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January 13, 2010

U.S. Environmental Protection Agency – Region II
290 Broadway – 22nd Floor
New York, NY 10007-1866

Attn: Mr. Adolph Everett, P.E.
Chief, RCRA Programs Branch

Re: Contract N69450-08-C-0093
Corrective Action for SWMUs 14, 56, 68 and 69
Naval Activity Puerto Rico, Ceiba, Puerto Rico
U.S. Naval Activity Puerto Rico (NAPR)
EPA I.D. No. PR2170027203
Letter Report – SWMU 56/Site 56A Source Area Investigation Report

Dear Mr. Everett:

Michael Baker, Jr., Inc. (Baker), on behalf of the Navy, has completed the sampling and laboratory analysis of surface soil collected adjacent to Rabaul Street and sediment collected from the drainage ditch system at Solid Waste Management Unit (SWMU) 56/Site 56A. SWMU 56/Site 56A is located southwest of SWMU 56 and consists of Building 207 (formerly a weapons inert storage area) and a drainage ditch system that conveys storm water to a drainage ditch downgradient from SWMU 56.

A preliminary evaluation of the analytical data indicates that there are elevated concentrations of certain chemicals in sediments within the drainage ditch system adjacent to Building 207, from the headwaters of the ditch system to Rabaul Street. Sediment samples collected from the drainage ditch system downgradient of Rabaul Street (56A-SD06 to 56A-SD10) also contained elevated concentrations of certain chemicals. While potential contamination was indicated by the sediment analytical data, the source of the contamination cannot be ascertained by the available analytical data. Therefore, additional sampling is recommended to determine the source of contamination, and if this area should move forward in the Resource Conservation and Recovery Act (RCRA) program.

The paragraphs that follow provide a brief summary of the surface soil and drainage ditch sediment sampling activities and a discussion of the analytical data.

Background Information

Sediment samples were collected from the drainage ditch system downgradient from SWMU 56/Site 56A in September 2008 as part of an ongoing investigation at SWMU 56. Sediment samples were collected upgradient of potential influences from SWMU 56 to provide an analytical data set that could be used as a SWMU-specific background data set. However, several metals (e.g., arsenic, cobalt, copper, lead, vanadium, and zinc) were detected in three sediment samples (56SD08, 56SD09 and 56SD11) at

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concentrations greater than ecological-based screening values previously established and used in ecological risks assessments at NAPR.

The analytical results from the September 2008 sampling event were presented at a meeting on October 30, 2008 attended by the United States Environmental protection Agency (USEPA), Puerto Rico Environmental Quality Board (PREQB), Navy, TechLaw, Inc. (consultant for USEPA), TRC (consultant for PREQB), Baker Environmental, Inc. (consultant for the Navy), and Right Way Environmental Contactors, Inc. (remediation contractor for the Navy). During the meeting, Building 207 was identified as a potential source of contamination since it is located upstream of two drainage ditch sediment samples containing elevated metal concentrations (i.e., 56SD08 and 56SD09). Rabaul Street, located between Building 207 and sediment locations 56SD08 and 56SD09, also was identified as a potential source of metals contamination. It was recommended that soil from the embankment leading from the road to the ditch be collected to determine if activities conducted on the road could be contributing to the metals contamination in this area. It also was recommended that additional sediment samples be collected within the drainage ditch system adjacent to and downgradient from Building 207. An exercise was conducted during this meeting in which sampling locations were proposed and agreed upon by all parties.

On May 20, 2009, Baker on behalf of the Navy submitted a figure showing the proposed sample locations (Figure 1) and a sampling matrix outlining the samples to be collected to the USEPA and the PREQB for review and approval. It was indicated at this time that the approved Final Corrective Measures Study Work Plan SWMU 56 (Baker, 2007) would be used to implement the surface soil and drainage ditch sediment sampling program. The USEPA approved the sampling locations on May 20, 2009, while the PREQB approved the locations on May 26, 2009.

Field Activities

Surface soil and sediment samples were collected in June 2009 as follows:

- Four surface soil samples were collected using a bucket auger from the ground surface to a maximum depth of one foot on both sides of Rabaul Street as shown on Figure 2 (bucket auger refusal at 56A-SS03 and 56A-SS04 occurred at a depth of eight inches and nine inches, respectively). One duplicate and one matrix spike/matrix spike duplicate [MS/MSD] sample also were collected.
- Ten sediment samples (locations are shown on Figure 2) were collected from the surface to a depth of 4 inches using dedicated stainless steel spoons. One duplicate and one MS/MSD sample also were collected.

The surface soil and sediment samples were sent to Test America (Savannah, Georgia) for Appendix IX volatile organic compound (VOC), semivolatile organic compound (SVOC) (including low level polycyclic aromatic hydrocarbons [LLPAHs]), organochlorine pesticide, polychlorinated biphenyl (PCB) and metal analyses. The data was certified by a Puerto Rico certified chemist. All analytical data was validated by DataQual Environmental Services, LLC. (St. Louis, Missouri) in accordance with USEPA Region II Data Validation Standard Operating Procedures.

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Deviations from Approved Sampling Locations

The proposed sample locations are presented on Figure 1, while the actual sample locations are shown on Figure 2. Prior to sample collection activities, the following sampling points were adjusted in the field with PREQB concurrence (A PREQB representative was present during sediment sampling activities): 56A-SD01, 56A-SD02, 56A-SD03, 56A-SD04, 56A-SD05, 56A-SD08, 56A-SD09 and 56A-SD10. The location of sediment sample 56A-SD03 was re-established 15 feet to the west of its proposed location, closer to the headwaters of the northern ditch. There was no evidence of a ditch at proposed sample locations 56A-SD01 and 56A-SD02. Therefore, these proposed locations were re-established downgradient of the headwaters of the southern ditch. Sample locations 56A-SD04 and 56A-SD05 were re-established downgradient of the headwaters of the northern ditch. Sample location 56A-SD08 was moved to the confluence of the two drainage ditches. 56A-SD09 and 56ASD10 were re-located downgradient of the confluence of the two ditches.

Analytical Results

Detected concentrations of VOCs, SVOCs (including LLP AHs), organochlorine pesticides, and metals for surface soil and drainage ditch sediment are provided in Tables 1 and 2, respectively (PCBs were not detected in either media and are excluded from the tables). The analytical results for the three sediment samples collected in September 2008 and cited above (i.e., 56SD08, 56SD09 and 56SD11) are included in Table 2. These three sediment samples were analyzed only for Appendix IX metals. The surface soil and sediment data were first screened against background and then against human health and ecological screening values. Screening criteria for surface soil included USEPA Regional Screening Levels (RSLs) for Residential and Industrial Soil, ecological soil screening values, and NAPR basewide background screening values. Screening criteria for sediment included RSLs for Residential and Industrial soil, ecological sediment screening values, and upper limit of the mean concentrations for a background freshwater drainage ditch sediment data set derived from sediment samples collected June 24 to June 27, 2009. The background sediment sampling program was approved by the USEPA and PREQB on May 28, 2009 and June 3, 2009, respectively. Analytical results will be presented as an addendum to the *Revised Final II Summary Report for Environmental Background Concentrations for Inorganic Compounds* under separate cover. It is noted that the ecological screening values used in the comparison to the sediment analytical data are invertebrate-based values and used for preliminary screening purposes to determine if a release has occurred. Therefore, they are not intended to be representative of all potential ecological receptors. A comparison of detected concentrations to applicable screening criteria is included within Tables 1 and 2 for surface soil and sediment, respectively. A representation of the spatial distribution of detected surface soil and sediment concentrations greater than screening criteria is provided on Figures 3 and 4, respectively.

Surface Soil

As evidenced by Table 1, six VOCs, three SVOCs, and nine pesticides were detected in surface soil. Benzo(a)pyrene) was detected in two surface soil samples (23J ug/kg in 56A-SS04 and 19J ug/kg in 56S-SS04D at a concentration greater than the USEPA RSL for Residential Soil. None of the other detected organics were present at concentrations greater than human health or ecological screening values.

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Fifteen metals were detected in the surface soil samples collected at SWMU 56/Site 56A (see Table 1). Of these fifteen metals, arsenic and lead exceed either the human health or ecological screening criteria and background value: arsenic and lead. Arsenic was detected in four surface soil samples at concentrations greater than the RSL for residential soil and industrial soil and background value (4.1 mg/kg in 56A-SS02, 2.8 mg/kg in 56A-SS03, 6.2 mg/kg in 56A-SS04, and 5 mg/kg in 56A-SS04D), while lead was detected in two surface soil samples at concentrations greater than the ecological soil screening value and background value (23.1J mg/kg in 56A-SS04 and 22.4 mg/kg in 56A-SS04D). The analytical data show no significant impact to surface soils in the vicinity of the ditch adjacent to Rabaul Street.

Sediment

Detected chemicals in the drainage ditch sediment samples were compared to human health and ecological screening criteria as shown in Table 2. Ten background sediment samples (and one duplicate sample) were collected from the freshwater drainage ditch during this sampling event. A background screening value (mean plus two standard deviations i.e. upper limit of the means) for each metal was calculated from the background drainage ditch sediment data set previously discussed using the procedures presented in the *Revised Final II Summary Report for Environmental Background Concentrations of Inorganic Compounds* (Baker, 2008) and the sediment sample results were compared to this upper limit of the means as an indicator of potential site contamination. As discussed and agreed upon during the October 30, 2008 meeting at the USEPA Region 2 Offices, the results of the background freshwater drainage ditch sediment samples will be provided under separate cover as an addendum to the *Revised Final II Summary Report for Environmental Background Concentrations of Inorganic Compounds*

As evidenced by Table 2, nine VOCs were detected in drainage ditch sediment (2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone, carbon disulfide, ethylmethacrylate, isobutyl alcohol, propionitrile, and 1,4-dioxane). Of these nine VOCs, 2-butanone, 2-hexanone, acetone, isobutyl alcohol, propionitrile, and 1,4-dioxane were detected in one or more of the sediment samples at concentrations greater than ecologically-based sediment screening values. It is noted that analytical results for isobutyl alcohol, propionitrile, and 1,4-dioxane in ten of eleven sediment samples were rejected during data validation activities. As such the completeness goals for these three VOCs (95 percent of all sample data), established in the Data Control Quality Assurance Plan (DCQAP; Baker, 1995), were not met.

