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# SUPPLEMENTAL POLYAROMATIC HYDROCARBONS SAMPLING IN SURFACE SOIL AND SEDIMENT AT STUDY AREA 16 NTC ORLANDO FL

11/16/1999

HARDING LAWSON ASSOCIATES

Harding Lawson Associates

November 16, 1999

Southern Division Naval Facilities Engineering Command
P.O. Box 190010
2155 Eagle Dr.
North Charleston, SC 29419-9010

ATTN: Ms. Barbara Nwokike, Code 187300

Subject: **Supplemental PAH Sampling in Surface Soil and Sediment**
**Study Area 16**
**NTC, Orlando**
**Contract: N62467-89-D-0317**

Dear Barbara:

On August 17, 1999, HLA collected 14 surface soil samples at 13 locations (1 duplicate) and 6 sediment samples at 5 locations (1 duplicate). This work was conducted in accordance with a letter workplan dated March 1997[1] and discussions at Orlando Partnering Team meetings leading up to the BCT approval to transfer SA 16 to the Tank Management Program. The parcel was an active motor pool until recently, and the OPT decided to wait until site activities ceased before implementing the supplemental field investigation. These samples augment the initial site screening investigation, in which 16 surface soil samples and 2 sediment samples were collected. The field effort was conducted to resolve the issue of whether or not the surface soil and sediment at SA 16 would require remediation. The parcel is currently listed in the BRAC Cleanup Plan as multimodal, consistent with nonresidential reuse. The samples were submitted to an approved laboratory for CLP laboratory analysis of PAHs in accordance with USEPA level IV DQOs.

The surface soil and sediment samples were collected at the locations shown on Figure 1 (attached), and are well-distributed throughout the site so that a risk evaluation can be completed if necessary or appropriate. Also shown on Figure 1 are the previous sampling locations and exceedances of screening criteria from the site screening investigation reported in September 1996[2]. The sample nomenclature for the August 1999 sampling event is 16SAXX01 or 16DAXX01, where "S" denotes surface soil, and "D" denotes sediment.

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[1] ABB Environmental Services letter dated March 13, 1997; subject: *Approach for Evaluation of Study Areas with PAH Concentrations Greater than Screening Criteria, Study Areas 16, 17, 18, 21, 23, 26 (Background Surface Soil Samples), 27, 39 and 40*, prepared for SOUTHNAVFACENGCOM, North Charleston, South Carolina.

[2] ABB Environmental Services, *Base Realignment and Closure Environmental Site Screening Report, Study Area 16, NTC, Orlando*, prepared for SOUTHNAVFACENGCOM, North Charleston, South Carolina.

Sampling Rationale. The sample location for 16SA0101/16DA0101/16SA0201 was selected to be upstream of previously collected samples to see what was coming from offsite. This area is more accurately described as a dry swale than a ditch, so "sediment" may not be an accurate designation.

The sample location for 16SA0301/16DA0201/16SA0401 is located on the north side of a large concrete drainage flume opposite the large paved area. This location was selected to determine what contaminants were in the sediment upstream of this major influx area, which had PAH detections that exceeded industrial screening criteria in the 1995 site screening investigation.

The sample location for 16SA0501/16DA0301/16SA0601 is located upstream of a drain pipe outfall on the east side of the ditch. The sampling rationale was again to check sediment concentrations upstream of an unknown input to the system.

The sample location for 16SA0701/16DA0401/16SA0801 is the point furthest downstream that receives direct runoff from the paved parking areas.

The sample location for 16SA0901/16DA0501/16SA1001 was located downstream from everything and should be receiving equal runoff locally from either side of the ditch.

The surface soil sample locations 16SA1101/16SA1201/16SA1301 were selected to evaluate runoff from the paved areas into the grass area.

**Results.** The analytical results of the soil samples were evaluated by comparing the concentrations of the various PAHs detected to screening criteria, including Florida Department of Environmental Protection (FDEP) residential and industrial Soil Cleanup Target Levels (SCTLs) and USEPA Region III Industrial Risk-Based Concentrations (RBCs) (Table 1).

