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NTC ORLANDO
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LETTER SUMMARIZING ADDITIONAL SITE SCREENING RESULTS AND
RECOMMENDATIONS AT STUDY AREAS 39 AND 40 NTC ORLANDO FL
1/22/1997
ABB ENVIRONMENTAL



S B M C Cay

January 22, 1997

8545.295

Commanding Officer
SOUTHNAVFACENGCOM
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Charleston, SC 24019-9010
Attn: Mr. Wayne Hansel, P.E., Code 18B7

**Subject: Additional Site Screening Results and Recommendations
NTC, Orlando- Study Areas 39 and 40
Contract; N62467-89-D-0317/CTO 107**

Dear Mr. Hansel:

In response to a request from the Orlando Partnering Team (OPT), ABB Environmental Services (ABB-ES) has recently completed an additional phase of screening at Study Areas (SAs) 39 (the former coal storage yard) and 40 (former "bottle" landfill). The purpose of the additional screening was to further evaluate the nature and extent of polynuclear aromatic hydrocarbons (PAHs) in surface soil, and tetrachloroethene (PCE) in groundwater. Arsenic was also determined in the surface soil samples as this metal was found to slightly exceed soil cleanup goals (SCG) during the initial site screening. SAs 39 and 40 are located in the southwest corner of the Main Base of the Naval Training Center, Orlando (Figure 1).

RESULTS OF INITIAL SITE SCREENING. During the initial phase of site screening, benzo(a)pyrene and/or dibenz(a,h)anthracene were detected above their respective Florida residential soil cleanup goals (SCGs) in four surface soil sampling locations at SA 39 (39B003, 39B005, 39S006, and 39S007), and one surface soil sampling location at SA 40 (40B001).

Arsenic was detected in five surface soil samples at SA 39 at concentrations exceeding background screening concentrations and Florida SCGs (39B002, 39B004, 39B005, 39S005, and 39S006). Arsenic was detected in one surface soil sample at SA 40 at a concentration of 1.1 mg/kg (40S002). Arsenic exceedances ranged from 1.1 to 6.7 mg/kg, versus a Florida SCG of 0.7 mg/kg and a background screening concentration of 1.0 mg/kg.

PCE was detected in groundwater at one sampling location in SA 39 (39G00301, collected at monitoring well OLD-39-03A) at a concentration in excess of the Florida Primary Standard for PCE. For complete details regarding the initial screening results, please refer to the ABB-ES report entitled "Technical Memorandum, Site Survey Investigations, Study Areas 39, 40, and 45", June 1996.

ADDITIONAL SITE SCREENING ACTIVITIES. The objective of the additional screening was to more fully characterize the extent of PAHs and arsenic detected in surface soil at SAs 39 and 40, and to confirm the presence and further evaluate the extent of PCE in groundwater.

PAH screening was accomplished through the use of immunoassay (IA) testing techniques (with 20% of the samples submitted for laboratory confirmation).

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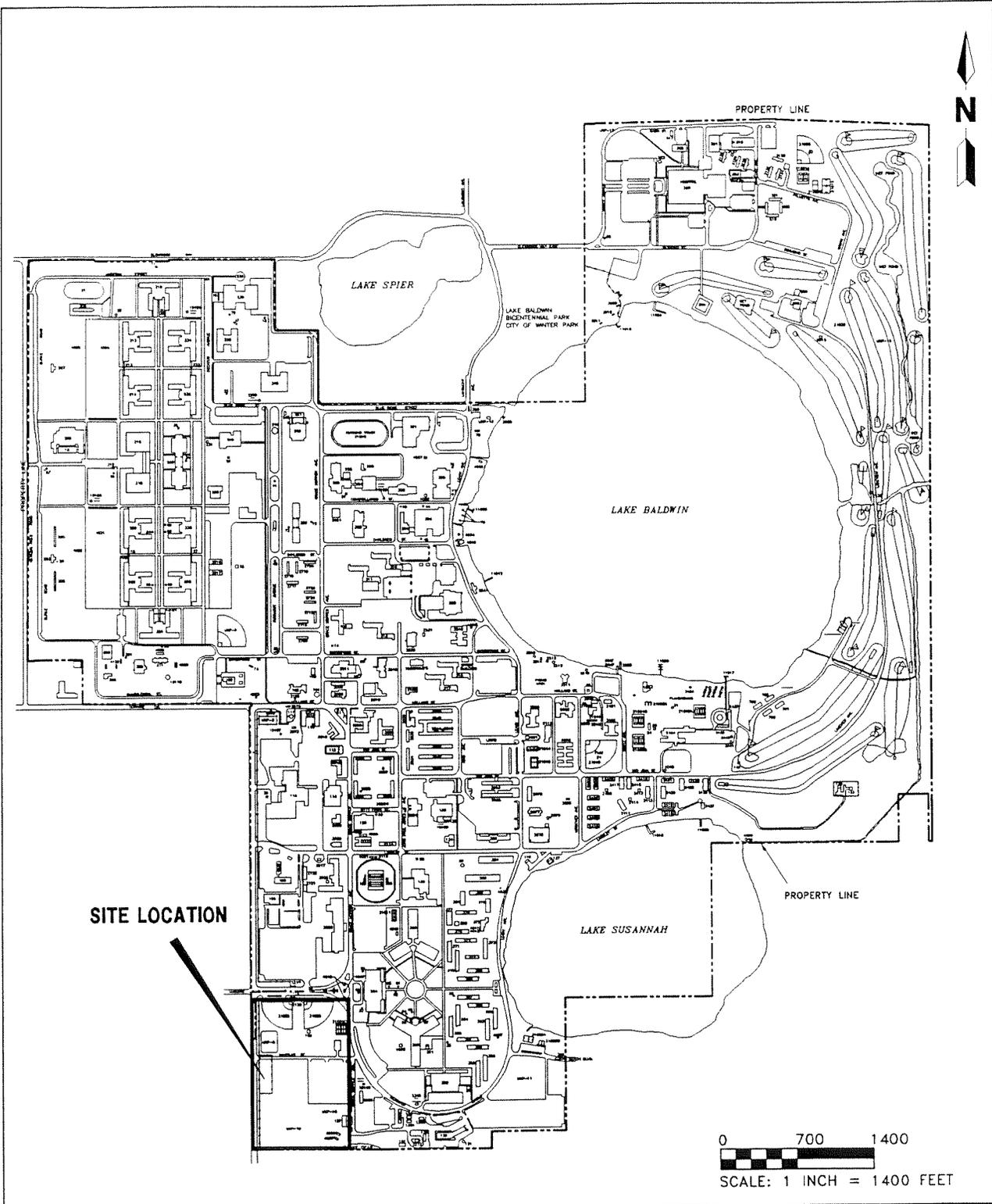


