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January 8, 2010

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

Attn: Mr. Timothy Gordon

Re: Contract N62470-07-D-0502
IQC for A/E Services for Multi-Media
Environmental Compliance Engineering Support
Delivery Order (DO) 0002
U.S. Naval Activity Puerto Rico (NAPR)
EPA I.D. No. PR2170027203
Draft Corrective Measures Study (CMS) Investigation for SWMU 61
Request for Additional Sampling

Dear Mr. Gordon:

In response to EPA comments dated December 15, 2009 on the proposal for additional sampling at SWMU 61 this proposal has been modified below. Navy responses to EPA comments dated December 15, 2009 and PR EQB comments dated October 22, 2009 on the October 7, 2009 Draft Corrective Measures Study (CMS) Investigation for SWMU 61 Request for Additional Sampling is attached for your review.

Michael Baker, Jr., Inc. (Baker), on behalf of the Navy, has completed the environmental sampling and laboratory analysis specified in the Final Corrective Measures Study Work Plan for SWMU 61 (December 6, 2007). A preliminary evaluation of the resulting data indicates that the extent of contamination in the surface soil, subsurface soil, sediment and groundwater has not been fully defined. In addition, completeness goals for VOCs in soil were not achieved due to data quality issues identified during validation activities. Additional sampling of these media is required to complete the field work requirements for a CMS and to identify the nature and extent of contamination requiring follow-on action. Field activities that have already been completed and the associated data, as well as the results from the proposed additional sampling will be fully documented and evaluated in the CMS Investigation Report for SWMU 61. This additional sampling and analysis will follow the approved sampling and analytical procedures in the Final Work Plan. The following paragraphs provide a brief summary of the field activities completed, the sampling results and the additional sampling proposed for this SWMU.

Field Activities

The field activities specified in the Final Work Plan for SWMU 61 (Former Bundy Area Maintenance Facilities) primarily consisted of:

- The collection of surface soil samples from 20 soil boring locations for laboratory analysis of Appendix IX volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs) (including low level polycyclic aromatic hydrocarbons [LLPAHs]) and metals.

- The collection of a total of 40 subsurface soil samples from 20 soil boring locations for laboratory analysis of Appendix IX VOCs, SVOCs (including LLPAHs) and metals.

- The installation of permanent monitoring wells at six of the 20 soil boring locations.

- The collection of groundwater samples from six monitoring wells for laboratory analysis of Appendix IX VOCs, SVOCs (including LLPAHs), and total and dissolved metals.

Sample locations are provided on Figure 1.

This field program was conducted in May and June 2008. During the development of the CMS Investigation Report sparsity of data from the adjacent freshwater wetland was identified as a data gap. Collection of sediment samples from nine locations and background sediment samples from an additional nine locations from the adjacent freshwater wetland was conducted in October 2008. Sediment sample locations are shown on Figure 2.

Analytical Results

Detected concentrations of VOCs, SVOCs (including LLPAHs) and metals for surface soil, shallow subsurface soil, subsurface soil, sediment and groundwater are provided on Tables 1 through 6. Data were preliminarily screened against various human health and ecological criteria to identify potential data gaps or areas requiring further delineation (additional risk-based evaluation of the data will be included in the CMS Investigation Report). Screening criteria for surface and subsurface soil included USEPA Regional Screening Levels (RSLs) for Residential and Industrial Soil, ecological screening values and Naval Activity Puerto Rico (NAPR) basewide background screening values; screening criteria for groundwater included RSLs for Tap Water, maximum contaminant levels (MCLs), ecological screening criteria for surface water and NAPR Basewide background screening values; screening criteria for sediment included RSLs for Residential and Industrial soil, selected ecological soil screening values and maximum constituent concentrations from the background freshwater sediment samples. A comparison of the detected concentrations to applicable screening criteria is provided on Tables 1 through 4 and Table 6. Complete analytical data, including third party data validation and certification by a Puerto Rican chemist is available on request and will be included in the CMS Investigation Report.

The following paragraphs provide a brief summary of the analytical results and identification of the constituents and areas requiring further delineation at SWMU 61.

Surface Soil

Detected compounds in the surface soil were compared to human health and ecological screening criteria and background as shown on Table 1.

Four VOCs were detected in surface soil (i.e., 2-hexanone, acetone, carbon disulfide, and iodomethane). However, none of the detections exceed screening criteria. Although screening criteria were not exceeded, additional evaluation of VOCs is recommended because the completeness goal (95 percent of all sample data) established in the Data Control Quality Assurance Plan (DCQAP) was not met. Specifically, non-detected results for four samples (61SB04-01, 61SB09-001, 61SB09-00D, and 61SB10-00) were rejected during data validation activities.

Twenty-two SVOCs were detected in the surface soil; of these 22 SVOCs, only five PAHs exceeded human health screening criteria: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene and indeno(1,2,3-cd)pyrene. The ecological screening criteria for low or high molecular weight PAHs were not exceeded. Figure 3 illustrates the distribution of benzo(a)pyrene in surface soil with isoconcentration lines corresponding to the RSLs for Residential and Industrial Soil. With the exception of 61SB05, the SVOC exceedances occurred in the southern portion of the site with the highest concentrations at 61SB01, 61SB07 and 61SB09. Although the concentrations are low, the lateral extent of PAH contamination in the surface soil in the southern portion of the site requires further delineation.

Sixteen metals were detected in the surface soil samples collected from SWMU 61 (see Table 1). Only five of the 16 detected metals exceeded either the human health or ecological screening criteria and background: arsenic, barium, copper, lead and zinc (see Figure 4). Arsenic was detected at each of the 20 surface soil sample locations and exceeded the RSL for Residential Soil at 20 locations, exceeded both the RSL for Residential and Industrial Soil at 15 locations and exceeded the RSL for Residential and Industrial Soil and background at five locations. The locations where both human health criteria and background were exceeded include 61SB05 and 62SB06 in the northern portion of the site, 61SB12 in the western portion of the site and 61SB04 and 61SB10 in the eastern portion of the site. The extent of contamination in each of these areas is not fully defined and requires the collection of additional samples. Barium exceeded both the ecological soil screening criteria and background at two locations, 61SB13 and 61SB20. The barium exceedance at 61SB13 appears to be delineated; however, the exceedance at 61SB20 requires further definition. Copper exceeded the ecological screening criteria at 14 locations; both the ecological screening criteria and the background screening value were exceeded at only one location, 61SB16. The copper exceedance is limited to this one location and does not require further delineation. Lead exceeded both the ecological screening value and the background screening value at one location, 61SB04 in the eastern portion of the site. The extent of lead contamination in this area requires further definition. Zinc exceeded both the ecological screening criteria and the background screening value at four locations: 61SB04 and 61SB10 in the eastern portion of the site, and 61SB08 and 61SB12 in the southwestern portion of the site. Each of these areas also requires further investigation with respect to the occurrence of zinc.

Based on the data collected for the CMS Investigation, the distribution of PAHs, arsenic, barium, lead and zinc in surface soil has not been fully defined and additional surface soil sampling is required to delineate the extent of these contaminants. In addition, data completeness goals for VOCs were not met due to data

quality issues identified during validation activities (non-detected results for approximately 30 percent of the surface soil samples were rejected). Therefore, additional surface soil sampling for this analyte class is required to meet project objectives for data completeness.

Shallow Subsurface Soil (1 to 3 ft bgs)

Detected compounds in the shallow subsurface soil (1 to 3 feet below ground surface [ft bgs]) were compared to human health and ecological screening criteria and background as shown on Table 2.

Four VOCs were detected in the shallow subsurface soil (2-hexanone, acetone, carbon disulfide, and iodomethane), with none of the detections exceeding screening criteria. Identical to surface soil, validation activities identified data quality issues that resulted in non-detected results for three shallow subsurface soil samples to be rejected (61SB03-01, 61SB09-01, and 61SB13-01). Because the completeness goal for VOCs was not achieved, additional evaluation of this analyte class is recommended.
Twenty-one SVOCs were detected in the shallow subsurface soil; of the 21 detected SVOCs, only five PAHs exceeded human health screening criteria at one location, 61SB09: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene and indeno(1,2,3-cd)pyrene. Ecological screening criteria for low or high molecular weight PAHs were not exceeded. Benzo(a)pyrene also exceeded screening criteria at two other locations, 61SB01 and 61SB08. Figure 5 illustrates the distribution of benzo(a)pyrene in shallow subsurface soil with isoconcentration lines corresponding to the RSL for Industrial and Residential Soil. This figure shows elevated concentrations of benzo(a)pyrene in the southwestern portion of the SWMU. Additional shallow subsurface soil sampling is required to delineate the lateral extent of this contamination.

Sixteen metals were detected in the shallow subsurface soil samples collected from SWMU 61; only three of the 16 detected metals exceeded either the human health or ecological screening criteria and background: arsenic, barium, and cobalt (see Table 2). Arsenic was detected at each of the 20 shallow subsurface soil sample locations and exceeded the RSL for Residential Soil at all 20 locations, and exceeded the RSL for Residential and Industrial Soil and background at 12 locations, as shown on Figure 6. Based on the available data, additional definition of the arsenic concentrations in the shallow subsurface soil is required around the perimeter of the site adjacent to 61SB01, 61SB04, 61SB05, 61SB08, 61SB12, 61SB15 and 61SB19. Note that the arsenic concentrations are relatively low and maybe more indicative of natural background variability rather than site contamination. Barium exceeded the ecological soil screening criteria and background at five locations: in the northern portion of the site in the vicinity of 61SB05 and 61SB18, in the west central portion of the site in the vicinity of 61SB11 and 61SB12 and in the southern of the site in the vicinity of 61SB07. Barium requires further delineation in each of these three areas. Cobalt exceeded background and ecological soil screening criteria at one location, 61SB11. The cobalt distribution appears to be delineated at this location.

Based on the data collected for the CMS Investigation, the extent of PAH, arsenic and barium contamination in the shallow subsurface soil has not been fully defined. Additional sampling, primarily around the perimeter of the SWMU is required to delineate this contamination. As discussed above, the detected arsenic concentrations may represent natural background variability rather than site contamination. Collection of additional samples will increase the power of statistical testing that may be conducted on the data set to evaluate this situation. In addition to PAHs and metals, additional sampling

is required to achieve data completeness goals for VOCs. As discussed above, non-detected VOC results for three shallow subsurface soil samples, representing 15 percent of the shallow subsurface soil samples, were rejected during data validation activities.

Subsurface Soil (3 to 11 ft bgs)

Detected compounds in the subsurface soil (greater than 3 ft bgs) were compared to human health and ecological screening criteria and background as shown on Table 3.

Six VOCs were detected in the subsurface soil (3-chloro-1-propene, acetone, carbon disulfide, iodomethane, and trichloroethene). None of the detections exceed screening criteria. However, identical to surface and shallow subsurface soil, non-detected results for three samples (61SB13-05, 61SB14-05, and 61SB15-05) were rejected during data validation activities. As such, the data completeness goals for this analyte class were not met. Investigation of potential on-site sources of VOC contamination also is necessary in the vicinity of monitoring wells 61SB05 and 61SB06 and borings 61SB17 and 61SB18. Based on these considerations, additional sampling for VOCs is recommended.

Thirteen SVOCs were detected in the shallow subsurface soil. Of the 13 detected SVOCs, only one PAH, benzo(a)pyrene exceeded human health screening criteria at two locations, 61SB01 and 61SB07. As shown on Table 3, the benzo(a)pyrene concentrations at these two locations are relatively low. However, because of their co-location with surface and shallow subsurface soil PAH exceedances, the subsurface soil PAH exceedances represent a potential data gap with respect to the extent of contamination.

Fourteen metals were detected in the shallow subsurface soil samples collected from SWMU 61. Only three of the 14 detected metals exceeded either the human health or ecological screening criteria and background: arsenic, cobalt and vanadium (see Table 3). Arsenic was detected at 19 of the 20 subsurface soil sample locations (the arsenic data for one location was rejected by the data validator) and exceeded the RSL for Residential Soil at all 19 locations, and exceeded the RSL for Residential and Industrial Soil and background at 11 locations, as shown on Figure 7. Based on the available data, additional definition of the arsenic concentration in subsurface soil is required around the perimeter of the site adjacent to 61SB01, 61SB02, 61SB04, 61SB05, 61SB06, 61SB07, 61SB08, 61SB15 and 61SB20. Note that arsenic concentrations are relatively low and may be more indicative of natural background variability rather than site contamination. Cobalt exceeded background and the RSL for Residential Soil at seven locations; cobalt also exceeded background and the RSL for Industrial Soil at six of these locations, primarily in the northern portion of the site. Additional delineation of the cobalt contamination is required in the northern portion of the site around 61SB05, 61SB06, 61SB19 and 61SB20. Vanadium exceeded background and the RSL for Residential Soil at one location (61SB18) from a depth of 9 to 11 ft bgs. This represents a single exceedance at depth that does not require further delineation.

Based on the data collected for the CMS Investigation, the extent of PAH, arsenic and cobalt contamination in the subsurface soil has not been fully defined. Additional sampling, primarily around the perimeter of the SWMU is required to delineate this contamination; this will also increase the power of statistical testing that may be conducted on the data set to evaluate background verses site contamination. Additional sampling for VOCs also is required to achieve data completeness goals for this analyte class (approximately 12 percent of the subsurface soil samples were rejected during data validation activities).

Sediment

Detected compounds in the freshwater sediment samples were compared to human health and ecological screening criteria as shown on Table 4. Nine background sediment samples were collected from the freshwater wetland as shown on Table 5. Although there is not a sufficient number of samples to calculate a Background Screening Value (mean plus two standard deviations), the sediment sample results were compared to the maximum detections in the background data set as an indicator of potential site contamination. A more complete evaluation of background will be provided in the CMS Report.

Two VOCs were detected in the sediment, although none of the detections exceeded screening criteria. Additional delineation is not required for this suite of constituents in the sediment.

Twelve SVOCs were detected in the sediment. Only two of the 12 detected SVOCs exceeded their respective screening criteria: 3 & 4 methylphenol and benzo(a)pyrene. 3 & 4 Methylphenol exceeded the ecological screening criteria; no human health criteria have been established for this compound. Benzo(a)pyrene exceeded the RSL for Residential Soil at six of the nine sediment sample locations, as shown on Table 4. The levels of the detected SVOCs are relatively low; however, any additional sediment samples that are collected from the wetland should include SVOCs to verify that the contamination is low level and delineated.

Fourteen metals were detected in the sediment samples collected from SWMU 61. Of the 14 detected metals, eight exceeded either the human health or ecological screening criteria and the maximum detected background concentrations: antimony, barium, cadmium, chromium, copper, lead, mercury and nickel (see Table 4). Antimony was detected at two sample locations (61SD08 and 61SD09) at a concentration in excess of the RSL for Residential Soil, the ecological soil screening value and the maximum detected background concentration. Barium and cadmium were detected at one sample location at concentrations in excess of both the ecological soil screening value and the maximum background concentration. Chromium was detected at seven sampling locations at a concentration in excess of the ecological screening criteria and the maximum background concentration. Copper was detected at six sampling locations at a concentration in excess of the ecological screening criteria and the maximum background concentration. Lead was detected at all nine sampling locations at a concentration in excess of the ecological screening criteria and the maximum background concentration. Mercury was detected at two sampling locations at a concentration in excess of the ecological screening criteria and the maximum background concentration. Nickel was detected at one sampling location at a concentration in excess of the ecological screening criteria and the maximum background concentration. The distribution of these metals, particularly lead, has not been defined in the freshwater sediment and additional sampling is required to fully delineate the extent of this contamination.

Based on the data collected for the CMS Investigation, the extent of PAH, antimony, barium, chromium, copper, lead, mercury and nickel contamination in the sediment has not been fully defined and additional sampling in the freshwater wetland is required.

Groundwater

Detected compounds in the groundwater were compared to human health and ecological screening criteria and background as shown on Table 6.

Four VOCs were detected in the groundwater samples; three of these VOCs were detected at concentrations in excess of screening criteria including chloroform, tetrachloroethene and trichloroethene (see Figure 9). Chloroform was detected in five of the six monitoring well samples at concentrations exceeding the RSL for Tap Water. Tetrachloroethene was detected at a concentration in excess of the RSL for Tap Water in the groundwater sample collected from 61SB06. Trichloroethene was detected at concentrations in excess of the RSL for Tap Water in the groundwater samples collected from 61SB05 and 61SB06. Trichloroethene was also detected at a concentration in excess of the MCL in the sample collected from 61SB05. This contamination is believed to be associated with SWMU 54 (located approximately 175 feet east-northeast of SWMU 61), although this has not been confirmed. Data from the adjacent SWMU 54 should be reviewed in conjunction with data from SWMU 61 to determine the potential source of this contamination. Installation of groundwater monitoring wells along the eastern border of SWMU 61 also may assist in determining the hydrogeologic connection between the two SWMUs.

One SVOC, bis(2-ethylhexyl) phthalate was detected in the groundwater samples collected from monitoring wells 61SB02 and 61SB04 at a concentration greater that the ecological groundwater screening value. This compound was detected at trace concentrations and is a typical laboratory artifact. No additional delineation is required.

Eight metals (arsenic, barium, chromium cobalt, copper, nickel, selenium and vanadium) were detected in the total recoverable fraction of the groundwater samples collected from SWMU 61. Although there were various exceedances of the RSLs for Tap Water and the ecological groundwater screening values, none of the detected concentrations exceeded background. No additional delineation is required.

Five metals (barium, cobalt, nickel, selenium and vanadium) were detected in the dissolved fraction of the groundwater samples collected from SWMU 61. Vanadium exceeded the RSL for Tap Water, the ecological groundwater screening value and the background screening value in samples collected from five of the six monitoring wells; vanadium did not exceed the RSL for Tap Water or background at 61SB01. Additional delineation of the distribution of dissolved vanadium in groundwater is required.

Based on the data collected for the CMS Investigation, the extent of VOC and vanadium contamination in the groundwater has not been fully defined. Additional sampling, primarily around the perimeter of the SWMU is required to delineate this contamination.

Additional Sampling

Additional sampling at SWMU 61 is proposed to further delineate contamination in the soil and groundwater in the upland area and in the sediment in the freshwater wetlands at SWMU 61. The procedures given in the Final Corrective Measures Study Work Plan for SWMU 61 will be followed to conduct this additional investigation. The following items outline the additional work proposed for SWMU 61 (refer to Figures 10 and 11 for sample locations):

- A total of 32 soil borings are proposed for installation to a depth of 12 feet below the ground surface. These borings will be installed primarily around the perimeter of the site, as shown on Figure 10 to further delineate surface, shallow subsurface and subsurface soil contamination. However, several borings will be installed in the vicinity of monitoring wells 61SB05 and 61SB06 and borings 61SB17 and 61SB18 to further investigate potential on-site sources. Note that the location of the borings may be adjusted in the field, as needed to allow for better characterization of potential migration pathways (i.e. topographic low areas or swales, etc.). Surface soil (0 to 1 ft bgs), shallow subsurface soil (1 to 3 ft bgs) and subsurface soil (9 to 11 ft bgd or to just above the groundwater table, unless field screening indicates a different interval as displaying contamination) samples will be collected from each boring. Each sample will be analyzed for Appendix IX VOCs, SVOCs (including LLPAHs), and metals. In addition, those locations sampled in June 2008 with rejected VOC results (61SB03, 61SB04, 61-SB09, and 61SB10, 61SB13, 61SB14, and 61SB15) will be re-sampled and analyzed for VOCs. At a given location, re-sampling will be limited to the specific depth interval with rejected data. For example, rejected data at 61SB15 were limited to soil collected from the 9 to 11 ft depth interval. Therefore, re-sampling at 61SB15 will be limited to this depth interval.

- Groundwater monitoring wells are proposed for installation in seven of the 32 borings, as shown on Figure 10. Groundwater samples will be collected from each of the seven newly installed wells as well as from the six existing wells. Groundwater samples will be analyzed for Appendix IX VOCs, SVOCs (including LLPAHs) and metals (total and dissolved fractions). Additionally, data from the proposed sampling at SWMU 54 should be reviewed to ascertain the impact of groundwater contamination from SWMU 54 on SWMU 61. To assist this evaluation, a simultaneous set of groundwater elevation measurements will be collected from the SWMU 61 monitoring wells and from each of the SWMU 54 monitoring wells. Top of casing elevations will be determined for each newly installed well.

- A total of 20 sediment samples will be collected from the freshwater wetland area from a depth of 0 to 0.25 ft bgs (see Figure 11). The sediment samples will be analyzed for Appendix IX SVOCs, Appendix IX metals, total organic carbon (TOC) and acid volatile sulfide/ simultaneously-extracted metals (AVS/SEM).

- A total of ten background sediment samples are proposed for collection from the freshwater wetland area to supplement the existing background samples and to provide a sufficient number of samples to conduct statistical analysis of the data set. These sediment samples will be analyzed for Appendix IX metals.

The PEM1 wetland depicted on the various figures attached to this Request for Additional Sampling was delineated by Geo-marine, Inc. in December 1999 from 1993 color infrared and 1998 true color photography. As such the PEM1 wetland boundary does not represent a field delineated jurisdictional boundary. Therefore, as part of the additional sampling effort, the wetland boundary within the borders of the SWMU will be field-delineated in accordance with the 1987 Corps of Engineers wetland delineation manual.