Sediment samples were evaluated by comparing the detected PAH concentrations to (1) USEPA Sediment Quality Criteria; (2) USEPA Region IV Sediment Screening Values; (3) FDEP Sediment Quality Assessment Guidelines (SQAG) (Toxic Effect Level [TEL]); and (4) Ontario SQAG (Lowest Effect Level [LEL]). The screening value derived is the lowest of (1) through (4), which was generally the FDEP SQAG TEL, unless no value was determined, in which case the screening value was derived from the Ontario guidelines (Tables 2A and 2B). It should be noted that the FDEP Probable Effect Levels (PELs) are sometimes used in place of TELs in a risk assessment. The TELs are very conservative when compared to other commonly used SQAGs. In addition, FDEP values are for estuarine sediment.

**Surface soil.** Of the 13 surface soil locations, 4 had minor exceedances of residential screening criteria for either benzo(a)pyrene or dibenzo(a,h)anthracene (Table 1). The concentrations of these two compounds varied from 110 to 150 ug/kg, versus the Florida residential SCTL for both compounds of 100 ug/kg. The sample locations with these exceedances (Figure 1) were 16SA0301, 16SA0401, 16SA0501, and 16SA1201. The nonresidential SCTL for both compounds is 500 ug/kg.

Sediment. For the five sediment locations, four had exceedances of screening criteria. Two of these samples (16DA0301 and 16DA0401) had concentrations of dibenz(a,h)anthracene at concentrations of 35 and 11 ug/kg, respectively, slightly exceeding the screening value of 6.22 ug/kg. Another sample (16DA0101) had detections of 4 PAHs that had moderate exceedances of screening criteria: acenaphthene, acenaphthylene, dibenz(a,h)anthracene, and fluoranthene. The fourth sample (16DA0201) had detections of nearly all PAHs at concentrations up to two orders of magnitude greater than screening concentrations.

**Recommendations.** Four surface soil sample locations (16S009, 16S011, 16S013, 16S014) have exceedances of one or more PAHs that exceed 3 times the nonresidential SCTL for soil. One of the sediment samples (16DA0201) had PAHs at concentrations that exceed three of the four sources for sediment screening values for nearly every PAH for which sediment values have been calculated. Therefore, HLA recommends that institutional controls be implemented to limit site worker exposure until the soil at SA 16 can be remediated to meet nonresidential criteria. Remediation of surface soil may include soil removals with confirmation samples at four locations (16S009, 16S011, 16S013, and 16S014). It is likely that ditch maintenance will remediate the accumulation of contaminants in the ditches surrounding the site. Confirmation samples should be taken following ditch maintenance activities, particularly in the vicinity of sample 16DA0201, to verify that toxic levels of PAHs have been removed.

Should you have any questions or need additional information, please call me at (904) 772-7688.

Very Truly Yours,

**Harding Lawson Associates**

Richard P. Allen

Richard P. Allen
Project Technical Lead

Attachments (Figure 1, Tables 1, 2A and 2B)

cc: Wayne Hansel, SOUTHNAVFACENGCOM
Nancy Rodriguez, USEPA Region IV
David Grabka, FDEP
Steve McCoy, Tetra Tech NUS
Al Aikens, CH2M Hill
John Kaiser
File

| SEDIMENT | ug/kg |
|---|---|
| Acenaphthene | 48 JP |
| Acenaphthylene | 8.3 J |
| Dibenz(a,h)anthracene | 55 P |
| Fluoranthene | 200 |

| GROUNDWATER ug/l (Floating Product present) | |
|---|---|
| Iron | 1250 |

| SURFACE SOIL | ug/kg |
|---|---|
| Benzo(b)fluoranthene | 2800 |
| Benzo(a)anthracene | 1000 |
| Benzo(a)pyrene | 2100 |
| Dibenz(a,h)anthracene | 560 |
| Indeno(1,2,3-cd)pyrene | 1800 |

| SURFACE SOIL | ug/kg |
|---|---|
| Benzo(a)pyrene | 400 |
| Dibenz(a,h)anthracene | 120 J |