FIGURE 1
SITE VICINITY MAP



TECHNICAL MEMORANDUM
SITE SCREENING INVESTIGATION
STUDY AREAS 39 AND 40

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Screening using IA provides a semi-quantitative measure of the total PAH concentration in soil. The soil samples submitted for PAH confirmatory analysis were also analyzed for arsenic.

In order to further evaluate PCE contamination in groundwater from monitoring well OLD-39-03A, five additional monitoring wells were installed in that area.

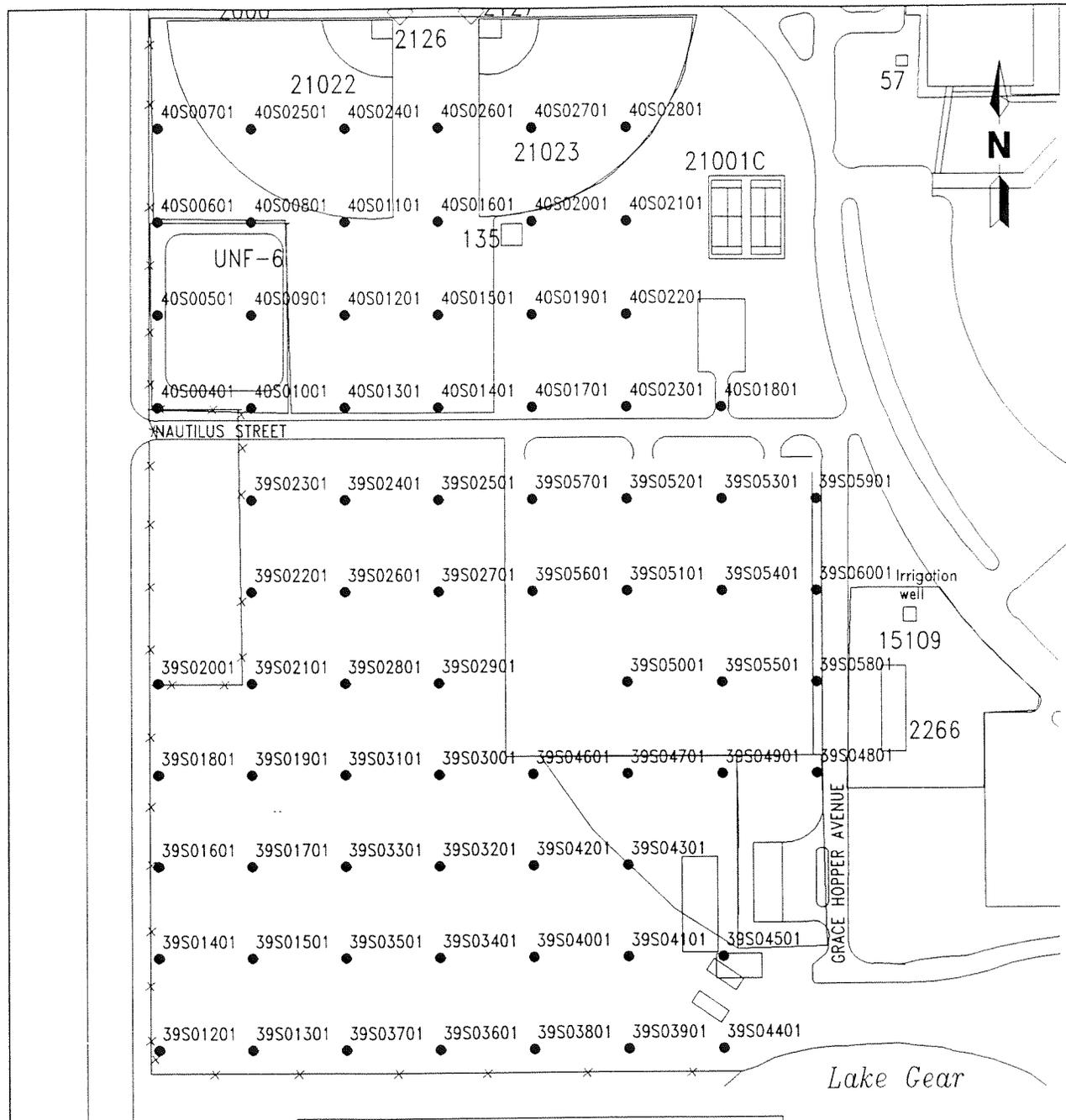
Soil Screening. PAHs in surface soil were evaluated at SAs 39 and 40 by collecting 74 soil samples on 100-foot centers (Figure 2). Soil was composited at each grid node from the surface to a depth of 1 foot. Each sample was analyzed using PAH immunoassay test kits in accordance with USEPA Method 4035. Immunoassay testing utilizes an enzyme which reacts with PAH compounds at a constant rate. A semi-quantitative total PAH concentration of a sample can be determined by comparing the optical absorbance of the enzyme/PAH mixture from the sample to that of a sample of known total PAH concentration. The absorbance of a minimum of three samples of known total PAH concentration is used to establish a calibration curve. The curve is then used to correlate the absorbance of the collected samples to a total PAH concentration. Immunoassay testing does not differentiate individual PAH compounds but does provide an excellent test for the presence or absence of PAHs, yielding a total PAH concentration.

To confirm the results of the immunoassay testing, sixteen of the samples were split and submitted to a certified analytical laboratory for analysis of PAHs using EPA Method 8270M (gas chromatography/mass spectroscopy with selective ion monitoring). The laboratory was also instructed to analyze the sixteen surface soil samples for arsenic.

