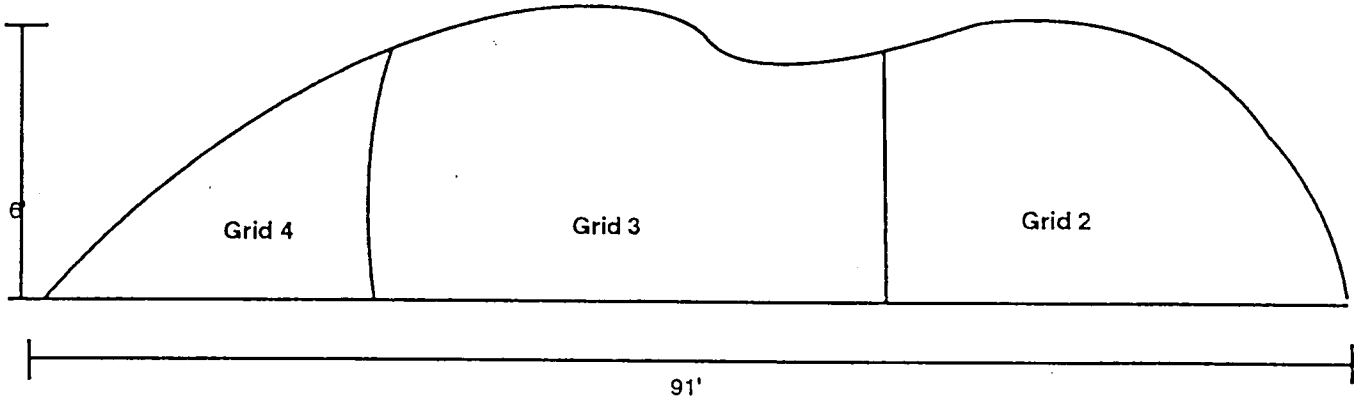
Not to scale.

Figure 3. Elevation view of Soil Pile A depicting grid locations, Navy Fuel Farm at NAS Willow Grove, Horsham Township, PA.



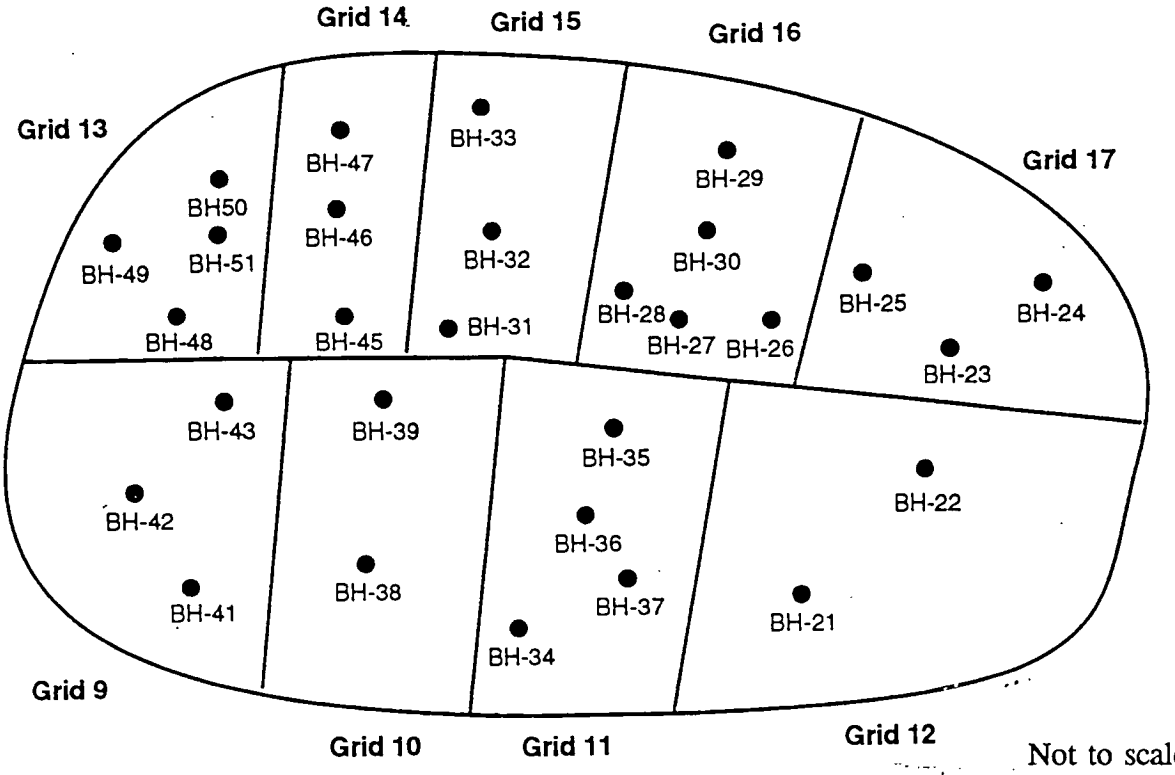
Not to scale.

Figure 4. Plan view of Soil Pile B depicting sample and grid locations, Navy Fuel Farm at NAS Willow Grove, Horsham Township, PA.