| SURFACE SOIL | ug/kg |
|---|---|
| Benzo(a)anthracene | 1100 |
| Benzo(a)pyrene | 1200 |
| Benzo(b)fluoranthene | 1400 |
| Dibenz(a,h)anthracene | 320 J |
| Benzo(a)anthracene (Duplicate) | 2000 |
| Benzo(a)pyrene (Duplicate) | 1700 |
| Benzo(b)fluoranthene (Duplicate) | 2100 |
| Dibenz(a,h)anthracene (Duplicate) | 410 |

| SURFACE SOIL | ug/kg |
|---|---|
| Benzo(a)pyrene | 120 |

| SURFACE SOIL | ug/kg |
|---|---|
| Dibenz(a,h)anthracene | 3400 J |
| Benzo(a)anthracene | 11000 |
| Benzo(a)pyrene | 16000 |
| Benzo(b)fluoranthene | 23000 |
| Benzo(k)fluoranthene | 17000 |
| Indeno(1,2,3-cd)pyrene | 14000 |

| SURFACE SOIL | ug/kg |
|---|---|
| Benzo(a)pyrene | 110 X |

| SURFACE SOIL | ug/kg |
|---|---|
| Benzo(a)pyrene | 150 J |

| SURFACE SOIL | ug/kg |
|---|---|
| Indeno(1,2,3-cd)pyrene | 1400 |
| Benzo(a)anthracene | 2400 |
| Benzo(a)pyrene | 2300 |
| Benzo(b)fluoranthene | 3900 D |
| Dibenz(a,h)anthracene | 500 |

| SURFACE SOIL (Organics ug/kg, Inorganics mg/kg) | |
|---|---|
| Arsenic | 2.1 J |
| Aroclor-1260 | 220 J |

| SURFACE SOIL | mg/kg |
|---|---|
| Arsenic | 3.4 |

| SURFACE SOIL | ug/kg |
|---|---|
| Benzo(a)pyrene | 150 |

| SURFACE SOIL | ug/kg |
|---|---|
| Dibenz(a,h)anthracene | 120 X |

| SEDIMENT | ug/kg |
|---|---|
| Benzo(a)anthracene | 1100 D |
| Benzo(a)pyrene | 1100 D |
| Chrysene | 1400 D |
| Dibenzo(a,h)anthracene | 580 PD |
| Fluoranthene | 4200 D |
| Phenanthrene | 1200 D |
| Pyrene | 2000 D |

| SEDIMENT | ug/kg |
|---|---|
| Dibenz(a,h)anthracene | 35 X |

| SEDIMENT | ug/kg |
|---|---|
| Dibenz(a,h)anthracene | 11 J |

| SEDIMENT (Organics ug/kg, Inorganics mg/kg) | |
|---|---|
| bis(2-Ethylhexyl)phthalate | 190 J |
| bis(2-Ethylhexyl)phthalate (Duplicate) | 320 J |
| Aroclor-1260 | 280 J |
| Aroclor-1260 (Duplicate) | 270 J |
| Lead (Duplicate) | 27.9 J |
| SURFACE WATER ug/l | |
| Aluminum | 2400 |
| Iron | 9800 |
| Lead | 13.5 |
| Mercury | .13 B |
| Zinc | 48.1 |

| SEDIMENT (Organics ug/kg, Inorganics mg/kg) | |
|---|---|
| Fluoranthene | 230 J |
| Lead | 84.5 J |
| SURFACE WATER ug/l | |
| Aluminum | 229 |
| Iron | 12300 |
| Silver | 2.8 B |

16DA0101 16SA0201 16SA0101 16S008 16B017 OLD-16-01 Pine trees 16S009 16S018 OLD-OR-06 16W019 16D019 16S014 Drum storage Hazardous waste shelters UST Fence 7171 7154 16S010 16S011 16SA0301 18SA0401 16DA0201 Asphalt 7172 16B023 16B022 Battery room 16B021 16G005 Former UST (gasoline) Fuel island Picnic area (grass) Planter Former site 7175 Former UST (diesel) Vehicle wash rack 16B006 Grass 16B007 7168 16SA1201 16SA0501 16DA0301 16SA0601 7170 16S012 16S015 OLD-16-02 (85.85) 16SA1101 Truck parking (grass) 7169 16SA1301 Quonset tent storage 16SA0701 16SA0801 16DA0401 AVENUE C Drain pipe outfall 16S013 16SA0901 16SA1001 16DA0501 BINNACLE WAY 16W020 16D020 N