Groundwater Screening. Five monitoring wells were installed during this most recent phase of site screening. All wells are in the vicinity of monitoring well OLD-39-03A (Figure 3). Four of the wells were screened at the water table, and the fifth was screened at the surface of a clayey zone at a depth of 32 to 34 feet below land surface (bls).

The four shallow wells were constructed so that the screened interval would intercept the water table. One of these wells (OLD-39-09A) was installed approximately 30 feet downgradient (south-southeast) from OLD-39-03A. A second well (OLD-39-11A) was placed approximately 30 feet upgradient. The remaining two wells (OLD-39-08A and OLD-39-10A) were placed sidegradient to groundwater flow approximately 30 feet from OLD-39-03A. The shallow wells were constructed as microwells, and were installed with the TerraProbeSM, a van-mounted drilling device that utilizes hydraulic pressure to penetrate into the subsurface. These wells were constructed with 3/4-inch diameter polyvinyl chloride (PVC) riser and 0.010-inch slotted screen. The screened section was prepacked with a 20/30 silica sand filter. Nine feet of slotted screen was used for each shallow well. A one-foot thick layer of bentonite was placed above the filter pack, and the remainder of the borehole was filled with grout. The microwells were completed at the surface with a concrete pad, bolt-down vault, and locking cap.

A fifth well (OLD-39-07B) was placed approximately 10 feet downgradient of OLD-39-03A (Figure 3). It was constructed as an intermediate-depth well to evaluate groundwater quality data from the deeper part of the surficial aquifer in this area. Prior to installation, soil samples were collected continuously from 16 feet to 80 feet bls using Standard Penetration Testing (SPT) to determine lithology. The samples indicated a potential aquitard, comprised of a silty to sandy clay layer extending from approximately 32 to 34 feet bls.



LEGEND

● 39S01301
Soil sample locations and designations for polynuclear aromatic hydrocarbons (PAH) immuassay screening

—x—x— Fence

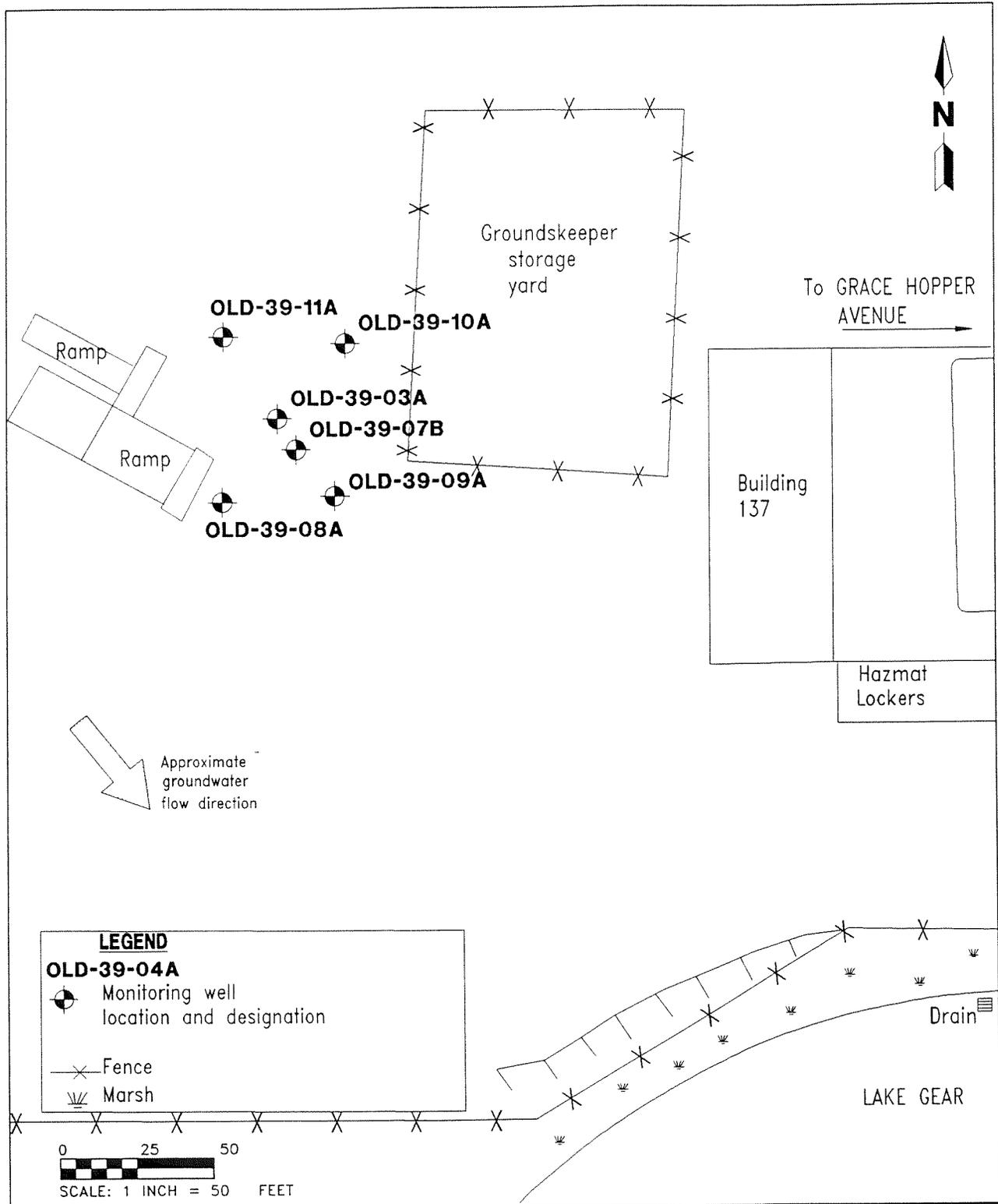
DRAWING NOT TO SCALE

**FIGURE 2
SOIL SAMPLING LOCATIONS**



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SITE SCREENING INVESTIGATION
STUDY AREAS 39, AND 40**

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**FIGURE 3
LOCATION OF MONITORING WELLS**



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SITE SCREENING INVESTIGATION
STUDY AREAS 39 AND 40**

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The remainder of the soils are comprised of silt and sand. The top of the Hawthorn Group was encountered at approximately 45 feet bls. The Hawthorn at this location is comprised of sand to 80 feet bls. Because the sandy clay lens may act as an aquitard, the screen for monitoring well OLD-39-07B was placed at 27 to 32 feet bls.