In addition to VOCs, six SVOCs (3,4-methylphenol, benzo[a]pyrene, bis[2-ethylhexyl]phthalate, di-n-octylphthalate, fluoranthene, and pyrene) and thirteen organochlorine pesticides (see Table 2) were detected in one or more of the drainage ditch sediment samples. Benzo(a)pyrene was detected at a concentration above the USEPA Residential RSL in two samples (24J ug/kg in 56A-SD03 and 37J ug/kg in 56A-SD07), while di-n-octylphthalate was detected above the ecological-based sediment screening value in three samples (99J ug/kg in 56A-SD02, 140J ug/kg in 56A-SD07, 82J ug/kg in 56A-SD10, and 130J ug/kg in the duplicate 56A-SD10D). Of the thirteen pesticides detected in drainage ditch sediment, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and heptachlor were detected above ecological-based sediment screening values (see Table 2). None of the pesticides were detected above human health-based SLs.

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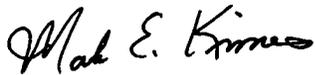
Fifteen metals were detected in drainage ditch sediment samples collected from SWMU 56/Site 56A. Of the 15 detected metals, arsenic, barium, cobalt, copper, lead, mercury, nickel, tin, vanadium, and zinc were detected above either the human health or ecological screening values and the upper limit of the mean background concentration (see Table 2 and Figure 4). As shown on Table 2, sample 56A-SD01 exhibited the highest detected arsenic and lead concentration (17.3J mg/kg and 216 mg/kg, respectively) concentrations of metals detected. Sediment sample location 56A-SD01 is located in the southern drainage ditch adjacent to Building 207 (see Figure 2). An orange precipitate, similar to the iron precipitates observed in water bodies impacted by acid mine drainage, was observed within the ditch at this location. Although the source of the precipitated material is not known, groundwater may be serving as a transport mechanisms for the substance prior to its precipitation within the ditch bed. The extent of the orange precipitate was limited to a segment of the drainage ditch from approximately ten yards upgradient of sample location 56A-SD01 to the culvert inlet immediately downgradient from sample location 56A-SD01 (see Figure 2 for the location of the referenced culvert relative to 56A-SD01).

In summary, the analytical data do not suggest that chemical detections above screening criteria in drainage ditch sediments west of Rabaul Road can be attributed to soil contamination in the vicinity of Rabaul Road and the culverts that convey ditch water under this roadway. However, the analytical data do indicate the presence of elevated VOC, SVOC, pesticide, and metal concentrations (i.e., elevated with respect to human health, ecological, and/or background screening criteria) within drainage ditch sediments east and west of Rabaul Street. While contamination is indicated by the sediment analytical data, it cannot be definitively stated that the source of this contamination is Building 207. Therefore, it is recommended that an additional field investigation be conducted in the vicinity of Building 207 to determine if activities conducted at this structure are responsible for the elevated concentrations detected in drainage ditch sediments. Specific activities associated with this investigation will be presented in a work plan once the Navy approves a formal scope of work and secures the necessary funding for project implementation.

If you have questions regarding this submittal, please contact Mr. Mark Davidson at (843) 743-2124.

Sincerely,

MICHAEL BAKER JR., INC.



Mark E. Kimes, P.E.
Activity Coordinator

MEK/lp
Attachments

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cc: Ms. Debra Evans-Ripley, BRAC PMO SE (letter only)
Mr. David Criswell, BRAC PMO SE (letter only)
Mr. Mark E. Davidson, BRAC PMO SE (1 hard copy)
Mr. Pedro Ruiz, NAPR (1 hard copy)
Mr. Timothy Gordon, EPA Region II (1 hard copy)
Mr. Carl Soderberg, US EPA Caribbean Office (1 hard copy)
Mr. Felix Lopez, US F&WS (1 hard copy)
Mr. Anthony Scacifero, TechLaw, Inc. (1 hard copy)
Ms. Willmarie Rivera, PREQB (1 hard copy)
Ms. Gloria Toro, PREQB (1 hard copy)

TABLES

TABLE 1

**SUMMARY OF DETECTED LAB RESULTS - SURFACE SOIL
SWMU 56 / SITE 56A
SOURCE AREA INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Site ID	Regional	<i>Regional</i>	Ecological		56A-SS01	56A-SS02	56A-SS03	56A-SS04	56A-SS04
Sample ID	Screening	<i>Screening</i>	Soil	<u>NAPR</u>	56A-SS01	56A-SS02	56A-SS03	56A-SS04	56A-SS04D
Date	Levels	<i>Levels</i>	Screening	<u>Basewide</u>	6/23/09	6/23/09	6/23/09	6/23/09	6/23/09
Depth Range (ft bgs)	Residential	<i>Industrial</i>	Values	<u>Background⁽¹⁾</u>	0-1	0-1	0-0.66	0-0.75	0-0.75
Volatile Organic Compounds (ug/kg)									
1,4-Dioxane	44,000	160,000	NE	NE	210 J	290 R	260 R	210 J	380 R
2-Hexanone	NE	NE	NE	NE	18	15 U	13 U	16 J	19 U
4-Methyl-2-pentanone	530,000 ⁽²⁾	5,200,000 ⁽²⁾	NE	NE	3.7 J	15 U	13 U	16 U	19 U
Acetone	6,100,000 ⁽²⁾	61,000,000 ⁽²⁾	NE	NE	48 J	22 J	13 R	48 J	34 J
Isobutyl alcohol	2,300,000 ⁽²⁾	31,000,000 ⁽²⁾	NE	NE	78 J	290 R	260 R	330 R	380 R
Propionitrile	NE	NE	NE	NE	65 J	290 R	260 R	71 J	380 R
Semivolatile Organic Compounds (ug/kg)									
Benzo(a)pyrene	15.0	210	NE	NE	38 U	43 U	39 UJ	23 J	19 J
bis(2-Ethylhexyl)phthalate	35,000	120,000	6,010 ⁽³⁾⁽⁴⁾	NE	38 U	43 U	43	44 U	44 U
Fluoranthene	230,000 ⁽²⁾	2,200,000 ⁽²⁾	NE	NE	38 U	43 U	9.3 J	22 J	17 J
Pesticides (ug/kg)									
4,4'-DDE	1,400	5,100	93 ⁽⁶⁾	NE	0.92 J	8.8	2.5 J	4 J	5.7
4,4'-DDT	1,700	7,000	93 ⁽⁶⁾	NE	2 J	2.1 J	3.7 J	6.5 J	7 J
Alpha-chlordane	1,600 ⁽⁵⁾	6,500 ⁽⁵⁾	100 ⁽⁹⁾	NE	0.32 J	2.2 U	1.9 U	2.2 U	0.38 J
Delta-BHC	270 ⁽⁵⁾	960 ⁽⁵⁾	201 ⁽⁷⁾⁽⁸⁾	NE	1.9 U	2.2 U	1.9 U	2.2 U	0.36 J
Endrin aldehyde	1,800 ⁽²⁾⁽⁵⁾	18,000 ⁽²⁾⁽⁵⁾	100 ⁽⁹⁾	NE	0.63 J	4.2 U	3.8 U	4.2 U	4.3 U
Endrin ketone	1,800 ⁽²⁾⁽⁵⁾	18,000 ⁽²⁾⁽⁵⁾	NE	NE	3.7 U	4.2 U	3.8 U	4.2 U	1.4 J
Gamma-chlordane	1,600 ⁽⁵⁾	6,500 ⁽⁵⁾	100 ⁽⁹⁾	NE	1.9 U	2.2 U	0.24 J	2.2 U	2.2 U
Heptachlor	110	380	100 ⁽⁹⁾	NE	0.41 J	2.2 U	1.9 U	2.2 U	2.2 U
Isodrin	NE	NE	100 ⁽⁹⁾	NE	1.9 U	2.2 U	1.9 U	2.2 U	0.37 J

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SWMU 56 / SITE 56A
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Site ID	Regional	<i>Regional</i>	Ecological		56A-SS01	56A-SS02	56A-SS03	56A-SS04	56A-SS04
Sample ID	Screening	<i>Screening</i>	Soil	<u>NAPR</u>	56A-SS01	56A-SS02	56A-SS03	56A-SS04	56A-SS04D
Date	Levels	<i>Levels</i>	Screening	<u>Basewide</u>	6/23/09	6/23/09	6/23/09	6/23/09	6/23/09
Depth Range (ft bgs)	Residential	<i>Industrial</i>	Values	<u>Background⁽¹⁾</u>	0-1	0-1	0-0.66	0-0.75	0-0.75
Metals (mg/kg)									
Antimony	3.10 ⁽²⁾	41.0 ⁽²⁾	78.0 ⁽¹⁰⁾	3.17	1.6 J	<u>2.8</u> J	1.7 J	<u>2.7</u> J	<u>2.5</u> J
Arsenic	0.390	1.60	18.0 ⁽¹¹⁾	2.65	0.36 U	<u>4.1</u>	<u>2.8</u>	<u>6.2</u>	<u>5</u>
Barium	1,500 ⁽²⁾	19,000 ⁽²⁾	330 ⁽¹²⁾	199	82.7	184	53.5	78.5	65.2
Cadmium	7.00 ⁽²⁾	80.0 ⁽²⁾	0.77 ⁽¹³⁾	1.02	0.07 U	0.08 U	0.29 J	0.08 U	0.12 J
Chromium	280	1,400	26.0 ⁽¹⁴⁾	49.8	7.2	22.7	20.5	23	23.8
Cobalt	2.30 ⁽²⁾	30.0 ⁽²⁾	13.0 ⁽¹⁵⁾	46.2	17	31.6	11.1	19.2	18
Copper	310 ⁽²⁾	4,100 ⁽²⁾	28.0 ⁽¹⁶⁾	168	94	105	63	86.4	89
Lead	400	800	11.0 ⁽¹⁷⁾	22.0	3.2 J	11.7 J	17.6 J	23.1 J	22.4 J
Mercury	0.430 ⁽²⁾	2.40 ⁽²⁾	0.10 ⁽¹⁸⁾	0.109	0.017 U	0.056	0.046	0.027	0.042
Nickel	150 ⁽²⁾	2,000 ⁽²⁾	38.0 ⁽¹⁹⁾	20.7	5.1 J	9.2 J	9.2 J	10.5 J	10.1 J
Selenium	39.0 ⁽²⁾	510 ⁽²⁾	0.52 ⁽²⁰⁾	1.48	0.21 U	0.93	0.31 J	0.8	0.74
Silver	39.0 ⁽²⁾	510 ⁽²⁾	4.2 ⁽²¹⁾	NE	0.1 U	0.11 U	0.07 U	0.08 J	0.07 U
Thallium	0.510 ⁽²⁾	6.60 ⁽²⁾	1.0 ⁽²²⁾	NE	1.7	3.1	1.3	2.9	2.2
Vanadium	55.0 ⁽²⁾	720 ⁽²⁾	7.8 ⁽²³⁾	259	145	217	121	153	140
Zinc	2,300 ⁽²⁾	31,000 ⁽²⁾	4.6 ⁽²⁴⁾	115	47.5	57.9	63.5	87.9	99.8