**LEGEND**

- Drainage channels
- Fire hydrant
- Pedestrian bridge
- Sanitary sewer
- Oil-water separator
- Floor trench drain
- Existing monitoring well
- Soil boring and monitoring well location with groundwater elevation on September 14, 1995
- Pole mounted transformer
- Soil boring location
- Surface soil sample location
- Surface water sample location
- Sediment sample location
- UST Underground storage tank
- Surface runoff sluice
- Soil gas detection (benzene, naphtha)

ug/kg micrograms per kilogram
mg/kg milligrams per kilogram
ug/l micrograms per liter

J Reported concentration is an estimated value.
D Indicates value was determined during a diluted reanalysis.
B Reported concentration is between the instrument detection limit and the contract required detection limit.
P Greater than 40% difference in concentrations between detectors
X Concentration reported is based on quantitation from a single detector

0 75 150
SCALE: 1 Inch = 150 Feet

K:\02530\02530-09\LTR\02530900.DWG, VC-B8 11/15/99 12:21:29, ACAD14

**FIGURE 1**

**SOIL BORING, MONITORING WELL, SURFACE SOIL, SEDIMENT, AND SURFACE WATER SAMPLING LOCATIONS, MCCOY ANNEX BUILDINGS 7168,7171, 7172, AND FORMER 7175, U.S. ARMY MOTOR POOL COMPOUND, STUDY AREA 16**

**BASE REALIGNMENT AND CLOSURE ENVIRONMENTAL SITE SCREENING REPORT**

**NAVAL TRAINING CENTER ORLANDO, FLORIDA**

# Table 1. Summary of Analytical Results, Supplemental Sampling
## Polynuclear Aromatic Hydrocarbons
## Study Area 16

Naval Training Center, Orlando
Orlando, FL

| Sample_ID | SCTL [2] Residential | SCTL [2] Industrial | RBC [3] for Industrial Soil | | 16SA0101 | | 16SA0201 | | 16SA0301 | | 16SA0301D | | 16SA0401 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab_ID | | | | | S915520-4 | | S915520-6 | | S915520-14 | | S915520-15 | | S915520-20 | |
| Sampling Date | | | | | 17-Aug-99 | | 17-Aug-99 | | 17-Aug-99 | | 17-Aug-99 | | 17-Aug-99 | |
| **Polynuclear Aromatic Hydrocarbons, ug/kg** | | | | | | | | | | | | | | |
| 1-Methylnaphthalene | 68,000 | 470,000 | | | 12 | J | 21 | U | 30 | P | 29 | P | 89 | |
| 2-Methylnaphthalene | 80,000 | 560,000 | | | 14 | JP | 21 | U | 24 | U | 49 | P | 25 | U |
| Acenaphthene | 1,900,000 | 18,000,000 | 120,000,000 | n | 53 | U | 52 | U | 52 | J | 14 | JP | 140 | P |
| Acenaphthylene | 1,100,000 | 11,000,000 | | | 12 | J | 21 | U | 94 | | 64 | | 100 | |
| Anthracene | 18,000,000 | 260,000,000 | 610,000,000 | n | 0.89 | J | 0.87 | J | 5.5 | | 6.6 | | 22 | |
| Benzo(a)anthracene | 1,400 | 5,000 | 7,800 | c | 14 | | 3.8 | JP | 46 | | 48 | | 160 | |
| Benzo(a)pyrene | 100 | 500 | 780 | c | 19 | | 3.9 | J | 64 | | 62 | | 150 | |
| Benzo(b)fluoranthene | 1,400 | 4,800 | 7,800 | c | 31 | | 8 | | 120 | | 110 | | 260 | D |
| Benzo(g,h,i)perylene | 2,300,000 | 41,000,000 | | | 43 | P | 8.3 | JP | 120 | P | 120 | P | 220 | P |
| Benzo(k)fluoranthene | 15,000 | 52,000 | 78,000 | c | 10 | | 2.1 | JP | 49 | | 45 | | 100 | |
| Chrysene | 140,000 | 450,000 | 780,000 | c | 27 | | 7.2 | | 78 | | 81 | | 250 | D |
| Dibenzo(a,h)anthracene | 100 | 500 | 780 | c | 10 | U | 10 | U | 120 | X | 99 | X | 77 | X |
| Fluoranthene | 2,900,000 | 48,000,000 | 82,000,000 | n | 57 | | 20 | | 140 | P | 160 | | 440 | |
| Fluorene | 2,200,000 | 28,000,000 | 82,000,000 | n | 10 | U | 10 | U | 14 | U | 12 | U | 7.5 | J |
| Indeno(1,2,3-cd)pyrene | 1,500 | 5,300 | 7,800 | c | 23 | P | 6.7 | J | 82 | | 80 | | 160 | D |
| Naphthalene | 40,000 | 270,000 | 41,000,000 | n | 21 | U | 21 | U | 24 | U | 23 | U | 25 | U |
| Phenanthrene | 2,000,000 | 30,000,000 | | | 12 | | 3.8 | J | 47 | | 46 | | 180 | |
| Pyrene | 2,200,000 | 37,000,000 | | | 38 | | 14 | | 94 | | 86 | | 290 | |