Following development and purging, groundwater samples were collected from OLD-39-03A and the five newly-installed monitoring wells. The samples were analyzed for the presence of volatile organic compounds using EPA Method 524.2.

RESULTS.

Soil Screening. A summary of the total PAH results using IA for the 74 surface soil samples is presented in Table 1. These results were used to generate the PAH concentration contour map presented in Figure 4. As shown, there are several areas where the PAH concentration in the surface soil is greater than 1 milligram per kilogram (mg/kg). One of the larger areas bisects the southeast corner of SA 39 in a southwest to northeast orientation. Two other large areas encompass most of the western and eastern sides, respectively, of SA 40. There are several smaller areas, including two along the southern border of SA 39, and one in the north-central part of SA 39.

Evaluation of Confirmation Samples. The 16 samples submitted for confirmatory laboratory analysis were selected from samples with a wide range of field-screened total PAH concentrations to provide information on the overall precision and variability of the field screening program. Arsenic concentrations were also determined in the surface soil samples submitted for PAH analysis. A list of the IA results and the offsite laboratory PAH and arsenic results are presented in Table 2. The relationship between the IA and offsite PAH confirmatory results are shown graphically in Figure 5. IA results generally compare favorably with the offsite confirmation results, with a calculated correlation coefficient of 0.65 (IA values expressed as greater than 1 were excluded from the calculation). The favorable comparison between IA and laboratory results is more apparent when the total PAH concentrations are below 0.2 mg/kg (Figure 5). At concentrations above 0.2 mg/kg, a relatively high variability (scatter) is shown, which can be explained by the fact that as more PAH contamination is encountered in a sample, the complexity of antibody loading to multiple individual PAH receptor sites is much greater. PAH antibodies bind to different PAHs with different affinities.

An alternate evaluation of both screening and confirmatory results is to actually relate these results to a "presence/absence" test, since the primary objective of the field screening program is to determine whether PAH contamination is present at concentrations above a preliminary screening value. The screening value used for this evaluation is 0.1 mg/kg, the residential SCG for benzo(a)pyrene and dibenz(a,h)anthracene. This screening value is conservative, as it represents a total PAH concentration. It is unlikely that the PAHs present are only those with such low SCGs. As shown in Table 2, IA results indicating the presence or absence of PAHs at concentrations above the screening value are confirmed by the offsite results in 14 out of 16 sampling locations (87%). The other two locations are shown as either a false positive (39S051) or a false negative (39S059). A summary of the positive detections in surface soil analytical results for PAHs is provided in Attachment A.

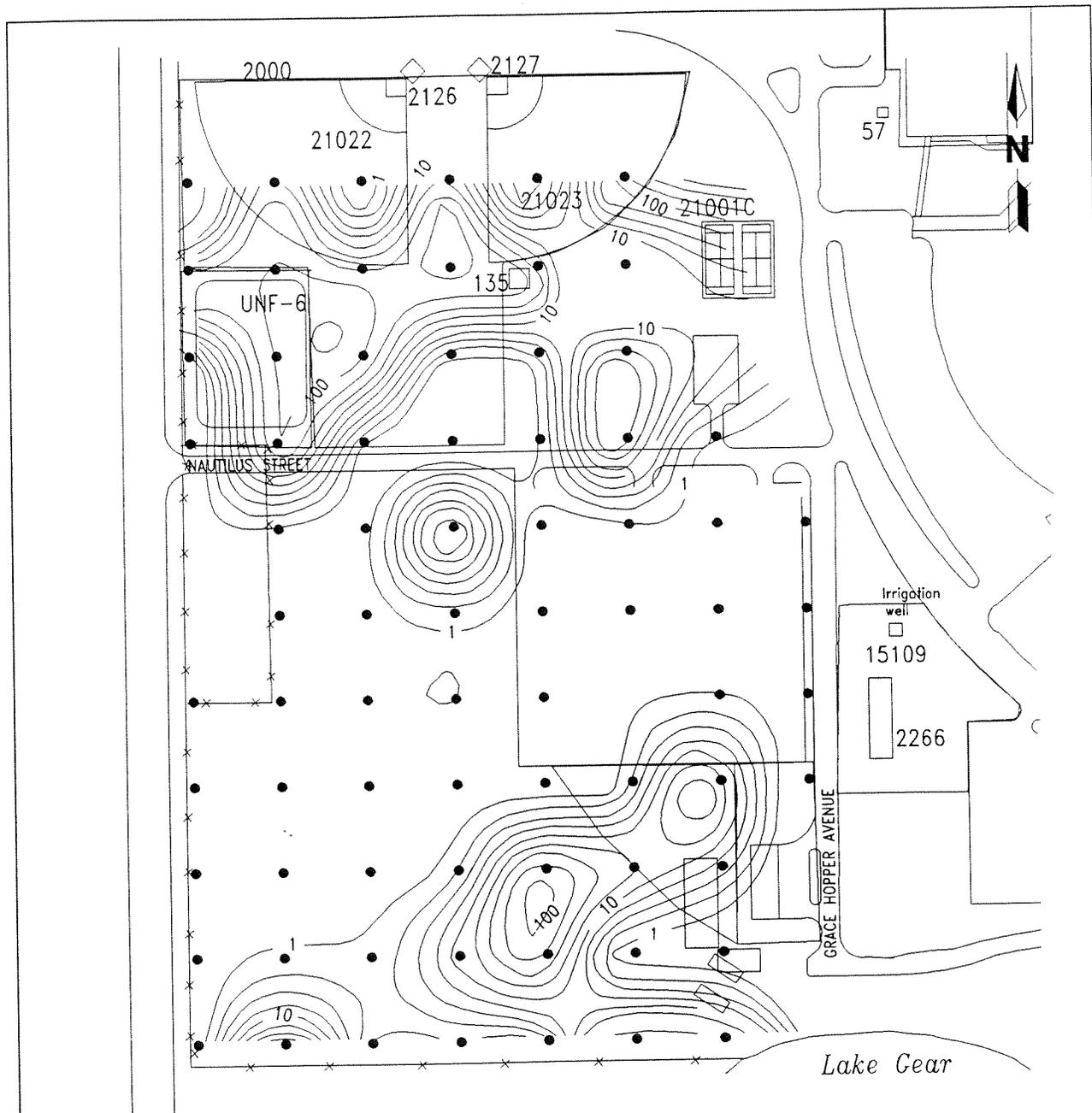
TABLE 1 - IMMUNOASSAY SCREENING RESULTS
 Total Polyaromatic Hydrocarbons (PAH)
 Study Areas 39 and 40