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Notes/Qualifiers:

J - Estimated: The analyte was positively identified; the quantitation is an estimation
U - Undetected at the Method Detection Limit
UJ - Reported quantitation limit is qualified as estimated
R - Rejected data; data is not usable
ft bgs - feet below ground surface

ug/kg - microgram per kilogram
mg/kg - miligram per kilogram
NE - Not Established
NAPR - Naval Activity Puerto Rico

- (1) NAPR basewide background freshwater drainage ditch sediment screening value (upper limit of the means concentration [mean plus two standard deviations]) (Baker, 2008)
- (2) Noncarcinogenic Regional Screening Levels based on a target hazard quotient of 0.1 for conservative screening purposes.
- (3) The screening value shown is an average of the target and intervention soil standards. The value is based on a default organic carbon content of 0.02 (2 percent), which represents a minimum value (adjustment range is 2 to 30 percent).
- (4) Value for total phthalates (4) [MHSPE 2000]
- (5) Chlordane used as a surrogate for screening purposes for alpha-chlordane and gamma-chlordane; Technical BHC used as a surrogate for screening purposes for delta-BHC; Endrin used as a surrogate for screening purposes for endrin aldehyde and endrin ketone.
- (6) Ecological soil screening level for birds [USEPA 2007a]
- (7) The value represents a total concentration for all chlorophenols (mono, di, tri, tetra, and pentachlorophenol).
- (8) Value for total BHC compounds [MHSPE, 2000]
- (9) Background-based value [Friday, 1998]
- (10) Ecological soil screening level for soil invertebrates [USEPA 2005a]
- (11) Ecological soil screening level for plants [USEPA 2005b]
- (12) Ecological soil screening level for soil invertebrates [USEPA 2005c]
- (13) Ecological soil screening level for birds [USEPA 2005d]
- (14) Ecological soil screening level for birds [USEPA 2008]
- (15) Ecological soil screening level for plants [USEPA 2005e]
- (16) Ecological soil screening level for birds [USEPA 2007b]
- (17) Ecological soil screening level for birds [USEPA 2005f]
- (18) Toxicological threshold for earthworms [Efroymson et al. 1997a]
- (19) Ecological soil screening level for plants [USEPA 2007c]
- (20) Ecological soil screening level for plants [USEPA 2007d]
- (21) Ecological soil screening level for plants [USEPA 2006]
- (22) Toxicological threshold for plants [Efroymson et al. 1997b]
- (23) Ecological soil screening level for birds [USEPA 2005g]
- (24) Ecological soil screening level for birds [USEPA 2007e]

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SWMU 56 / SITE 56A
SOURCE AREA INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Table References:

Baker Environmental, Inc, (2008). Revised Final II Summary Report for Environmental Background Concentrations of Inorganic Compounds, Naval Activity Puerto Rico, Ceiba, Puerto Rico. February 29, 2008.

Efroymson, R.A., M.E. Will, and G.W. Suter II. 1997a. Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process: 1997 Revisions. Oak Ridge National Laboratory, Oak Ridge, TN. ES/ER/TM-126/R2.

Efroymson, R.A., M.E. Will, G.W. Suter II, and A.C. Wooten. 1997b. Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants: 1997 Revisions. Oak Ridge National Laboratory, Oak Ridge, TN. ES/ER/TM-85/R3

Friday, G.P. 1998. Ecological Screening Values for Surface Water, Sediment, and Soil. Westinghouse Savannah River Company, Savannah River Site, Aiken, SC. WSRC-TR-98-00110.

Ministry of Housing, Spatial Planning and Environment (MHSPE). 2000. Circular on Target Values and Intervention Values for Soil Remediation. Directorate-General for Environmental Protection, Department of Soil Protection, The Hague, Netherlands. February 4, 2000.

United States Environmental Protection Agency (USEPA). 2008. Ecological Soil Screening Levels for Chromium (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-66.

USEPA. 2007a. Ecological Soil Screening Levels for DDT and Metabolites. Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-57.

USEPA. 2007b. Ecological Soil Screening Levels for Copper (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-68.

USEPA. 2007c. Ecological Soil Screening Levels for Nickel (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-76.

USEPA. 2007d. Ecological Soil Screening Levels for Selenium (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-72.

USEPA. 2007e. Ecological Soil Screening Levels for Zinc (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-72.

USEPA. 2006. Ecological Soil Screening Levels for Silver (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWEER Directive 9285.7-77.

TABLE 1

**SUMMARY OF DETECTED LAB RESULTS - SURFACE SOIL
SWMU 56 / SITE 56A
SOURCE AREA INVESTIGATION
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Table References (cont):

USEPA. 2005a. Ecological Soil Screening Levels for Antimony (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-61.

USEPA. 2005b. Ecological Soil Screening Levels for Arsenic (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C.

USEPA. 2005c. Ecological Soil Screening Levels for Barium (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-63.

USEPA. 2005d. Ecological Soil Screening Levels for Cadmium (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-62.

USEPA. 2005e. Ecological Soil Screening Levels for Cobalt (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-67

USEPA. 2005f. Ecological Soil Screening Levels for Lead (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-70.

USEPA. 2005g. Ecological Soil Screening Levels for Vanadium (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-75.

TABLE 2

SUMMARY OF DETECTED LAB RESULTS - SEDIMENT
SWMU 56 / SITE 56A
SOURCE AREA INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	Regional	<i>Regional</i>	Ecological		56A-SD01	56A-SD02	56A-SD03	56A-SD04
Sample ID	Screening	<i>Screening</i>	Sediment	<u>Freshwater</u>	56A-SD01	56A-SD02	56A-SD03	56A-SD04
Date	Levels	<i>Levels</i>	Screening	<u>Sediment</u>	6/23/2009	6/23/2009	6/23/2009	6/23/2009
Depth Range (ft bgs)	Residential	<i>Industrial</i>	Values	<u>Background</u> ⁽¹⁾	0-0.33	0-0.33	0-0.33	0-0.33
Volatile Organic Compounds (ug/kg)								
2-Butanone	2,800,000 ⁽²⁾	19,000,000 ⁽²⁾	41.5 ⁽¹²⁾	NE	310 J	260 J	34	110 J
2-Hexanone	NE	NE	22.5 ⁽¹²⁾	NE	62 J	14 J	28 U	45 UJ
4-Methyl-2-pentanone	530,000 ⁽²⁾	5,200,000 ⁽²⁾	33.0 ⁽¹²⁾	NE	18 J	51 UJ	28 U	45 UJ
Acetone	6,100,000 ⁽²⁾	61,000,000 ⁽²⁾	9.88 ⁽¹²⁾	NE	1400 J	1200 J	230	970 J
Carbon disulfide	67,000 ⁽²⁾	300,000 ⁽²⁾	13.9 ⁽¹²⁾	NE	21 UJ	20 UJ	7.7 J	18 UJ
Ethylmethacrylate	700,000 ⁽²⁾	9,200,000 ⁽²⁾	6,584 ⁽¹²⁾	NE	53 J	200 UJ	110 U	180 UJ
Isobutyl alcohol	2,300,000 ⁽²⁾	31,000,000 ⁽²⁾	219 ⁽¹²⁾	NE	270 J	1000 R	560 R	890 R
Propionitrile	NE	NE	218 ⁽¹²⁾	NE	230 J	1000 R	560 R	890 R
1,4-Dioxane	44,000	160,000	119 ⁽¹²⁾	NE	600 J	1000 R	560 R	890 R
Semivolatile Organic Compounds (ug/kg)								
3,4-Methylphenol	760,000 ⁽²⁾	9,300,000 ⁽²⁾	100 ⁽³⁾⁽⁴⁾	NE	120 UJ	47 J	51 UJ	100 UJ
Benzo(a)pyrene	15.0	210	150 ⁽⁷⁾	NE	120 UJ	110 UJ	24 J	100 UJ
bis(2-Ethylhexyl)phthalate	35,000	120,000	180 ⁽⁸⁾	NE	120 UJ	110 UJ	51 U	100 UJ
Di-n-octylphthalate	NE	NE	61 ⁽³⁾	NE	120 UJ	99 J	19 J	100 UJ
Fluoranthene	230,000 ⁽²⁾	2,200,000 ⁽²⁾	420 ⁽⁷⁾	NE	120 UJ	27 J	58	40 J
Pyrene	170,000 ⁽²⁾	1,700,000 ⁽²⁾	1,600 ⁽⁷⁾	NE	120 UJ	110 UJ	51 U	100 UJ
Pesticides (ug/kg)								
4,4'-DDD	2,000	7,200	4.9 ⁽⁸⁾	NE	11 UJ	10 UJ	4.9 U	9.7 UJ
4,4'-DDE	1,400	5,100	3.2 ⁽⁸⁾	NE	3.1 J	2.5 J	2.1 J	5.4 J
4,4'-DDT	1,700	7,000	5.3 ⁽⁸⁾	NE	11 UJ	10 UJ	1.1 J	9.7 UJ
Aldrin	29.0	100	2.0 ⁽¹³⁾	NE	5.9 UJ	5.3 UJ	2.5 U	5 UJ
Alpha-chlordane	1,600 ⁽⁵⁾	6,500 ⁽⁵⁾	3.2 ⁽⁵⁾	NE	5.9 UJ	5.3 UJ	0.44 J	5 UJ
Beta-BHC	270	960	6.0 ⁽¹³⁾	NE	2.9 UJ	1.7 J	0.82 J	2.5 UJ