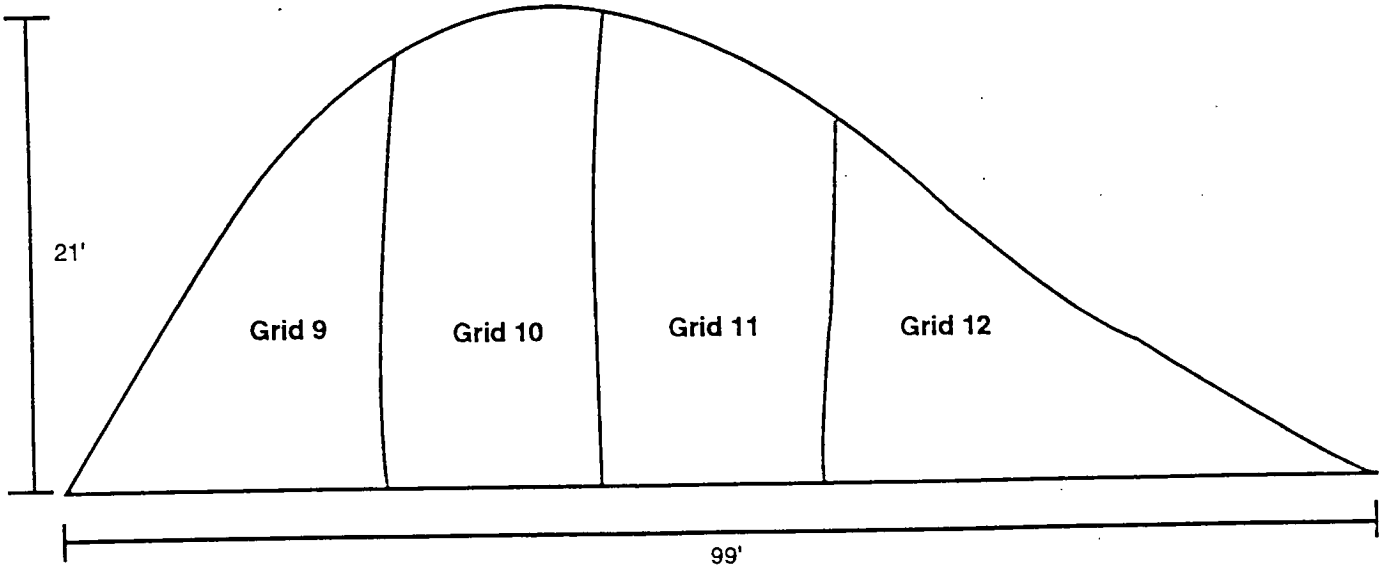
Not to scale.

Figure 5. Elevation view of Soil Pile B depicting grid locations, Navy Fuel Farm at NAS Willow Grove, Horsham Township, PA.



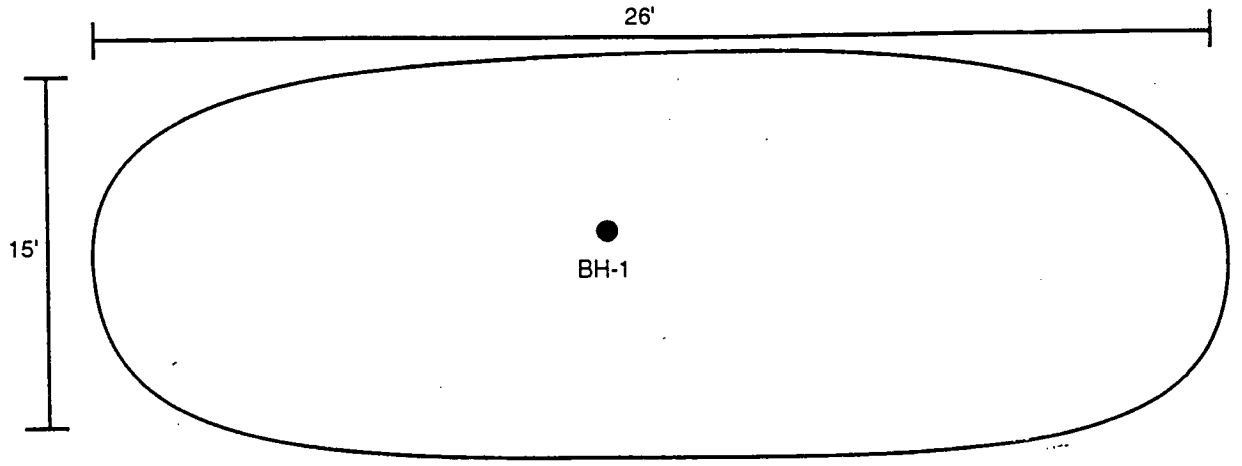
Not to scale.

Figure 6. Plan View of Soil Pile C depicting sample and grid locations, Navy Fuel Farm at NAS Willow Grove, Horsham Township, PA.