Sample Identifier	Location		Optical Density Absorbance (unitless)	PAH Concentration (mg/kg)	Remarks
	Easting	Northing			
39S012	1000	1000	.11	> 1	
39S013	1100	1000	.09	> 1	Dilution 70.
39S014	1000	1100	.13	.6	
39S015	1100	1100	.11	> 1	
39S016	1000	1200	.48	.24	
39S017	1100	1200	.32	.51	Duplicate sample showed PAH concentration of .65 ppm.
39S018	1000	1300	.68	.095	Duplicate sample showed PAH concentration of .30 ppm.
39S019	1100	1300	.41	.33	
39S020	1000	1400	.58	.145	
39S021	1100	1400	.66	.1	
39S022	1100	1500	.56	.16	
39S023	1100	1600	.41	.33	
39S024	1200	1600	.27	.65	
39S025	1300	1600	0	> 1	Dilution >100. Duplicate sample showed a PAH concentration of >1 ppm.
39S026	1200	1500	.29	.59	
39S027	1300	1500	.19	1.0	Duplicate sample showed a PAH concentration of >1 ppm.
39S028	1200	1400	.59	.14	
39S029	1300	1400	1.21	0	
39S030	1300	1300	.29	.59	
39S031	1200	1300	.22	.85	Duplicate sample showed a PAH concentration of .59 ppm.
39S032	1300	1200	.07	> 1	
39S033	1200	1200	.26	.68	
39S034	1300	1100	.12	> 1	Dilution 10.
39S035	1200	1100	.12	> 1	
39S036	1300	1000	.01	> 1	
39S037	1200	1000	.02	> 1	
39S038	1400	1000	0	> 1	
39S039	1500	1000	.01	> 1	Dilution > 100.
39S040	1400	1100	.08	> 1	Dilution > 100.
39S041	1500	1100	.37	.39	
39S042	1400	1200	.13	> 1	Dilution > 100.
39S043	1500	1200	.11	> 1	Dilution 28.
39S044	1600	1000	.05	> 1	Dilution > 100.
39S045	1600	1100	.47	.27	
39S046	1400	1300	.44	.30	
39S047	1500	1300	.38	.37	
39S048	1700	1300	.34	.43	
39S049	1600	1300	.1	> 1	Dilution > 100.
39S050	1500	1400	.85	.025	
39S051	1500	1500	.53	.21	

TABLE 1 - IMMUNOASSAYSCREENING RESULTS
Total Polyaromatic Hydrocarbons (PAH)
Study Areas 39 and 40

Sample Identifier	Location		Optical Density Absorbance (unitless)	PAH Concentration (mg/kg)	Remarks
	Easting	Northing			
39S052	1500	1600	.48	.26	
39S053	1600	1600	.89	.015	
39S054	1600	1500	.75	.05	
39S055	1600	1400	.98	0	
39S056	1400	1500	.51	.23	
39S057	1400	1600	.79	.05	
39S058	1700	1400	.42	.30	
39S059	1700	1500	.77	.055	
39S060	1700	1600	.21	.68	
40S004	1000	1700	.41	.32	
40S005	1000	1800	.32	.45	
40S006	1000	1900	0	> 1	Dilution > 100.
40S007	1000	2000	.31	.46	Duplicate showed PAH concentration of .46 ppm.
40S008	1100	1900	0	> 1	Dilution > 100.
40S009	1100	1800	.01	> 1	Dilution > 100.
40S010	1100	1700	.04	> 1	Dilution > 100.
40S011	1200	1900	.01	> 1	Dilution > 100.
40S012	1200	1800	.11	> 1	Dilution > 100.
40S013	1200	1700	.21	.68	
40S014	1300	1700	.31	.46	
40S015	1300	1800	.33	.43	
40S016	1300	1900	.01	> 1	Dilution > 100.
40S017	1400	1700	.35	.53	
40S018	1600	1700	.25	.77	
40S019	1400	1800	.29	.65	
40S020	1400	1900	.1	> 1	Dilution > 100.
40S021	1500	1900	.44	.39	
40S022	1500	1800	.1	> 1	Dilution > 100.
40S023	1500	1700	.09	> 1	Dilution > 100.
40S024	1200	2000	.68	.14	
40S025	1100	2000	.17	> 1	Dilution > 100.
40S026	1300	2000	.09	> 1	Dilution > 100.
40S027	1400	2000	.43	.41	
40S028	1500	2000	.04	> 1	Dilution > 100.

Note: All results expressed in milligrams per kilogram (mg/kg).



LEGEND

- Polynuclear Aromatic Hydrocarbons immunoassay sample locations at 100 foot spacings
- x—x— Fence

NOTE:
Three contours
per decade

DRAWING NOT TO SCALE

FIGURE 4
SURFACE SOIL PAH CONCENTRATION
CONTOUR MAP (PPM)



TECHNICAL MEMORANDUM
SITE SCREENING INVESTIGATION
STUDY AREAS 39, AND 40
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Total Polynuclear Aromatic Hydrocarbons (PAHs) in Soil
Immunoassay versus 8270M Confirmation Results