Initiation of the additional work described herein will begin 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

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. 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)
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NAVY RESPONSES TO USEPA COMMENTS DATED DECEMBER 15, 2009 AND PREQB COMMENTS DATED OCTOBER 22, 2009

DRAFT CORRECTIVE MEASURES STUDY (CMS) INVESTIGATION FOR SWMU 61, REQUEST FOR ADDITIONAL SAMPLING DATED OCTOBER 7, 2009

EPA COMMENTS

(EPA Comments are provided in italics, while Navy responses are provided in plain text)

GENERAL COMMENTS

1. *The second bulleted item under the subsection "Additional Sampling," on Page 7, indicates that groundwater monitoring wells will be installed in six of the 25 proposed borings; and that groundwater samples will be collected from these newly-installed wells as well as the six existing wells. The subsection further indicates that "[g]roundwater samples will be analyzed for Appendix IX [semi-volatile organic compounds] SVOCs (including [low-level polynuclear aromatic hydrocarbons] LLPAHs) and metals (total and dissolved fractions)." There are two issues of concern with this proposed approach. First, volatile organic compounds (VOCs), including trichloroethene (TCE), chloroform and tetrachloroethene, were detected in groundwater samples above applicable screening criteria during the previous sampling event. Therefore, VOCs should be added to the proposed list of analytes for groundwater samples. Second, the second paragraph under the subsection "Groundwater," on Page 6, states that the VOC contamination in groundwater may be associated with SWMU 54. SWMU 54 is located approximately 175 feet east-northeast of SWMU 61. The Request for Additional Sampling has not presented a potentiometric surface map that shows the anticipated groundwater flow direction at the site in relation to SWMU 54. As a result, it cannot be determined whether the proposed groundwater monitoring well locations shown on Figure 10, Proposed Soil and Groundwater Sample Location Map, are appropriate to determine the source of the groundwater contamination and to define its extent. Revise the Request for Additional Sampling to propose analysis of groundwater samples for VOCs in addition to SVOCs (including LLPAHs) and metals. In addition, revise the Request for Additional Sampling to include a figure which depicts the groundwater flow direction at the site in relation to SWMU 54.*

Navy Response: The Navy offers the following points of clarification relative to this comment. Groundwater contours for SWMU 61 were not presented on a figure within the Request for Additional Sampling due to a problem with the survey data collected during the June 2008 sampling event. The groundwater wells will be re-surveyed during the proposed field event and a groundwater contour map will be generated as part of the CMS. It is noted that recent groundwater elevation data for SWMU 54 and SWMU 61 monitoring wells, collected as part of the ongoing remediation pilot study at SWMU 54 by CH2M Hill indicates that groundwater flow is relatively flat and the flow direction is from east to west toward the PEM1B wetland unit. Based on the CH2M Hill data, the Navy believes that the proposed and existing groundwater monitoring well locations are appropriate to determine the source of groundwater contamination. However, to assist in further defining the extent of contamination, one additional monitoring well is being proposed southwest of monitoring wells 61SB05 and 61SB06 (see revised Figure 10). The Request for Additional Sampling also will be revised to indicate that groundwater collected from proposed and existing monitoring wells will be analyzed for VOCs.

2. *As previously noted, the Request for Additional Sampling indicates that the VOC contamination in groundwater may be associated with SWMU 54. The Request for Additional Sampling further reasons that no additional VOC sampling for soil based contamination is required because none of the six VOCs that were detected in subsurface soil greater than three feet below ground*

surface (bgs) exceeded the screening criteria (Page 4). Note, however that the detected concentrations of VOCs in soil were not compared to Protection of Groundwater Soil Screening Levels (SSLs) conservatively based on a dilution attenuation factor (DAF) of one, which are included on EPA's Regional Screening Level table (May 2009) (available online at: http://www.epa.gov/reg3hwmd/risk/human/rbconcentration_table/Generic_Tables/index.htm). A review of results listed in Table 3, Summary of Detected Laboratory Results, Subsurface Soil, indicates that chloroform was detected in soil sample 61SB17-05 from 9-11 feet bgs at an estimated concentration of 1.1J micrograms per kilogram (ug/kg). This concentration exceeds the Protection of Groundwater SSL of 0.055 ug/kg. Table 3 also shows that TCE was detected in soil sample 61SB18-05, 9-11 ft bgs at an estimated concentration of 1.5J ug/kg, which exceeds its Protection of Groundwater SSL of 0.61 ug/kg. Borings 61SB17 and 61SB18 are both located just south of the two monitoring wells which reported these same VOCs in groundwater (i.e., 61SB05 and 61SB06). These detections indicate that it may be necessary to further investigate potential on-site sources as they may be contributing to groundwater VOC contamination. Revise the Request for Additional Sampling to propose additional subsurface sampling for VOCs in the vicinity of borings 61SB17 and 61SB18 and monitoring wells 61SB05 and 61SB06 to determine whether contaminated soil may be acting as a source of the groundwater contamination. Alternatively, provide justification for not proposing additional sampling for VOCs in this area. Additionally, revise Table 3 to add a column that includes the Protection of Groundwater SSLs for comparison to the soil results, and revise the text of the Request for Additional Sampling to discuss the potential for contaminants in soil to impact site groundwater.

Navy Response: The Navy does not believe it is appropriate to compare subsurface soil analytical data to Protection of Groundwater SSLs since groundwater samples have been collected and additional groundwater samples will be collected from existing and new monitoring wells, thus allowing for a quantitative determination of groundwater quality. Therefore, Table 3 will not be revised to include a comparison of subsurface soil to Protection of Groundwater SSLs and the text within the Request for Additional Sampling will not be revised to include a discussion of the potential for soil contaminants to impact groundwater.

With regard to the request for additional soil sampling, text within the Request for Additional Sampling, as well as Figure 10) will be revised to indicate that four additional borings will be installed in the vicinity of borings 61SB17 and 61SB18 and monitoring wells 61SB05 and 61SB06. In addition, a monitoring well will be installed in one of these borings and a groundwater sample will be collected (see the Navy response to General Comment No. 1 above). Surface soil (0 to 1 ft bgs), shallow subsurface soil (1 to 3 ft bgs), and subsurface soil (9 to 11 ft bgs or just above the groundwater table, unless field screening indicates a different interval as displaying contamination) samples will be collected from each boring. The soil samples and groundwater sample will be analyzed for Appendix IX VOCs, SVOCs (including low level PAHs), and metals. It is noted that additional proposed soil sample locations have already been established around historical structures northeast and southeast of boring 61SB17 and 61SB18 and monitoring wells 61SB05 and 61SB06 to further investigate potential onsite sources of contamination

3. *The third bulleted item under the subsection "Additional Sampling," on Page 7, states that 20 sediment samples will be collected and analyzed for Appendix IX metals (including total organic carbon, and acid volatile sulfide/simultaneously extracted metals). However this section does not indicate that the sediment samples will also be analyzed for SVOCs. As stated in the third paragraph under the subsection "Sediment," on Page 5, "The levels of the detected SVOCs [in sediment] are relatively low; however, any additional sediment samples that are collected from the wetland should include SVOCs to verify that the contamination is low level and delineated." Revise the Request for Additional Sampling to propose SVOC analysis for the 20 sediment samples.*

Navy Response: The third bullet item under the section "Additional Sampling" will be revised to indicate that sediment samples collected from the PEM1 wetland unit adjacent to SWMU 61 will be analyzed for SVOCs.

4. *The first bulleted item on Page 8, states that "[a] limited habitat/vegetation evaluation will be conducted to verify the location of the wetland boundaries within the borders of the SWMU." The Request for Additional Sampling has not indicated what this limited evaluation will entail, nor how it will be conducted. Revise the Request for Additional Sampling to present further detail on the procedures for conducting a limited habitat/vegetation evaluation since this activity was not previously described in the Final Corrective Measures Study Work Plan for SWMU 61, dated December 6, 2007.*

Navy Response: The PEM1 wetland depicted on the various figures attached to the Request for Additional Sampling were delineated by Geo-marine, Inc. in December 1999 from 1993 color infrared and 1998 true color photography. As such the PEM1 wetland boundary does not represent a field delineated jurisdictional boundary. To ensure the accuracy of the wetland boundary depicted on the figures, the wetland boundary within the borders or the SWMU will be field-delineated in accordance with the 1987 Corps of Engineers wetland delineation manual. The last bullet item under the section named "Additional Sampling" will be revised to include this information.

5. *The Summary of Detected Laboratory Results tables indicate that several of the VOC results have been flagged as rejected (61SB09-00, 61SB09-00D, 61SB10-00 on Table 1, Surface Soil; 61SB03-01, 61SB09-01, 61SB13-01, 61SB16-01 on Table 2, Shallow Subsurface Soil; 61SB13-05, 61SB14-05, 61SB15-05 on Table 3, Subsurface Soil). The Request for Additional Sampling does not comment on these rejected results. If insufficient data are available to achieve project objectives due to these rejected results, then additional sampling may be required to fulfill data needs. Revise the Request for Additional Sampling to address the various rejected results for VOCs analysis in soil; indicate whether additional VOC sampling is necessary to achieve project objectives with respect to this analyte class.*

Navy Response: The initial VOC analyses for four surface soil samples (61SB04-00, 61SB09-00, 61SB09-00D, 61SB10-00), three subsurface soil samples collected from the 1.0 to 3.0-foot depth interval (61SB03-01, 61SB09-01, 61SB13-01), and three subsurface soil samples collected from the 3.0 to 11.0-foot depth interval (61SB13-05, 61SB14-05, 61SB15-05) resulted in surrogate and/or internal standard failure that required re-analysis. The initial VOC analysis for subsurface soil sample 61-SB16-01 (collected from the 1.0 to 3.0-foot depth interval) was insufficient due to a poor purge that also required re-analysis. The second analysis from the second sample vial for these eleven samples failed due to instrument error. The laboratory compensated by analyzing for VOCs from bulk sample supply. Because a significant amount of volatile constituents may be lost during handling of a bulk sample, non-detected results for these eleven samples, including non-detected results for the VOCs listed in Tables 1 through 3, were rejected during data validation activities. Based on the rejection of non-detected VOC results, the Navy acknowledges that the completeness goals (95 percent of all sample data) established in the Data Control Quality Assurance Plan (DCQAP) for surface soil, subsurface soil collected from the 1.0 to 3.0-foot depth interval, and subsurface soil collected from the 3.0 to 11.0-foot depth interval were not met. For this reason, depth-specific locations indicated above with rejected VOC results will be re-sampled and re-analyzed for VOCs. As discussed in The Navy's response to General Comment No. 2, surface and subsurface soil samples collected at the proposed locations depicted on Figure 10 also will be analyzed for VOCs.

The Request for Additional Sampling will be revised to (1) include the discussion of the rejected VOC results, and (2) indicate that the depth-specific soil sample locations with rejected VOC results will be re-sampled and analyzed for VOCs, and (3) indicate that the proposed soil sample locations (all depth intervals) will be analyzed for VOCs.

MINOR COMMENT

6. *Table 3 is titled "Summary of Detected Laboratory Results – Subsurface Soil (above 3 feet)." However, the table presents the results for soil samples collected from a depth of three feet bgs up to 11 feet bgs. For clarity, revise the title of Table 3 to state that the results are presented for subsurface soil from three to 11 feet bgs, rather than above three feet.*

Navy Response: The title for Table 3 will be revised to indicate that analytical data are from subsurface soil samples collected from the 3.0 to 11.0-foot depth interval.

PREQB COMMENTS

(PREQB Comments are provided in italics, while Navy responses are provided in plain text)

1. *The second bullet for the additional sampling part stated that groundwater wells will be installed "in six of the 25 boring, as shown on Figure 10". It should be clarified that there will be 28 soil boring instead of 25.*

Navy Response: The Navy is proposing four additional borings in the vicinity of monitoring wells 61SB06 and 61SB05 and soil borings 61SB17 and 61SB17. A monitoring well will be installed at one of these additional borings. Therefore, the total number of proposed borings and monitoring wells are 32 and 7, respectively. The text within the Request for Additional Sampling will be revised to include the correct number of borings and monitoring wells.

2. *To assist the evaluation of the impact of SWMU 54 on SWMU 61, it is being proposed to review the data from SWMU 54. It is also proposed to collect a simultaneous set of groundwater elevation measurements from selected wells of SWMU 54. Please clarify what would be the criteria for selecting the wells to be measured.*

Navy Response: Groundwater elevations for all SWMU 54 and SWMU 61 monitoring wells, as well as the proposed monitoring wells at SWMU 61will be measured. The Text within the Request for Additional Sampling will be revised to indicate that groundwater elevation measurements will be collected at all existing SWMU 54 and 61 monitoring wells, as well as all proposed SWMU 61 monitoring wells.

TABLES

TABLE 1

SUMMARY OF DETECTED LABORATORY RESULTS - SURFACE SOIL
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range	**Regional Screening Levels Residential**	*Regional Screening Levels Industrial*	Selected Ecological Soil Screening Values	NAPR Basewide Background[1]	61SB01 61SB01-00 6/2/2008 0.0-1.0	61SB01 61SB01-00D 6/2/2008 0.0-1.0	61SB02 61SB02-00 6/3/2008 0.0-1.0	61SB03 61SB03-00 6/4/2008 0.0-1.0	61SB04 61SB04-00 6/4/2008 0.0-1.0
Volatile Organic Compounds (ug/kg)									
2-Hexanone	NE	NE	NE	NE	2.4 U	3 U	2.2 U	1.9 UJ	2.9 R
Acetone	6,100,000 [2]	61,000,000 [2]	NE	NE	160 J	190 J	60 U	96 U	6.2 R
Carbon disulfide	67,000 [2]	300,000 [2]	NE	NE	0.59 U	0.73 U	0.54 U	0.55 J	0.71 R
Iodomethane	NE	NE	NE	NE	1.3 J	1.4 U	1.1 U	1.2 J	1.4 R
Semivolatile Organic Compunds (ug/kg)									
2-Methylnaphthalene	31,000 [2]	410,000 [2]	NE	NE	2.1 UJ	2.1 UJ	2 R	1.9 U	11
Acenaphthene	340,000 [2]	3,300,000 [2]	NE	NE	17 J	12 J	0.69 R	0.64 U	3.2 J
Acenaphthylene	340,000 [2][3]	3,300,000 [2][3]	NE	NE	2.1 UJ	2.1 UJ	2 R	1.9 U	2.4 U
Anthracene	1,700,000 [2]	17,000,000 [2]	NE	NE	30 J	17 J	6 J	1.9 U	5.3 J
Benzo[a]anthracene	150	2,100	NE	NE	**180** J	120 J	41 J	3.7 J	31
Benzo[a]pyrene	15	210	NE	NE	***250*** J	**190** J	**59** J	6.9 J	**36** J
Benzo[b]fluoranthene	150	2,100	NE	NE	**370** J	**260** J	77 J	10	58
Benzo[g,h,i]perylene	170,000 [2][3]	1,700,000 [2][3]	NE	NE	130 J	90 J	34 J	5.4 J	33
Benzo[k]fluoranthene	1,500	21,000	NE	NE	1.2 UJ	1.2 UJ	1.2 R	1.1 UJ	1.4 UJ
Benzyl alcohol	3,100,000 [2]	31,000,000 [2]	NE	NE	9.9 UJ	9.8 UJ	9.6 UJ	9 U	11 U
Bis(2-ethylhexyl) phthalate	35,000	120,000	6,010 [5][6]	NE	15 UJ	11 UJ	78 R	19 U	85 U
Butyl benzyl phthalate	260,000	910,000	6,010 [5][6]	NE	8.9 UJ	8.8 UJ	8.7 R	8.1 U	13 J
Chrysene	15,000	210,000	NE	NE	180 J	130 J	44 J	4.3 J	32
Dibenz(a,h)anthracene	15	210	NE	NE	**20** J	**23** J	8.7 J	1.5 J	0.82 U
Dibenzofuran	NE	NE	NE	NE	6.6 J	5.1 UJ	5.1 R	4.7 U	5.9 U
Fluoranthene	230,000 [2]	2,200,000 [2]	NE	NE	260 J	160 J	57 J	6 J	36
Fluorene	230,000 [2]	2,200,000 [2]	NE	NE	9.1 J	4 J	0.93 R	0.86 U	1.4 J
Indeno[1,2,3-cd]pyrene	150	2,100	NE	NE	83 J	64 J	34 J	3.2 J	20 J
Naphthalene	3,900	20,000	NE	NE	4.2 UJ	2.8 UJ	0.72 R	0.67 U	2.1 U
Phenanthrene	170,000 [2][3]	1,700,000 [2][3]	NE	NE	140 J	72 J	22 J	2.2 J	18
Phenol	1,800,000 [2]	18,000,000 [2]	NE	NE	5.9 UJ	5.9 UJ	5.8 UJ	5.4 U	6.7 U
Pyrene	170,000 [2]	1,700,000 [2]	NE	NE	280 J	160 J	44 J	5.4 J	45

TABLE 1

SUMMARY OF DETECTED LABORATORY RESULTS - SURFACE SOIL
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range	**Regional Screening Levels Residential**	*Regional Screening Levels Industrial*	Selected Ecological Soil Screening	NAPR Basewide Background[1]	61SB01 61SB01-00 6/2/2008 0.0-1.0	61SB01 61SB01-00D 6/2/2008 0.0-1.0	61SB02 61SB02-00 6/3/2008 0.0-1.0	61SB03 61SB03-00 6/4/2008 0.0-1.0	61SB04 61SB04-00 6/4/2008 0.0-1.0
PAHs (ug/kg)									
Low molecular weight PAHs	NE	NE	29,000 [7]	NE	464.5	272	91.34	16.07	79.4
High molecular weight PAHs	NE	NE	18,000 [8]	NE	1494.2	1038.2	342.9	41.5	257.22
Metals (mg/kg)									
Antimony	3.1 [2]	41 [2]	78 [9]	3.17	0.52 U	0.53 U	0.3 UJ	0.31 UJ	2.5 J
Arsenic	0.39	1.6	18 [10]	2.65	***2.3***	***2.4***	***2.6***	***2***	***3.5***
Barium	1,500 [2]	19,000 [2]	330 [9]	199	64	73	170 J	82	110
Beryllium	16 [2]	200 [2]	40 [9]	0.590	0.19	0.2	0.27	0.3	0.23
Cadmium	70 [2]	800 [2]	32 [10]	1.02	0.2	0.24	1.3	0.12	0.85
Chromium	280	1,400	57 [11]	49.8	20 J	19 J	30 J	16	45
Cobalt	2.3 [2]	30 [2]	13 [10]	46.2	**10**	**8.8**	**16** J	**9.6**	**17**
Copper	310 [2]	41,000 [2]	70 [10]	168	35	35	95	47	120
Lead	400 [4]	800 [4]	120 [10]	22	41	39	87 J	19	250
Mercury	2 [2]	31 [2]	0.1 [12]	0.109	0.031	0.029	0.022	0.012 J	0.067 J
Nickel	160 [2]	2,000 [2]	38 [10]	20.7	9.8 J	7.5 J	11	7.4	17
Selenium	39 [2]	510 [2]	0.52 [10]	1.48	0.53 J	0.5 J	0.48 J	0.31 J	0.49 J
Silver	39 [2]	510 [2]	560 [10]	NE	0.042 J	0.032 J	0.043 J	0.032 J	0.08 J
Tin	4,700 [2]	61,000 [2]	50 [13]	NE	4.5 U	4.6 U	4.4 U	4.2 U	5 U
Vanadium	55 [2]	720 [2]	10 [14]	259	**71**	**65**	**130**	**67**	**120**
Zinc	2,300 [2]	31,000 [2]	120 [9]	115	59 J	49 J	92	40 J	540 J

TABLE 1

SUMMARY OF DETECTED LABORATORY RESULTS - SURFACE SOIL
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range	**Regional Screening Levels Residential**	*Regional Screening Levels Industrial*	Selected Ecological Soil Screening Values	NAPR Basewide Background[1]	61SB05 61SB05-00 6/3/2008 0.0-1.0	61SB06 61SB06-00 6/2/2008 0.0-1.0	61SB07 61SB07-00 6/3/2008 0.0-1.0	61SB08 61SB08-00 6/2/2008 0.0-1.0	61SB09 61SB09-00 6/4/2008 0.0-1.0
Volatile Organic Compounds (ug/kg)									
2-Hexanone	NE	NE	NE	NE	2.5 UJ	2.6 U	140	89	2.7 R
Acetone	6,100,000 (2)	61,000,000 (2)	NE	NE	120 U	170 J	170	170	5.7 R
Carbon disulfide	67,000 (2)	300,000 (2)	NE	NE	0.6 U	0.63 U	0.63 U	0.65 U	0.66 R
Iodomethane	NE	NE	NE	NE	1.2 UJ	1.8 J	1.7 J	2 J	1.3 R
Semivolatile Organic Compunds (ug/kg)									
2-Methylnaphthalene	31,000 (2)	410,000 (2)	NE	NE	1.8 U	1.8 U	4.2 U	2.1 U	5.2 U
Acenaphthene	340,000 (2)	3,300,000 (2)	NE	NE	0.61 U	0.61 U	42	6.8 J	29 J
Acenaphthylene	340,000 (2)(3)	3,300,000 (2)(3)	NE	NE	1.8 U	1.8 U	2.2 U	2.1 U	2.2 U
Anthracene	1,700,000 (2)	17,000,000 (2)	NE	NE	2.2 J	3.4 J	67	11	53 J
Benzo[a]anthracene	150	2,100	NE	NE	15	2.6 J	**340**	61	**260**
Benzo[a]pyrene	15	210	NE	NE	**23** J	3.6 J	***350*** J	**83** J	***320*** J
Benzo[b]fluoranthene	150	2,100	NE	NE	31 J	10	**310**	120	**460**
Benzo[g,h,i]perylene	170,000 (2)(3)	1,700,000 (2)(3)	NE	NE	1.8 UJ	1.8 U	220	51	200
Benzo[k]fluoranthene	1,500	21,000	NE	NE	14 J	1.1 UJ	170 J	1.2 UJ	1.3 UJ
Benzyl alcohol	3,100,000 (2)	31,000,000 (2)	NE	NE	8.6 U	8.6 UJ	11 U	10 U	10 U
Bis(2-ethylhexyl) phthalate	35,000	120,000	6,010 (5)(6)	NE	55 U	19 U	21 U	20 U	19 U
Butyl benzyl phthalate	260,000	910,000	6,010 (5)(6)	NE	9 J	7.7 U	9.5 U	46	9.3 U
Chrysene	15,000	210,000	NE	NE	26	2.5 J	350	68	250
Dibenz(a,h)anthracene	15	210	NE	NE	0.63 UJ	0.64 U	0.78 U	9.3	**46**
Dibenzofuran	NE	NE	NE	NE	4.5 U	4.5 U	14 J	5.2 U	10 J
Fluoranthene	230,000 (2)	2,200,000 (2)	NE	NE	14	4.7 J	420	84	420
Fluorene	230,000 (2)	2,200,000 (2)	NE	NE	0.83 U	0.83 U	19	3.7 J	16 J
Indeno[1,2,3-cd]pyrene	150	2,100	NE	NE	1.3 UJ	3.1 J	**190**	43 J	**170** J
Naphthalene	3,900	20,000	NE	NE	1.5 U	0.65 U	12	1.9 U	5.4 U
Phenanthrene	170,000 (2)(3)	1,700,000 (2)(3)	NE	NE	4.9 J	1.8 U	250	47	220
Phenol	1,800,000 (2)	18,000,000 (2)	NE	NE	5.2 U	5.2 U	7.6 J	6 U	6.2 U
Pyrene	170,000 (2)	1,700,000 (2)	NE	NE	44	4 J	510	86	370