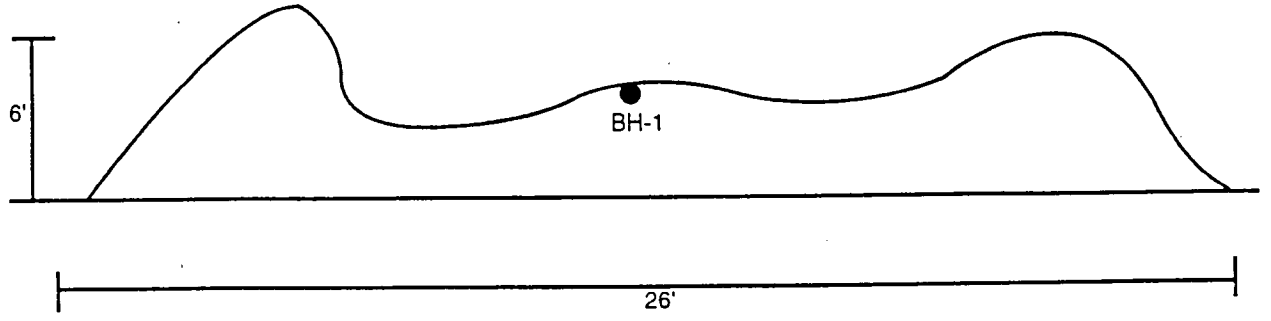
Not to scale.

Figure 7. Elevation view of Soil Pile C depicting grid locations, Navy Fuel Farm at NAS Willow Grove, Horsham Township, PA.



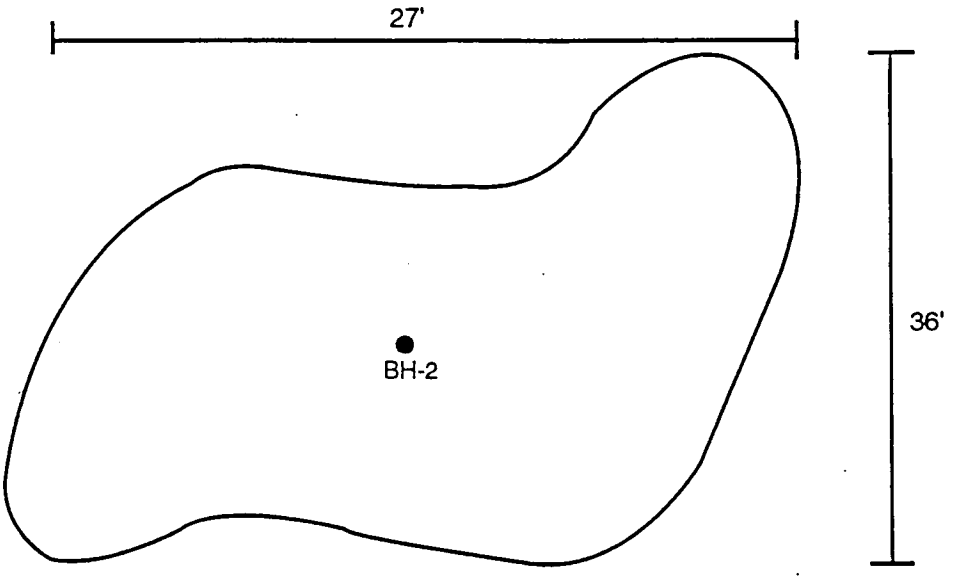
Not to scale.

Figure 8. Plan view of Soil Pile D depicting borehole and grid locations, Navy Fuel Farm at NAS Willow Grove, Horsham Township,PA.



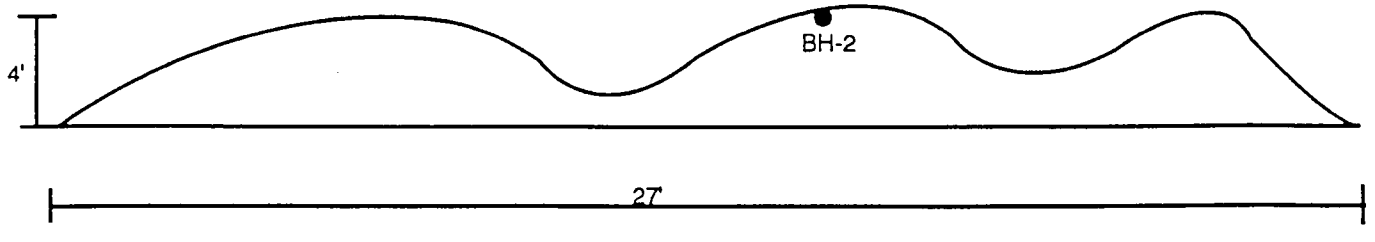
Not to scale.

Figure 9. Elevation view of Soil Pile D depicting grid locations, Navy Fuel Farm at NAS Willow Grove, Horsham Township, PA.



Not to scale.

Figure 10. Plan view of Soil Pile E depicting sample and grid locations, Navy Fuel Farm at NAS Willow Grove, Horsham Township, PA.



Not to scale.

Figure 11. Elevation view of Soil Pile E depicting grid locations, Navy Fuel Farm at NAS Willow Grove, Horsham Township, PA.