B = Reported concentration is between the instrument detection limit (IDL) and Contract Required Detection Limit (CRDL).

D = Indicates value was determined during a diluted reanalysis.

J = Reported concentration is an estimated quantity.

P = Greater than 40% difference in concentrations between detector.

X = Concentration reported is based on quantitation from a single detector.

U = The analyte/compound was analyzed for but was not detected above the reported sample quantitation limit.
The number preceding the U qualifier is the reported sample quantitation limit.

# Table 1. Summary of Analytical Results, Supplemental Sampling
## Polynuclear Aromatic Hydrocarbons
## Study Area 16

Naval Training Center, Orlando
Orlando, FL

| Sample_ID | SCTL [2] Residential | SCTL [2] Industrial | RBC [3] for Industrial Soil | | 16SA0501 | | 16SA0601 | | 16SA0701 | | 16SA0801 | | 16SA0901 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab_ID | | | | | S915520-12 | | S915520-19 | | S915520-10 | | S915520-18 | | S915520-7 | |
| Sampling Date | | | | | 17-Aug-99 | | 17-Aug-99 | | 17-Aug-99 | | 17-Aug-99 | | 17-Aug-99 | |
| **Polynuclear Aromatic Hydrocarbons, ug/kg** | | | | | | | | | | | | | | |
| 1-Methylnaphthalene | 68,000 | 470,000 | | | 44 | | 22 | U | 23 | U | 22 | U | 23 | U |
| 2-Methylnaphthalene | 80,000 | 560,000 | | | 23 | U | 22 | U | 23 | U | 22 | U | 23 | U |
| Acenaphthene | 1,900,000 | 18,000,000 | 120,000,000 | n | 62 | | 56 | U | 58 | U | 56 | U | 58 | U |
| Acenaphthylene | 1,100,000 | 11,000,000 | | | 12 | J | 22 | U | 13 | J | 22 | U | 23 | U |
| Anthracene | 18,000,000 | 260,000,000 | 610,000,000 | n | 8.5 | | 4.5 | U | 4.6 | U | 0.81 | J | 4.7 | U |
| Benzo(a)anthracene | 1,400 | 5,000 | 7,800 | c | 66 | | 3.9 | J | 8.8 | | 8.6 | | 7.2 | |
| Benzo(a)pyrene | 100 | 500 | 780 | c | 73 | | 5.6 | | 9.4 | P | 20 | | 5.9 | P |
| Benzo(b)fluoranthene | 1,400 | 4,800 | 7,800 | c | 120 | | 12 | | 16 | | 22 | | 11 | |
| Benzo(g,h,i)perylene | 2,300,000 | 41,000,000 | | | 100 | P | 11 | U | 6.8 | JP | 11 | U | 12 | U |
| Benzo(k)fluoranthene | 15,000 | 52,000 | 78,000 | c | 52 | | 5.5 | | 7 | | 13 | | 3.9 | J |
| Chrysene | 140,000 | 450,000 | 780,000 | c | 100 | | 7.6 | | 13 | | 13 | | 7 | P |
| Dibenzo(a,h)anthracene | 100 | 500 | 780 | c | **110** | X | 4 | JX | 7.9 | J | 88 | X | 12 | U |
| Fluoranthene | 2,900,000 | 48,000,000 | 82,000,000 | n | 220 | | 16 | | 29 | | 21 | | 20 | |
| Fluorene | 2,200,000 | 28,000,000 | 82,000,000 | n | 2.2 | JP | 11 | U | 12 | U | 11 | U | 12 | U |
| Indeno(1,2,3-cd)pyrene | 1,500 | 5,300 | 7,800 | c | 78 | | 6.7 | J | 10 | JP | 44 | | 2.7 | JP |
| Naphthalene | 40,000 | 270,000 | 41,000,000 | n | 23 | U | 22 | U | 23 | U | 22 | U | 23 | U |
| Phenanthrene | 2,000,000 | 30,000,000 | | | 52 | | 2.1 | JP | 5.3 | | 3.8 | J | 3 | J |
| Pyrene | 2,200,000 | 37,000,000 | | | 120 | | 11 | J | 16 | P | 22 | P | 13 | P |