TABLE 1

SUMMARY OF DETECTED LABORATORY RESULTS - SURFACE SOIL
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range	**Regional Screening Levels Residential**	*Regional Screening Levels Industrial*	Selected Ecological Soil Screening	NAPR Basewide Background[1]	61SB05 61SB05-00 6/3/2008 0.0-1.0	61SB06 61SB06-00 6/2/2008 0.0-1.0	61SB07 61SB07-00 6/3/2008 0.0-1.0	61SB08 61SB08-00 6/2/2008 0.0-1.0	61SB09 61SB09-00 6/4/2008 0.0-1.0
PAHs (ug/kg)									
Low molecular weight PAHs	NE	NE	29,000 [7]	NE	27.64	15.59	816.4	158.6	750.8
High molecular weight PAHs	NE	NE	18,000 [8]	NE	156.73	29.34	2440.8	522.5	2077.3
Metals (mg/kg)									
Antimony	3.1 [2]	41 [2]	78 [9]	3.17	0.55 J	0.2 U	0.85 J	0.5 U	0.57 UJ
Arsenic	0.39	1.6	18 [10]	2.65	***3.3***	***3.9***	**1.5**	***2.1***	***2.1***
Barium	1,500 [2]	19,000 [2]	330 [9]	199	71 J	61	96 J	140	82
Beryllium	16 [2]	200 [2]	40 [9]	0.590	0.18	0.2	0.23	0.29	0.46
Cadmium	70 [2]	800 [2]	32 [10]	1.02	0.45	0.032 U	0.12 J	0.28	0.4
Chromium	280	1,400	57 [11]	49.8	33 J	40 J	28 J	20 J	28 J
Cobalt	2.3 [2]	30 [2]	13 [10]	46.2	**15** J	**18**	**10** J	**8.5**	**13**
Copper	310 [2]	41,000 [2]	70 [10]	168	110	110	47	56	110 J
Lead	400 [4]	800 [4]	120 [10]	22	39 J	3.9	58 J	53	120
Mercury	2 [2]	31 [2]	0.1 [12]	0.109	0.044	0.012 J	0.032	0.039	0.05 J
Nickel	160 [2]	2,000 [2]	38 [10]	20.7	14	21 J	8.1	8.3 J	53 R
Selenium	39 [2]	510 [2]	0.52 [10]	1.48	0.44 J	0.19 J	0.44 J	0.45 J	0.97
Silver	39 [2]	510 [2]	560 [10]	NE	0.1 J	0.032 J	0.036 J	0.051 J	0.046 J
Tin	4,700 [2]	61,000 [2]	50 [13]	NE	4.1 U	4.1 U	5 U	4.5 U	23 J
Vanadium	55 [2]	720 [2]	10 [14]	259	**97**	**100**	**91**	**69**	**74**
Zinc	2,300 [2]	31,000 [2]	120 [9]	115	120	29 J	52	190 J	400 R

TABLE 1

SUMMARY OF DETECTED LABORATORY RESULTS - SURFACE SOIL
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range	**Regional Screening Levels Residential**	*Regional Screening Levels Industrial*	Selected Ecological Soil Screening Values	NAPR Basewide Background[1]	61SB09 61SB09-00D 6/4/2008 0.0-1.0	61SB10 61SB10-00 6/4/2008 0.0-1.0	61SB11 61SB11-00 6/3/2008 0.0-1.0	61SB12 61SB12-00 6/3/2008 0.0-1.0	61SB1 61SB13- 6/4/200 0.0-1.0
Volatile Organic Compounds (ug/kg)									
2-Hexanone	NE	NE	NE	NE	2.7 R	2.5 R	3 UJ	2.7 U	2.8
Acetone	6,100,000 (2)	61,000,000 (2)	NE	NE	5.7 R	5.3 R	210	90 UJ	120
Carbon disulfide	67,000 (2)	300,000 (2)	NE	NE	0.66 R	0.62 R	0.73 U	0.65 U	0.67
Iodomethane	NE	NE	NE	NE	1.3 R	1.2 R	5.1 J	1.3 U	5.4
Semivolatile Organic Compunds (ug/kg)									
2-Methylnaphthalene	31,000 (2)	410,000 (2)	NE	NE	9.2	7.5 U	2.3 U	2.2 U	2.4
Acenaphthene	340,000 (2)	3,300,000 (2)	NE	NE	84 J	2 J	0.76 U	2.6 J	0.73
Acenaphthylene	340,000 (2)(3)	3,300,000 (2)(3)	NE	NE	2.2 U	2 U	2.3 U	2.2 U	2.2
Anthracene	1,700,000 (2)	17,000,000 (2)	NE	NE	130 J	3.9 J	2.8 J	4.9 J	2.2
Benzo[a]anthracene	150	2,100	NE	NE	**530**	20	20	31	7.4
Benzo[a]pyrene	15	210	NE	NE	***650*** J	**31** J	**22** J	**50**	6.6
Benzo[b]fluoranthene	150	2,100	NE	NE	**890**	49	42	95	10
Benzo[g,h,i]perylene	170,000 (2)(3)	1,700,000 (2)(3)	NE	NE	310	18	2.3 U	39 J	3.5
Benzo[k]fluoranthene	1,500	21,000	NE	NE	1.3 UJ	1.2 UJ	1.3 UJ	1.3 U	1.3
Benzyl alcohol	3,100,000 (2)	31,000,000 (2)	NE	NE	10 UJ	9.6 U	11 U	10 U	10
Bis(2-ethylhexyl) phthalate	35,000	120,000	6,010 (5)(6)	NE	41 U	460	26 U	53 U	37
Butyl benzyl phthalate	260,000	910,000	6,010 (5)(6)	NE	9.3 U	8.7 U	9.6 U	9.2 U	9.2
Chrysene	15,000	210,000	NE	NE	500	23	22	40	7.7
Dibenz(a,h)anthracene	15	210	NE	NE	**72**	3.6 J	0.79 U	12	2.1
Dibenzofuran	NE	NE	NE	NE	28 J	5.1 U	5.6 U	5.4 U	5.3
Fluoranthene	230,000 (2)	2,200,000 (2)	NE	NE	710	32	23	45	8.8
Fluorene	230,000 (2)	2,200,000 (2)	NE	NE	39 J	1.3 J	1 U	1.5 J	0.98
Indeno[1,2,3-cd]pyrene	150	2,100	NE	NE	**250** J	16 J	13	16	5.6
Naphthalene	3,900	20,000	NE	NE	19	0.98 U	0.8 U	1 UJ	1
Phenanthrene	170,000 (2)(3)	1,700,000 (2)(3)	NE	NE	480	15	9.7	20	4.3
Phenol	1,800,000 (2)	18,000,000 (2)	NE	NE	6.2 UJ	5.8 U	6.4 U	6.2 U	6.1
Pyrene	170,000 (2)	1,700,000 (2)	NE	NE	830	35	29	50	9.5

TABLE 1

SUMMARY OF DETECTED LABORATORY RESULTS - SURFACE SOIL
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range	**Regional Screening Levels Residential**	*Regional Screening Levels Industrial*	Selected Ecological Soil Screening	NAPR Basewide Background[1]	61SB09 61SB09-00D 6/4/2008 0.0-1.0	61SB10 61SB10-00 6/4/2008 0.0-1.0	61SB11 61SB11-00 6/3/2008 0.0-1.0	61SB12 61SB12-00 6/3/2008 0.0-1.0	61SB1 61SB13- 6/4/200 0.0-1.0
PAHs (ug/kg)									
Low molecular weight PAHs	NE	NE	29,000 [7]	NE	1473.4	64.68	42.66	79.4	22.61
High molecular weight PAHs	NE	NE	18,000 [8]	NE	4033.3	196.8	152.39	334.3	53.7
Metals (mg/kg)									
Antimony	3.1 [2]	41 [2]	78 [9]	3.17	0.46 UJ	1.3	0.26 UJ	0.44 UJ	0.089
Arsenic	0.39	1.6	18 [10]	2.65	***2.1***	***2.7***	***2.6***	***2.7***	***2.2***
Barium	1,500 [2]	19,000 [2]	330 [9]	199	73	91	210 J	120	640
Beryllium	16 [2]	200 [2]	40 [9]	0.590	0.37	0.23	0.47	0.25	0.5
Cadmium	70 [2]	800 [2]	32 [10]	1.02	0.42	0.43	0.25	0.4	0.037
Chromium	280	1,400	57 [11]	49.8	19 J	33	34 J	27	35
Cobalt	2.3 [2]	30 [2]	13 [10]	46.2	**9.4**	**12**	**18** J	**12** J	**27**
Copper	310 [2]	41,000 [2]	70 [10]	168	60 J	99	110	70	79
Lead	400 [4]	800 [4]	120 [10]	22	37	56	24 J	62	2.5
Mercury	2 [2]	31 [2]	0.1 [12]	0.109	0.049 J	0.033	0.038	0.047	0.023
Nickel	160 [2]	2,000 [2]	38 [10]	20.7	8.3 R	14	13	11 J	13
Selenium	39 [2]	510 [2]	0.52 [10]	1.48	0.96	0.4 J	1.1	0.74	0.67
Silver	39 [2]	510 [2]	560 [10]	NE	0.034 J	0.065 J	0.034 J	0.063 J	0.019
Tin	4,700 [2]	61,000 [2]	50 [13]	NE	4.7 U	4.4 U	4.8 U	4.7 U	4.7
Vanadium	55 [2]	720 [2]	10 [14]	259	**71**	**97**	**130**	**110**	**220**
Zinc	2,300 [2]	31,000 [2]	120 [9]	115	100 R	200 J	84	220	30

TABLE 1

SUMMARY OF DETECTED LABORATORY RESULTS - SURFACE SOIL
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**Regional**	*Regional*	Selected	NAPR	3	61SB14	61SB15	61SB16	61SB17	61SB18
Sample ID	**Screening**	*Screening*	Ecological	Basewide	00	61SB14-00	61SB15-00	61SB16-00	61SB17-00	61SB18-0
Date	**Levels**	*Levels*	Soil	Background[1]	8	6/4/2008	6/4/2008	6/3/2008	6/3/2008	6/3/2008
Depth Range	**Residential**	*Industrial*	Screening Values			0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
Volatile Organic Compounds (ug/kg)										
2-Hexanone	NE	NE	NE	NE	UJ	2 UJ	2.4 UJ	3.1 U	2.3 U	3.2
Acetone	6,100,000 [2]	61,000,000 [2]	NE	NE	U	120	150	150	59 UJ	280
Carbon disulfide	67,000 [2]	300,000 [2]	NE	NE	U	0.5 U	0.59 U	0.76 U	0.57 U	0.89
Iodomethane	NE	NE	NE	NE	J	2.1 J	1.6 J	1.7 J	1.1 U	2.9
Semivolatile Organic Compunds (ug/kg)										
2-Methylnaphthalene	31,000 [2]	410,000 [2]	NE	NE	J	1.9 U	24 J	2.1 U	2.3 U	2.6
Acenaphthene	340,000 [2]	3,300,000 [2]	NE	NE	U	0.63 U	1.1 J	0.69 U	0.76 U	0.87
Acenaphthylene	340,000 [2][3]	3,300,000 [2][3]	NE	NE	U	1.9 U	1.8 UJ	2.1 U	2.3 U	2.6
Anthracene	1,700,000 [2]	17,000,000 [2]	NE	NE	U	1.9 U	1.8 UJ	2.1 U	2.3 U	2.6
Benzo[a]anthracene	150	2,100	NE	NE	J	1.9 U	6.3 J	2.1 U	2.3 U	7.8
Benzo[a]pyrene	15	210	NE	NE	J	0.73 UJ	7.7 J	0.8 UJ	0.88 UJ	1
Benzo[b]fluoranthene	150	2,100	NE	NE		0.84 U	17 J	0.92 U	1 U	25
Benzo[g,h,i]perylene	170,000 [2][3]	1,700,000 [2][3]	NE	NE	J	1.9 U	7.6 J	2.1 U	2.3 U	2.6
Benzo[k]fluoranthene	1,500	21,000	NE	NE	UJ	1.1 UJ	1.1 UJ	1.2 UJ	1.3 UJ	1.5
Benzyl alcohol	3,100,000 [2]	31,000,000 [2]	NE	NE	U	8.8 U	8.7 UJ	9.7 U	11 U	12
Bis(2-ethylhexyl) phthalate	35,000	120,000	6,010 [5][6]	NE	U	13 U	22 UJ	15 U	13 U	48
Butyl benzyl phthalate	260,000	910,000	6,010 [5][6]	NE	U	7.9 U	9.4 UJ	8.7 U	9.6 U	29
Chrysene	15,000	210,000	NE	NE	J	0.67 U	8.9 J	0.74 U	0.88 J	11
Dibenz(a,h)anthracene	15	210	NE	NE	J	0.65 U	2.4 J	0.72 U	0.78 U	0.9
Dibenzofuran	NE	NE	NE	NE	U	4.6 U	4.5 UJ	5.1 U	5.6 U	6.4
Fluoranthene	230,000 [2]	2,200,000 [2]	NE	NE		1.9 U	12 J	2.1 U	2.3 U	11
Fluorene	230,000 [2]	2,200,000 [2]	NE	NE	U	0.85 U	0.99 J	0.93 U	1 U	1.2
Indeno[1,2,3-cd]pyrene	150	2,100	NE	NE	J	1.3 UJ	9.2 J	1.5 UJ	1.6 UJ	1.8
Naphthalene	3,900	20,000	NE	NE	U	0.68 U	1.3 UJ	0.73 U	0.8 U	1.4
Phenanthrene	170,000 [2][3]	1,700,000 [2][3]	NE	NE	J	1.9 U	7.3 J	2.1 U	2.3 U	3.9
Phenol	1,800,000 [2]	18,000,000 [2]	NE	NE	U	5.3 U	5.2 UJ	5.8 U	6.4 U	7.3
Pyrene	170,000 [2]	1,700,000 [2]	NE	NE		1.9 U	15 J	2.1 U	2.3 U	18

TABLE 1

SUMMARY OF DETECTED LABORATORY RESULTS - SURFACE SOIL
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	**Regional**	*Regional*	Selected	NAPR	3	61SB14	61SB15	61SB16	61SB17	61SB18
Sample ID	**Screening**	*Screening*	Ecological	Basewide	00	61SB14-00	61SB15-00	61SB16-00	61SB17-00	61SB18-0(
Date	**Levels**	*Levels*	Soil	Background[1]	8	6/4/2008	6/4/2008	6/3/2008	6/3/2008	6/3/2008
Depth Range	**Residential**	*Industrial*	Screening			0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0	0.0-1.0
PAHs (ug/kg)										
Low molecular weight PAHs	NE	NE	29,000 [7]	NE		11.66	50.29	12.85	14.06	26.17
High molecular weight PAHs	NE	NE	18,000 [8]	NE		10.99	75.2	12.18	13.34	69.6
Metals (mg/kg)										
Antimony	3.1 [2]	41 [2]	78 [9]	3.17	UJ	0.076 UJ	0.18 UJ	0.089 UJ	0.091 UJ	0.69
Arsenic	0.39	1.6	18 [10]	2.65		**0.73**	***2.3***	**1.1**	***2.2***	***2.4***
Barium	1,500 [2]	19,000 [2]	330 [9]	199		76	99	240 J	270 J	100
Beryllium	16 [2]	200 [2]	40 [9]	0.590		0.12	0.22	0.34	0.31	0.2
Cadmium	70 [2]	800 [2]	32 [10]	1.02	U	0.068 J	0.12	0.037 U	0.038 U	0.35
Chromium	280	1,400	57 [11]	49.8		55	23	17 J	25 J	44
Cobalt	2.3 [2]	30 [2]	13 [10]	46.2		**13**	**16**	**18** J	**22** J	**17**
Copper	310 [2]	41,000 [2]	70 [10]	168		47	78	180	160	91
Lead	400 [4]	800 [4]	120 [10]	22		3.6	70	1 J	0.9 J	59
Mercury	2 [2]	31 [2]	0.1 [12]	0.109	J	0.0055 J	0.0099 J	0.022 J	0.008 J	0.041
Nickel	160 [2]	2,000 [2]	38 [10]	20.7		15	18	9.7	14	21
Selenium	39 [2]	510 [2]	0.52 [10]	1.48		0.12 U	0.2 J	0.21 J	0.47 J	0.41
Silver	39 [2]	510 [2]	560 [10]	NE	UJ	0.016 UJ	0.053 J	0.03 J	0.052 J	0.069
Tin	4,700 [2]	61,000 [2]	50 [13]	NE	U	4.1 U	4.2 U	4.7 U	4.9 U	5.9
Vanadium	55 [2]	720 [2]	10 [14]	259		**120**	**150**	**150**	**140**	**120**
Zinc	2,300 [2]	31,000 [2]	120 [9]	115	J	31 J	59 J	36	45	86

TABLE 1

SUMMARY OF DETECTED LABORATORY RESULTS - SURFACE SOIL
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range	**Regional Screening Levels Residential**	*Regional Screening Levels Industrial*	Selected Ecological Soil Screening Values	NAPR Basewide Background[1]		61SB19 61SB19-00 6/3/2008 0.0-1.0	61SB20 61SB20-00 6/2/2008 0.0-1.0
Volatile Organic Compounds (ug/kg)							
2-Hexanone	NE	NE	NE	NE	U	2.2 UJ	2.3 U
Acetone	6,100,000 [2]	61,000,000 [2]	NE	NE	J	130	150
Carbon disulfide	67,000 [2]	300,000 [2]	NE	NE	U	0.53 U	0.56 U
Iodomethane	NE	NE	NE	NE	J	1 UJ	1.1 U
Semivolatile Organic Compunds (ug/kg)							
2-Methylnaphthalene	31,000 [2]	410,000 [2]	NE	NE	U	1.9 U	1.9 U
Acenaphthene	340,000 [2]	3,300,000 [2]	NE	NE	U	0.65 U	0.84 J
Acenaphthylene	340,000 [2][3]	3,300,000 [2][3]	NE	NE	U	1.9 U	1.9 J
Anthracene	1,700,000 [2]	17,000,000 [2]	NE	NE	U	1.9 U	4.1 J
Benzo[a]anthracene	150	2,100	NE	NE	J	1.9 U	4 J
Benzo[a]pyrene	15	210	NE	NE	UJ	8.1	0.72 UJ
Benzo[b]fluoranthene	150	2,100	NE	NE		5 J	0.83 U
Benzo[g,h,i]perylene	170,000 [2][3]	1,700,000 [2][3]	NE	NE	U	4.4 J	1.9 U
Benzo[k]fluoranthene	1,500	21,000	NE	NE	UJ	1.1 U	1.1 UJ
Benzyl alcohol	3,100,000 [2]	31,000,000 [2]	NE	NE	U	16 J	8.8 U
Bis(2-ethylhexyl) phthalate	35,000	120,000	6,010 [5][6]	NE	U	22 U	24 U
Butyl benzyl phthalate	260,000	910,000	6,010 [5][6]	NE	J	8.2 U	7.9 U
Chrysene	15,000	210,000	NE	NE		2.8 J	24
Dibenz(a,h)anthracene	15	210	NE	NE	U	0.67 U	0.65 U
Dibenzofuran	NE	NE	NE	NE	U	4.8 U	4.6 U
Fluoranthene	230,000 [2]	2,200,000 [2]	NE	NE		1.9 U	11
Fluorene	230,000 [2]	2,200,000 [2]	NE	NE	U	0.88 U	0.85 U
Indeno[1,2,3-cd]pyrene	150	2,100	NE	NE	U	1.7 J	1.3 UJ
Naphthalene	3,900	20,000	NE	NE	U	0.77 UJ	0.93 U
Phenanthrene	170,000 [2][3]	1,700,000 [2][3]	NE	NE	J	1.9 U	3.1 J
Phenol	1,800,000 [2]	18,000,000 [2]	NE	NE	U	5.5 U	5.3 U
Pyrene	170,000 [2]	1,700,000 [2]	NE	NE		1.9 U	13