TABLE 2

SUMMARY OF DETECTED LAB RESULTS - SEDIMENT
 SWMU 56 / SITE 56A
 SOURCE AREA INVESTIGATION
 NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	Regional	Regional	Ecological		56A-SD01	56A-SD02	56A-SD03	56A-SD04
Sample ID	Screening	Screening	Sediment	Freshwater	56A-SD01	56A-SD02	56A-SD03	56A-SD04
Date	Levels	Levels	Screening	Sediment	6/23/2009	6/23/2009	6/23/2009	6/23/2009
Depth Range (ft bgs)	Residential	Industrial	Values	Background ⁽¹⁾	0-0.33	0-0.33	0-0.33	0-0.33
Pesticides (ug/kg) (Cont)								
Dieldrin	30.0	110	2.0 ⁽¹³⁾	NE	11 UJ	10 UJ	4.9 U	9.7 UJ
Endrin aldehyde	1,800 ⁽²⁾⁽⁵⁾	18,000 ⁽²⁾⁽⁵⁾	6.01 ⁽⁵⁾	NE	11 UJ	10 UJ	4.9 U	9.7 UJ
Gamma-chlordane	1,600 ⁽⁵⁾	6,500 ⁽⁵⁾	3.2 ⁽⁵⁾	NE	5.9 UJ	5.3 UJ	2.5 U	5 UJ
Heptachlor	110	380	0.3 ⁽¹⁴⁾	NE	5.9 UJ	5.3 UJ	4.9 U	2 J
Heptachlor epoxide	53.0	190	2.5 ⁽¹²⁾	NE	5.9 UJ	5.3 UJ	2.5 U	5 UJ
Isodrin	NE	NE	2,944 ⁽¹²⁾	NE	5.9 UJ	5.3 UJ	2.5 U	5 UJ
Methoxychlor	31,000 ⁽²⁾	310,000 ⁽²⁾	29.6 ⁽¹²⁾	NE	59 UJ	10 J	25 U	50 UJ
Metals (mg/kg)								
Antimony	3.10 ⁽²⁾	41.0 ⁽²⁾	2.00 ⁽⁶⁾	8.62	1.1 J	0.52 UJ	0.25 UJ	0.47 UJ
Arsenic	0.390	1.60	9.80 ⁽⁷⁾	2.83	17.3 J	1.3 J	1.3 J	2.6 J
Barium	1,500 ⁽²⁾	19,000 ⁽²⁾	20 ⁽⁸⁾	208.04	92.6 J	93 J	77.2	38.2 J
Beryllium	16.0 ⁽²⁾	200 ⁽²⁾	NE	0.36	0.59 UJ	0.52 UJ	0.44 U	0.55 UJ
Cadmium	7.00 ⁽²⁾	80.0 ⁽²⁾	1.0 ⁽⁷⁾	0.22	0.09 UJ	0.08 UJ	0.04 UJ	0.07 UJ
Chromium	280	1,400	43 ⁽⁷⁾	63.41	52.5 J	28.5 J	36.7	37.1 J
Cobalt	2.30 ⁽²⁾	30.0 ⁽²⁾	50 ⁽⁸⁾	45.07	59.5 J	22.5 J	26.7 J	63.3 J
Copper	310 ⁽²⁾	4,100 ⁽²⁾	32 ⁽⁷⁾	159.81	79.4 J	89.2 J	80.5 J	83.4 J
Lead	400	800	36 ⁽⁷⁾	19.4	216 J	31.9 J	14.5	9.7 J
Mercury	0.430 ⁽²⁾	2.40 ⁽²⁾	0.18 ⁽⁷⁾	0.17	0.14 J	0.15 J	0.18	0.088 J
Nickel	150 ⁽²⁾	2,000 ⁽²⁾	23 ⁽⁷⁾	18.1	24.6 J	11.7 J	21.5	29.5 J
Selenium	39.0 ⁽²⁾	510 ⁽²⁾	2.0 ⁽⁹⁾	3.69	2.2 J	1.7 J	0.69 J	1.5 J
Tin	4,700 ⁽²⁾	61,000 ⁽²⁾	3.4 ⁽³⁾⁽¹⁰⁾	7.72	7.7 J	6.6 J	3.5 J	6.1 J
Vanadium	55.0 ⁽²⁾	720 ⁽²⁾	57 ⁽³⁾⁽¹¹⁾	241.10	167 J	140 J	149	208 J
Zinc	2,300 ⁽²⁾	31,000 ⁽²⁾	120 ⁽⁷⁾	148.46	148 J	73.8 J	57.6 J	58.2 J

TABLE 2

SUMMARY OF DETECTED LAB RESULTS - SEDIMENT
SWMU 56 / SITE 56A
SOURCE AREA INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	Regional	Regional	Ecological		56A-SD05	56A-SD06	56A-SD07	56A-SD08	56A-SD09
Sample ID	Screening	Screening	Sediment	Freshwater	56A-SD05	56A-SD06	56A-SD07	56A-SD08	56A-SD09
Date	Levels	Levels	Screening	Sediment	6/23/2009	6/23/2009	6/23/2009	6/23/2009	6/23/2009
Depth Range (ft bgs)	Residential	Industrial	Values	Background ⁽¹⁾	0-0.33	0-0.33	0-0.33	0-0.33	0-0.33
Volatile Organic Compounds (ug/kg)									
2-Butanone	2,800,000 ⁽²⁾	19,000,000 ⁽²⁾	41.5 ⁽¹²⁾	NE	350 J	49 U	59 J	61 J	56 J
2-Hexanone	NE	NE	22.5 ⁽¹²⁾	NE	54 UJ	49 U	27 UJ	30 UJ	29 UJ
4-Methyl-2-pentanone	530,000 ⁽²⁾	5,200,000 ⁽²⁾	33.0 ⁽¹²⁾	NE	54 UJ	49 U	27 UJ	30 UJ	29 UJ
Acetone	6,100,000 ⁽²⁾	61,000,000 ⁽²⁾	9.88 ⁽¹²⁾	NE	1800	310	250 J	400 J	240 J
Carbon disulfide	67,000 ⁽²⁾	300,000 ⁽²⁾	13.9 ⁽¹²⁾	NE	22 UJ	20 U	11 UJ	12 UJ	11 UJ
Ethylmethacrylate	700,000 ⁽²⁾	9,200,000 ⁽²⁾	6,584 ⁽¹²⁾	NE	220 UJ	200 U	110 UJ	120 UJ	110 UJ
Isobutyl alcohol	2,300,000 ⁽²⁾	31,000,000 ⁽²⁾	219 ⁽¹²⁾	NE	1100 R	990 R	530 R	600 R	570 R
Propionitrile	NE	NE	218 ⁽¹²⁾	NE	1100 R	990 R	530 R	600 R	570 R
1,4-Dioxane	44,000	160,000	119 ⁽¹²⁾	NE	1100 R	990 R	530 R	600 R	570 R
Semivolatile Organic Compounds (ug/kg)									
3,4-Methylphenol	760,000 ⁽²⁾	9,300,000 ⁽²⁾	100 ⁽³⁾⁽⁴⁾	NE	120 UJ	62 UJ	72 UJ	81 UJ	72 UJ
Benzo(a)pyrene	15.0	210	150 ⁽⁷⁾	NE	120 UJ	62 U	37 J	81 UJ	72 UJ
bis(2-Ethylhexyl)phthalate	35,000	120,000	180 ⁽⁸⁾	NE	120 UJ	62 U	31 J	81 UJ	72 UJ
Di-n-octylphthalate	NE	NE	61 ⁽³⁾	NE	120 UJ	62 U	140 J	81 UJ	72 UJ
Fluoranthene	230,000 ⁽²⁾	2,200,000 ⁽²⁾	420 ⁽⁷⁾	NE	120 UJ	62 U	40 J	81 UJ	72 UJ
Pyrene	170,000 ⁽²⁾	1,700,000 ⁽²⁾	1,600 ⁽⁷⁾	NE	120 UJ	62 U	68 J	81 UJ	72 UJ
Pesticides (ug/kg)									
4,4'-DDD	2,000	7,200	4.9 ⁽⁸⁾	NE	1.6 J	7.5	4.7 J	1.7 J	3 J
4,4'-DDE	1,400	5,100	3.2 ⁽⁸⁾	NE	3.4 J	94	85 J	11 J	30 J
4,4'-DDT	1,700	7,000	5.3 ⁽⁸⁾	NE	11 UJ	63	6 J	1.8 J	4.7 J
Aldrin	29.0	100	2.0 ⁽¹³⁾	NE	5.9 UJ	3.1 U	0.86 J	4 UJ	3.6 UJ
Alpha-chlordane	1,600 ⁽⁵⁾	6,500 ⁽⁵⁾	3.2 ⁽⁵⁾	NE	5.9 UJ	3.1 U	1.4 J	4 UJ	3.6 UJ
Beta-BHC	270	960	6.0 ⁽¹³⁾	NE	2.9 UJ	1.2 J	1.8 UJ	2 UJ	1.6 J