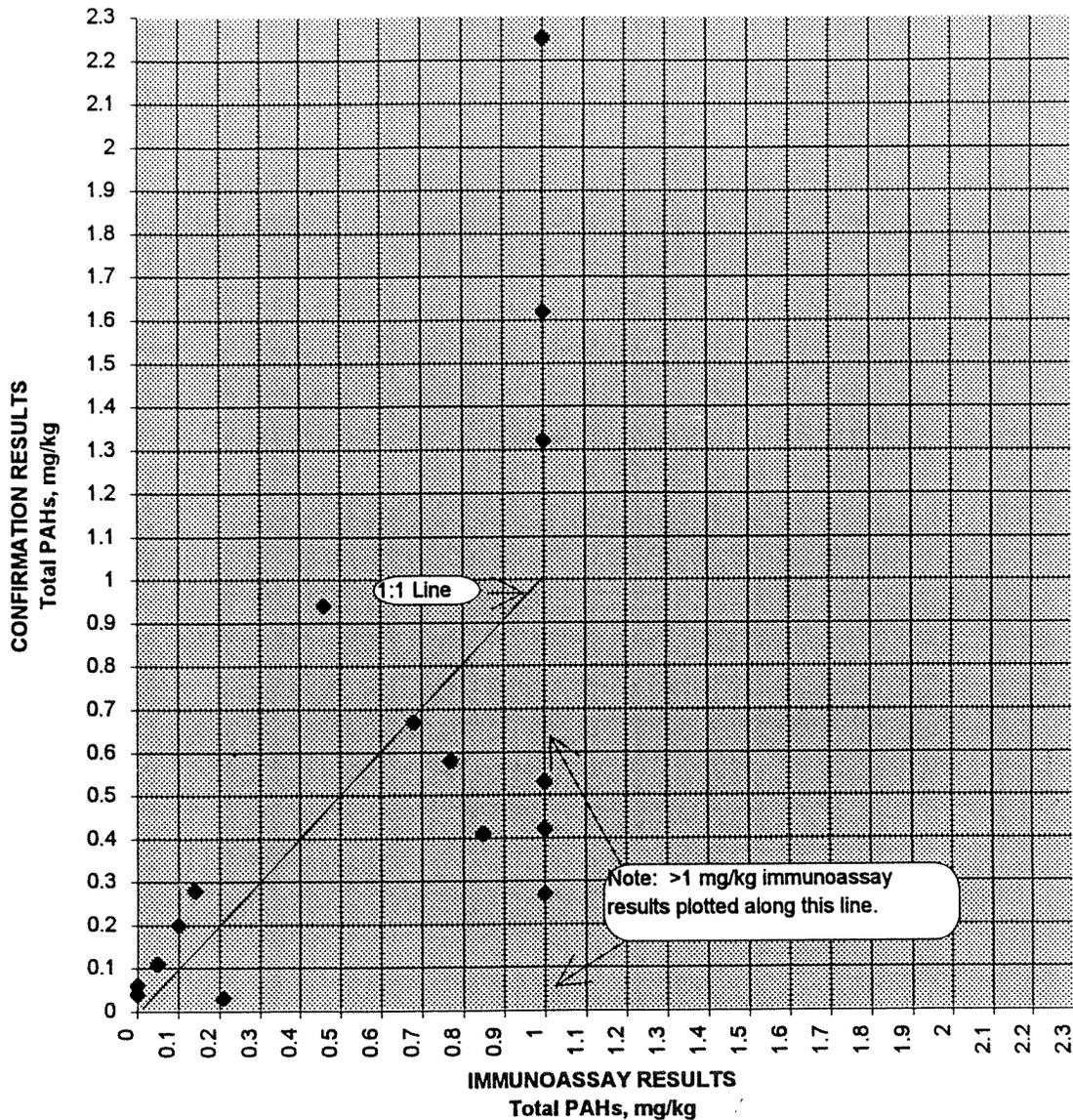


FIGURE 5
COMPARISON OF IMMUNOASSAY SCREENING AND
LABORATORY RESULTS



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SITE SCREENING INVESTIGATION
STUDY AREAS 39, AND 40

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For the 16 samples, the ratio of carcinogenic PAHs to total PAHs is between 15% and 59%, with a mean of 40.9% and a standard deviation of 11 (Attachment A). This implies that if one can determine the total PAH concentration of a sample (as, for example, with IA), then those PAH compounds regarded as "risk drivers" (benzo(a)pyrene and dibenz(a,h)anthracene) can be approximated. For example, if a sample had a total PAH concentration of 1000 $\mu\text{g}/\ell$, then there is a 95% chance that 30% to 52% (or 300 to 520 $\mu\text{g}/\ell$) of the sample will be comprised of carcinogenic PAHs.

Only 5 of the 16 samples submitted to the laboratory had exceedances of Florida SCGs (39S039, 39S043, 39S060, 40S007, and 40S010), and all of these were for a single PAH compound, benzo(a)pyrene. The maximum benzo(a)pyrene detection for the 16 samples was 300 $\mu\text{g}/\ell$ in 39S043. No PAH detections in any of the samples exceeded Florida industrial SCGs.

Of the 16 samples submitted, 12 samples had arsenic concentrations below the detection limit, and 4 samples had arsenic concentrations which equalled or exceeded the background screening value and which ranged from 1 to 3.1 mg/kg (40S010, 39S043, 40S028, and 40S007). Both the frequency and magnitude of the arsenic detections suggest that arsenic contamination is not significant in surface soil.

Groundwater Screening. PCE was detected in each of the groundwater samples collected from OLD-39-03A and the five wells installed during the present investigation. The PCE concentration ranged from 2 $\mu\text{g}/\ell$ at the upgradient shallow well location (OLD-39-11A) to 36 $\mu\text{g}/\ell$ at the shallow downgradient well location (OLD-39-09A). Trichloroethene (TCE) was also detected at a concentration of 2 $\mu\text{g}/\ell$ at OLD-39-08A. A summary of the positive detections in groundwater analytical results is presented in Attachment B. The groundwater analytical results were used to generate the PCE concentration contour map (Figure 6). The results from the intermediate well are not included on Figure 6. The results show that the impacted groundwater extends at least thirty feet in all directions from OLD-39-03A, with the higher concentrations situated in the downgradient direction. The results of the intermediate well (OLD-39-07B) show that the PCE is present at 30 feet bls.