TABLE 1

SUMMARY OF DETECTED LABORATORY RESULTS - SURFACE SOIL
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range	**Regional Screening Levels Residential**	*Regional Screening Levels Industrial*	Selected Ecological Soil Screening	NAPR Basewide Background[1]		61SB19 61SB19-00 6/3/2008 0.0-1.0		61SB20 61SB20-00 6/2/2008 0.0-1.0	
PAHs (ug/kg)									
Low molecular weight PAHs	NE	NE	29,000 [7]	NE		11.8		24.62	
High molecular weight PAHs	NE	NE	18,000 [8]	NE		27.57		47.5	
Metals (mg/kg)									
Antimony	3.1 [2]	41 [2]	78 [9]	3.17	UJ	0.11	UJ	0.083	U
Arsenic	0.39	1.6	18 [10]	2.65		**1.3**		**1**	
Barium	1,500 [2]	19,000 [2]	330 [9]	199	J	130		360	
Beryllium	16 [2]	200 [2]	40 [9]	0.590		0.24		0.23	
Cadmium	70 [2]	800 [2]	32 [10]	1.02		0.074	J	0.032	U
Chromium	280	1,400	57 [11]	49.8	J	51		23	J
Cobalt	2.3 [2]	30 [2]	13 [10]	46.2	J	**18**	J	**17**	
Copper	310 [2]	41,000 [2]	70 [10]	168		96		130	
Lead	400 [4]	800 [4]	120 [10]	22	J	8.7		0.93	
Mercury	2 [2]	31 [2]	0.1 [12]	0.109		0.035		0.0096	J
Nickel	160 [2]	2,000 [2]	38 [10]	20.7		22	J	12	J
Selenium	39 [2]	510 [2]	0.52 [10]	1.48	J	0.24	J	0.17	J
Silver	39 [2]	510 [2]	560 [10]	NE	J	0.03	J	0.04	J
Tin	4,700 [2]	61,000 [2]	50 [13]	NE	U	4.3	U	4.1	U
Vanadium	55 [2]	720 [2]	10 [14]	259		**230**		**120**	
Zinc	2,300 [2]	31,000 [2]	120 [9]	115		33		45	J

TABLE 1

SUMMARY OF DETECTED LABORATORY RESULTS - SURFACE SOIL
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY 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 - micrograms per kilogram
mg/kg - miligrams per kilogram
NE - Not Established
NAPR - Naval Activity Puerto Rico
PAH - Polynuclear Aromatic Hydrocarbon
USEPA - United States Environmental Protection Agency

(1) NAPR basewide background surface soil 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) Pyrene used as a surrogate for screening purposes for benzo[g,h,i]perylene and phenanthrecene; acenaphthene used as a surrogate for acenaphthylene.
(4) USEPA Action Level for lead in soils.
(5) 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).
(6) Value for total phthalates (MHSPE 2000)
(7) Low molecular weight PAHs are defined by the USEPA (2007a) as PAH compounds composed of fewer than four rings. The low molecular weight PAH compounds analyzed for in SWMU 61 soil were 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, fluoranthene, fluorene, naphthalene, and phenanthrene. Maximum method detection limit was used if there were no detections.
(8) High molecular weight PAHs are defined by the USEPA (2007a) as PAH compounds composed of four or more rings. The high molecular weight PAH compounds analyzed for in SWMU 61 soil were benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and pyrene. Maximum method detection limits were used for non-detected PAHs.
(9) Invertebrate-based ecological soil screening level (USEPA, 2005a [antimony], USEPA, 2005f [barium]; USEPA, 2005g [beryllium]; USEPA, 2007d [zinc])
(10) Plant-based ecological soil screening level (USEPA, 2005b [arsenic]; USEPA, 2005c [cadmium]; USEPA, 2005d [cobalt]; USEPA, 2005e [lead]; USEPA, 2007b [copper]; USEPA, 2007c [nickel]; USEPA, 2007e [selenium], USEPA, 2006 [silver].
(11) Reproduction-based MATC for *Eisenia andrei* (earthworm) [USEPA, 2008]
(12) Toxicological threshold for earthworms (Efroymson et al., 1997a)
(13) Toxicological threshold for plants (Efroymson et al., 1997b)
(14) Growth-based LOAEC for *Brassica oleracea* (broccoli) with a safety factor of 10 (USEPA, 2005h)

TABLE 1

SUMMARY OF DETECTED LABORATORY RESULTS - SURFACE SOIL
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Table References:

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USEPA. 2007a. Ecological Soil Screening Levels for Polycyclic Aromatic Hydrocarbons (PAHs) (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-78.

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 Zinc (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-72.

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

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.

TABLE 1

SUMMARY OF DETECTED LABORATORY RESULTS - SURFACE SOIL
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Table References (cont.):

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

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

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

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

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

USEPA. 2005h. 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 LABORATORY RESULTS - SHALLOW SUBSURFACE SOIL (1 to 3 feet)
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range (ft bgs)	**Regional Screening Levels Residential**	*Regional Screening Levels Industrial*	Selected Ecological Soil Screening Values	NAPR Basewide Background [1]	61SB01 61SB01-01 6/2/2008 1.0-3.0	61SB02 61SB02-01 6/3/2008 1.0-3.0	61SB03 61SB03-01 6/4/2008 1.0-3.0	61SB04 61SB04-01 6/4/2008 1.0-3.0	61SB05 61SB05-01 6/3/2008 1.0-3.0
Volatile Organic Compounds (ug/kg)									
2-Hexanone	NE	NE	NE	NE	2.2 U	2.5 U	2.3 R	2.6 UJ	2 U
Acetone	6,100,000 [2]	61,000,000 [2]	NE	NE	82 J	74 U	4.8 R	62 U	11 UJ
Carbon disulfide	67,000 [2]	300,000 [2]	NE	NE	0.54 U	0.61 U	0.56 R	0.64 U	0.49 U
Iodomethane	NE	NE	NE	NE	1.1 U	2.7 J	1.1 R	1.3 U	0.95 U
Semivolatile Organic Compounds (ug/kg)									
1,1'-Biphenyl	390,000 [2]	5,100,000 [2]	NE	NE	8.3 U	8.8 U	8.1 U	360 J	8.3 U
1,4-Dichlorobenzene	2,600	13,000	20,000 [5]	NE	7 U	7.3 U	6.8 U	68 U	6.9 U
2-Methylnaphthalene	31,000 [2]	410,000 [2]	NE	NE	1.9 U	2 U	1.9 U	770	1.9 U
Acenaphthene	340,000 [2]	3,300,000 [2]	NE	NE	0.64 U	0.67 U	0.62 U	77	0.64 U
Acenaphthylene	340,000 [2][3]	3,300,000 [2][3]	NE	NE	1.9 U	2 U	1.9 U	57 J	1.9 U
Anthracene	1,700,000 [2]	17,000,000 [2]	NE	NE	1.9 U	2 U	1.9 U	19 U	1.9 U
Benzo[a]anthracene	150	2,100	NE	NE	28	2 U	1.9 U	19 U	1.9 U
Benzo[a]pyrene	15	210	NE	NE	**29** J	0.78 UJ	0.72 UJ	7.2 UJ	0.74 UJ
Benzo[b]fluoranthene	150	2,100	NE	NE	67	0.9 U	0.83 U	8.3 U	0.85 U
Benzo[g,h,i]perylene	170,000 [2][3]	1,700,000 [2][3]	NE	NE	8.7	2 U	1.9 U	19 U	1.9 U
Benzo[k]fluoranthene	1,500	21,000	NE	NE	1.1 UJ	1.2 UJ	1.1 UJ	11 UJ	1.1 UJ
Benzyl alcohol	3,100,000 [2]	31,000,000 [2]	NE	NE	9 U	9.5 U	8.7 U	88 U	8.9 U
Bis(2-ethylhexyl) phthalate	35,000	120,000	6,010 [6][7]	NE	15 U	66 U	6.7 U	53 U	13 U
Chrysene	15,000	210,000	NE	NE	35	0.72 U	0.66 U	6.7 U	0.68 U
Dibenz(a,h)anthracene	15	210	NE	NE	3.3 J	0.7 U	0.64 U	6.5 U	0.66 U
Dibenzofuran	NE	NE	NE	NE	4.7 U	5 U	4.6 U	67 J	4.7 U

TABLE 2

SUMMARY OF DETECTED LABORATORY RESULTS - SHALLOW SUBSURFACE SOIL (1 to 3 feet)
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range (ft bgs)	**Regional Screening Levels Residential**	*Regional Screening Levels Industrial*	Selected Ecological Soil Screening	NAPR Basewide Background [1]	61SB01 61SB01-01 6/2/2008 1.0-3.0	61SB02 61SB02-01 6/3/2008 1.0-3.0	61SB03 61SB03-01 6/4/2008 1.0-3.0	61SB04 61SB04-01 6/4/2008 1.0-3.0	61SB05 61SB05-01 6/3/2008 1.0-3.0
Semivolatile Organic Compounds (ug/kg)									
Fluoranthene	230,000 [2]	2,200,000 [2]	NE	NE	37	2 U	1.9 U	19 J	2.2 J
Fluorene	230,000 [2]	2,200,000 [2]	NE	NE	0.86 U	0.91 U	0.84 U	120	0.86 U
Indeno[1,2,3-cd]pyrene	150	2,100	NE	NE	4.8 J	1.4 UJ	1.3 U	13 UJ	1.3 U
Phenanthrene	170,000 [2][3]	1,700,000 [2][3]	NE	NE	4 J	2 U	1.9 U	270	1.9 U
Pyrene	170,000 [2]	1,700,000 [2]	NE	NE	45	2 U	1.9 U	46 J	2.1 J
PAHs (ug/kg)									
Low molecular weight PAHs	NE	NE	29,000 [8]	NE	48.87	12.29	11.61	1338.6	12.22
High molecular weight PAHs	NE	NE	18,000 [9]	NE	221.9	11.7	10.95	136.7	11.23
Metals (mg/kg)									
Antimony	3 [2]	41 [2]	78 [10]	NE	0.26 U	0.082 UJ	0.13 UJ	0.42 UJ	0.079 UJ
Arsenic	0.39	1.6	18 [11]	1.59	***2***	**1.4**	**1.3**	***5.5***	***1.9***
Barium	1,500 [2]	19,000 [2]	330 [10]	220	74	260 J	99	63	350 J
Beryllium	16 [2]	200 [2]	40 [10]	0.596	0.18	0.34	0.3	0.2	0.31
Cadmium	70 [2]	800 [2]	32 [11]	0.54	0.051 J	0.034 U	0.032 U	0.14	0.07 J
Chromium	280	1,400	57 [12]	114.5	22 J	28 J	6	27	14 J
Cobalt	2.3 [2]	30 [2]	13 [11]	26.9	**12**	**15** J	**7.7**	**10**	**19** J
Copper	310 [2]	41,000 [2]	70 [11]	246	49	56	24	67	170
Lead	400 [4]	800 [4]	120 [11]	6.3	17	2 J	1.3	8.3	1.8 J
Mercury	2.3 [2]	31 [2]	0 [13]	0.108	0.015 J	0.031	0.0067 J	0.064 J	0.0052 J
Nickel	160 [2]	2,000 [2]	38 [11]	24.7	8.3 J	6.9	3.7	14	9.5
Selenium	39 [2]	510 [2]	0.52 [11]	5.94	0.2 J	0.93	0.19 J	0.16 J	0.41 J
Silver	39 [2]	510 [2]	560 [11]	NE	0.023 J	0.022 J	0.017 UJ	0.069 J	0.057 J
Thallium	0.51 [2]	6.6 [2]	1.0 [14]	0.92	0.12 U	0.13 U	0.12 U	0.12 U	0.12 U
Vanadium	55 [2]	720 [2]	10 [15]	434	**96**	**130**	44	**99**	**130**
Zinc	2,300 [2]	31,000 [2]	120 [10]	88	24 J	15	20 J	37 J	55

TABLE 2

SUMMARY OF DETECTED LABORATORY RESULTS - SHALLOW SUBSURFACE SOIL (1 to 3 feet)
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range (ft bgs)	**Regional Screening Levels Residential**	*Regional Screening Levels Industrial*	Selected Ecological Soil Screening Values	NAPR Basewide Background [1]	61SB06 61SB06-01 6/2/2008 1.0-3.0	61SB07 61SB07-01 6/3/2008 1.0-3.0	61SB08 61SB08-01 6/2/2008 1.0-3.0	61SB09 61SB09-01 6/4/2008 1.0-3.0	61SB10 61SB10-01 6/4/2008 1.0-3.0
Volatile Organic Compounds (ug/kg)									
2-Hexanone	NE	NE	NE	NE	2.4 U	2.2 U	2.8 U	2.5 R	2.4 U
Acetone	6,100,000 [2]	61,000,000 [2]	NE	NE	21 J	17 U	24 J	5.2 R	29 UJ
Carbon disulfide	67,000 [2]	300,000 [2]	NE	NE	0.58 U	0.53 U	0.68 U	0.61 R	6.1
Iodomethane	NE	NE	NE	NE	1.1 U	2 J	1.3 U	1.2 R	1.1 U
Semivolatile Organic Compounds (ug/kg)									
1,1'-Biphenyl	390,000 [2]	5,100,000 [2]	NE	NE	8.7 U	8.7 U	8.1 U	8.7 U	9.4 UJ
1,4-Dichlorobenzene	2,600	13,000	20,000 [5]	NE	7.3 J	7.2 U	6.8 U	7.3 U	7.9 UJ
2-Methylnaphthalene	31,000 [2]	410,000 [2]	NE	NE	2 U	2 U	1.9 U	3.2 U	2.2 UJ
Acenaphthene	340,000 [2]	3,300,000 [2]	NE	NE	0.67 U	0.67 U	6.1 J	31	0.73 UJ
Acenaphthylene	340,000 [2][3]	3,300,000 [2][3]	NE	NE	2 U	2 U	1.9 U	2 U	2.2 UJ
Anthracene	1,700,000 [2]	17,000,000 [2]	NE	NE	2 U	2 U	11	56	2.2 UJ
Benzo[a]anthracene	150	2,100	NE	NE	2 U	2 U	62	**270**	2.2 UJ
Benzo[a]pyrene	15	210	NE	NE	0.77 UJ	0.77 UJ	**94** J	***360*** J	0.84 UJ
Benzo[b]fluoranthene	150	2,100	NE	NE	0.89 U	0.89 U	130	**450**	0.97 UJ
Benzo[g,h,i]perylene	170,000 [2][3]	1,700,000 [2][3]	NE	NE	2 U	2 U	50	230	2.2 UJ
Benzo[k]fluoranthene	1,500	21,000	NE	NE	1.2 UJ	1.2 UJ	1.1 UJ	1.2 UJ	1.3 UJ
Benzyl alcohol	3,100,000 [2]	31,000,000 [2]	NE	NE	9.4 U	9.4 U	8.8 U	9.4 U	10 UJ
Bis(2-ethylhexyl) phthalate	35,000	120,000	6,010 [6][7]	NE	57 U	11 U	19 U	8.3 U	19 UJ
Chrysene	15,000	210,000	NE	NE	0.71 U	0.71 U	61	260	0.78 UJ
Dibenz(a,h)anthracene	15	210	NE	NE	0.69 U	0.69 U	4.9 J	**50**	0.75 UJ
Dibenzofuran	NE	NE	NE	NE	4.9 U	4.9 U	4.6 U	10 J	5.4 UJ

TABLE 2

SUMMARY OF DETECTED LABORATORY RESULTS - SHALLOW SUBSURFACE SOIL (1 to 3 feet)
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range (ft bgs)	**Regional Screening Levels Residential**	*Regional Screening Levels Industrial*	Selected Ecological Soil Screening	NAPR Basewide Background [1]	61SB06 61SB06-01 6/2/2008 1.0-3.0	61SB07 61SB07-01 6/3/2008 1.0-3.0	61SB08 61SB08-01 6/2/2008 1.0-3.0	61SB09 61SB09-01 6/4/2008 1.0-3.0	61SB10 61SB10-01 6/4/2008 1.0-3.0
Semivolatile Organic Compounds (ug/kg)									
Fluoranthene	230,000 [2]	2,200,000 [2]	NE	NE	2 U	2 U	78	390	2.2 UJ
Fluorene	230,000 [2]	2,200,000 [2]	NE	NE	0.9 U	0.9 U	3.2 J	15	0.98 UJ
Indeno[1,2,3-cd]pyrene	150	2,100	NE	NE	1.4 U	1.4 UJ	34 J	**270** J	1.5 UJ
Phenanthrene	170,000 [2][3]	1,700,000 [2][3]	NE	NE	2 U	2 U	48	220	2.2 UJ
Pyrene	170,000 [2]	1,700,000 [2]	NE	NE	2 U	2 U	100	340	2.2 UJ
PAHs (ug/kg)									
Low molecular weight PAHs	NE	NE	29,000 [8]	NE	12.27	12.27	151.5	724.3	13.48
High molecular weight PAHs	NE	NE	18,000 [9]	NE	11.66	11.66	537	2231.2	12.74
Metals (mg/kg)									
Antimony	3 [2]	41 [2]	78 [10]	NE	0.08 U	0.084 UJ	0.18 U	0.62 J	0.085 UJ
Arsenic	0.39	1.6	18 [11]	1.59	**0.74**	**1.5**	***2.3***	***4.1***	**1.4**
Barium	1,500 [2]	19,000 [2]	330 [10]	220	230	770 J	280	110	310 J
Beryllium	16 [2]	200 [2]	40 [10]	0.596	0.3	0.38	0.43	0.33	0.47
Cadmium	70 [2]	800 [2]	32 [11]	0.54	0.033 U	0.035 U	0.15	0.57	0.035 U
Chromium	280	1,400	57 [12]	114.5	22 J	20 J	20 J	27	42
Cobalt	2.3 [2]	30 [2]	13 [11]	26.9	**15**	**4.7** J	**16**	**17**	**23** J
Copper	310 [2]	41,000 [2]	70 [11]	246	98	39	96	84	200
Lead	400 [4]	800 [4]	120 [11]	6.3	0.87	1.7 J	11	58	1.2
Mercury	2.3 [2]	31 [2]	0 [13]	0.108	0.0044 J	0.019 J	0.008 J	0.032 J	0.0046 J
Nickel	160 [2]	2,000 [2]	38 [11]	24.7	14 J	5.2	11 J	13	23
Selenium	39 [2]	510 [2]	0.52 [11]	5.94	0.18 J	0.47 J	0.27 J	0.6	0.4 J
Silver	39 [2]	510 [2]	560 [11]	NE	0.034 J	0.018 UJ	0.082 J	0.056 J	0.025 J
Thallium	0.51 [2]	6.6 [2]	1.0 [14]	0.92	0.2 J	0.13 U	0.12 U	0.13 U	0.14 U
Vanadium	55 [2]	720 [2]	10 [15]	434	**180**	**84**	**120**	**120**	**160**
Zinc	2,300 [2]	31,000 [2]	120 [10]	88	32 J	12	49 J	100 J	36 J

TABLE 2

SUMMARY OF DETECTED LABORATORY RESULTS - SHALLOW SUBSURFACE SOIL (1 to 3 feet)
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range (ft bgs)	**Regional Screening Levels Residential**	*Regional Screening Levels Industrial*	Selected Ecological Soil Screening Values	NAPR Basewide Background [1]	61SB11 61SB11-01 6/3/2008 1.0-3.0	61SB12 61SB12-01 6/3/2008 1.0-3.0	61SB13 61SB13-01 6/4/2008 1.0-3.0	61SB14 61SB14-01 6/4/2008 1.0-3.0	61SB15 61SB15-01 6/4/2008 1.0-3.0
Volatile Organic Compounds (ug/kg)									
2-Hexanone	NE	NE	NE	NE	2.5 UJ	2.2 UJ	2.6 R	1.8 UJ	2.1 UJ
Acetone	6,100,000 [2]	61,000,000 [2]	NE	NE	110 U	100 U	5.5 R	35 U	82 U
Carbon disulfide	67,000 [2]	300,000 [2]	NE	NE	0.6 U	0.53 U	0.64 R	0.69 J	0.59 J
Iodomethane	NE	NE	NE	NE	1.2 J	1.2 J	1.3 R	0.88 U	1.5 J
Semivolatile Organic Compounds (ug/kg)									
1,1'-Biphenyl	390,000 [2]	5,100,000 [2]	NE	NE	9.4 U	8.3 U	9.3 U	8.3 U	9 U
1,4-Dichlorobenzene	2,600	13,000	20,000 [5]	NE	7.9 U	6.9 U	7.8 U	6.9 U	7.5 U
2-Methylnaphthalene	31,000 [2]	410,000 [2]	NE	NE	2.2 U	1.9 U	2.1 U	1.9 U	3.4 U
Acenaphthene	340,000 [2]	3,300,000 [2]	NE	NE	0.73 U	0.64 U	0.71 U	0.64 U	0.69 U
Acenaphthylene	340,000 [2][3]	3,300,000 [2][3]	NE	NE	2.2 U	1.9 U	2.1 U	1.9 U	2.1 U
Anthracene	1,700,000 [2]	17,000,000 [2]	NE	NE	2.2 U	1.9 U	2.1 U	1.9 U	2.1 U
Benzo[a]anthracene	150	2,100	NE	NE	2.2 U	1.9 U	2.1 U	2.5 J	3.9 J
Benzo[a]pyrene	15	210	NE	NE	0.84 UJ	1.7 J	0.83 UJ	2.5 J	3.8 J
Benzo[b]fluoranthene	150	2,100	NE	NE	0.97 U	2.2 J	0.95 U	0.85 U	9.3
Benzo[g,h,i]perylene	170,000 [2][3]	1,700,000 [2][3]	NE	NE	2.2 U	2.4 J	2.1 U	1.9 U	5.7 J
Benzo[k]fluoranthene	1,500	21,000	NE	NE	1.3 UJ	1.1 U	1.3 UJ	1.2 J	2.1 J
Benzyl alcohol	3,100,000 [2]	31,000,000 [2]	NE	NE	10 U	23 J	10 U	9 U	9.7 U
Bis(2-ethylhexyl) phthalate	35,000	120,000	6,010 [6][7]	NE	6.7 U	15 U	11 U	5.6 U	13 U
Chrysene	15,000	210,000	NE	NE	0.78 U	1.1 J	0.76 U	2 J	3 J
Dibenz(a,h)anthracene	15	210	NE	NE	0.75 U	2.2 J	0.74 U	0.66 U	1.6 J
Dibenzofuran	NE	NE	NE	NE	5.4 U	4.7 U	5.3 U	4.7 U	5.1 U