TABLE 2

SUMMARY OF DETECTED LAB RESULTS - SEDIMENT
SWMU 56 / SITE 56A
SOURCE AREA INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	Regional	Regional	Ecological		56A-SD05	56A-SD06	56A-SD07	56A-SD08	56A-SD09
Sample ID	Screening	Screening	Sediment	Freshwater	56A-SD05	56A-SD06	56A-SD07	56A-SD08	56A-SD09
Date	Levels	Levels	Screening	Sediment	6/23/2009	6/23/2009	6/23/2009	6/23/2009	6/23/2009
Depth Range (ft bgs)	Residential	Industrial	Values	Background ⁽¹⁾	0-0.33	0-0.33	0-0.33	0-0.33	0-0.33
Pesticides (ug/kg) (Cont)									
Dieldrin	30.0	110	2.0 ⁽¹³⁾	NE	11 UJ	6 U	1.2 J	7.9 UJ	7 UJ
Endrin aldehyde	1,800 ⁽²⁾⁽⁵⁾	18,000 ⁽²⁾⁽⁵⁾	6.01 ⁽⁵⁾	NE	11 UJ	1.5 J	7 UJ	7.9 UJ	7 UJ
Gamma-chlordane	1,600 ⁽⁵⁾	6,500 ⁽⁵⁾	3.2 ⁽⁵⁾	NE	5.9 UJ	0.78 J	1.1 J	4 UJ	3.6 UJ
Heptachlor	110	380	0.3 ⁽¹⁴⁾	NE	5.9 UJ	3.1 U	0.64 J	0.61 J	3.6 UJ
Heptachlor epoxide	53.0	190	2.5 ⁽¹²⁾	NE	5.9 UJ	0.76 J	3.6 U	4 UJ	0.58 J
Isodrin	NE	NE	2,944 ⁽¹²⁾	NE	5.9 UJ	3.1 U	3.6 UJ	4 UJ	0.77 J
Methoxychlor	31,000 ⁽²⁾	310,000 ⁽²⁾	29.6 ⁽¹²⁾	NE	59 UJ	31 U	36 UJ	40 UJ	36 UJ
Metals (mg/kg)									
Antimony	3.10 ⁽²⁾	41.0 ⁽²⁾	2.00 ⁽⁶⁾	8.62	0.59 UJ	0.31 UJ	0.32 J	0.49 UJ	0.34 UJ
Arsenic	0.390	1.60	9.80 ⁽⁷⁾	2.83	2 J	3.9	1 J	3.4 J	1.2 J
Barium	1,500 ⁽²⁾	19,000 ⁽²⁾	20 ⁽⁸⁾	208.04	75 J	49.1	37.7	213 J	74.9 J
Beryllium	16.0 ⁽²⁾	200 ⁽²⁾	NE	0.36	0.46 UJ	0.6 J	0.29 U	0.55 UJ	0.41 UJ
Cadmium	7.00 ⁽²⁾	80.0 ⁽²⁾	1.0 ⁽⁷⁾	0.22	0.09 UJ	0.05 UJ	0.03 UJ	0.07 UJ	0.05 UJ
Chromium	280	1,400	43 ⁽⁷⁾	63.41	21.2 J	29.5	19.5	41.9 J	29.3 J
Cobalt	2.30 ⁽²⁾	30.0 ⁽²⁾	50 ⁽⁸⁾	45.07	62.6 J	46.1 J	24.6 J	81.1 J	36.7 J
Copper	310 ⁽²⁾	4,100 ⁽²⁾	32 ⁽⁷⁾	159.81	72.4 J	163 J	56.4 J	140 J	90.6 J
Lead	400	800	36 ⁽⁷⁾	19.4	7.1 J	18	19.2	32.9 J	23.5 J
Mercury	0.430 ⁽²⁾	2.40 ⁽²⁾	0.18 ⁽⁷⁾	0.17	0.11 J	0.098	0.014 J	0.017 J	0.13
Nickel	150 ⁽²⁾	2,000 ⁽²⁾	23 ⁽⁷⁾	18.1	14.3 J	10.9	6.7	16.2 J	10.9 J
Selenium	39.0 ⁽²⁾	510 ⁽²⁾	2.0 ⁽⁹⁾	3.69	0.96 UJ	0.49 UJ	0.85 J	0.8 UJ	0.55 UJ
Tin	4,700 ⁽²⁾	61,000 ⁽²⁾	3.4 ⁽³⁾⁽¹⁰⁾	7.72	8.3 J	4.7 J	2.9 J	9.9 J	7.2 J
Vanadium	55.0 ⁽²⁾	720 ⁽²⁾	57 ⁽³⁾⁽¹¹⁾	241.10	127 J	319	133	275 J	194 J
Zinc	2,300 ⁽²⁾	31,000 ⁽²⁾	120 ⁽⁷⁾	148.46	46 J	55.5 J	50.1 J	101 J	66.4 J

TABLE 2

SUMMARY OF DETECTED LAB RESULTS - SEDIMENT
SWMU 56 / SITE 56A
SOURCE AREA INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	Regional	Regional	Ecological		56A-SD10	56A-SD10	56SD08	56SD09	56SD11
Sample ID	Screening	Screening	Sediment	Freshwater	56A-SD10	56A-SD10D	56SD08	56SD09	56SD11
Date	Levels	Levels	Screening	Sediment	6/23/2009	6/23/2009	9/25/2008	9/25/2008	9/25/2008
Depth Range (ft bgs)	Residential	Industrial	Values	Background ⁽¹⁾	0-0.33	0-0.33	0-0.33	0-0.33	0-0.33
Volatile Organic Compounds (ug/kg)									
2-Butanone	2,800,000 ⁽²⁾	19,000,000 ⁽²⁾	41.5 ⁽¹²⁾	NE	24 U	28 UJ	NA	NA	NA
2-Hexanone	NE	NE	22.5 ⁽¹²⁾	NE	24 U	28 UJ	NA	NA	NA
4-Methyl-2-pentanone	530,000 ⁽²⁾	5,200,000 ⁽²⁾	33.0 ⁽¹²⁾	NE	24 U	28 UJ	NA	NA	NA
Acetone	6,100,000 ⁽²⁾	61,000,000 ⁽²⁾	9.88 ⁽¹²⁾	NE	24 U	92 J	NA	NA	NA
Carbon disulfide	67,000 ⁽²⁾	300,000 ⁽²⁾	13.9 ⁽¹²⁾	NE	9.5 U	11 UJ	NA	NA	NA
Ethylmethacrylate	700,000 ⁽²⁾	9,200,000 ⁽²⁾	6,584 ⁽¹²⁾	NE	95 U	110 UJ	NA	NA	NA
Isobutyl alcohol	2,300,000 ⁽²⁾	31,000,000 ⁽²⁾	219 ⁽¹²⁾	NE	470 R	570 R	NA	NA	NA
Propionitrile	NE	NE	218 ⁽¹²⁾	NE	470 R	570 R	NA	NA	NA
1,4-Dioxane	44,000	160,000	119 ⁽¹²⁾	NE	470 R	570 R	NA	NA	NA
Semivolatile Organic Compounds (ug/kg)									
3,4-Methylphenol	760,000 ⁽²⁾	9,300,000 ⁽²⁾	100 ⁽³⁾⁽⁴⁾	NE	67 UJ	71 UJ	NA	NA	NA
Benzo(a)pyrene	15.0	210	150 ⁽⁷⁾	NE	67 U	71 UJ	NA	NA	NA
bis(2-Ethylhexyl)phthalate	35,000	120,000	180 ⁽⁸⁾	NE	67 U	71 UJ	NA	NA	NA
Di-n-octylphthalate	NE	NE	61 ⁽³⁾	NE	82	130 J	NA	NA	NA
Fluoranthene	230,000 ⁽²⁾	2,200,000 ⁽²⁾	420 ⁽⁷⁾	NE	67 U	18 UJ	NA	NA	NA
Pyrene	170,000 ⁽²⁾	1,700,000 ⁽²⁾	1,600 ⁽⁷⁾	NE	67 U	71 UJ	NA	NA	NA
Pesticides (ug/kg)									
4,4'-DDD	2,000	7,200	4.9 ⁽⁸⁾	NE	1.6 J	1.4 J	NA	NA	NA
4,4'-DDE	1,400	5,100	3.2 ⁽⁸⁾	NE	26	25 J	NA	NA	NA
4,4'-DDT	1,700	7,000	5.3 ⁽⁸⁾	NE	2 J	2.6 J	NA	NA	NA
Aldrin	29.0	100	2.0 ⁽¹³⁾	NE	0.92 J	3.5 UJ	NA	NA	NA
Alpha-chlordane	1,600 ⁽⁵⁾	6,500 ⁽⁵⁾	3.2 ⁽⁵⁾	NE	3.3 U	3.5 UJ	NA	NA	NA
Beta-BHC	270	960	6.0 ⁽¹³⁾	NE	1.5 J	1.4 J	NA	NA	NA