TABLE 1 SUMMARY OF SOIL BORINGS CONDUCTED AND SAMPLES COLLECTED AT NAS WILLOW GROVE, 25-30 APRIL 1994

Pile Name	Grid No.	No. of Bore Holes/Grid	Bore Hole No.	Depth of Bore Hole (ft)	Samples/Bore Hole	Sample No.	PID PPM	Depth (ft)
E	1	2	BH-01	6	3	BH1A42594	4.8	1
E	1					BH1B42594	18.6	2
E	1					BH1C42594	>100	4
D	1		BH-02	4	2	BH2A42594	20.6	1
D	1					BH2B42594	18	4
B	2	3	BH-03	4	2	BH3A42694	0	1
B						BH3B42694	0	3.5
B	2		BH-04	4	1	BH4A42694	0	4
B	2		BH-05	3	2	BH5A42694	0	1
						BH5B42694	0	3
B	3	4	BH-06	2	1	BH6A42694	0	2
B	3		BH-17	3	1	BH17A42694	0	3
B	3		BH-18	5	2	BH18A42694	0	2.5
						BH18B42694	0	4
B	3		BH-19	2	1	BH19A42694	0	2
B	4	2	BH-07	8	3	BH7A42694	0	1
						BH7B42694	0	5

TABLE 1 (Cont.)

Pile Name	Grid No.	No. of Bore Holes/Grid	Bore Hole No.	Depth of Bore Hole (ft)	Samples/Bore Hole	Sample No.	PID PPM	Depth (ft)
						BH7C42694	0	8
B	4		BH-08	6	2	BH8A42694	0	2
						BH8B42694	0	5
B	5	4	BH-09	5	2	BH9A42694	0	1
						BH9B42694	0	4
B	5		BH-10	2	1	BH10A42694	0.5	2
B	5		BH-11	2	1	BH11A42694	0	2
B	5		BH-12	2	1	BH12A42694	0	2
B	6	2	BH-13	7	2	BH13A42694	0	1.5
						BH13B42694	0	6
B	6		BH-14	8	3	BH14A42694	1	3
						BH14B42694	0	6
						BH14C42694	0	7.5
B	7	2	BH-15	9	3	BH15A42694	0	1.5
						BH15B42694	0	3.5
						BH15C42694	0	8.5
B	7		BH-16	5	2	BH16A42694	0	2
						BH16B42694	0	5
C	9	4	BH-41	3	2	BH41A42894	0	1.5

TABLE 1 (Cont.)

Pile Name	Grid No.	No. of Bore Holes/Grid	Bore Hole No.	Depth of Bore Hole (ft)	Samples/Bore Hole	Sample No.	PID PPM	Depth (ft)
						BH41B42894	0	3
C	9		BH-42	2	1	BH42A42894	0	2
C	9		BH-43	2	1	BH43A42894	0	2
C	9		BH-44	3	1	BH44A42894	0	2.5
C	10	3	BH-38	2	1	BH38A42794	0	2
C	10		BH-39	2	1	BH39A42794	0	2
C	10		BH-40	7	3	BH40A42794	0	2
						BH40B42794	0	5
						BH40C42794	0	7
C	11	4	BH-34	4	2	BH34A42794	0	1.5
						BH34B42794	0	4
C	11		BH-35	2	1	BH35A42794	0	2
C	11		BH-36	2	1	BH36A42794	0	2
C	11		BH-37	2	1	BH37A42794	0	2
C	12	2	BH-21	4	2	BH21A42794	0	1.5
						BH21B42794	0	3
C	12		BH-22	8	3	BH22A42794	0	3
						BH22B42794	0	6
						BH22C42794	0	7.5

TABLE 1 (Cont.)

Pile Name	Grid No.	No. of Bore Holes/Grid	Bore Hole No.	Depth of Bore Hole (ft)	Samples/Bore Hole	Sample No.	PID PPM	Depth (ft)
C	13	4	BH-48(DUP1A)	2	1	BH48A42894	0	1.5
C	13		BH-49(DUP1B&C)	5	2	BH49A42894	0	1.5
						BH49B42894	0	5
C	13		BH-50(DUP1D)	2	1	BH50A42894	0	2
C	13		BH-51(DUP1E)	2	1	BH51A42894	0	2
C	14	3	BH-45	7	2	BH45A42894	0	1.5
						BH45B42894	0	7
C	14		BH-46	6	2	BH46A42894	0	2
						BH46B42894	0	6
C	14		BH-47	2	1	BH47A42894	0	2
C	15	3	BH-31	2	1	BH31A42794	0	1.5
C	15		BH-32	7	3	BH32A42794	0	2.5
						BH32B42794	0	5
						BH32C42794	0	7
C	15		BH-33	2	1	BH33A42794	0	2
C	16	5	BH-26	2	1	BH26A42794	0	1
C	16		BH-27	3	1	BH27A42794	0	3
C	16		BH-28	2	1	BH28A42794	0	2
C	16		BH-29	2	1	BH29A42794	0	1.5

TABLE 1 (Cont.)