TABLE 2

SUMMARY OF DETECTED LABORATORY RESULTS - SHALLOW SUBSURFACE SOIL (1 to 3 feet)
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range (ft bgs)	**Regional Screening Levels Residential**	*Regional Screening Levels Industrial*	Selected Ecological Soil Screening	NAPR Basewide Background [1]	61SB11 61SB11-01 6/3/2008 1.0-3.0	61SB12 61SB12-01 6/3/2008 1.0-3.0	61SB13 61SB13-01 6/4/2008 1.0-3.0	61SB14 61SB14-01 6/4/2008 1.0-3.0	61SB15 61SB15-01 6/4/2008 1.0-3.0
Semivolatile Organic Compounds (ug/kg)									
Fluoranthene	230,000 [2]	2,200,000 [2]	NE	NE	2.2 U	1.9 U	2.1 U	3.3 J	2.7 J
Fluorene	230,000 [2]	2,200,000 [2]	NE	NE	0.98 U	0.86 U	0.96 U	0.86 U	0.94 U
Indeno[1,2,3-cd]pyrene	150	2,100	NE	NE	1.5 U	1.3 U	1.5 UJ	1.3 UJ	2.8 J
Phenanthrene	170,000 [2][3]	1,700,000 [2][3]	NE	NE	2.2 U	1.9 U	2.1 U	1.9 U	2.1 U
Pyrene	170,000 [2]	1,700,000 [2]	NE	NE	2.2 U	1.9 U	2.1 U	3.3 J	4 J
PAHs (ug/kg)									
Low molecular weight PAHs	NE	NE	29,000 [8]	NE	13.47	11.69	12.92	13.07	14.81
High molecular weight PAHs	NE	NE	18,000 [9]	NE	12.74	15.8	12.38	16.21	36.2
Metals (mg/kg)									
Antimony	3 [2]	41 [2]	78 [10]	NE	0.089 UJ	0.078 UJ	0.083 UJ	0.077 UJ	0.11 UJ
Arsenic	0.39	1.6	18 [11]	1.59	***2.7***	***2.2***	***2.4***	**1.4**	***2.3***
Barium	1,500 [2]	19,000 [2]	330 [10]	220	490 J	390	160	220	170
Beryllium	16 [2]	200 [2]	40 [10]	0.596	1.2	0.67	0.45	0.22	0.41
Cadmium	70 [2]	800 [2]	32 [11]	0.54	0.037 U	0.054 J	0.034 U	0.032 U	0.15
Chromium	280	1,400	57 [12]	114.5	64 J	51	38	9.9	39
Cobalt	2.3 [2]	30 [2]	13 [11]	26.9	***36*** J	**26** J	**11**	**15**	**20**
Copper	310 [2]	41,000 [2]	70 [11]	246	170	110	74	150	130
Lead	400 [4]	800 [4]	120 [11]	6.3	2.7 J	4.6	3.2	0.59	15
Mercury	2.3 [2]	31 [2]	0 [13]	0.108	0.029	0.0073 J	0.013 J	0.0043 UJ	0.013 J
Nickel	160 [2]	2,000 [2]	38 [11]	24.7	21	13 J	7.6	7.3	16
Selenium	39 [2]	510 [2]	0.52 [11]	5.94	1.3	0.58	1.7	0.41 J	0.42 J
Silver	39 [2]	510 [2]	560 [11]	NE	0.019 UJ	0.023 J	0.018 UJ	0.057 J	0.035 J
Thallium	0.51 [2]	6.6 [2]	1.0 [14]	0.92	0.14 U	0.13 U	0.13 U	0.12 U	0.13 U
Vanadium	55 [2]	720 [2]	10 [15]	434	**220**	**200**	**230**	**110**	**150**
Zinc	2,300 [2]	31,000 [2]	120 [10]	88	50	40	25 J	31 J	59 J

TABLE 2

SUMMARY OF DETECTED LABORATORY RESULTS - SHALLOW SUBSURFACE SOIL (1 to 3 feet)
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range (ft bgs)	**Regional Screening Levels Residential**	*Regional Screening Levels Industrial*	Selected Ecological Soil Screening Values	NAPR Basewide Background [1]	61SB16 61SB16-01 6/3/2008 1.0-3.0	61SB17 61SB17-01 6/3/2008 1.0-3.0	61SB18 61SB18-01 6/3/2008 1.0-3.0	61SB19 61SB19-01 6/3/2008 1.0-3.0	61SB20 61SB20-01 6/2/2008 1.0-3.0
Volatile Organic Compounds (ug/kg)									
2-Hexanone	NE	NE	NE	NE	2.7 R	2.9 UJ	25 J	2 UJ	2.7 U
Acetone	6,100,000 [2]	61,000,000 [2]	NE	NE	5.7 R	79 U	110 UJ	48 U	39 J
Carbon disulfide	67,000 [2]	300,000 [2]	NE	NE	0.66 R	0.7 U	1.5 U	0.48 U	0.64 U
Iodomethane	NE	NE	NE	NE	1.3 R	1.4 UJ	1.4 U	0.94 UJ	1.3 U
Semivolatile Organic Compounds (ug/kg)									
1,1'-Biphenyl	390,000 [2]	5,100,000 [2]	NE	NE	9.5 U	10 U	9.9 U	9.3 U	8 U
1,4-Dichlorobenzene	2,600	13,000	20,000 [5]	NE	8 U	8.4 U	8.3 U	7.8 U	6.7 U
2-Methylnaphthalene	31,000 [2]	410,000 [2]	NE	NE	2.2 U	2.3 U	2.3 U	2.1 U	1.8 U
Acenaphthene	340,000 [2]	3,300,000 [2]	NE	NE	0.73 U	0.77 U	0.76 U	0.72 U	0.62 U
Acenaphthylene	340,000 [2][3]	3,300,000 [2][3]	NE	NE	2.2 U	2.3 U	2.3 U	2.1 U	1.8 U
Anthracene	1,700,000 [2]	17,000,000 [2]	NE	NE	2.2 U	2.3 U	2.3 U	2.1 U	1.8 U
Benzo[a]anthracene	150	2,100	NE	NE	2.2 U	2.3 U	2.3 U	2.3 J	1.8 U
Benzo[a]pyrene	15	210	NE	NE	0.85 UJ	0.89 U	0.88 UJ	3.4 J	0.71 UJ
Benzo[b]fluoranthene	150	2,100	NE	NE	0.97 U	1 U	1 U	6.7 J	0.82 U
Benzo[g,h,i]perylene	170,000 [2][3]	1,700,000 [2][3]	NE	NE	2.2 U	2.3 UJ	2.3 U	5 J	1.8 U
Benzo[k]fluoranthene	1,500	21,000	NE	NE	1.3 UJ	1.3 U	1.3 UJ	1.3 U	1.1 UJ
Benzyl alcohol	3,100,000 [2]	31,000,000 [2]	NE	NE	10 U	11 J	11 U	10 U	8.7 U
Bis(2-ethylhexyl) phthalate	35,000	120,000	6,010 [6][7]	NE	6.3 U	14 U	19 U	150	22 U
Chrysene	15,000	210,000	NE	NE	0.78 U	0.82 U	0.81 U	4.4 J	0.66 U
Dibenz(a,h)anthracene	15	210	NE	NE	0.76 U	0.8 U	0.79 U	0.74 U	0.64 U
Dibenzofuran	NE	NE	NE	NE	5.4 U	5.7 U	5.6 U	5.3 U	4.5 U

TABLE 2

SUMMARY OF DETECTED LABORATORY RESULTS - SHALLOW SUBSURFACE SOIL (1 to 3 feet)
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range (ft bgs)	**Regional Screening Levels Residential**	*Regional Screening Levels Industrial*	Selected Ecological Soil Screening	NAPR Basewide Background [1]	61SB16 61SB16-01 6/3/2008 1.0-3.0	61SB17 61SB17-01 6/3/2008 1.0-3.0	61SB18 61SB18-01 6/3/2008 1.0-3.0	61SB19 61SB19-01 6/3/2008 1.0-3.0	61SB20 61SB20-01 6/2/2008 1.0-3.0
Semivolatile Organic Compounds (ug/kg)									
Fluoranthene	230,000 [2]	2,200,000 [2]	NE	NE	2.2 U	2.3 U	2.3 U	2.6 J	1.8 U
Fluorene	230,000 [2]	2,200,000 [2]	NE	NE	0.99 U	1 U	1 U	0.97 U	0.83 U
Indeno[1,2,3-cd]pyrene	150	2,100	NE	NE	1.5 UJ	1.6 U	1.6 U	1.5 U	1.3 UJ
Phenanthrene	170,000 [2][3]	1,700,000 [2][3]	NE	NE	2.2 U	2.3 U	2.3 U	2.1 U	1.8 U
Pyrene	170,000 [2]	1,700,000 [2]	NE	NE	2.2 U	2.3 U	2.3 U	5.4 J	1.8 U
PAHs (ug/kg)									
Low molecular weight PAHs	NE	NE	29,000 [8]	NE	13.49	14.08	14.06	13.5	11.1
High molecular weight PAHs	NE	NE	18,000 [9]	NE	12.76	13.31	13.28	30.74	10.63
Metals (mg/kg)									
Antimony	3 [2]	41 [2]	78 [10]	NE	0.088 UJ	0.098 UJ	0.097 UJ	0.088 UJ	0.073 U
Arsenic	0.39	1.6	18 [11]	1.59	**1.3**	***1.8***	***2.3***	***2.4***	**1.3**
Barium	1,500 [2]	19,000 [2]	330 [10]	220	180 J	150	380 J	140	260
Beryllium	16 [2]	200 [2]	40 [10]	0.596	0.62	0.38	0.52	0.47	0.25
Cadmium	70 [2]	800 [2]	32 [11]	0.54	0.036 U	0.04 U	0.04 U	0.047 J	0.038 J
Chromium	280	1,400	57 [12]	114.5	9.9 J	15	33 J	35	23 J
Cobalt	2.3 [2]	30 [2]	13 [11]	26.9	**24** J	**26** J	**16** J	**14** J	**15**
Copper	310 [2]	41,000 [2]	70 [11]	246	140	140	88	98	120
Lead	400 [4]	800 [4]	120 [11]	6.3	1.2 J	0.84	3.2 J	2.4	0.81
Mercury	2.3 [2]	31 [2]	0 [13]	0.108	0.005 J	0.0074 J	0.02 J	0.038	0.0076 J
Nickel	160 [2]	2,000 [2]	38 [11]	24.7	7.9	17 J	8.1	12 J	13 J
Selenium	39 [2]	510 [2]	0.52 [11]	5.94	0.47 J	0.49 J	1.7	1.1	0.18 J
Silver	39 [2]	510 [2]	560 [11]	NE	0.039 J	0.021 UJ	0.023 J	0.027 J	0.048 J
Thallium	0.51 [2]	6.6 [2]	1.0 [14]	0.92	0.14 U	0.16 U	0.16 U	0.14 U	0.12 U
Vanadium	55 [2]	720 [2]	10 [15]	434	**180**	**270**	**250**	**170**	**140**
Zinc	2,300 [2]	31,000 [2]	120 [10]	88	28	50	30	37	44 J

TABLE 2

SUMMARY OF DETECTED LABORATORY RESULTS - SHALLOW SUBSURFACE SOIL (1 to 3 feet)
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY 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 - micrograms per kilogram
mg/kg - miligrams per kilogram
PAH - Polynuclear Aromatic Hydrocarbon
NE - Not Established
USEPA - United States Environmental Protection Agency
NAPR - Naval Activity Puerto Rico

(1) NAPR basewide background subsurface soil screening value for clay (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) Pyrene used as a surrogate for screening purposes for benzo[g,h,i]perylene and phenanthrecene; acenaphthene used as a surrogate for acenaphthylene.
(4) USEPA Action Level for lead in soils.
(5) Toxicological threshold for earthworms (Efroymson et al. 1997a)
(6) 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).
(7) Value for total phthalates (MHSPE 2000)
(8) Low molecular weight PAHs are defined by the USEPA (2007a) as PAH compounds composed of fewer than four rings. The low molecular weight PAH compounds analyzed for in SWMU 61 soil were 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, fluoranthene, fluorene, naphthalene, and phenanthrene. Maximum method detection limit was used if there were no detections.
(9) High molecular weight PAHs are defined by the USEPA (2007a) as PAH compounds composed of four or more rings. The high molecular weight PAH compounds analyzed for in SWMU 61 soil were benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and pyrene. Maximum method detection limits were used for non-detected PAHs.
(10) Invertebrate-based ecological soil screening level (USEPA, 2005a [antimony], USEPA, 2005f [barium]; USEPA, 2005g [beryllium]; USEPA, 2005h [vanadium]); USEPA, 2007d [zinc])
(11) Plant-based ecological soil screening level (USEPA, 2005b [arsenic]; USEPA, 2005c [cadmium]; USEPA, 2005d [cobalt]; USEPA, 2005e [lead]; USEPA, 2007b [copper]; USEPA, 2007c [nickel]; USEPA, 2007e [selenium], USEPA, 2006 [silver].
(12) Reproduction-based MATC for *Eisenia andrei* (earthworm) [USEPA, 2008]
(13) Toxicological threshold for earthworms (Efroymson et al., 1997a)
(14) Toxicological threshold for plants (Efroymson et al., 1997b)
(15) Growth-based LOAEC for *Brassica oleracea* (broccoli) with a safety factor of 10 (USEPA, 2005h)

TABLE 2

SUMMARY OF DETECTED LABORATORY RESULTS - SHALLOW SUBSURFACE SOIL (1 to 3 feet)
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Table References:

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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

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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 Zinc (Interim Final). Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-72.

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

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.

TABLE 2

SUMMARY OF DETECTED LABORATORY RESULTS - SHALLOW SUBSURFACE SOIL (1 to 3 feet)
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Table References (cont.):

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

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

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

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

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

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

TABLE 3

SUMMARY OF DETECTED LABORATORY RESULTS - SUBSURFACE SOIL (3 to 11 feet)
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range	**Regional Screening Levels** **Residential**	*Regional Screening Levels* *Industrial*	NAPR Basewide Background [1]	61SB01 61SB01-02 6/2/2008 3.0-5.0	61SB02 61SB02-05 6/3/2008 9.0-11.0	61SB03 61SB03-05 6/4/2008 9.0-11.0	61SB04 61SB04-05 6/4/2008 9.0-11.0	61SB05 61SB05-05 6/3/2008 9.0-11.0	61SB06 61SB06-05 6/2/2008 9.0-11.0
Volatile Organic Compounds (ug/kg)									
3-Chloro-1-propene	70 [2]	350 [2]	NE	1.3 U	1.5 U	1.8 UJ	1.5 UJ	1.8 UJ	1.7 U
Acetone	6,100,000 [2]	61,000,000 [2]	NE	41 J	8.5 J	49 U	140	22 U	5 UJ
Carbon disulfide	67,000 [2]	300,000 [2]	NE	2.8 J	0.5 U	0.6 U	0.53 U	0.61 U	0.57 U
Chloroform	300	1500	NE	0.44 U	0.49 U	0.59 U	0.52 U	0.6 U	0.56 U
Iodomethane	NE	NE	NE	1 J	0.99 U	1.2 U	1.9 J	1.2 UJ	1.1 U
Trichloroethene	2800	14000	NE	0.87 U	0.99 U	1.2 U	1 U	1.2 U	1.1 U
Semivolatile Organic Compounds (ug/kg)									
Anthracene	1,700,000 [2]	17,000,000 [2]	NE	1.9 U	2.1 U	2.1 U	1.9 U	2.1 U	2.3 U
Benzo[a]anthracene	150	2,100	NE	12	2.1 U	2.1 U	1.9 U	2.1 U	2.3 U
Benzo[a]pyrene	15	210	NE	**18** J	0.81 UJ	0.82 UJ	0.73 UJ	0.82 UJ	0.91 UJ
Benzo[b]fluoranthene	150	2,100	NE	31	0.93 U	0.95 U	0.84 U	0.95 U	1 U
Benzo[g,h,i]perylene	170,000 [2][3]	1,700,000 [2][3]	NE	1.9 U	2.1 U	2.1 U	1.9 U	2.1 U	2.3 U
Benzo[k]fluoranthene	1,500	21,000	NE	1.1 UJ	1.2 UJ	1.2 UJ	1.1 UJ	1.2 UJ	1.4 UJ
Benzyl alcohol	3,100,000 [2]	31,000,000 [2]	NE	9.1 U	9.8 U	10 U	8.8 U	10 U	11 U
Chrysene	15,000	210,000	NE	17	0.75 U	0.76 U	0.67 U	0.76 U	0.84 U
Dibenz(a,h)anthracene	15	210	NE	0.67 U	0.72 U	0.74 U	0.65 U	0.73 U	0.81 U
Fluoranthene	230,000 [2]	2,200,000 [2]	NE	10	2.1 U	2.1 U	1.9 U	2.1 U	2.3 U
Indeno[1,2,3-cd]pyrene	150	2,100	NE	1.4 U	1.5 UJ	1.5 U	1.3 UJ	1.5 U	1.6 U
Phenanthrene	170,000 [2][3]	1,700,000 [2][3]	NE	8.5	2.1 U	2.1 U	1.9 U	2.1 U	2.3 U
Pyrene	170,000 [2]	1,700,000 [2]	NE	13	2.1 U	2.1 U	1.9 U	2.1 U	2.3 U
Metals (mg/kg)									
Arsenic	0.39	1.6	1.59	***1.7***	***2.1***	**1.4**	***4.3***	***1.9***	***1.7***
Barium	1,500 [2]	19,000 [2]	220	99	58 J	46	260	320 J	180
Beryllium	16 [2]	200 [2]	0.596	0.35	0.67	0.41	0.37	0.57	0.89

TABLE 3

SUMMARY OF DETECTED LABORATORY RESULTS - SUBSURFACE SOIL (3 to 11 feet)
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range	**Regional Screening Levels** **Residential**	*Regional Screening Levels* *Industrial*	NAPR Basewide Background [1]	61SB01 61SB01-02 6/2/2008 3.0-5.0	61SB02 61SB02-05 6/3/2008 9.0-11.0	61SB03 61SB03-05 6/4/2008 9.0-11.0	61SB04 61SB04-05 6/4/2008 9.0-11.0	61SB05 61SB05-05 6/3/2008 9.0-11.0	61SB06 61SB06-05 6/2/2008 9.0-11.0
Metals (mg/kg)									
Cadmium	70 [2]	800 [2]	0.54	0.052 J	0.035 U	0.035 U	0.033 U	0.053 J	0.039 U
Chromium	280	1,400	114.5	20 J	42 J	50	4.3	26 J	78 J
Cobalt	2.3 [2]	30 [2]	26.9	**13**	**12** J	**18**	**17**	***40*** J	***36***
Copper	310 [2]	41,000 [2]	246	22	120	86	32	60	110
Lead	400 [4]	800 [4]	6.3	2.9	1.6 J	1.9	0.35	2.4 J	2.9
Mercury	2 [2]	31 [2]	0.108	0.03	0.012 J	0.011 J	0.0041 UJ	0.029	0.013 J
Nickel	160 [2]	2,000 [2]	24.7	3.9 J	13	15	4.5	10	20 J
Selenium	39 [2]	510 [2]	5.94	0.3 J	0.21 J	0.52 J	0.4 J	2	0.7
Silver	39 [2]	510 [2]	NE	0.017 J	0.026 J	0.032 J	0.022 J	0.037 J	0.028 J
Vanadium	55 [2]	720 [2]	434	**100**	**230**	**180**	**100**	**180**	**320**
Zinc	2,300 [2]	31,000 [2]	88	11 J	36	35 J	30 J	25	40 J