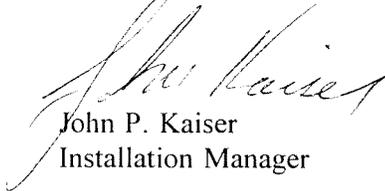
Recommendations. Based on the surface soil screening results and confirmatory laboratory results, ABB-ES recommends that a risk characterization be completed that considers both arsenic and PAHs as chemicals of potential concern. The risk characterization will provide the basis for determining the appropriateness of a FOSL/FOST for SAs 39 and 40 under the current reuse scenario, the need for remediation, or a possible transfer to operable unit status.

Based on the groundwater analytical results, it is evident that the PCE concentrations in groundwater exceed the Florida Primary Standard ($3 \mu\text{g}/\ell$) by up to an order of magnitude. ABB-ES recommends further evaluation of the nature and extent of the PCE plume, and has prepared a work plan for additional studies that will permit further evaluation of the PCE plume on the east side of SA 39.

It is our intent to discuss these results at the next scheduled OPT meeting. If you have questions or comments regarding this matter, please call me at (407) 895-8845.

Very Truly Yours,

ABB ENVIRONMENTAL SERVICES, INC.



John P. Kaiser
Installation Manager

cc: Nancy Rodriguez, USEPA Region IV
John Mitchell, FDEP
Barbara Nwokike, Southern Division
Nick Ugolini, Southern Division
Lt. G. Whipple, NTC-Public Works Officer
Mac McNeil, BEI
Steve McCoy, Brown & Root

**Attachment A - Summary of Positive Detections in Surface Soil Analytical Results, PAH
Confirmatory Samples**

Attachment B. Summary of Positive Detections in Groundwater Analytical Results
Supplemental Sampling
Study Area 39

Site Screening Report
Naval Training Center
Orlando, FL

Well ID				OLD-39-03A		OLD-39-07B	OLD-39-08A	OLD-39-09A	OLD-39-10A	OLD-39-11A
Sample ID	FDEPG	Primary FEDMCL	RBC ¹ for Tap Water	39G00301	39G00301D	39G00701	39G00801	39G00901	39G01001	39G01101
Sampling Date				11/27/96	11/27/96	11/27/96	11/26/96	11/26/96	11/26/96	11/26/96
Volatile Organics, ug/L										
Tetrachloroethene	3²	5	1.1 c	15	14	12	22	36	3	2
Toluene	40 ³ / 1000 ²	1000	750 n							1
Trichloroethene	3 ²	5	1.6 c				2			

NOTES:

¹ RBC = Risk-Based Concentration Table, USEPA Region III, May 1996, R.L. Smith.

² Primary Standard

³ Secondary Standard.

n = noncarcinogenic pathway

c = carcinogenic pathway

ID = identifier

USEPA = U.S. Environmental Protection Agency.

FDEPG = Florida Department of Environmental Protection, Groundwater Guidance Concentrations, June 1994.

FEDMCL= Federal Maximum Contaminant Levels, Primary Drinking Water Regulations and Health Advisories, October 1996.

ug/l = micrograms per liter.

Bold/shaded numbers indicate exceedance of groundwater guidance.

Blank space indicates analyte/compound was not detected at the reporting limit.

Attachment B - Summary of Positive Detections in Groundwater Analytical Results

Attachment A. Summary of Positive Detections in Surface Soil Analytical Results
Polyaromatic Hydrocarbons
Confirmatory Samples

Site Screening 39 and 40
Naval Training Center, Orlando
Orlando, FL

Sample ID	SCG ¹ Residential	RBC ² for Residential Soil	RBC ² for Industrial Soil	39S01801	39S02501	39S02701	39S02901	39S03101	39S03901	39S04301	
Sampling Date				12/2/96	12/2/96	12/2/96	12/2/96	12/2/96	12/2/96	12/3/96	
Depth, ft bls				0-1	0-1	0-1	0-1	0-1	0-1	0-1	
Polyaromatic Hydrocarbons, ug/kg											
1-Methylnaphthalene	960,000	3,100,000 n	82,000,000 n	6.5	2.5	8		70	16	180	
2-Methylnaphthalene	960,000	3,100,000 n	82,000,000 n	10	4.5	11	2.5	48	22	210	
Acenaphthene	2,800,000	4,700,000 n	120000000 n							7.5	
Acenaphthylene	670,000	2,300,000 n	61,000,000 n	5.5	16	36	3	12	70	140	
Anthracene	20,000,000	23,000,000 n	610000000 n	10	39	60	12	14	130	140	
Benzo(a)anthracene	1,400	880 c	7,800 c	18	20	6.5	2.5	20	110	170	
Benzo(a)pyrene	100	88 c	780 c	30	43	70	4.5	48	220	300	
Benzo(b)fluoranthene	1,400	880 c	7,800 c	7.5	10	18		13	75	120	
Benzo(g,h,i)perylene	14,000	2300000 n	61,000,000 n	5	8.5	16		7.5	38	38	
Benzo(k)fluoranthene	14,000	8,800 c	78,000 c	7.5	10	18		13	75	120	
Chrysene	140,000	88,000 c	780,000 c	20	26	32	3	24	140	180	
Dibenz(a,h)anthracene	100	88 c	780 c						10	12	
Fluoranthene	2,900,000	3,100,000 n	82,000,000 n	24	23	20	3.5	18	140	140	
Fluorene	2,400,000	3,100,000 n	82,000,000 n	3		3		4	3.5	8	
Indeno(1,2,3-cd)pyrene	1,400	880 c	7,800 c	7	8.5	14		6	40	42	
Naphthalene	1,300,000	3,100,000 n	82,000,000 n	7.5	4.5	8.5	3	17	14	100	
Phenanthrene	1,700,000	2,300,000 n	61,000,000 n	14	10	16	4.5	60	55	180	
Pyrene	2,200,000	2,300,000 n	61,000,000 n	26	44	70	4	28	180	180	
			Total PAHs	201.5	269.5	407	42.5	402.5	1338.5	2267.5	
			Total Carcinogenic PAHs	90	117.5	158.5	10	124	670	944	
			% Carcinogenic PAHs / Total PAHs	44.67	43.60	38.94	23.53	30.81	50.06	41.63	
				Average % Carcinogenic/Total PAHs (n=16)				40.95			
				Range (Percent)				15.15	-	58.70	
				Standard Deviation				11.10			