Pile Name	Grid No.	No. of Bore Holes/Grid	Bore Hole No.	Depth of Bore Hole (ft)	Samples/Bore Hole	Sample No.	PID PPM	Depth (ft)
C	16		BH-30	2	1	BH30A42794	0	2
C	17	3	BH-23	2	1	BH23A42794	0	1.5
C	17		BH-24	8	3	BH24A42794	0	3
						BH24B42794	0	5.5
						BH24C42794	0	7.5
C	17		BH-25	2	1	BH25A42794	0	2
A	18	2	BH-52	2	2	BH52A42894	2.8	2
						BH52B42794	30	5
A	18		BH-53	10	3	BH53A42894	0.5	2
						BH53B42894	110	5
						BH53C42894	60	10
A	19	4	BH-58	2	1	BH58A42994	0	2
A	19		BH-59	2	1	BH59A42994	0	2
A	19		BH-60	2	1	BH60A42994	0	2
A	19		BH-61	9	2	BH61A42994	50	5.5
						BH61B42994	30	8.5
A	20	2	BH-62	3	1	BH62A42994	0.1	2.5
A	20		BH-63	15	4	BH63A42994	0	2.5
						BH63B42994	0.25	6

TABLE 1 (Cont.)

Pile Name	Grid No.	No. of Bore Holes/Grid	Bore Hole No.	Depth of Bore Hole (ft)	Samples/Bore Hole	Sample No.	PID PPM	Depth (ft)
						BH63C42994	70	12
						BH63D42994	9	14.5
A	21	5	BH-64(DUP2A)	2	1	BH64A42994	0	2
A	21		BH-65(DUP2B)	2	1	BH65A42994	0	2
A	21		BH-66(DUP2C)	5	1	BH66A42994	30	5
A	21		BH-67(DUP2D)	2	1	BH67A42994	0	2
A	21		BH-68(DUP2E)	6	1	BH68A42994	40	6
A	22	3	BH-69	2	1	BH69A42994	0	2
A	22		BH-70	6	2	BH70A42994	0	3
						BH70B42994	5	6
A	22		BH-71	5	2	BH71A42994	0	3
						BH71B42994	12	5
A	23	3	BH-72	2	1	BH72A43094	0	2
A	23		BH-73	2	1	BH73A43094	0	2
A	23		BH-74	8	3	BH74A43094	0	3
						BH74B43094	110	5
						BH74C43094	150	8
A	24	3	BH-75	7	3	BH75A43094	0	3
						BH75B43094	0	5

TABLE 1 (Cont.)

Pile Name	Grid No.	No. of Bore Holes/Grid	Bore Hole No.	Depth of Bore Hole (ft)	Samples/Bore Hole	Sample No.	PID PPM	Depth (ft)
						BH75C43094	0	7
A	24		BH-76	2	1	BH76A43094	0	2
A	24		BH-77	3	1	BH77A43094	0	3
A	25	5	BH-78	3	1	BH78A43094	0	3
A	25		BH-79	3	1	BH79A43094	0	3
A	25		BH-80	3	1	BH80A43094	0	3
A	25		BH-81	2	1	BH81A43094	0	2
A	25		BH-82	2	1	BH82A43094	0	2
A	26	3	BH-83	3	2	BH83A43094	0	3
						BH83B43094	5	5
A	26		BH-84	5	2	BH84A43094	0	3
						BH84B43094	0	4.5
A	26		BH-85	2	1	BH85A43094	0	2
A	27	5	BH-86	2	1	BH86A43094	0	2
A	27		BH-87	3	1	BH87A43094	0	3
A	27		BH-88	2	1	BH88A43094	0	2
A	27		BH-89	2	1	BH89A43094	0	2
A	27		BH-90	2	1	BH90A43094	0	1.5
A	28	5	BH-91(DUP3A)	2	1	BH91A43094	2	2

TABLE 1 (Cont.)

Pile Name	Grid No.	No. of Bore Holes/Grid	Bore Hole No.	Depth of Bore Hole (ft)	Samples/Bore Hole	Sample No.	PID PPM	Depth (ft)
A	28		BH-92(DUP3B)	2	1	BH92A43094	0	1.5
A	28		BH-93(DUP3C)	2	1	BH93A43094	0	2
A	28		BH-94(DUP3D)	4	1	BH94A43094	30	4
A	28		BH-95(DUP3E)	2	1	BH95A43094	0	1.5
A	29	4	BH-54	2	1	BH54A42894	2	2
A	29		BH-55	2	1	BH55A42894	9	2
A	29		BH-56	2	1	BH56A42894	1	2
A	29		BH-57	5	2	BH57A42894	12	2
						BH57B42894	14	5