TABLE 3

SUMMARY OF DETECTED LABORATORY RESULTS - SUBSURFACE SOIL (3 to 11 feet)
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range	**Regional Screening Levels** **Residential**	*Regional Screening Levels* *Industrial*	NAPR Basewide Background [1]	61SB07 61SB07-04 6/3/2008 7.0-9.0	61SB07 61SB07-04D 6/3/2008 7.0-9.0	61SB08 61SB08-03 6/2/2008 5.0-7.0	61SB09 61SB09-05 6/4/2008 9.0-11.0	61SB10 61SB10-05 6/4/2008 9.0-11.0	61SB10 61SB10-05D 6/4/2008 9.0-11.0
Volatile Organic Compounds (ug/kg)									
3-Chloro-1-propene	70 [2]	350 [2]	NE	1.3 U	1.4 U	1.7 U	1.5 UJ	1.7 U	2 U
Acetone	6,100,000 [2]	61,000,000 [2]	NE	31 U	18 U	18 J	150	20 UJ	9.2 UJ
Carbon disulfide	67,000 [2]	300,000 [2]	NE	0.45 UJ	6.1 J	0.58 U	0.52 U	0.58 U	0.67 U
Chloroform	300	1500	NE	0.43 U	0.48 U	0.57 U	0.51 U	0.57 U	0.66 U
Iodomethane	NE	NE	NE	1 J	0.95 U	1.1 U	1.6 J	1.1 U	1.3 U
Trichloroethene	2800	14000	NE	0.86 U	0.95 U	1.1 U	1 U	1.1 U	1.3 U
Semivolatile Organic Compounds (ug/kg)									
Anthracene	1,700,000 [2]	17,000,000 [2]	NE	2 U	2.3 J	2.2 U	2.2 U	1.9 UJ	2.2 UJ
Benzo[a]anthracene	150	2,100	NE	2 UJ	25 J	2.2 U	2.2 U	1.9 UJ	2.2 UJ
Benzo[a]pyrene	15	210	NE	0.79 UJ	**28** J	0.86 UJ	0.85 UJ	0.75 UJ	0.86 UJ
Benzo[b]fluoranthene	150	2,100	NE	0.91 U	0.89 U	0.99 U	0.98 U	0.87 UJ	0.99 UJ
Benzo[g,h,i]perylene	170,000 [2][3]	1,700,000 [2][3]	NE	2 UJ	14 J	2.2 U	2.2 U	1.9 UJ	2.2 UJ
Benzo[k]fluoranthene	1,500	21,000	NE	1.2 UJ	35 J	1.3 UJ	1.3 UJ	1.1 UJ	1.3 UJ
Benzyl alcohol	3,100,000 [2]	31,000,000 [2]	NE	9.6 U	9.4 U	10 U	10 U	9.1 UJ	10 UJ
Chrysene	15,000	210,000	NE	1.2 J	28 J	0.79 U	0.79 U	0.7 UJ	0.79 UJ
Dibenz(a,h)anthracene	15	210	NE	0.71 U	4.3 J	0.76 U	0.76 U	0.67 UJ	0.77 UJ
Fluoranthene	230,000 [2]	2,200,000 [2]	NE	2 UJ	40 J	2.2 U	2.2 U	1.9 UJ	2.2 UJ
Indeno[1,2,3-cd]pyrene	150	2,100	NE	1.4 UJ	15 J	1.6 UJ	1.5 UJ	1.4 UJ	1.6 UJ
Phenanthrene	170,000 [2][3]	1,700,000 [2][3]	NE	2 UJ	10 J	2.2 U	2.2 U	1.9 UJ	2.2 UJ
Pyrene	170,000 [2]	1,700,000 [2]	NE	2 UJ	32 J	2.2 U	2.2 U	1.9 UJ	2.2 UJ
Metals (mg/kg)									
Arsenic	0.39	1.6	1.59	**1.4**	***2.4***	***2***	**1.5**	4.8 R	2 R
Barium	1,500 [2]	19,000 [2]	220	150 J	75 J	240	750	220 J	87 J
Beryllium	16 [2]	200 [2]	0.596	0.43	0.51	0.46	0.38	0.48	0.61

TABLE 3

SUMMARY OF DETECTED LABORATORY RESULTS - SUBSURFACE SOIL (3 to 11 feet)
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range	**Regional Screening Levels** **Residential**	*Regional Screening Levels* *Industrial*	NAPR Basewide Background [1]	61SB07 61SB07-04 6/3/2008 7.0-9.0	61SB07 61SB07-04D 6/3/2008 7.0-9.0	61SB08 61SB08-03 6/2/2008 5.0-7.0	61SB09 61SB09-05 6/4/2008 9.0-11.0	61SB10 61SB10-05 6/4/2008 9.0-11.0	61SB10 61SB10-05D 6/4/2008 9.0-11.0
Metals (mg/kg)									
Cadmium	70 [2]	800 [2]	0.54	0.035 U	0.036 J	0.037 U	0.037 U	0.032 U	0.038 U
Chromium	280	1,400	114.5	23 J	50 J	34 J	44	4.2 R	53 R
Cobalt	2.3 [2]	30 [2]	26.9	**18** J	**26** J	**19**	**13**	**17** J	**21** J
Copper	310 [2]	41,000 [2]	246	33 J	48 J	47	87	150 J	91 J
Lead	400 [4]	800 [4]	6.3	2.6 J	3 J	3.3	2.5	0.32 R	2.8 R
Mercury	2 [2]	31 [2]	0.108	0.018 J	0.016 J	0.037	0.0043 UJ	0.004 U	0.0061 J
Nickel	160 [2]	2,000 [2]	24.7	7	8.9	7 J	10	6.6 J	16 J
Selenium	39 [2]	510 [2]	5.94	0.17 J	0.41 J	0.5 J	0.98	0.42 J	0.95
Silver	39 [2]	510 [2]	NE	0.018 UJ	0.018 UJ	0.019 U	0.021 J	0.017 UJ	0.023 J
Vanadium	55 [2]	720 [2]	434	**90** J	**190** J	**160**	**210**	**79** J	**260** J
Zinc	2,300 [2]	31,000 [2]	88	17 J	25 J	16 J	26 J	26 J	35 J

TABLE 3

SUMMARY OF DETECTED LABORATORY RESULTS - SUBSURFACE SOIL (3 to 11 feet)
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range	**Regional Screening Levels Residential**	*Regional Screening Levels Industrial*	NAPR Basewide Background [1]	61SB11 61SB11-05 6/3/2008 9.0-11.0	61SB12 61SB12-05 6/3/2008 9.0-11.0	61SB12 61SB12-05D 6/3/2008 9.0-11.0	61SB13 61SB13-05 6/4/2008 9.0-11.0	61SB14 61SB14-05 6/4/2008 9.0-11.0	61SB15 61SB15-05 6/4/2008 9.0-11.0
Volatile Organic Compounds (ug/kg)									
3-Chloro-1-propene	70 [2]	350 [2]	NE	1.7 UJ	1.7 UJ	2 U	1.8 R	2.1 R	2 R
Acetone	6,100,000 [2]	61,000,000 [2]	NE	44 U	110 U	5.8 UJ	6.1 R	8.1 R	8.6 R
Carbon disulfide	67,000 [2]	300,000 [2]	NE	0.56 U	0.57 U	0.67 U	0.62 R	0.7 R	0.67 R
Chloroform	300	1500	NE	0.55 U	0.56 U	0.66 U	0.61 R	0.69 R	0.66 R
Iodomethane	NE	NE	NE	1.1 UJ	7 J	1.3 UJ	1.2 R	1.4 R	1.3 R
Trichloroethene	2800	14000	NE	1.1 U	1.1 U	1.3 U	1.2 R	1.4 R	1.3 R
Semivolatile Organic Compounds (ug/kg)									
Anthracene	1,700,000 [2]	17,000,000 [2]	NE	2.1 U	2.2 U	2.2 U	2.1 U	2.3 U	2.2 U
Benzo[a]anthracene	150	2,100	NE	2.1 U	2.2 U	2.2 U	2.1 U	2.3 U	2.2 U
Benzo[a]pyrene	15	210	NE	0.8 UJ	0.86 U	0.86 U	0.8 UJ	0.89 UJ	0.85 UJ
Benzo[b]fluoranthene	150	2,100	NE	0.92 U	0.99 U	0.99 U	0.92 U	1 U	0.98 U
Benzo[g,h,i]perylene	170,000 [2][3]	1,700,000 [2][3]	NE	2.1 U	2.2 UJ	2.2 UJ	2.1 U	2.3 U	2.2 U
Benzo[k]fluoranthene	1,500	21,000	NE	1.2 UJ	1.3 U	1.3 U	1.2 UJ	1.4 UJ	1.3 UJ
Benzyl alcohol	3,100,000 [2]	31,000,000 [2]	NE	9.7 U	19 J	21 J	9.7 U	11 U	10 U
Chrysene	15,000	210,000	NE	0.74 U	0.79 U	0.79 U	0.74 U	0.83 U	0.79 U
Dibenz(a,h)anthracene	15	210	NE	0.72 U	0.77 U	0.77 U	0.71 U	0.8 U	0.76 U
Fluoranthene	230,000 [2]	2,200,000 [2]	NE	2.1 U	2.2 U	2.2 U	2.1 U	2.3 U	2.2 U
Indeno[1,2,3-cd]pyrene	150	2,100	NE	1.5 U	1.6 U	1.6 U	1.5 UJ	1.6 UJ	1.5 UJ
Phenanthrene	170,000 [2][3]	1,700,000 [2][3]	NE	2.1 U	2.2 U	2.2 U	2.1 U	2.3 U	2.2 U
Pyrene	170,000 [2]	1,700,000 [2]	NE	2.1 U	2.2 U	2.2 U	2.1 U	2.3 U	2.2 U
Metals (mg/kg)									
Arsenic	0.39	1.6	1.59	**1.3**	**1.2**	**1.5**	***1.7***	**1**	***1.8***
Barium	1,500 [2]	19,000 [2]	220	50 J	260 J	470 J	97	42	160
Beryllium	16 [2]	200 [2]	0.596	0.4	0.35	0.35	0.5	0.57	0.74

TABLE 3

SUMMARY OF DETECTED LABORATORY RESULTS - SUBSURFACE SOIL (3 to 11 feet)
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range	**Regional Screening Levels** **Residential**	*Regional Screening Levels* *Industrial*	NAPR Basewide Background [1]	61SB11 61SB11-05 6/3/2008 9.0-11.0	61SB12 61SB12-05 6/3/2008 9.0-11.0	61SB12 61SB12-05D 6/3/2008 9.0-11.0	61SB13 61SB13-05 6/4/2008 9.0-11.0	61SB14 61SB14-05 6/4/2008 9.0-11.0	61SB15 61SB15-05 6/4/2008 9.0-11.0
Metals (mg/kg)									
Cadmium	70 [2]	800 [2]	0.54	0.035 U	0.036 U	0.04 U	0.035 U	0.038 U	0.037 U
Chromium	280	1,400	114.5	36 J	41	36	47	55	46
Cobalt	2.3 [2]	30 [2]	26.9	**13** J	**18** J	**21** J	**27**	**17**	**21**
Copper	310 [2]	41,000 [2]	246	75	80	85	110	67	93
Lead	400 [4]	800 [4]	6.3	1.8 J	2.4	2.8	2.5	1.6	2.3
Mercury	2 [2]	31 [2]	0.108	0.0068 J	0.024	0.025	0.0042 UJ	0.0047 J	0.0049 UJ
Nickel	160 [2]	2,000 [2]	24.7	11	7.9 J	8.2 J	13	14	16
Selenium	39 [2]	510 [2]	5.94	0.32 J	0.4 J	0.52 J	0.44 J	0.48 J	0.71
Silver	39 [2]	510 [2]	NE	0.018 UJ	0.019 UJ	0.02 UJ	0.018 UJ	0.02 UJ	0.019 UJ
Vanadium	55 [2]	720 [2]	434	**150**	**170**	**220**	**230**	**250**	**200**
Zinc	2,300 [2]	31,000 [2]	88	21	25	24	29 J	24 J	40 J

TABLE 3

SUMMARY OF DETECTED LABORATORY RESULTS - SUBSURFACE SOIL (3 to 11 feet)
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range	**Regional Screening Levels Residential**	*Regional Screening Levels Industrial*	NAPR Basewide Background [1]	61SB15 61SB15-05D 6/4/2008 9.0-11.0	61SB16 61SB16-05 6/3/2008 9.0-11.0	61SB17 61SB17-05 6/3/2008 9.0-11.0	61SB18 61SB18-05 6/3/2008 9.0-11.0	61SB19 61SB19-02 6/3/2008 3.0-5.0	61SB20 61SB20-05 6/2/2008 9.0-11.0
Volatile Organic Compounds (ug/kg)									
3-Chloro-1-propene	70 [2]	350 [2]	NE	2.1 J	1.7 U	1.9 U	1.9 UJ	1.5 UJ	2 U
Acetone	6,100,000 [2]	61,000,000 [2]	NE	13 UJ	7 UJ	11 UJ	39 U	25 U	17 J
Carbon disulfide	67,000 [2]	300,000 [2]	NE	0.59 U	0.58 U	0.64 U	0.64 U	0.5 U	0.9 J
Chloroform	300	1500	NE	0.58 U	0.56 U	1.1 J	0.63 U	0.49 U	0.66 U
Iodomethane	NE	NE	NE	1.2 U	1.1 U	1.3 U	1.3 UJ	0.98 UJ	1.3 U
Trichloroethene	2800	14000	NE	1.2 U	1.1 U	1.3 U	1.5 J	0.98 U	1.3 U
Semivolatile Organic Compounds (ug/kg)									
Anthracene	1,700,000 [2]	17,000,000 [2]	NE	1.9 UJ	2.3 U	2.2 U	2.4 U	1.9 U	2.2 UJ
Benzo[a]anthracene	150	2,100	NE	1.9 UJ	2.3 U	2.2 U	2.4 U	1.9 U	2.2 UJ
Benzo[a]pyrene	15	210	NE	0.75 UJ	0.89 UJ	0.84 UJ	0.94 U	0.73 U	0.86 UJ
Benzo[b]fluoranthene	150	2,100	NE	0.86 UJ	1 U	0.97 U	1.1 U	0.84 UJ	1 UJ
Benzo[g,h,i]perylene	170,000 [2][3]	1,700,000 [2][3]	NE	1.9 UJ	2.3 U	2.2 U	2.4 UJ	1.9 UJ	2.2 UJ
Benzo[k]fluoranthene	1,500	21,000	NE	1.1 UJ	1.4 U	1.3 UJ	1.4 U	1.1 U	1.3 UJ
Benzyl alcohol	3,100,000 [2]	31,000,000 [2]	NE	9.1 UJ	11 U	10 U	12 J	8.8 U	10 UJ
Chrysene	15,000	210,000	NE	0.69 UJ	0.83 U	0.78 U	0.87 U	0.67 U	0.8 UJ
Dibenz(a,h)anthracene	15	210	NE	0.67 UJ	0.8 U	0.75 U	0.84 U	0.65 U	0.77 UJ
Fluoranthene	230,000 [2]	2,200,000 [2]	NE	1.9 UJ	2.3 U	2.2 U	2.4 U	1.9 U	2.2 UJ
Indeno[1,2,3-cd]pyrene	150	2,100	NE	1.4 UJ	1.6 UJ	1.5 UJ	1.7 U	1.3 U	1.6 UJ
Phenanthrene	170,000 [2][3]	1,700,000 [2][3]	NE	1.9 UJ	2.3 U	2.2 U	2.4 U	1.9 U	2.2 UJ
Pyrene	170,000 [2]	1,700,000 [2]	NE	1.9 UJ	2.3 U	2.2 U	2.4 U	1.9 U	2.2 UJ
Metals (mg/kg)									
Arsenic	0.39	1.6	1.59	***5.8***	**0.81**	**0.65**	***2.3***	**1.3**	***1.9***
Barium	1,500 [2]	19,000 [2]	220	220 J	230 J	100 J	750	190	320
Beryllium	16 [2]	200 [2]	0.596	0.46	0.74	0.21	0.97	0.31	0.55

TABLE 3

SUMMARY OF DETECTED LABORATORY RESULTS - SUBSURFACE SOIL (3 to 11 feet)
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range	**Regional Screening Levels** **Residential**	*Regional Screening Levels* *Industrial*	NAPR Basewide Background [1]	61SB15 61SB15-05D 6/4/2008 9.0-11.0	61SB16 61SB16-05 6/3/2008 9.0-11.0	61SB17 61SB17-05 6/3/2008 9.0-11.0	61SB18 61SB18-05 6/3/2008 9.0-11.0	61SB19 61SB19-02 6/3/2008 3.0-5.0	61SB20 61SB20-05 6/2/2008 9.0-11.0
Metals (mg/kg)									
Cadmium	70 [2]	800 [2]	0.54	0.031 U	0.039 U	0.036 U	0.041 U	0.032 U	0.084 J
Chromium	280	1,400	114.5	3.9	50 J	170 J	46	22	50 J
Cobalt	2.3 [2]	30 [2]	26.9	**16** J	***33*** J	**26** J	***51*** J	***32*** J	***41***
Copper	310 [2]	41,000 [2]	246	170	71	51	110	200	71
Lead	400 [4]	800 [4]	6.3	0.25 U	1.1 J	0.78 J	3	1	3.4
Mercury	2 [2]	31 [2]	0.108	0.0038 U	0.0052 U	0.0043 U	0.021 J	0.0038 U	0.034
Nickel	160 [2]	2,000 [2]	24.7	8.5	14	72	25 J	12 J	15 J
Selenium	39 [2]	510 [2]	5.94	0.49 J	0.15 U	0.14 U	2.4	0.53	0.76
Silver	39 [2]	510 [2]	NE	0.016 UJ	0.02 UJ	0.019 J	0.06 J	0.049 J	0.019 U
Vanadium	55 [2]	720 [2]	434	**69**	**120**	**140**	**450**	**130**	**220**
Zinc	2,300 [2]	31,000 [2]	88	26 J	28	36	34	40	25 J

TABLE 4

SUMMARY OF DETECTED LABORATORY RESULTS - SEDIMENT
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range (ft bgs)	**Regional Screening Levels Residential**	*Regional Screening Levels Industrial*	Selected Ecological Soil Screening Values	Maximum Detected Background Concentration [16]	61SD01 61SD01 10/1/2008 0.0-0.25	61SD01D 61SD01D 10/1/2008 0.0-0.25	61SD02 61SD02 10/1/2008 0.0-0.25	61SD03 61SD03 10/1/2008 0.0-0.25	61SD04 61SD04 10/1/2008 0.0-0.25	61SD05 61SD05 10/1/2008 0.0-0.25
Volatile Organic Compounds (ug/kg)										
2-Butanone (MEK)	2800000 [2]	19000000 [2]	41.5 [5]	NE	11 J	6.9 UJ	7.5 UJ	5.7 UJ	12 J	12 J
Iodomethane	NE	NE	NA	NE	2.6 UJ	2.6 UJ	2.8 J	2.1 UJ	2.5 UJ	2.8 UJ
Semivolatile Organic Compunds (ug/kg)										
3 & 4 Methylphenol	NE	NE	8.0 [6][7][8]	NE	19 UJ	19 UJ	540 J	15 UJ	18 UJ	20 UJ
Anthracene	1,700,000	17,000,000	57	NE	7.7 J	4.4 J	6 J	3.6 UJ	4.8 J	4.7 UJ
Benzo[a]anthracene	150 [2]	2,100 [2]	110 [9]	NE	64 J	36 J	49 J	22 J	37 J	19 J
Benzo[a]pyrene	15	210	150 [9]	NE	**74** J	**39** J	**55** J	**28** J	**51** J	**34** J
Benzo[b]fluoranthene	150	2,100	1800 [9]	NE	100 J	43 J	4.7 UJ	3.6 UJ	4.2 UJ	4.7 UJ
Benzo[g,h,i]perylene	170,000	1,700,000	170 [6][10]	NE	66 J	37 J	46 J	21 J	40 J	4.7 UJ
Bis(2-ethylhexyl) phthalate	35,000 [2][3]	120,000 [2][3]	240 [11]	NE	71 UJ	39 J	83 J	46 J	56 J	65 J
Chrysene	15,000	210,000	170 [11]	NE	73 J	44 J	65 J	26 J	53 J	27 J
Fluoranthene	230,000	2,200,000	420 [9]	NE	65 J	43 J	59 J	26 J	48 J	23 J
Indeno[1,2,3-cd]pyrene	150 [2]	2,100 [2]	200 [9]	NE	8.4 UJ	15 UJ	23 J	12 UJ	19 J	9.1 UJ
Phenanthrene	170,000	1,700,000	200 [11]	NE	51 J	34 J	48 J	20 J	35 J	20 J
Pyrene	170,000 [2][3]	1,700,000 [2][3]	1600 [9]	NE	210 J	130 J	180 J	74 J	160 J	66 J
Metals (mg/kg)										
Antimony	3.1 [2]	41 [2]	2.0 [12]	0.51	0.9 J	1 J	1.9 J	1.1 J	1.1 J	0.81 J
Arsenic	0.39	1.6	9.8 [9]	5.5	***1.9*** J	***2*** J	***2.9*** J	***2.7*** J	***2.3*** J	***1.7*** J

TABLE 4

SUMMARY OF DETECTED LABORATORY RESULTS - SEDIMENT
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range (ft bgs)	**Regional Screening Levels** **Residential**	*Regional Screening Levels* *Industrial*	Selected Ecological Soil Screening Values	Maximum Detected Background Concentration [16]	61SD01 61SD01 10/1/2008 0.0-0.25	61SD01D 61SD01D 10/1/2008 0.0-0.25	61SD02 61SD02 10/1/2008 0.0-0.25	61SD03 61SD03 10/1/2008 0.0-0.25	61SD04 61SD04 10/1/2008 0.0-0.25	61SD05 61SD05 10/1/2008 0.0-0.25
Metals (mg/kg)										
Barium	1,500 [2]	19,000 [2]	20 [13]	340	220 J	250 J	400 J	290 J	250 J	250 J
Beryllium	16 [2]	200 [2]	NE	0.52	0.49 J	0.52 J	0.74 J	0.59 J	0.54 J	0.51 J
Cadmium	70 [2]	800 [2]	1.0 [9]	0.36	0.57 J	0.57 J	0.77 J	0.64 J	0.64 J	0.49 J
Chromium	280	1,400	43 [9]	41	38 J	44 J	65 J	52 J	47 J	40 J
Cobalt	2.3 [2]	30 [2]	50 [13]	63	**22** J	**24** J	**29** J	**28** J	**23** J	**23** J
Copper	310 [2]	41,000 [2]	32 [9]	170	120 J	130 J	220 J	180 J	150 J	160 J
Lead	400 [4]	800 [4]	36 [9]	22	170 J	190 J	290 J	140 J	170 J	82 J
Mercury	2 [2]	31 [2]	0.18 [9]	0.12	0.13 J	0.11 J	0.16 J	0.15 J	0.13 J	0.14 J
Nickel	160 [2]	2,000 [2]	23 [9]	26	17 J	19 J	27 J	22 J	20 J	18 J
Selenium	39 [2]	510 [2]	2.0 [14]	2.7	0.76 J	0.78 J	1.2 J	1.1 J	0.88 J	0.85 J
Vanadium	55 [2]	720 [2]	57 [15]	210	**130** J	**140** J	**200** J	**190** J	**160** J	**150** J
Zinc	2,300 [2]	31,000 [2]	120 [9]	250	130 J	150 J	210 J	170 J	180 J	120 J
Total Organic Carbon (mg/kg)										
Total Organic Carbon	NE	NE	NE	NE	56,000	54,000	63,000	42,000	61,000	64,000