TABLE 2

SUMMARY OF DETECTED LAB RESULTS - SEDIMENT
 SWMU 56 / SITE 56A
 SOURCE AREA INVESTIGATION
 NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	Regional	Regional	Ecological		56A-SD10	56A-SD10	56SD08	56SD09	56SD11
Sample ID	Screening	Screening	Sediment	Freshwater	56A-SD10	56A-SD10D	56SD08	56SD09	56SD11
Date	Levels	Levels	Screening	Sediment	6/23/2009	6/23/2009	9/25/2008	9/25/2008	9/25/2008
Depth Range (ft bgs)	Residential	Industrial	Values	Background ⁽¹⁾	0-0.33	0-0.33	0-0.33	0-0.33	0-0.33
Pesticides (ug/kg) (Cont)									
Dieldrin	30.0	110	2.0 ⁽¹³⁾	NE	6.5 U	6.9 UJ	NA	NA	NA
Endrin aldehyde	1,800 ⁽²⁾⁽⁵⁾	18,000 ⁽²⁾⁽⁵⁾	6.01 ⁽⁵⁾	NE	6.5 U	6.9 UJ	NA	NA	NA
Gamma-chlordane	1,600 ⁽⁵⁾	6,500 ⁽⁵⁾	3.2 ⁽⁵⁾	NE	3.3 U	3.5 UJ	NA	NA	NA
Heptachlor	110	380	0.3 ⁽¹⁴⁾	NE	1.1 J	3.5 UJ	NA	NA	NA
Heptachlor epoxide	53.0	190	2.5 ⁽¹²⁾	NE	3.3 U	3.5 UJ	NA	NA	NA
Isodrin	NE	NE	2,944 ⁽¹²⁾	NE	3.3 U	3.5 UJ	NA	NA	NA
Methoxychlor	31,000 ⁽²⁾	310,000 ⁽²⁾	29.6 ⁽¹²⁾	NE	33 U	35 UJ	NA	NA	NA
Metals (mg/kg)									
Antimony	3.10 ⁽²⁾	41.0 ⁽²⁾	2.00 ⁽⁶⁾	8.62	0.35 UJ	0.37 UJ	0.62 UJ	1.2 UJ	0.67 UJ
Arsenic	0.390	1.60	9.80 ⁽⁷⁾	2.83	2.2	1.8 J	4.8 J	3.2 J	3.1 J
Barium	1,500 ⁽²⁾	19,000 ⁽²⁾	20 ⁽⁸⁾	208.04	78.9	70.4 J	56 J	51 J	58 J
Beryllium	16.0 ⁽²⁾	200 ⁽²⁾	NE	0.36	0.5 U	0.54 UJ	0.46 J	0.2 UJ	0.32 J
Cadmium	7.00 ⁽²⁾	80.0 ⁽²⁾	1.0 ⁽⁷⁾	0.22	0.05 UJ	0.06 UJ	0.37 J	0.82 J	0.36 J
Chromium	280	1,400	43 ⁽⁷⁾	63.41	35.8	40.8 J	25 J	31 J	31 J
Cobalt	2.30 ⁽²⁾	30.0 ⁽²⁾	50 ⁽⁸⁾	45.07	53.5 J	50.6 J	85 J	28 J	46 J
Copper	310 ⁽²⁾	4,100 ⁽²⁾	32 ⁽⁷⁾	159.81	102 J	105 J	240 J	96 J	110 J
Lead	400	800	36 ⁽⁷⁾	19.4	24.8	24.4 J	13 J	46 J	19 J
Mercury	0.430 ⁽²⁾	2.40 ⁽²⁾	0.18 ⁽⁷⁾	0.17	0.012	0.13 J	0.05 J	0.09 J	0.04 UJ
Nickel	150 ⁽²⁾	2,000 ⁽²⁾	23 ⁽⁷⁾	18.1	13.9	13.5 J	15 J	19 J	14 J
Selenium	39.0 ⁽²⁾	510 ⁽²⁾	2.0 ⁽⁹⁾	3.69	0.78 J	0.61 J	1.9 J	1.2 J	1.2 J
Tin	4,700 ⁽²⁾	61,000 ⁽²⁾	3.4 ⁽³⁾⁽¹⁰⁾	7.72	6.2 J	6 J	8.6 UJ	11 UJ	12 UJ
Vanadium	55.0 ⁽²⁾	720 ⁽²⁾	57 ⁽³⁾⁽¹¹⁾	241.10	242	267 J	430 J	160 J	230 J
Zinc	2,300 ⁽²⁾	31,000 ⁽²⁾	120 ⁽⁷⁾	148.46	81.5 J	82.5 J	65 J	410 J	85 J

TABLE 2
SUMMARY OF DETECTED LAB RESULTS - SEDIMENT
SWMU 56 / SITE 56A
SOURCE AREA INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Notes/Qualifiers:

J - Estimated: The analyte was positively identified; the quantitation is an estimation
U - Undetected at the Method Detection Limit
UJ - Reported quantitation limit is qualified as estimated
R - Rejected data; data is not usable
ft bgs - feet below ground surface
ug/kg - microgram per kilogram
mg/kg - miligram per kilogram
NA - Not Analyzed
NE - Not Established
NAPR - Naval Activity Puerto Rico

- (1) Calculated freshwater sediment background screening value (upper limit of the means concentration [mean plus two standard deviations])
- (2) Noncarcinogenic Regional Screening Levels based on a target hazard quotient of 0.1 for conservative screening purposes.
- (3) The chemical lacks a freshwater bulk sediment screening value. The value shown is a marine/estuarine bulk sediment screening value.
- (4) The value shown is for 4-methylphenol.
- (5) Chlordane used as a surrogate for screening purposes for alpha-chlordane and gamma-chlordane; Endrin used as a surrogate for endrin aldehyde.
- (6) Effects Range-Low (Long and Morgan 1991)
- (7) Consensus-based Threshold Effect Concentration (MacDonald et al. 2000)
- (8) Threshold Effect Concentration (MacDonald et al. 2003)
- (9) USEPA Region 3 BTAG screening value (Lemley 2002 (as cited in USEPA 2007))
- (10) Minimum Apparent Effects Threshold (Neanthes bioassays) (Buchman 2008)
- (11) Minimum Apparent Effects Threshold (infaunal community impacts) (Buchman 2008)
- (12) EqP-based sediment screening values calculated using USEPA (1993 and 1996) methodology: $SV_{sed} = (K_{oc})(f_{oc})(SV_{sw})$ where K_{oc} is the organic carbon partition coefficient (L/kg), f_{oc} is the fraction of organic carbon (unitless), and SV_{sw} is the surface water screening value (ug/L). An f_{oc} of 0.01 was assumed.
- (13) Lowest Effect Level (Persaud et al. 1993)
- (14) Minimum Apparent Effects Threshold (bivalve) (Buchman 2008)

TABLE 2

**SUMMARY OF DETECTED LAB RESULTS - SEDIMENT
SWMU 56 / SITE 56A
SOURCE AREA INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO**

Table References:

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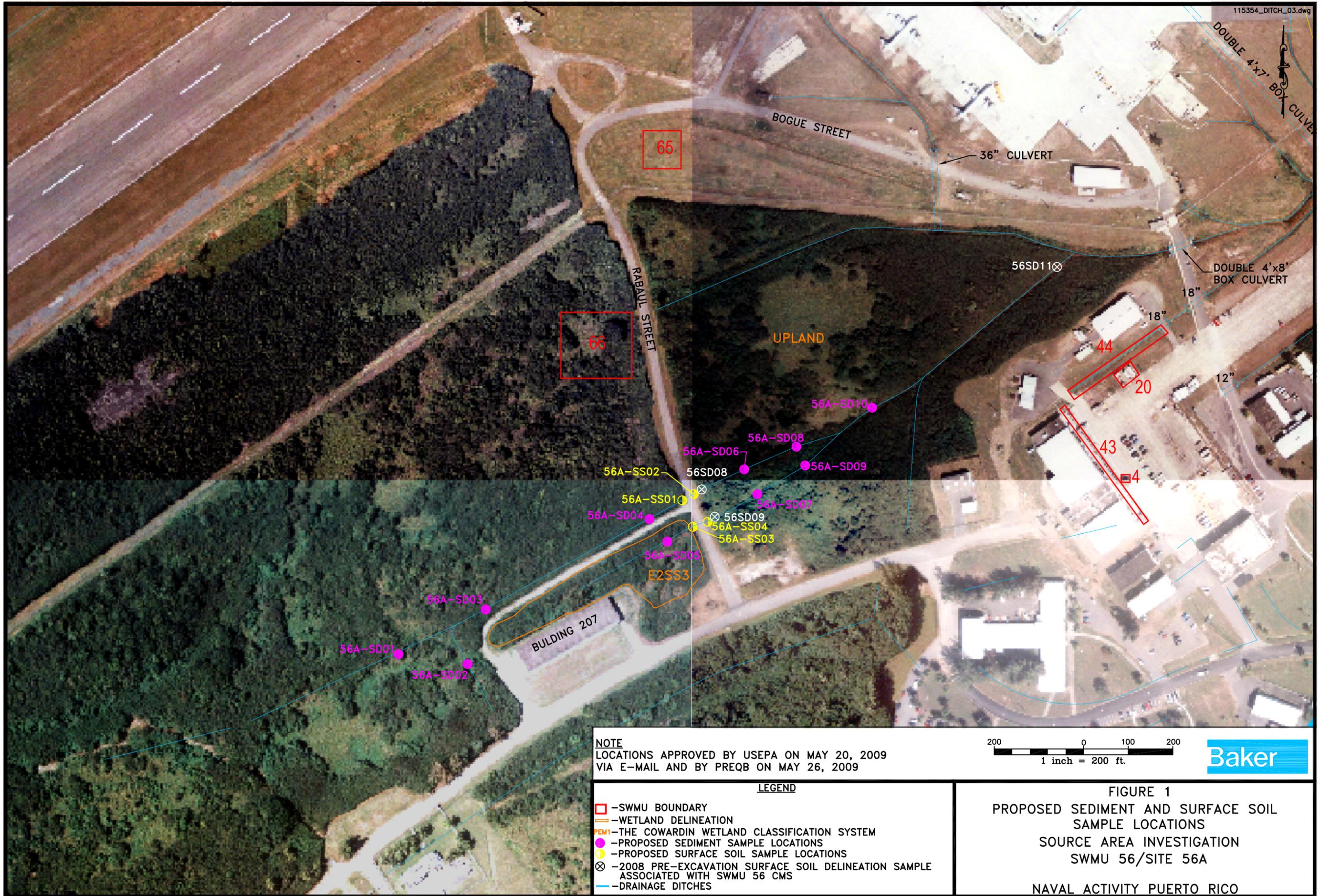
MacDonald, D.D., C.G. Ingersoll, T.A. Berger. 2000. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems. Arch. Environ. Contam. Toxicol. 39:20-31.