TABLE 2 NAS WILLOW GROVE: RESULTS OF PREDESIGN SAMPLING AND ANALYSIS OF SOIL PILES AT THE NAVY FUEL FARM

Pile No.	Grid No.	Sample Date	EA Borehole Sample IDs	Lab Sample ID	Benzene (µg/kg)	Toluene (µg/kg)	Ethylbenzene (µg/kg)	Total Xylene (µg/kg)	O-Xylene (µg/kg)	M&P Xylene (µg/kg)	Total BTEX (µg/kg)	TPH as JP-4 (mg/Kg)	Acetone (µg/kg)	Methylethyl -ketone (µg/kg)	Methylene Chloride (µg/kg)	Percent Solids
E&D	1	25-Apr-94	BH-01, -02	01\02 COMP	ND (6.18)	ND (6.18)	ND (6.18)	ND(12.4)	ND (6.18)	ND (6.18)	ND	ND (12.3)	ND (12.4)	ND(12.4)	7.3	81.3
B	2	26-Apr-94	BH-03,-04,-05	03/04/05 COMP	ND (5.82)	ND (5.82)	ND (5.82)	ND (11.7)	ND (5.82)	ND (5.82)	ND	ND (10.0)	ND (11.6)	ND (11.6)	12.4	85.5
B	4	26-Apr-94	BH-07,-08	07/08 COMP	ND (5.88)	ND (5.88)	ND (5.88)	ND (11.8)	ND (5.88)	ND (5.88)	ND	ND (11.8)	ND (11.8)	ND (11.8)	9.75	84.6
B	5	26-Apr-94	BH-09,-10,-11,-12	09/10/11/12 COMP	ND (5.74)	ND (5.74)	ND (5.74)	ND (11.5)	ND (5.74)	ND (5.74)	ND	ND (11.5)	ND (11.5)	ND (11.5)	10.4	86.6
B	6	26-Apr-94	BH-13,-14	13/14 COMP	ND (5.74)	ND (5.74)	ND (5.74)	ND (11.5)	ND (5.74)	ND (5.74)	ND	ND (11.5)	ND (11.5)	ND (11.5)	9.19	87.0
B	7	26-Apr-94	BH-15,-16	15/16 COMP	ND (5.95)	ND (5.95)	ND (5.95)	ND(11.9)	ND (5.95)	ND (5.95)	ND	ND (11.9)	ND (11.9)	ND (11.9)	9.59	84.1
B	3	26-Apr-94	BH-06,-17,-18,-19	06/17/18/19 COMP	ND (5.82)	ND (5.82)	ND (5.82)	ND (11.7)	ND (5.82)	ND (5.82)	ND	ND (11.6)	ND (11.6)	ND (11.6)	4.65 J	86.0
CS	-	26-Apr-94	CS 01,02,03,04,05	Concrete Comp	ND (5.16)	ND (5.16)	ND (5.16)	ND (10.4)	ND (5.16)	ND (5.16)	ND	ND (10.4)	ND (10.3)	ND (10.3)	6.09	96.6
-	-	25-Apr-94	FB1 (Field Blank 1)	EA29600 FB1	ND (5.00)	ND (5.00)	ND (5.00)	ND (10.0)	ND (5.00)	ND (5.00)	ND	ND (1.00)	52.2	33.0	24.4	NA
-	-	25-Apr-94	RB1 (Rinsate Blank 1)	EA29600 RB1	ND (5.00)	ND (5.00)	ND (5.00)	ND (10.0)	ND (5.00)	ND (5.00)	ND	ND (1.00)	74.6	ND (10.0)	22.3	NA
-	-	26-Apr-94	FB2 (Field Blank 2)	EA29600 FB2	ND (5.00)	ND (5.00)	ND (5.00)	ND (10.0)	ND (5.00)	ND (5.00)	ND	ND (1.00)	127	34.1	21.5	NA
-	-	26-Apr-94	RB2 (Rinsate Blank 2)	EA29600 RB2	ND (5.00)	ND (5.00)	ND (5.00)	ND (10.0)	ND (5.00)	ND (5.00)	ND	ND (1.00)	123	24.2	23.8	NA
-	-	26-Apr-94	Trip Blank	Trip Blank	ND (5.00)	ND (5.00)	ND (5.00)	ND (10.0)	ND (5.00)	ND (5.00)	ND	NA	ND (10.0)	ND (10.0)	2.66 J	NA
C	12	27-Apr-94	BH-21,-22	21/22 COMP	ND (5.82)	ND (5.82)	ND (5.82)	ND (11.7)	ND (5.82)	ND (5.82)	ND	ND (11.6)	ND (11.6)	ND (11.6)	ND (5.82)	86.2
C	17	27-Apr-94	BH-23,-24,-25	23/24/25 COMP	ND (5.68)	ND (5.68)	ND (5.68)	ND (11.4)	ND (5.68)	ND (5.68)	ND	ND(11.4)	ND (11.4)	ND (11.4)	9.81 J	87.7
C	16	27-Apr-94	BH-26,-27,-28,-29,-30	26/27/28/29/30 COMP	ND (5.68)	ND (5.68)	ND (5.68)	ND (11.4)	ND (5.68)	ND (5.68)	ND	ND (11.3)	ND (11.4)	ND (11.4)	27.6	88.3

TABLE 2 (Cont.)