TABLE 4

SUMMARY OF DETECTED LABORATORY RESULTS - SEDIMENT
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range (ft bgs)	**Regional Screening Levels Residential**	*Regional Screening Levels Industrial*	Selected Ecological Soil Screening Values	Maximum Detected Background Concentration [16]	61SD06 61SD06 10/1/2008 0.0-0.25	61SD07 61SD07 10/1/2008 0.0-0.25	61SD08 61SD08 10/1/2008 0.0-0.25	61SD09 61SD09 10/1/2008 0.0-0.25	61SD09D 61SD09D 10/1/2008 0.0-0.25
Volatile Organic Compounds (ug/kg)									
2-Butanone (MEK)	2800000 [2]	19000000 [2]	41.5 [5]	NE	11 J	11 J	9.8 J	11 UJ	9.5 UJ
Iodomethane	NE	NE	NA	NE	2.6 UJ	2.7 UJ	2.9 UJ	4.1 UJ	3.9 J
Semivolatile Organic Compunds (ug/kg)									
3 & 4 Methylphenol	NE	NE	8.0 [6][7][8]	NE	260 J	20 UJ	21 UJ	30 UJ	25 UJ
Anthracene	1,700,000	17,000,000	57	NE	4.4 UJ	4.6 UJ	4.9 UJ	6.9 UJ	5.9 UJ
Benzo[a]anthracene	150 [2]	2,100 [2]	110 [9]	NE	23 J	13 J	8.6 J	6.9 UJ	6.7 J
Benzo[a]pyrene	15	210	150 [9]	NE	**33** J	4.6 UJ	4.9 UJ	6.9 UJ	5.9 UJ
Benzo[b]fluoranthene	150	2,100	1800 [9]	NE	4.4 UJ	4.6 UJ	4.9 UJ	32 J	5.9 UJ
Benzo[g,h,i]perylene	170,000	1,700,000	170 [6][10]	NE	4.4 UJ	4.6 UJ	4.9 UJ	6.9 UJ	5.9 UJ
Bis(2-ethylhexyl) phthalate	35,000 [2][3]	120,000 [2][3]	240 [11]	NE	70 J	99 J	120 J	170 J	160 J
Chrysene	15,000	210,000	170 [11]	NE	29 J	17 UJ	13 UJ	14 UJ	11 UJ
Fluoranthene	230,000	2,200,000	420 [9]	NE	27 J	16 J	11 J	5.4 J	6.8 J
Indeno[1,2,3-cd]pyrene	150 [2]	2,100 [2]	200 [9]	NE	8.6 UJ	8.9 UJ	9.5 UJ	13 UJ	12 UJ
Phenanthrene	170,000	1,700,000	200 [11]	NE	21 J	10 J	6.9 J	6.9 UJ	5.9 UJ
Pyrene	170,000 [2][3]	1,700,000 [2][3]	1600 [9]	NE	85 J	46 J	29 J	29 J	19 J
Metals (mg/kg)									
Antimony	3.1 [2]	41 [2]	2.0 [12]	0.51	0.98 J	1.7 J	**4.3** J	**6.1** J	**6.2** J
Arsenic	0.39	1.6	9.8 [9]	5.5	***2.5*** J	***2.4*** J	***2.5*** J	***4*** J	***3.8*** J

TABLE 4

SUMMARY OF DETECTED LABORATORY RESULTS - SEDIMENT
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date Depth Range (ft bgs)	**Regional Screening Levels Residential**	*Regional Screening Levels Industrial*	Selected Ecological Soil Screening Values	Maximum Detected Background Concentration [16]	61SD06 61SD06 10/1/2008 0.0-0.25	61SD07 61SD07 10/1/2008 0.0-0.25	61SD08 61SD08 10/1/2008 0.0-0.25	61SD09 61SD09 10/1/2008 0.0-0.25	61SD09D 61SD09D 10/1/2008 0.0-0.25
Metals (mg/kg)									
Barium	1,500 [2]	19,000 [2]	20 [13]	340	290 J	250 J	220 J	240 J	260 J
Beryllium	16 [2]	200 [2]	NE	0.52	0.61 J	0.52 J	0.47 J	0.43 J	0.46 J
Cadmium	70 [2]	800 [2]	1.0 [9]	0.36	0.55 J	0.52 J	0.79 J	1.6 J	1.8 J
Chromium	280	1,400	43 [9]	41	52 J	48 J	43 J	42 J	46 J
Cobalt	2.3 [2]	30 [2]	50 [13]	63	**29** J	**23** J	**19** J	**22** J	**21** J
Copper	310 [2]	41,000 [2]	32 [9]	170	190 J	210 J	190 J	220 J	240 J
Lead	400 [4]	800 [4]	36 [9]	22	120 J	110 J	95 J	94 J	100 J
Mercury	2 [2]	31 [2]	0.18 [9]	0.12	0.12 J	0.0043 J	0.26 J	0.52 J	0.51 J
Nickel	160 [2]	2,000 [2]	23 [9]	26	22 J	21 J	19 J	22 J	23 J
Selenium	39 [2]	510 [2]	2.0 [14]	2.7	1.1 J	0.98 J	0.93 J	1.1 J	1.2 J
Vanadium	55 [2]	720 [2]	57 [15]	210	**190** J	**190** J	**160** J	**160** J	**160** J
Zinc	2,300 [2]	31,000 [2]	120 [9]	250	150 J	150 J	160 J	220 J	230 J
Total Organic Carbon (mg/kg)									
Total Organic Carbon	NE	NE	NE	NE	66,000	65,000	76,000	######	100,000

TABLE 4

SUMMARY OF DETECTED LABORATORY RESULTS - SEDIMENT
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY 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 - micrograms per kilogram
mg/kg - miligrams per kilogram
NE - Not Established
NAPR - Naval Activity Puerto Rico
USEPA - United States Environmental Protection Agency

(1) The values shown are freshwater screening values unless otherwise noted.
(2) Noncarcinogenic RSLs based on a target hazard quotient of 0.1 for conservative screening purposes.
(3) Pyrene used as a surrogate for screening purposes for benzo[g,h,i]perylene and phenanthrecene
(4) USEPA Action Level for lead in soils
(5) EqP-based screening value
(6) The chemical lacks a freshwater bulk sediment screening value. The value shown is a marine/estuarine bulk sediment screening value.
(7) The value shown is for 4-methylphenol.
(8) Minimum Apparent Effects Threshold (bivalve) [Buchman 2008]
(9) Consensus-based Threshold Effect Concentration (MacDonald et al., 2000)
(10) Minimum Apparent Effects Threshold (Echinoderm larvae and infaunal commuity impacts) [Buchman 2008]
(11) Lowest Effect Level (Persaud et al. 1993)
(12) Effects Range-Low (Long and Morgan, 1991)
(13) Threshold Effect Concentration (MacDonald et al., 2003)
(14) USEPA Region 3 BTAG screening value (Lemley 2002 [as cited in USEPA 2007])
(15) Minimum Apparent Effects Threshold (infaunal community impacts) [Buchman, 2008]
(16) Maximum detected background concentration from background samples BGFWSD01 through BGFWSD09, as shown on Table 5.

TABLE 4

SUMMARY OF DETECTED LABORATORY RESULTS - SEDIMENT
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

References:

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Long, E.R. and L.G. Morgan. 1991. The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program. National Oceanic and Atmospheric Administration, Seattle, WA. NOAA Technical Memorandum NOS OMA 52.

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.

MacDonald, D.D, C.G. Ingersoll, D.E. Smorong, R.A. Lindskoog, G. Sloane, and T. Biernacki. 2003. Development and Evaluation of Numerical Sediment Quality Assessment Guidelines for Florida Inland Waters. Prepared for Florida Department of Environmental Protection, Tallahassee, Florida. January 2003.

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).

TABLE 5

ANALYTICAL RESULTS FOR BACKGROUND SEDIMENT SAMPLES
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID	BGFWSD01	BGFWSD02	BGFWSD03	BGFWSD04	BGFWSD05	BGFWSD06	BGFWSD07	BGFWSD08	BGFWSD09	BGFWSD09D
Sample ID	BGFWSD01	BGFWSD02	BGFWSD03	BGFWSD04	BGFWSD05	BGFWSD06	BGFWSD07	BGFWSD08	BGFWSD09	BGFWSD09D
Date	10/1/2008	10/1/2008	10/1/2008	10/1/2008	10/1/2008	10/1/2008	10/1/2008	10/1/2008	10/1/2008	10/1/2008
Metals (mg/kg)										
Antimony	0.34 J	0.37 J	0.31 J	0.4 J	0.31 J	0.34 J	0.51 J	0.21 J	0.39 J	0.47 J
Arsenic	3.6 J	4.5 J	3.6 J	2.9 J	2.7 J	2 J	3.8 J	2.6 J	4.4 J	5.5 J
Barium	290 J	270 J	220 J	210 J	210 J	180 J	280 J	200 J	290 J	340 J
Beryllium	0.48 J	0.38 J	0.33 J	0.41 J	0.43 J	0.39 J	0.44 J	0.38 J	0.51 J	0.52 J
Cadmium	0.33 J	0.31 J	0.27 J	0.34 J	0.27 J	0.19 J	0.33 J	0.2 J	0.34 J	0.36 J
Chromium	38 J	34 J	25 J	28 J	26 J	25 J	33 J	28 J	40 J	41 J
Cobalt	63 J	63 J	44 J	48 J	47 J	38 J	44 J	28 J	33 J	38 J
Copper	170 J	140 J	110 J	120 J	110 J	120 J	120 J	110 J	140 J	150 J
Lead	22 J	18 J	14 J	16 J	12 J	9.3 J	19 J	10 J	20 J	20 J
Mercury	0.084 J	0.09 J	0.087 J	0.091 J	0.085 J	0.077 J	0.12 J	0.062 J	0.11 J	0.1 J
Nickel	26 J	22 J	17 J	18 J	16 J	16 J	21 J	16 J	23 J	24 J
Selenium	2.7 J	2.3 J	1.7 J	1.7 J	1.7 J	1.3 J	1.5 J	1.2 J	1.6 J	1.8 J
Silver	0.088 J	0.088 J	0.078 J	0.068 J	0.063 J	0.041 J	0.075 J	0.058 J	0.059 J	0.081 J
Thallium	0.33 UJ	0.35 UJ	0.33 UJ	0.4 UJ	0.33 UJ	0.25 UJ	0.42 UJ	0.24 UJ	0.27 UJ	0.24 UJ
Tin	11 UJ	12 UJ	11 UJ	13 UJ	11 UJ	8.3 UJ	14 UJ	8 UJ	9.1 UJ	8 UJ
Vanadium	200 J	210 J	150 J	150 J	170 J	160 J	170 J	160 J	170 J	200 J
Zinc	140 J	130 J	120 J	250 J	150 J	92 J	140 J	95 J	140 J	160 J
Total Organic Carbon (mg/kg)										
Total Organic Carbon	43000	55000	71000	78000	54000	44000	83000	32000	44000	NA

Notes/Qualifiers:

J - Estimated: The analyte was positively identified; the quantitation is an estimation
UJ - Reported quantitation limit is qualified as estimated
mg/kg - miligrams per kilogram
Shaded - maximum detected conentration of background values for constituent

TABLE 6

SUMMARY OF DETECTED LABORATORY RESULTS - GROUNDWATER
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Site ID Sample ID Date	**Regional Tap Water Screening Levels**	*USEPA MCLs*	Ecological Groundwater Screening Values [2]	NAPR Basewide Background [1]	61SB01 61GW01 6/11/2008	61SB02 61GW02 6/11/2008	61SB03 61GW03 6/11/2008	61SB03 61GW03D 6/10/2008	61SB04 61GW04 6/11/2008	61SB05 61GW05 6/10/2008	61SB06 61GW06 6/10/2008
Volatile Organic Compounds (ug/L)											
Chloroform	0.19	NE	140 [5]	NE	0.29 U	**0.58** J	**0.47** J	**0.43** J	**0.71** J	**3.8**	**6.9**
Chloromethane	190	NE	5,500 [6]	NE	0.38 J	0.28 UJ	0.28 UJ	0.54 J	0.28 UJ	0.28 UJ	0.28 UJ
Tetrachloroethene	0.11	5	45 [5]	NE	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	**2.8**
Trichloroethene	1.7	5	47 [5]	NE	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	***5.9***	**4.3**
Semivolatile Organic Compounds (ug/L)											
Bis(2-ethylhexyl) phthalate	4.8	6	0.3 [6]	NE	0.34 U	0.43 J	0.34 U	0.34 U	0.39 J	0.34 U	0.34 U
Total Metals (ug/L)											
Arsenic	0.045	10	150 [7]	18.89	**1.1** J	**1.8** J	**0.76** J	**1.1** J	**0.79** J	**0.71** J	**0.74** J
Barium	730 [3]	2,000	220 [5]	686	71	21	42	42	86	48	40
Chromium	11 [3][4]	100	34.6 [8][9]	162.41	0.67 J	0.6 U	0.6 U	0.6 U	0.6 U	1 J	0.82 J
Cobalt	1.1 [3]	NE	24 [5]	633.21	**2.6** J	**2.6** J	**1.9** J	**2.1** J	**2.3** J	**3.4** J	**1.9** J
Copper	150 [3]	1,300	3.6 [9][10]	324	1.6 U	5.6	3.4 U	1.2 U	1.2 U	4 U	2.7 U
Nickel	73 [3]	NE	20.4 [9][10]	95.74	2.3	3	1.2	1.3	0.82 J	1.7	1.6
Selenium	18 [3]	50	5.0 [10]	29.88	2.8	1.9 J	1.3 J	1.2 J	2 J	1.2 J	1.1 J
Vanadium	26 [3]	NE	12 [5]	484.66	21	**57**	**46**	**49**	**29**	**32**	**28**
Dissolved Metals (ug/L)											
Barium	730 [3]	2,000	220 [5]	260	75	18	42	39	82	42	34
Cobalt	1.1 [3]	NE	24 [5]	580.50	**3.2** J	**2.9**	**2.1**	**1.8**	**2.5**	**3.3**	**1.8**
Nickel	73 [3]	NE	20.3 [9][11]	84.1	2.3	2.6	1.2	1.1	0.74 J	1.4	1.2
Selenium	18 [3]	50	4.61 [11]	23.92	3.4	1.9 J	1.2 J	1.4 J	2.2 J	1.2 J	1.2 J
Vanadium	26 [3]	NE	12 [5]	20.96	20	**53**	**45**	**44**	**29**	**28**	25

TABLE 6

SUMMARY OF DETECTED LABORATORY RESULTS - GROUNDWATER
SWMU 61 - FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY REPORT
NAVAL ACTIVITY PUERTO RICO, CEIBA, PUERTO RICO

Notes/Qualifiers:

U - Not detected at the Method Detection Limit
J - Analyte present - Reported value is estimated
UJ - Reported quantitation limit is qualified as estimated
NE - Not Established
mg/l - microgram per liter
ug/l - microgram per liter
USEPA - United States Environmental Protection Agency
NAPR - Naval Activity Puerto Rico

(1) NAPR basewide background groundwater screening value (upper limit of the means concentration [mean plus two standard deviations]) (Baker, 2008)
(2) Ecological screening criteria is for groundwater discharges to freshwwater environments
(3) Noncarcinogenic RSLs based on a target hazard quotient of 0.1 for conservative screening purposes;
(4) Chromium VI is used for screening purposes
(5) USEPA Region 5 ecological screening level (USEPA, 2003)
(6) USEPA Region 4 chronic screening value (USEPA, 2001)
(7) Total recoverable Criteria Continuous Concentration for trivalent arsenic (USEPA, 2009)
(8) Total recoverable Criteria Continuous Concentration for trivalent chromium (USEPA, 2009)
(9) The screening value shown is based on a water hardness of 32.86 mg/L as $CaCO_3$.
(10) Total recoverable Criteria Continuous Concentration (USEPA, 2009)
(11) Dissolved Criteria Continuous Concentration (USEPA, 2009)

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.

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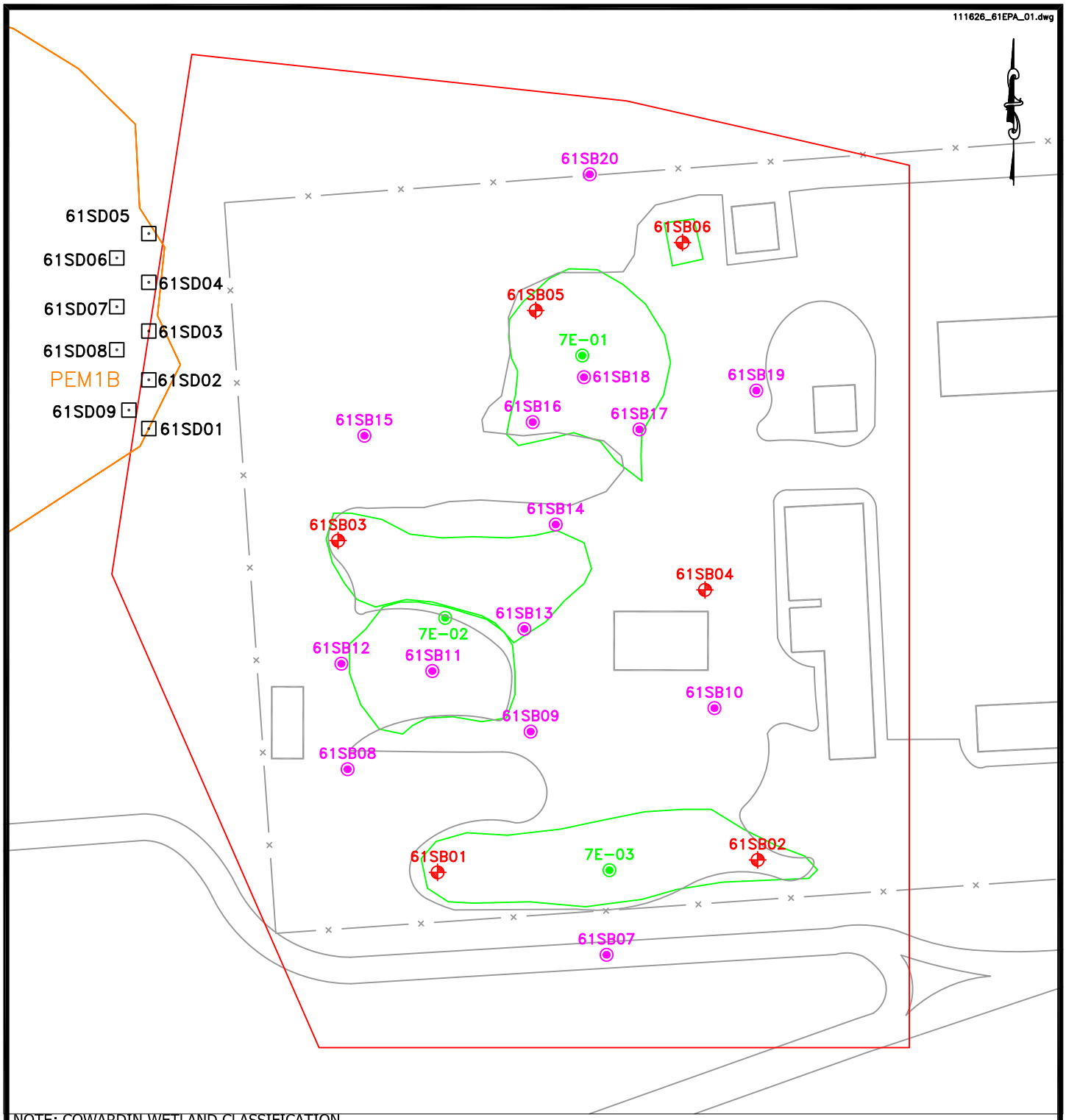
USEPA. 2003. USEPA Region 5 Ecological Screening Levels Table. http://www.epa.gov/reg5rcra/ca/ESL.pdf.

USEPA. 2001. Region 4 Ecological Risk Assessment Bulletins - Supplement to RQGS. Waste Management Division, Atlanta, GA. http://www.epa.gov/region04/waste/ots/ecolbul.htm.

FIGURES



NOTE: COWARDIN WETLAND CLASSIFICATION
PEM1B-PALUSTRINE, EMERGENT, PERSISTENT SATURATED

SOURCE: GEO-MARINE, INC., HISTORIC 1958

80 0 40 80
1 inch = 80 ft.