B = Reported concentration is between the instrument detection limit (IDL) and Contract Required Detecti

D = Indicates value was determined during a diluted reanalysis.

J = Reported concentration is an estimated quantity.

P = Greater than 40% difference in concentrations between detector.

X = Concentration reported is based on quantitation from a single detector.

U = The analyte/compound was analyzed for but was not detected above the reported sample quantitation l

The number preceding the U qualifier is the reported sample quantitation limit.

# Table 1. Summary of Analytical Results, Supplemental Sampling
## Polynuclear Aromatic Hydrocarbons
## Study Area 16

Naval Training Center, Orlando
Orlando, FL

| Sample_ID | SCTL [2] Residential | SCTL [2] Industrial | RBC [3] for Industrial Soil | | 16SA1001 | | 16SA1101 | | 16SA1201 | | 16SA1301 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab_ID | | | | | S915520-17 | | S915520-3 | | S915520-2 | | S915520-1 | |
| Sampling Date | | | | | 17-Aug-99 | | 17-Aug-99 | | 17-Aug-99 | | 17-Aug-99 | |
| **Polynuclear Aromatic Hydrocarbons, ug/kg** | | | | | | | | | | | | |
| 1-Methylnaphthalene | 68,000 | 470,000 | | | 71 | | 14 | JP | 35 | | 21 | U |
| 2-Methylnaphthalene | 80,000 | 560,000 | | | 86 | | 18 | JP | 50 | P | 21 | U |
| Acenaphthene | 1,900,000 | 18,000,000 | 120,000,000 | n | 190 | | 53 | U | 54 | U | 52 | U |
| Acenaphthylene | 1,100,000 | 11,000,000 | | | 88 | | 14 | J | 36 | | 21 | U |
| Anthracene | 18,000,000 | 260,000,000 | 610,000,000 | n | 6.4 | | 1.2 | JP | 3.5 | JP | 0.43 | J |
| Benzo(a)anthracene | 1,400 | 5,000 | 7,800 | c | 20 | | 20 | | 53 | | 6.6 | |
| Benzo(a)pyrene | 100 | 500 | 780 | c | 16 | | 22 | P | 65 | | 8.6 | |
| Benzo(b)fluoranthene | 1,400 | 4,800 | 7,800 | c | 18 | | 39 | | 110 | | 14 | |
| Benzo(g,h,i)perylene | 2,300,000 | 41,000,000 | | | 140 | | 55 | P | 120 | P | 20 | P |
| Benzo(k)fluoranthene | 15,000 | 52,000 | 78,000 | c | 9.2 | | 17 | | 48 | | 6.2 | |
| Chrysene | 140,000 | 450,000 | 780,000 | c | 25 | | 31 | | 86 | | 11 | |
| Dibenzo(a,h)anthracene | 100 | 500 | 780 | c | 100 | X | 53 | P | 120 | | 14 | |
| Fluoranthene | 2,900,000 | 48,000,000 | 82,000,000 | n | 50 | | 78 | | 140 | P | 17 | |
| Fluorene | 2,200,000 | 28,000,000 | 82,000,000 | n | 19 | | 11 | U | 1.9 | JP | 10 | U |
| Indeno(1,2,3-cd)pyrene | 1,500 | 5,300 | 7,800 | c | 22 | | 30 | | 75 | | 10 | JP |
| Naphthalene | 40,000 | 270,000 | 41,000,000 | n | 76 | | 21 | U | 22 | U | 21 | U |
| Phenanthrene | 2,000,000 | 30,000,000 | | | 16 | | 14 | | 48 | | 3.3 | J |
| Pyrene | 2,200,000 | 37,000,000 | | | 30 | | 50 | | 88 | P | 10 | JP |