Pile No.	Grid No.	Sample Date	EA Borehole Sample IDs	Lab Sample ID	Benzene (µg/kg)	Toluene (µg/kg)	Ethylbenzene (µg/kg)	Total Xylene (µg/kg)	O-Xylene (µg/kg)	M&P Xylene (µg/kg)	Total BTEX (µg/kg)	TPH as JP-4 (mg/Kg)	Acetone (µg/kg)	Methylethyl -ketone (µg/kg)	Methylene Chloride (µg/kg)	Percent Solids
C	15	27-Apr-94	BH-31,-32,-33	31/32/33 COMP	ND (5.88)	ND (5.88)	ND (5.88)	ND (11.8)	ND (5.88)	ND (5.88)	ND	ND (11.8)	ND (11.8)	ND (11.8)	21.7	85.1
C	11	27-Apr-94	BH-34,-35,-36,-37	34/35/36/37 COMP	ND (5.74)	ND (5.74)	ND (5.74)	ND (11.5)	ND (5.74)	ND (5.74)	ND	ND (11.4)	ND (11.5)	ND (11.5)	17.2	87.3
C	10	27-Apr-94	BH-38,-39-40	38/39/40 COMP	ND (5.88)	ND (5.88)	ND (5.88)	ND (11.8)	ND (5.88)	ND (5.88)	ND	ND (11.7)	ND (11.8)	ND (11.8)	13.1	85.4
C	9	28-Apr-94	BH-41,-42,-43,-44	41/42/43/44 COMP	ND (5.44)	ND (5.44)	ND (5.44)	ND (10.9)	ND (5.44)	ND (5.44)	ND	ND (10.9)	ND (10.9)	ND (10.9)	12.1	91.5
C	14	28-Apr-94	BH-45,-46,-47 COMP	45/46/47 COMP	ND (5.68)	ND (5.68)	ND (5.68)	ND (11.4)	ND (5.68)	ND (5.68)	ND	ND (11.4)	ND (11.4)	ND (11.4)	24.7	87.8
C	13	28-Apr-94	BH-48,-49,-50,-51	48/49/50/51 COMP	ND (5.62)	ND (5.62)	ND (5.62)	ND (11.3)	ND (5.62)	ND (5.62)	ND	ND (11.3)	ND (11.2)	ND (11.2)	8.29	88.8
C	13	28-Apr-94	DUP 1	DUP 1 COMP	ND (5.62)	ND (5.62)	ND (5.62)	ND (11.3)	ND (5.62)	ND (5.62)	ND	ND (11.3)	ND (11.2)	ND (11.2)	7.36	88.8
A	18	28-Apr-94	BH-52,-53	52/53 COMP	ND (5.88)	ND (5.88)	ND (5.88)	ND (11.8)	ND (5.88)	ND (5.88)	ND	ND (11.8)	ND (11.8)	ND (11.8)	24.3	84.5
A	29	28-Apr-94	BH-54,-55,-56,-57	54/55/56/57 COMP	ND (5.88)	ND (5.88)	ND (5.88)	ND (11.8)	ND (5.88)	ND (5.88)	ND	ND (11.8)	ND (11.8)	ND (11.8)	5.84 J	85.0
-	-	27-Apr-94	Trip Blank	Trip Blank	ND (5.00)	ND (5.00)	ND (5.00)	ND (10.0)	ND (5.00)	ND (5.00)	ND	NA	ND (10.0)	ND (10.0)	4.08 J	NA
-	-	27-Apr-94	RB3 (Rinsate Blank 3)	EA29600RB3	ND (5.00)	ND (5.00)	ND (5.00)	ND (10.0)	ND (5.00)	ND (5.00)	ND	ND (1.00)	6.56 J	ND (10.0)	2.36 J	NA
A	19	29-Apr-94	BH-58,-59,-60,-61	58/59/60/61 COMP	ND (5.95)	ND (5.95)	ND (5.95)	ND (11.9)	ND (5.95)	ND (5.95)	ND	ND (11.9)	ND (11.9)	ND (11.9)	13.6	83.9
A	20	29-Apr-94	BH-62,-63	62/63 COMP	ND (6.02)	ND (6.02)	ND (6.02)	ND (12.1)	ND (6.02)	ND (6.02)	ND	ND (12.0)	ND (12.0)	ND (12.0)	2.78 J	83.2
A	21	29-Apr-94	BH-64,-65,-66,-67,-68	64/65/66/67/68 COMP	ND (6.18)	ND (6.18)	ND (6.18)	ND (12.4)	ND (6.18)	ND (6.18)	ND	ND (12.3)	ND (12.4)	ND (12.4)	4.94 J	81.3
A	21	29-Apr-94	DUP 2	DUP 2 COMP	ND (6.02)	ND (6.02)	ND (6.02)	ND (12.1)	ND (6.02)	ND (6.02)	ND	ND (12.0)	ND (12.0)	ND (12.0)	10.2	83
-	-	29-Apr-94	Trip Blank	Trip Blank	ND (5.00)	ND (5.00)	ND (5.00)	ND (10.0)	ND (5.00)	ND (5.00)	ND	NA	ND (10.0)	ND (10.0)	7.60 B	NA
A	22	30-Apr-94	BH-69,-70,-71	69/70/71 COMP	ND (5.88)	ND (5.88)	ND (5.88)	ND (11.8)	ND (5.88)	ND (5.88)	ND	ND (11.8)	ND (11.8)	ND (11.8)	4.62 J	84.7
A	23	30-Apr-94	BH-72,-73,74	72/73/74 COMP	ND (5.88)	ND (5.88)	8.81	ND (11.8)	ND (5.88)	ND (5.88)	8.81	ND (11.7)	ND (11.8)	ND (11.8)	7.10	85.3

TABLE 2 (Cont.)