Persaud, D.R., R. Jaagumagi, and A. Hayton. 1993. Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario. Ontario Ministry of the Environment (OMOE).

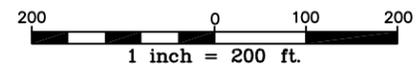
USEPA. 1996. Ecotox Thresholds. Eco Update, Volume 3, Number 2. Office of Solid Waste and Emergency Response, Washington, D.C. EPA/F-95/038.

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FIGURES

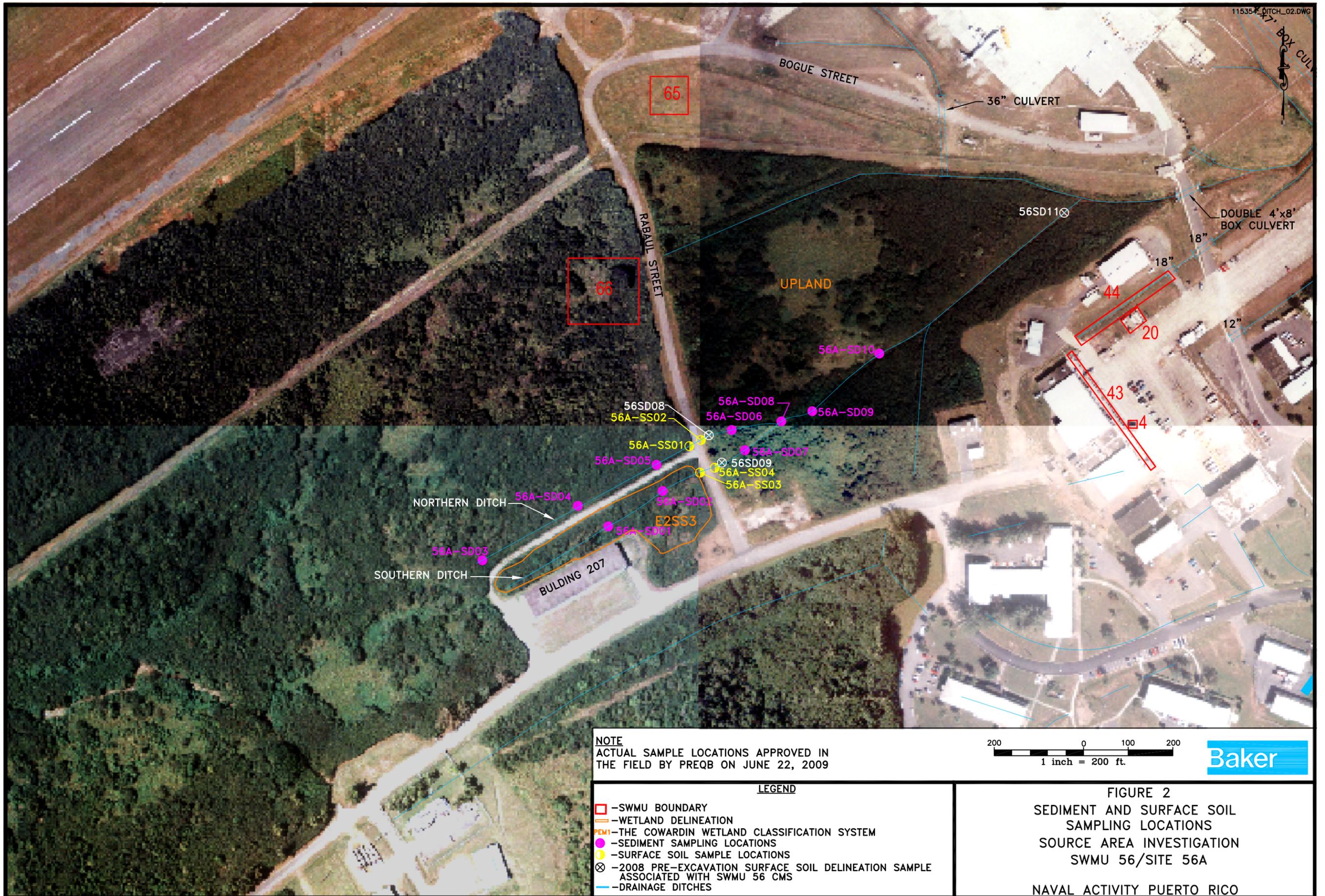


NOTE
 LOCATIONS APPROVED BY USEPA ON MAY 20, 2009
 VIA E-MAIL AND BY PREQB ON MAY 26, 2009

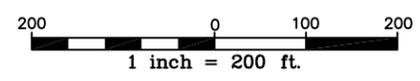


LEGEND	
	-SWMU BOUNDARY
	-WETLAND DELINEATION
PEM1	-THE COWARDIN WETLAND CLASSIFICATION SYSTEM
●	-PROPOSED SEDIMENT SAMPLE LOCATIONS
●	-PROPOSED SURFACE SOIL SAMPLE LOCATIONS
⊗	-2008 PRE-EXCAVATION SURFACE SOIL DELINEATION SAMPLE ASSOCIATED WITH SWMU 56 CMS
—	-DRAINAGE DITCHES

FIGURE 1
PROPOSED SEDIMENT AND SURFACE SOIL
SAMPLE LOCATIONS
SOURCE AREA INVESTIGATION
SWMU 56/SITE 56A
NAVAL ACTIVITY PUERTO RICO



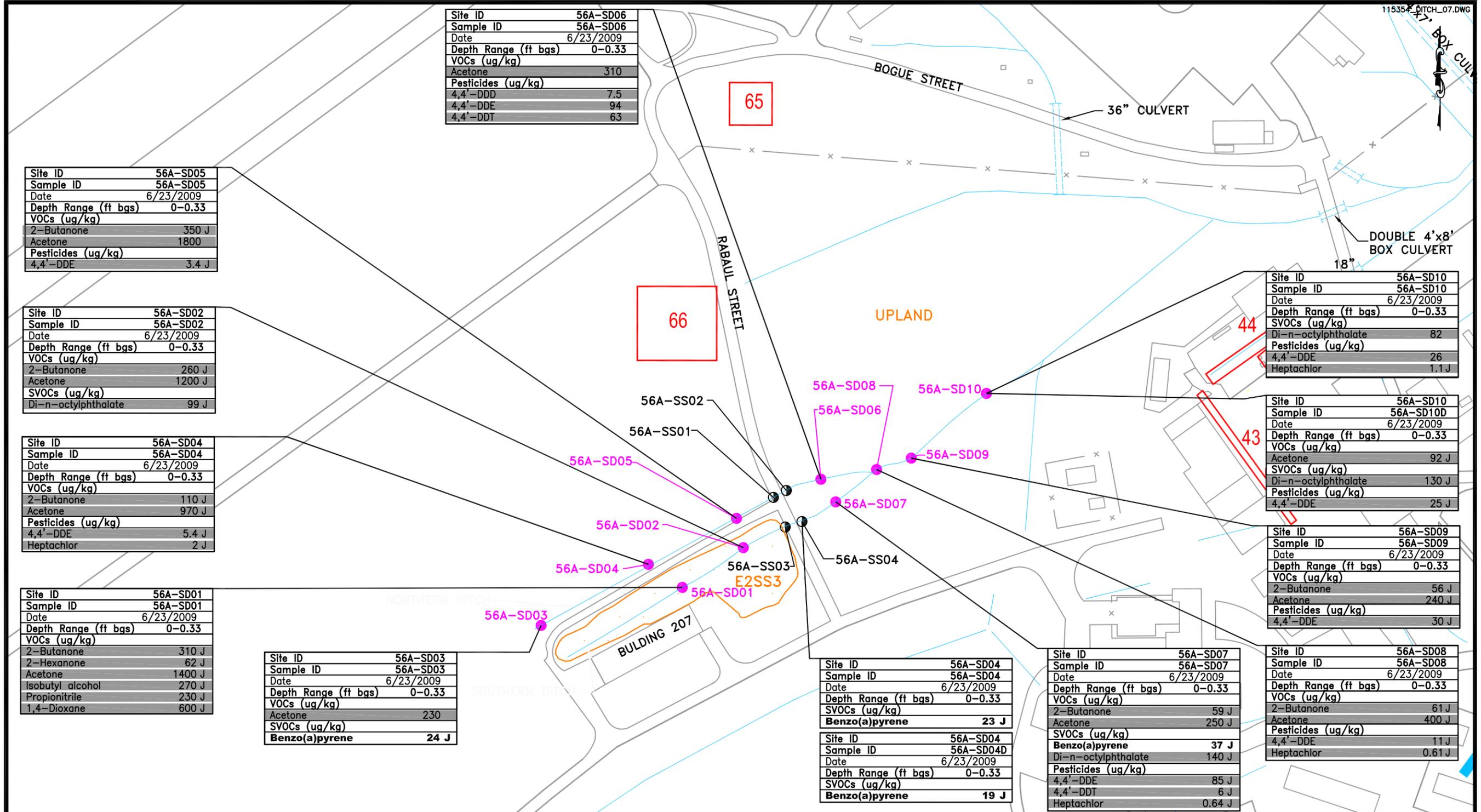
NOTE
 ACTUAL SAMPLE LOCATIONS APPROVED IN THE FIELD BY PREQB ON JUNE 22, 2009



LEGEND

- SWMU BOUNDARY
- WETLAND DELINEATION
- PEM1 -THE COWARDIN WETLAND CLASSIFICATION SYSTEM
- -SEDIMENT SAMPLING LOCATIONS
- -SURFACE SOIL SAMPLE LOCATIONS
- ⊗ -2008 PRE-EXCAVATION SURFACE SOIL DELINEATION SAMPLE ASSOCIATED WITH SWMU 56 CMS
- -DRAINAGE DITCHES

FIGURE 2
 SEDIMENT AND SURFACE SOIL SAMPLING LOCATIONS
 SOURCE AREA INVESTIGATION
 SWMU 56/SITE 56A
 NAVAL ACTIVITY PUERTO RICO