B = Reported concentration is between the instrument detection limit (IDL) and Contract Required Detecti

D = Indicates value was determined during a diluted reanalysis.

J = Reported concentration is an estimated quantity.

P = Greater than 40% difference in concentrations between detector.

X = Concentration reported is based on quantitation from a single detector.

U = The analyte/compound was analyzed for but was not detected above the reported sample quantitation l

The number preceding the U qualifier is the reported sample quantitation limit.

# Table 2A. Summary of Sediment Analytical Results, Supplemental Sampling
## Polynuclear Aromatic Hydrocarbons
## Study Area 16

Naval Training Center, Orlando
Orlando, FL

| Sample_ID | Screening Value [1] | 16DA0101 | 16DA0201 | 16DA0301 | 16DA0401 | 16DA0501 | 16DA0501D |
|---|---|---|---|---|---|---|---|
| Lab_ID | | S915520-5 | S915520-16 | S915520-13 | S915520-11 | S915520-8 | S915520-9 |
| Sampling Date | | 17-Aug-99 | 36,389 | 17-Aug-99 | 17-Aug-99 | 17-Aug-99 | 17-Aug-99 |
| **Polynuclear Aromatic Hydrocarbons, ug/kg** | | | | | | | |
| 1-Methylnaphthalene | ND | 32 | 690 | 29 U | 23 U | 26 U | 28 U |
| 2-Methylnaphthalene | 20.2 | 22 U | **440** P | 6.6 J | 6.6 JP | 26 U | 28 U |
| Acenaphthene | 6.71 | **48** JP | **240** P | 72 U | 58 U | 66 U | 71 U |
| Acenaphthylene | 5.87 | **8.9** J | 33 U | 29 U | 23 U | 26 U | 28 U |
| Anthracene | 46.9 | 3.5 J | **100** | 0.81 JP | 1.2 J | 5.3 U | 5.7 U |
| Benzo(a)anthracene | 74.8 | 40 | **1,100** D | 10 | 10 | 5.3 U | 1.2 J |
| Benzo(a)pyrene | 88.8 | 58 | **1,100** D | 14 | 16 | 1.3 J | 1.5 J |
| Benzo(b)fluoranthene | ND | 120 | 2,000 D | 28 | 29 | 2.7 J | 2.9 J |
| Benzo(g,h,i)perylene | 170 | 160 P | **1,900** PD | 60 P | 34 P | 13 U | 14 U |
| Benzo(k)fluoranthene | 240 | 51 | **840** D | 4.4 JP | 12 | 1.2 J | 1.3 J |
| Chrysene | 108 | 86 | **1,400** D | 21 | 20 | 1.7 JP | 2.3 J |
| Dibenz(a,h)anthracene | 6.22 | **98** P | **580** PD | **35** X | **11** J | 13 U | 14 U |
| Fluoranthene | 113 | **200** | **4,200** D | 46 | 49 | 5.8 J | 5.8 J |
| Fluorene | 21.2 | 11 U | **52** P | 14 U | 12 U | 13 U | 14 U |
| Indeno(1,2,3-cd)pyrene | 200 | 120 D | **1,200** D | 19 | 18 | 13 U | 14 U |
| Naphthalene | 34.6 | 22 U | **80** P | 29 U | 23 U | 26 U | 28 U |
| Phenanthrene | 86.7 | 43 | **1,200** D | 6.7 | 8.4 | 0.58 JP | 1.3 J |
| Pyrene | 153 | 110 P | **2,000** D | 30 P | 25 | 2.8 J | 3.1 J |
| | | | | | | | |
| **Total PAHs** | 1684 | 1233 | **19,155** | 455 | 379 | 249 | 264 |