Pile No.	Grid No.	Sample Date	EA Borehole Sample IDs	Lab Sample ID	Benzene (µg/kg)	Toluene (µg/kg)	Ethylbenzene (µg/kg)	Total Xylene (µg/kg)	O-Xylene (µg/kg)	M&P Xylene (µg/kg)	Total BTEX (µg/kg)	TPH as JP-4 (mg/Kg)	Acetone (µg/kg)	Methylethyl -ketone (µg/kg)	Methylene Chloride (µg/kg)	Percent Solids
A	24	30-Apr-94	BH-75,-76,-77	75/76/77 COMP	ND (5.95)	ND (5.95)	ND (5.95)	ND (11.9)	ND (5.95)	ND (5.95)	ND	ND (12.0)	ND (11.9)	ND (11.9)	4.18 J	83.6
A	25	30-Apr-94	BH-78,-79,-80,-81,-82	78/79/80/81/82 COMP	ND (5.88)	ND (5.88)	ND (5.88)	ND (11.8)	ND (5.88)	ND (5.88)	ND	ND (11.8)	ND (11.8)	ND (11.8)	3.75 J	84.6
A	26	30-Apr-94	BH-83,-84,-85	83/84/85 COMP	ND (6.02)	ND (6.02)	ND (6.02)	ND (12.1)	ND (6.02)	ND (6.02)	ND	ND (12.1)	ND (12.0)	ND (12.0)	4.20 J	82.7
A	27	30-Apr-94	BH-86,-87,-88,-89,-90	86/87/88/89/90 COMP	ND (5.95)	ND (5.95)	ND (5.95)	ND (11.9)	ND (5.95)	ND (5.95)	ND	ND (11.9)	ND (11.9)	ND (11.9)	7.55	84.1
A	28	30-Apr-94	BH-91,-92,-93,-94,-95	91/92/93/94/95 COMP	ND (5.95)	ND (5.95)	ND (5.95)	ND (11.9)	ND (5.95)	ND (5.95)	ND	ND (11.8)	ND (11.9)	ND (11.9)	7.41	84.4
A	28	30-Apr-94	DUP 3	DUP 3 COMP	ND (5.95)	ND (5.95)	ND (5.95)	ND (11.9)	ND (5.95)	ND (5.95)	ND	ND (11.8)	ND (11.9)	ND (11.9)	12.8	84.4

ND - Below laboratory detection limit, detection limit is in parenthesis.
NA - Not analyzed.
J - An estimated value, below method detection limit.
B - Indicates that the compound was found in the associated blank.

TABLE 3 PADER INTERIM CLEAN-UP LEVELS FOR CONTAMINATED SOIL

ANALYTE	CONCENTRATION
Benzene	0.2 mg/kg
Toluene	0.5 mg/kg
Ethylbenzene	1 mg/kg
Total Xylenes	0.7 mg/kg
TPH	200 mg/kg
Methylene Chloride	0.05 mg/kg
Methyl Ethyl Ketone	0.01 mg/kg

SOURCE: Pennsylvania Department of Environmental Resources. 1993. Clean-up Standards for Contaminated Soils. Interim Report. December.

TABLE 4 ANALYTICAL RESULTS FOR THE CONCRETE PILE, NAVY FUEL FARM AT NAS WILLOW GROVE, HORSHAM TOWNSHIP, PENNSYLVANIA

ANALYTE	CONCENTRATION	PADER Interim Clean-up Level (mg/kg)	TCLP Regulatory Level (mg/L)
Benzene	ND	0.2	NA
Toluene	ND	0.5	NA
Ethlybenzene	ND	1	NA
Total Xylenes	ND	0.7	NA
MEK	ND	0.01	NA
Methylene Chloride	0.006	0.05	NA
PCBs	0.054	5	NA
Total Arsenic	0.885 mg/kg	20	NA
Total Lead	2.86 mg/kg	NA	NA
Total Mercury	0.038 mg/kg	20	NA
Total Selenium	ND	60	NA
Total Silver	0.130 mg/kg	400	NA
Total Barium	38.9 mg/kg	5,000	NA
Total Cadmium	ND	20	NA
Total Chromium	19.6 mg/kg	1,000	NA
TCLP Silver	ND	NA	5
TCLP Arsenic	ND	NA	5
TCLP Barium	0.216 mg/L	NA	100
TCLP Cadmium	ND	NA	1
TCLP Chromium	ND	NA	5
TCLP Mercury	ND	NA	0.2
TCLP Lead	ND	NA	5
TCLP Selenium	ND	NA	1
TOX	ND	NA	NA
pH	11.5	NA	NA
TPH	ND	ND	NA

ND - Not Detected.
NA - Not Applicable.