Site ID	56A-SD06
Sample ID	56A-SD06
Date	6/23/2009
Depth Range (ft bgs)	0-0.33
VOCs (ug/kg)	310
Acetone	310
Pesticides (ug/kg)	
4,4'-DDD	7.5
4,4'-DDE	94
4,4'-DDT	63

Site ID	56A-SD05
Sample ID	56A-SD05
Date	6/23/2009
Depth Range (ft bgs)	0-0.33
VOCs (ug/kg)	
2-Butanone	350 J
Acetone	1800
Pesticides (ug/kg)	
4,4'-DDE	3.4 J

Site ID	56A-SD02
Sample ID	56A-SD02
Date	6/23/2009
Depth Range (ft bgs)	0-0.33
VOCs (ug/kg)	
2-Butanone	260 J
Acetone	1200 J
SVOCs (ug/kg)	
Di-n-octylphthalate	99 J

Site ID	56A-SD04
Sample ID	56A-SD04
Date	6/23/2009
Depth Range (ft bgs)	0-0.33
VOCs (ug/kg)	
2-Butanone	110 J
Acetone	970 J
Pesticides (ug/kg)	
4,4'-DDE	5.4 J
Heptachlor	2 J

Site ID	56A-SD01
Sample ID	56A-SD01
Date	6/23/2009
Depth Range (ft bgs)	0-0.33
VOCs (ug/kg)	
2-Butanone	310 J
2-Hexanone	62 J
Acetone	1400 J
Isobutyl alcohol	270 J
Propionitrile	230 J
1,4-Dioxane	600 J

Site ID	56A-SD03
Sample ID	56A-SD03
Date	6/23/2009
Depth Range (ft bgs)	0-0.33
VOCs (ug/kg)	
Acetone	230
SVOCs (ug/kg)	
Benzo(a)pyrene	24 J

Site ID	56A-SD04
Sample ID	56A-SD04
Date	6/23/2009
Depth Range (ft bgs)	0-0.33
VOCs (ug/kg)	
SVOCs (ug/kg)	
Benzo(a)pyrene	23 J
Site ID	56A-SD04
Sample ID	56A-SD04D
Date	6/23/2009
Depth Range (ft bgs)	0-0.33
VOCs (ug/kg)	
SVOCs (ug/kg)	
Benzo(a)pyrene	19 J

Site ID	56A-SD07
Sample ID	56A-SD07
Date	6/23/2009
Depth Range (ft bgs)	0-0.33
VOCs (ug/kg)	
2-Butanone	59 J
Acetone	250 J
SVOCs (ug/kg)	
Benzo(a)pyrene	37 J
Di-n-octylphthalate	140 J
Pesticides (ug/kg)	
4,4'-DDE	85 J
4,4'-DDT	6 J
Heptachlor	0.64 J

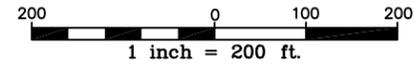
Site ID	56A-SD10
Sample ID	56A-SD10
Date	6/23/2009
Depth Range (ft bgs)	0-0.33
SVOCs (ug/kg)	
Di-n-octylphthalate	82
Pesticides (ug/kg)	
4,4'-DDE	26
Heptachlor	1.1 J

Site ID	56A-SD10
Sample ID	56A-SD10D
Date	6/23/2009
Depth Range (ft bgs)	0-0.33
VOCs (ug/kg)	
Acetone	92 J
SVOCs (ug/kg)	
Di-n-octylphthalate	130 J
Pesticides (ug/kg)	
4,4'-DDE	25 J

Site ID	56A-SD09
Sample ID	56A-SD09
Date	6/23/2009
Depth Range (ft bgs)	0-0.33
VOCs (ug/kg)	
2-Butanone	56 J
Acetone	240 J
Pesticides (ug/kg)	
4,4'-DDE	30 J

Site ID	56A-SD08
Sample ID	56A-SD08
Date	6/23/2009
Depth Range (ft bgs)	0-0.33
VOCs (ug/kg)	
2-Butanone	61 J
Acetone	400 J
Pesticides (ug/kg)	
4,4'-DDE	11 J
Heptachlor	0.61 J

NOTE
SAMPLE LOCATIONS APPROVED IN THE
FIELD BY PREQB ON JUNE 22, 2009



Notes/Qualifiers:	
ug/L	microgram per kilogram
J	Estimated value
█	Exceeds Ecological Screening Value
BOLD	Exceeds Residential Regional Screening Level
<i>ITALICS</i>	Exceeds Industrial Regional Screening Level

LEGEND	
	-SWMU BOUNDARY
	-WETLAND DELINEATION
	PEM1 - THE COWARDIN WETLAND CLASSIFICATION SYSTEM
	-SEDIMENT SAMPLING LOCATION
	-SURFACE SOIL SAMPLE LOCATION
	-DRAINAGE DITCHES

FIGURE 3
DETECTED ORGANICS IN SURFACE SOIL AND
SEDIMENT GREATER THAN RISK BASED
SCREENING CRITERIA
SOURCE AREA INVESTIGATION
SWMU 56/SITE 56A
NAVAL ACTIVITY PUERTO RICO

Site ID	56SD08
Sample ID	56SD08
Date	9/25/2008
Depth Range (ft bgs)	0-0.33
Metals (mg/kg)	
Arsenic	4.8 J
Cobalt	85 J
Copper	240 J
Vanadium	430 J

Site ID	56A-SD06
Sample ID	56A-SD06
Date	6/23/2009
Depth Range (ft bgs)	0-0.33
Metals (mg/kg)	
Arsenic	3.9
Beryllium	0.6 J
Cobalt	46.1 J
Copper	163 J
Vanadium	319

Site ID	56SD11
Sample ID	56SD11
Date	9/25/2008
Depth Range (ft bgs)	0-0.33
Metals (mg/kg)	
Arsenic	3.1 J
Cobalt	46 J
Cadmium	0.36 J

Site ID	56A-SS02
Sample ID	56A-SS02
Date	9/25/2008
Depth Range (ft bgs)	0-0.33
Metals (mg/kg)	
Arsenic	4.1

Site ID	56A-SD05
Sample ID	56A-SD05
Date	6/23/2009
Depth Range (ft bgs)	0-0.33
Metals (mg/kg)	
Cobalt	62.6 J
Tin	8.3 J

Site ID	56A-SD04
Sample ID	56A-SD04
Date	6/23/2009
Depth Range (ft bgs)	0-0.33
Metals (mg/kg)	
Cobalt	63.3 J
Nickel	29.5 J

Site ID	56A-SD01
Sample ID	56A-SD01
Date	6/23/2009
Depth Range (ft bgs)	0-0.33
Metals (mg/kg)	
Arsenic	17.3 J
Cobalt	59.5 J
Lead	216 J
Nickel	24.6 J

Site ID	56A-SD01
Sample ID	56A-SD01
Date	6/23/2009
Depth Range (ft bgs)	0-0.33
Metals (mg/kg)	
Mercury	0.18

Site ID	56A-SS03
Sample ID	56A-SS03
Date	9/25/2008
Depth Range (ft bgs)	0-0.33
Metals (mg/kg)	
Arsenic	2.8

Site ID	56A-SS04
Sample ID	56A-SS04
Date	9/25/2008
Depth Range (ft bgs)	0-0.33
Metals (mg/kg)	
Arsenic	6.2
Lead	23.1 J

Site ID	56A-SS04
Sample ID	56A-SS04D
Date	9/25/2008
Depth Range (ft bgs)	0-0.33
Metals (mg/kg)	
Arsenic	5
Lead	22.4 J

Site ID	56A-SD10
Sample ID	56A-SD10
Date	6/23/2009
Depth Range (ft bgs)	0-0.33
Metals (mg/kg)	
Cobalt	53.5 J
Vanadium	242

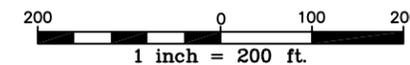
Site ID	56A-SD10
Sample ID	56A-SD10D
Date	6/23/2009
Depth Range (ft bgs)	0-0.33
Metals (mg/kg)	
Cobalt	50.6 J
Vanadium	267 J

Site ID	56A-SD08
Sample ID	56A-SD08
Date	6/23/2009
Depth Range (ft bgs)	0-0.33
Metals (mg/kg)	
Arsenic	3.4 J
Barium	213 J
Beryllium	0.46 J
Cadmium	0.37 J
Cobalt	81.1 J
Tin	9.9 J
Vanadium	275 J

Site ID	56SD09
Sample ID	56SD09
Date	9/25/2008
Depth Range (ft bgs)	0-0.33
Metals (mg/kg)	
Arsenic	3.2 J
Cadmium	0.82 J
Lead	46 J
Zinc	410 J

Notes/Qualifiers:	
ug/L	microgram per kilogram
J	Estimated value
█	Exceeds Ecological Screening Value
BOLD	Exceeds Residential Regional Screening Level
<i>ITALICS</i>	Exceeds Industrial Regional Screening Level
<u>UNDERLINE</u>	Exceeds Basewide Background Value

NOTE
SAMPLE LOCATIONS APPROVED IN THE
FIELD BY PREQB ON JUNE 22, 2009



LEGEND	
	-SWMU BOUNDARY
	-WETLAND DELINEATION
PEM1	-THE COWARDIN WETLAND CLASSIFICATION SYSTEM
●	-SEDIMENT SAMPLING LOCATION
●	-SURFACE SOIL SAMPLE LOCATION
⊗	-2008 PRE-EXCAVATION SEDIMENT DELINEATION SAMPLE LOCATION ASSOCIATED WITH SWMU 56 CMS
—	-DRAINAGE DITCHES

FIGURE 4
DETECTED METALS IN SURFACE SOIL AND
SEDIMENT GREATER THAN RISK-BASED AND
BACKGROUND SCREENING CRITERIA
SOURCE AREA INVESTIGATION
SWMU 56/SITE 56A
NAVAL ACTIVITY PUERTO RICO