Notes:

[1]The smaller value of USEPA SQC, USEPA Region IV SSV, FDEP SQAG TEL or PEL , and Ontario SQAG (See Table 2B for screening value source)

ND = not determined

B = Reported concentration is between the instrument detection limit (IDL) and Contract Required Detection Limit (CRDL).

D = Indicates value was determined during a diluted reanalysis.

J = Reported concentration is an estimated quantity.

P = greater than 40% difference in concentrations between detectors.

X = Concentration reported is based on quantitation from a single detector.

U = The analyte/compound was analyzed for but was not detected above the reported sample quantitation limit. The number preceding the U qualifier is the reported sample quantitation limit.

Table 2B. Derivation of Sediment Screening Value (See Table 2A), Supplemental Sampling
Polynuclear Aromatic Hydrocarbons
Study Area 16

Naval Training Center, Orlando
Orlando, FL

| Sample_ID | USEPA SQC [1] | USEPA Region IV SSV [2] | FDEP SQAG (TEL) [3] | FDEP SQAG (PEL) [3] | Ontario SQAG (LEL) [4] | Screening Value |
|---|---|---|---|---|---|---|
| **Polynuclear Aromatic Hydrocarbons, ug/kg** | | | | | | |
| 1-Methylnaphthalene | ND | ND | ND | ND | ND | ND |
| 2-Methylnaphthalene | ND | 330 | 20.2 | 201 | ND | 20.2 |
| Acenaphthene | 1300 | 330 | 6.71 | 88.9 | ND | 6.71 |
| Acenaphthylene | ND | 330 | 5.87 | 128 | ND | 5.87 |
| Anthracene | ND | 330 | 46.9 | 245 | 220 | 46.9 |
| Benzo(a)anthracene | 13,170 | 330 | 74.8 | 693 | 320 | 74.8 |
| Benzo(a)pyrene | 10,630 | 330 | 88.8 | 763 | 370 | 88.8 |
| Benzo(b)fluoranthene | ND | ND | ND | ND | ND | ND |
| Benzo(g,h,i)perylene | ND | ND | ND | ND | 170 | 170 |
| Benzo(k)fluoranthene | ND | ND | ND | ND | 240 | 240 |
| Chrysene | ND | 330 | 108 | 846 | 340 | 108 |
| Dibenz(a,h)anthracene | ND | 330 | 6.22 | 135 | 60 | 6.22 |
| Fluoranthene | 6200 | 330 | 113 | 1494 | 750 | 113 |
| Fluorene | ND | 330 | 21.2 | 144 | 190 | 21.2 |
| Indeno(1,2,3-cd)pyrene | ND | ND | ND | ND | 200 | 200 |
| Naphthalene | ND | 330 | 34.6 | 391 | ND | 34.6 |
| Phenanthrene | 1800 | 330 | 86.7 | 544 | 560 | 86.7 |
| Pyrene | 13,110 | 330 | 153 | 1398 | 490 | 153 |
| | | | | | | |
| **Total PAHs** | | **1,684** | | | | **1,684** |

Notes:

[1] USEPA Sediment Quality Criteria (SQC)(USEPA, 1993a, b, and c) and sediment quality guidelines (USEPA, 1988). Values are adjusted assuming 1% TOC.

[2] USEPA Region 4 Waste Management Division Sediment Screening Values (SSV) for Hazardous Waste Sites (USEPA, 1998).

[3] Florida Department of Environmental Protection (FDEP) Sediment Quality Assessment Guidelines (SQAG) Toxic Effect Level (TEL) and Probable Effect Level (PEL) (MacDonald, 1994).

[4] Ontario Ministry of the Environment (OME) SQAG Lowest Effect Level (LEL) (Persaud, 1996).

ND = not determined