Attachment A. Summary of Positive Detections in Surface Soil Analytical Results
Polyaromatic Hydrocarbons
Confirmatory Samples

Site Screening 39 and 40
Naval Training Center, Orlando
Orlando, FL

Sample ID	SCG ¹ Residential	RBC ² for Residential Soil	RBC ² for Industrial Soil	01	39S05101	39S05501	39S05901	39S06001	40S00701	40S01001
Sampling Date					12/4/96	12/4/96	12/5/96	12/5/96	12/4/96	12/4/96
Depth, ft bls					0-1	0-1	0-1	0-1	0-1	0-1
Polyaromatic Hydrocarbons, ug/kg										
1-Methylnaphthalene	960,000	3,100,000 n	82,000,000 n				2.5	4.5	5.5	4.5
2-Methylnaphthalene	960,000	3,100,000 n	82,000,000 n		3	3.5	4	5.5	9	8
Acenaphthene	2,800,000	4,700,000 n	120000000 n						3.5	3
Acenaphthylene	670,000	2,300,000 n	61,000,000 n			4.5	5.5	14	19	29
Anthracene	20,000,000	23,000,000 n	610000000 n		6.5	9	8	48	90	100
Benzo(a)anthracene	1,400	880 c	7,800 c		2.5	4	8.5	65	85	160
Benzo(a)pyrene	100	88 c	780 c			5	12	100	120	270
Benzo(b)fluoranthene	1,400	880 c	7,800 c			4	5.5	32	55	120
Benzo(g,h,i)perylene	14,000	2300000 n	61,000,000 n					14	43	46
Benzo(k)fluoranthene	14,000	8,800 c	78,000 c			4	5.5	32	55	120
Chrysene	140,000	88,000 c	780,000 c		2.5	4.5	8.5	75	100	160
Dibenz(a,h)anthracene	100	88 c	780 c					3	4	15
Fluoranthene	2,900,000	3,100,000 n	82,000,000 n		2.5	8	12	100	95	150
Fluorene	2,400,000	3,100,000 n	82,000,000 n		2.5		2.5	5.5	4	3.5
Indeno(1,2,3-cd)pyrene	1,400	880 c	7,800 c				3.5	19	34	47
Naphthalene	1,300,000	3,100,000 n	82,000,000 n		3	3.5	4	6	14	8.5
Phenanthrene	1,700,000	2,300,000 n	61,000,000 n		7	13	16	60	95	55
Pyrene	2,200,000	2,300,000 n	61,000,000 n		3.5	8	12	100	120	220
			Total PAHs		33	71	110	683.5	951	1519.5
			Total Carcinogenic PAHs		5	21.5	43.5	326	453	892
			% Carcinogenic PAHs / Total PAHs		15.15	30.28	39.55	47.70	47.63	58.70

Attachment A. Summary of Positive Detections in Surface Soil Analytical Results
 Polyaromatic Hydrocarbons
 Confirmatory Samples

Site Screening 39 and 40
 Naval Training Center, Orlando
 Orlando, FL

Sample ID	SCG ¹ Residential	RBC ² for Residential Soil	RBC ² for Industrial Soil	40S01801	40S02401	40S02801
Sampling Date				12/4/96	12/5/96	12/5/96
Depth, ft bls				0-1	0-1	0-1
Polyaromatic Hydrocarbons, ug/kg						
1-Methylnaphthalene	960,000	3,100,000 n	82,000,000 n	18		
2-Methylnaphthalene	960,000	3,100,000 n	82,000,000 n	30	4	4
Acenaphthene	2,800,000	4,700,000 n	120000000 n			
Acenaphthylene	670,000	2,300,000 n	61,000,000 n	46	10	38
Anthracene	20,000,000	23,000,000 n	610000000 n	42	36	50
Benzo(a)anthracene	1,400	880 c	7,800 c	55	19	38
Benzo(a)pyrene	100	88 c	780 c	90	43	75
Benzo(b)fluoranthene	1,400	880 c	7,800 c	24	24	34
Benzo(g,h,i)perylene	14,000	2300000 n	61,000,000 n	12	24	9.5
Benzo(k)fluoranthene	14,000	8,800 c	78,000 c	24	24	34
Chrysene	140,000	88,000 c	780,000 c	60	23	50
Dibenz(a,h)anthracene	100	88 c	780 c	4	4	
Fluoranthene	2,900,000	3,100,000 n	82,000,000 n	42	18	60
Fluorene	2,400,000	3,100,000 n	82,000,000 n	2.5	3	2.5
Indeno(1,2,3-cd)pyrene	1,400	880 c	7,800 c	14	18	12
Naphthalene	1,300,000	3,100,000 n	82,000,000 n	24	5	4.5
Phenanthrene	1,700,000	2,300,000 n	61,000,000 n	27	20	20
Pyrene	2,200,000	2,300,000 n	61,000,000 n	65	32	100
			Total PAHs	579.5	307	531.5
			Total Carcinogenic PAHs	271	155	243
			% Carcinogenic PAHs / Total PAHs	46.76	50.49	45.72

Attachment A. Summary of Positive Detections in Surface Soil Analytical Results
Polyaromatic Hydrocarbons
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Site Screening 39 and 40
Naval Training Center, Orlando
Orlando, FL

NOTES:

All analytical results expressed in micrograms per kilogram (ug/kg) soil dry weight.

¹ SCG = Soil Cleanup Goals in Florida (Florida Department of Environmental Protection memorandum, September 29, 1995), residential scenario.

² RBC = Risk-Based Concentration Table, USEPA Region III, May, 1996, R.L. Smith.

RBC for benzo(g,h,i)perylene, acenaphthylene, and phenanthrene are not available, value is based on pyrene.

RBC for 1-methylnaphthalene and 2-methylnaphthalene are not available, value is based on naphthalene.

ft bls = feet below land surface

ug/kg = micrograms per kilogram.

n = noncarcinogenic pathway

c = carcinogenic pathway

Blank cell in sample results indicate that the analyte or compound has not been detected at the reporting limit.

Bold/shaded values indicate exceedance of residential SCG and/or RBC.