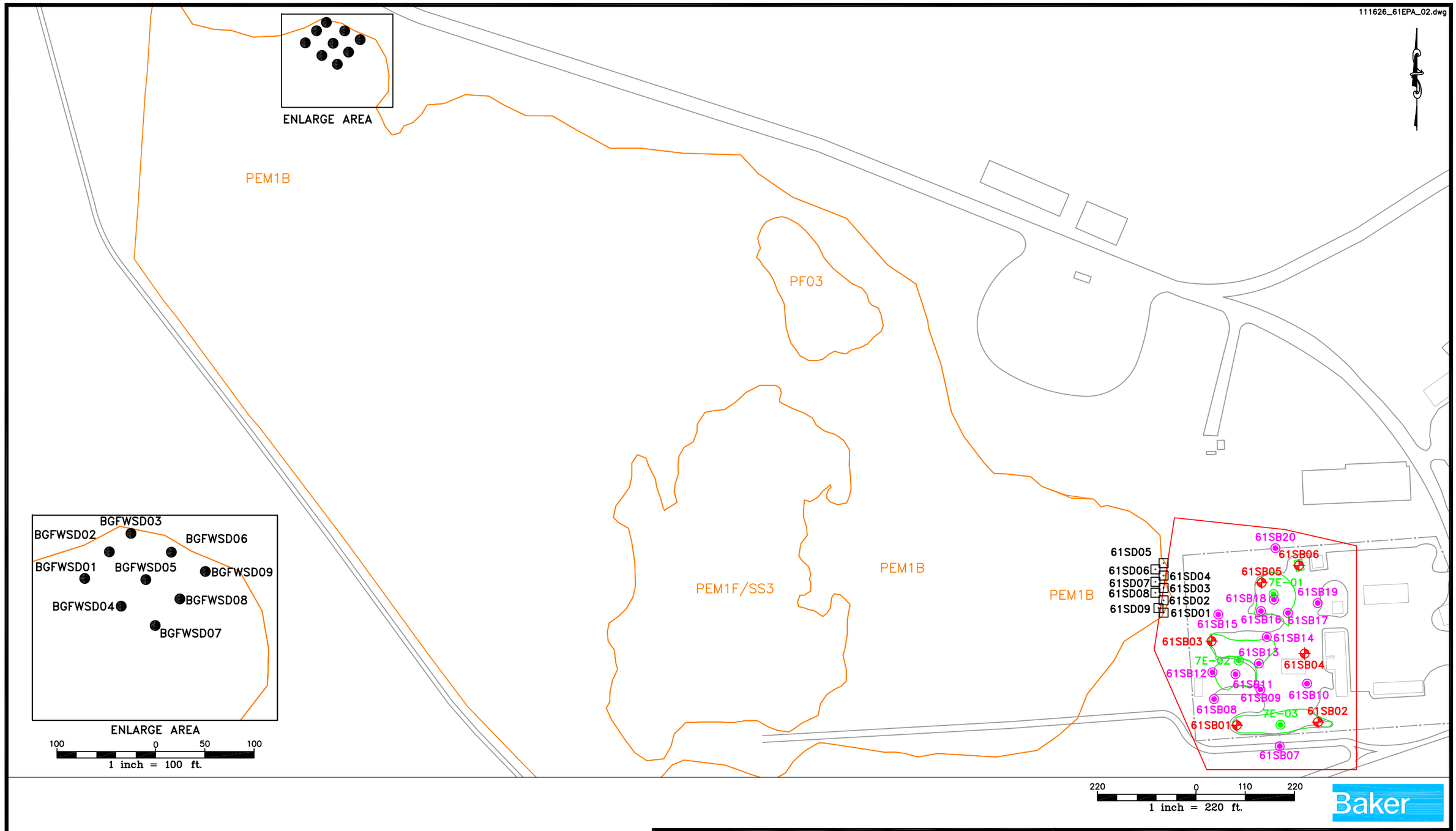
Baker

LEGEND

- —WETLAND DELINEATION
- —1958 POLYGON FEATURE
- —PREVIOUS SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION, ECP 2004
- —CMS INVESTIGATION SURFACE AND SUBSURFACE SOIL SAMPLING LOCATIONS
- —CMS INVESTIGATION SURFACE AND SUBSURFACE SOIL AND GROUNDWATER SAMPLING LOCATIONS
- —SEDIMENT SAMPLE LOCATION
- —SWMU BOUNDARY

FIGURE 1
SAMPLE LOCATION MAP
SWMU 61-FORMER BUNDY AREA
MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION

NAVAL ACTIVITY PUERTO RICO



NOTE: COWARDIN WETLAND CLASSIFICATION

PEM1B-PALUSTRINE, EMERGENT, PERSISTENT SATURATED

PFO3-PALUSTRINE, FORESTED, BROAD-LEAVED EVERGREEN

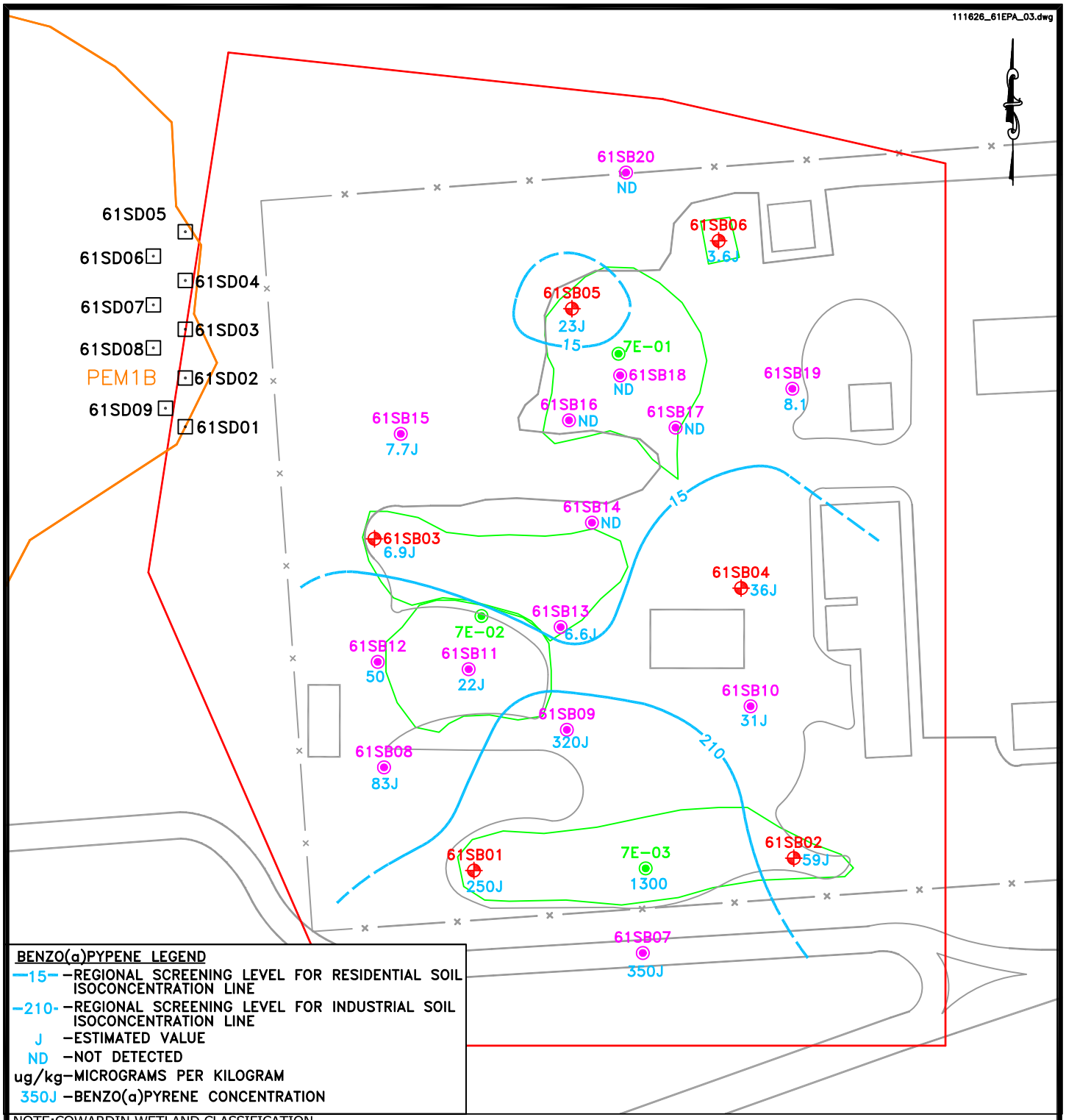
PEM1F/SS3-PALUSTRINE, EMERGENT, PERSISTENT SEMI-PERMANENT FLOODED/ SCRUB-SHRUB, BROAD-LEAVED EVERGREEN

LEGEND

- —WETLAND DELINEATION
- —1958 POLYGON FEATURE
- —PREVIOUS SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION, ECP 2004
- —CMS INVESTIGATION SURFACE AND SUBSURFACE SOIL SAMPLING LOCATIONS
- —CMS INVESTIGATION SURFACE AND SUBSURFACE SOIL AND GROUNDWATER SAMPLING LOCATIONS
- —SEDIMENT SAMPLE LOCATIONS
- —BACKGROUND FRESH WATER SEDIMENT APPROXIMATE SAMPLE LOCATION
- —SWMU BOUNDARY

FIGURE 2
SEDIMENT SAMPLE LOCATION MAP
SWMU 61—FORMER BUNDY AREA
MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION

NAVAL ACTIVITY PUERTO RICO



BENZO(a)PYPENE LEGEND

- —15— –REGIONAL SCREENING LEVEL FOR RESIDENTIAL SOIL ISOCONCENTRATION LINE
- –210- –REGIONAL SCREENING LEVEL FOR INDUSTRIAL SOIL ISOCONCENTRATION LINE
- J –ESTIMATED VALUE
- ND –NOT DETECTED
- ug/kg–MICROGRAMS PER KILOGRAM
- 350J –BENZO(a)PYRENE CONCENTRATION

NOTE:COWARDIN WETLAND CLASSIFICATION

1. PEM1B-PALUSTRINE, EMERGENT, PERSISTENT SATURATED
2. ALL VALUES GIVEN IN ug/kg

SOURCE: GEO–MARINE, INC., HISTORIC 1958

80 0 40 80

1 inch = 80 ft.

Baker

LEGEND

- –WETLAND DELINEATION
- –1958 POLYGON FEATURE
- –PREVIOUS SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION, ECP 2004
- –CMS INVESTIGATION SURFACE AND SUBSURFACE SOIL SAMPLING LOCATIONS
- –CMS INVESTIGATION SURFACE AND SUBSURFACE SOIL AND GROUNDWATER SAMPLING LOCATIONS
- –SEDIMENT SAMPLE LOCATIONS
- –SWMU BOUNDARY

FIGURE 3
DISTRIBUTION OF BENZO(a)PYRENE
IN SURFACE SOIL
SWMU 61–FORMER BUNDY AREA
MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION

NAVAL ACTIVITY PUERTO RICO

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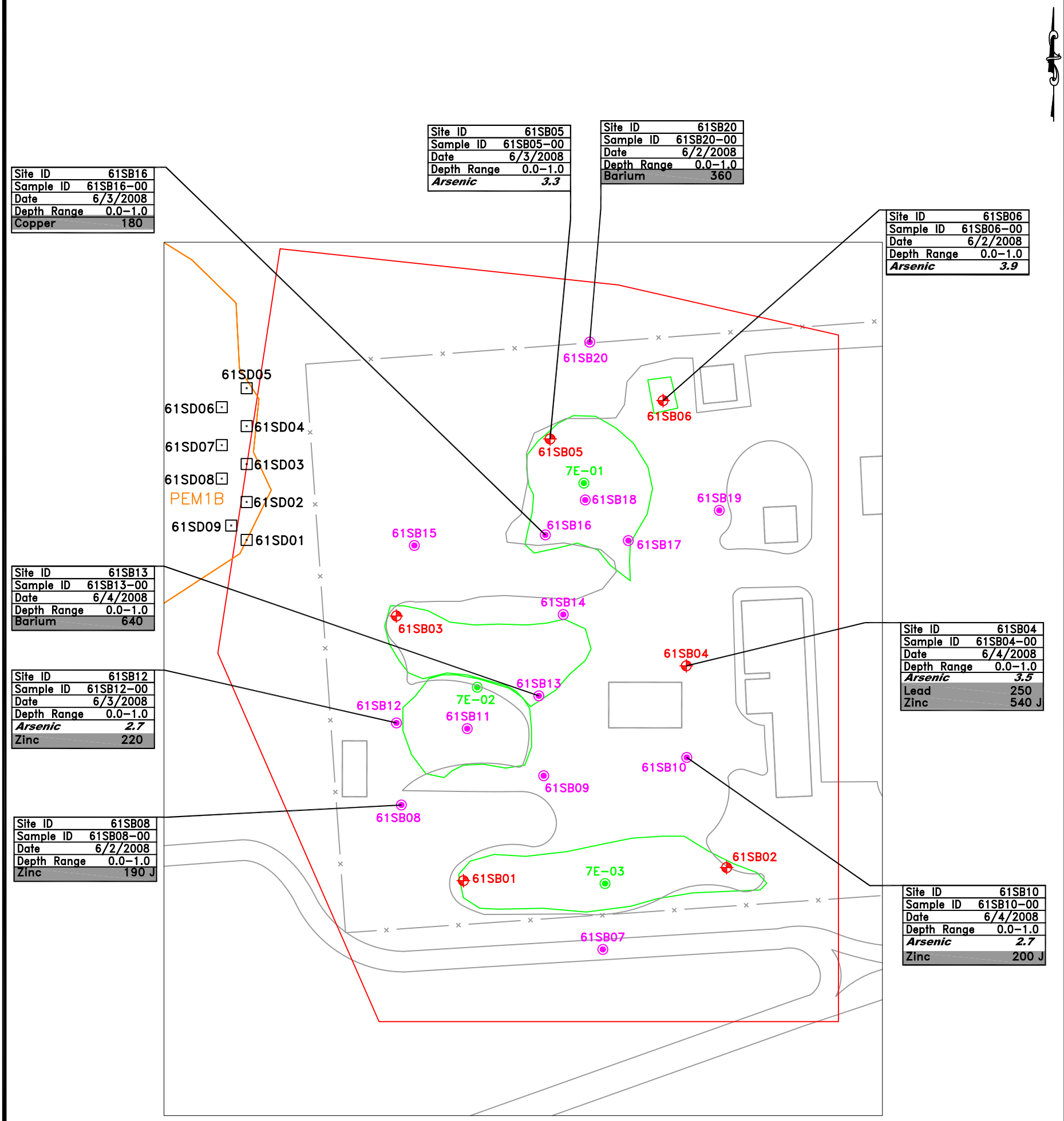


NOTES/COWARDIN WETLAND CLASSIFICATION/QUALIFIERS:

1. PEM1B - PALUSTRINE, EMERGENT, PERSISTENT SATURATED
2. ft bgs - FEET BELOW GROUND SURFACE
3. mg/kg - MILIGRAMS PER KILOGRAM
4. NAPR - NAVAL ACTIVITY PUERTO RICO
5. J - ESTIMATED VALUE
6. **BOLD** - EXCEEDS REGIONAL SCREENING LEVEL FOR RESIDENTAL SOIL
7. *ITALICS* -EXCEEDS REGIONAL SCREENING LEVEL FOR INDUSTRIAL SOIL
8. SHADE - EXCEEDS ECOLOGICAL SOIL SCREENING CRITERIA

ALL VALUES SHOWN EXCEED THEIR RESPECTIVE NAPR BASEWIDE BACKGROUND SURFACE SOIL SCREENING VALUE

INGANIC CONCENTRATIONS GIVEN IN mg/kg

SOURCE: GEO-MARINE, INC., SEPTEMBER 6, 2000.

80 0 40 80

1 inch = 80 ft.

Baker

LEGEND

- WETLAND DELINEATION
- 1958 POLYGON FEATURE
- PREVIOUS SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION, ECP 2004
- CMS INVESTIGATION SURFACE AND SUBSURFACE SOIL SAMPLING LOCATIONS
- CMS INVESTIGATION SURFACE AND SUBSURFACE SOIL AND GROUNDWATER SAMPLING LOCATIONS
- SEDIMENT SAMPLE
- SWMU BOUNDARY

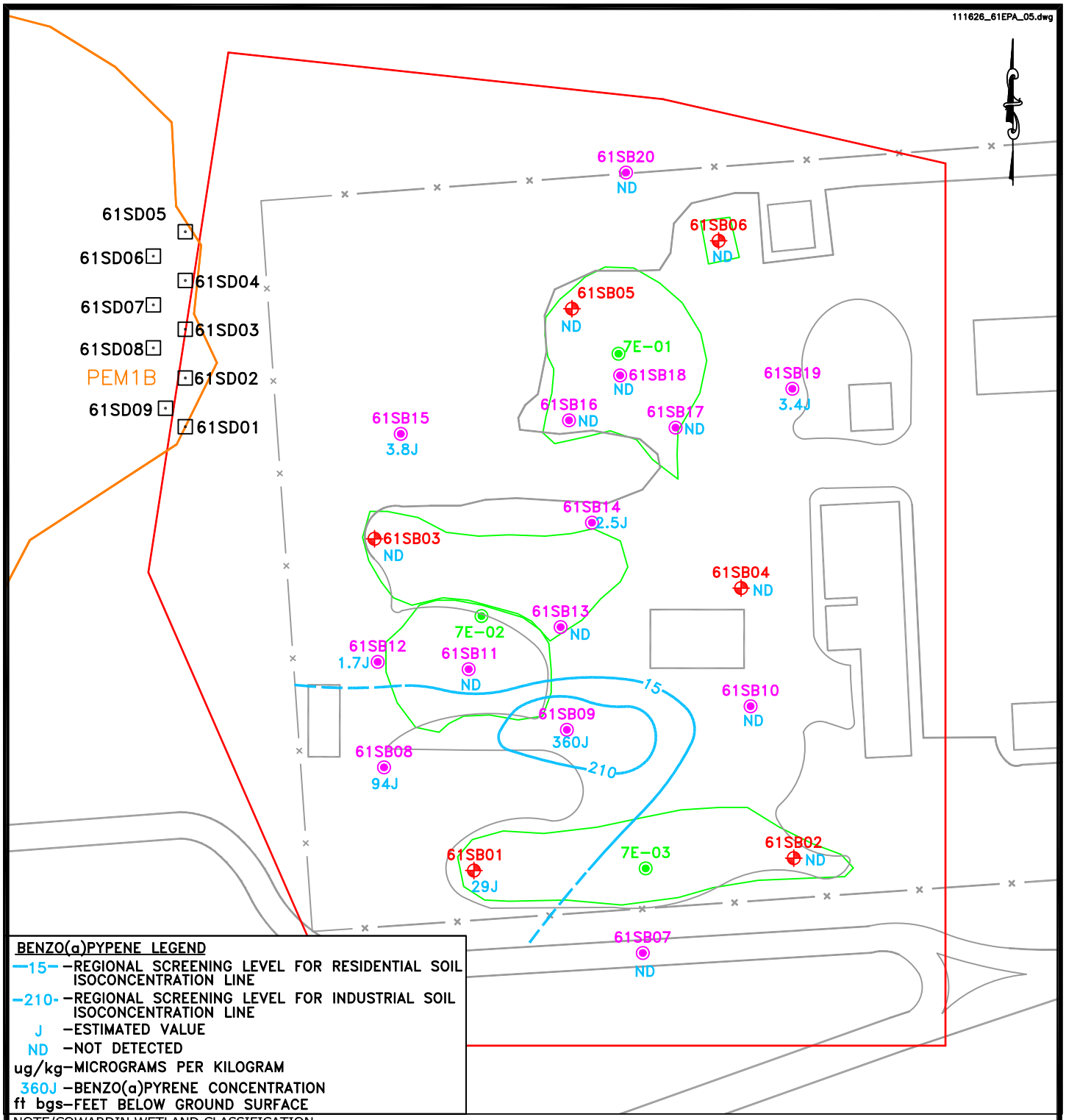
FIGURE 4

INORGANIC EXCEEDANCES OF SCREENING CRITERIA AND BACKGROUND IN SURFACE SOIL

SWMU 61-FORMER BUNDY AREA MAINTENANCE FACILITIES

CORRECTIVE MEASURES STUDY INVESTIGATION

NAVAL ACTIVITY PUERTO RICO



BENZO(a)PYPENE LEGEND

—15— –REGIONAL SCREENING LEVEL FOR RESIDENTIAL SOIL ISOCONCENTRATION LINE

–210- –REGIONAL SCREENING LEVEL FOR INDUSTRIAL SOIL ISOCONCENTRATION LINE

J –ESTIMATED VALUE

ND –NOT DETECTED

ug/kg–MICROGRAMS PER KILOGRAM

360J –BENZO(a)PYRENE CONCENTRATION

ft bgs–FEET BELOW GROUND SURFACE

NOTE/COWARDIN WETLAND CLASSIFICATION:

1. PEM1B-PALUSTRINE, EMERGENT, PERSISTENT SATURATED
2. ALL VALUES GIVEN IN ug/kg

SOURCE: GEO–MARINE, INC., HISTORIC 1958

80 0 40 80

1 inch = 80 ft.

Baker

LEGEND

–WETLAND DELINEATION

–1958 POLYGON FEATURE

–PREVIOUS SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION, ECP 2004

–CMS INVESTIGATION SURFACE AND SUBSURFACE SOIL SAMPLING LOCATIONS

–CMS INVESTIGATION SURFACE AND SUBSURFACE SOIL AND GROUNDWATER SAMPLING LOCATIONS

–SEDIMENT SAMPLE LOCATIONS

–SWMU BOUNDARY

FIGURE 5

DISTRIBUTION OF BENZO(a)PYRENE IN SHALLOW SUBSURFACE SOIL (1 TO 3 ft bgs)

SWMU 61–FORMER BUNDY AREA MAINTENANCE FACILITIES

CORRECTIVE MEASURES STUDY INVESTIGATION

NAVAL ACTIVITY PUERTO RICO

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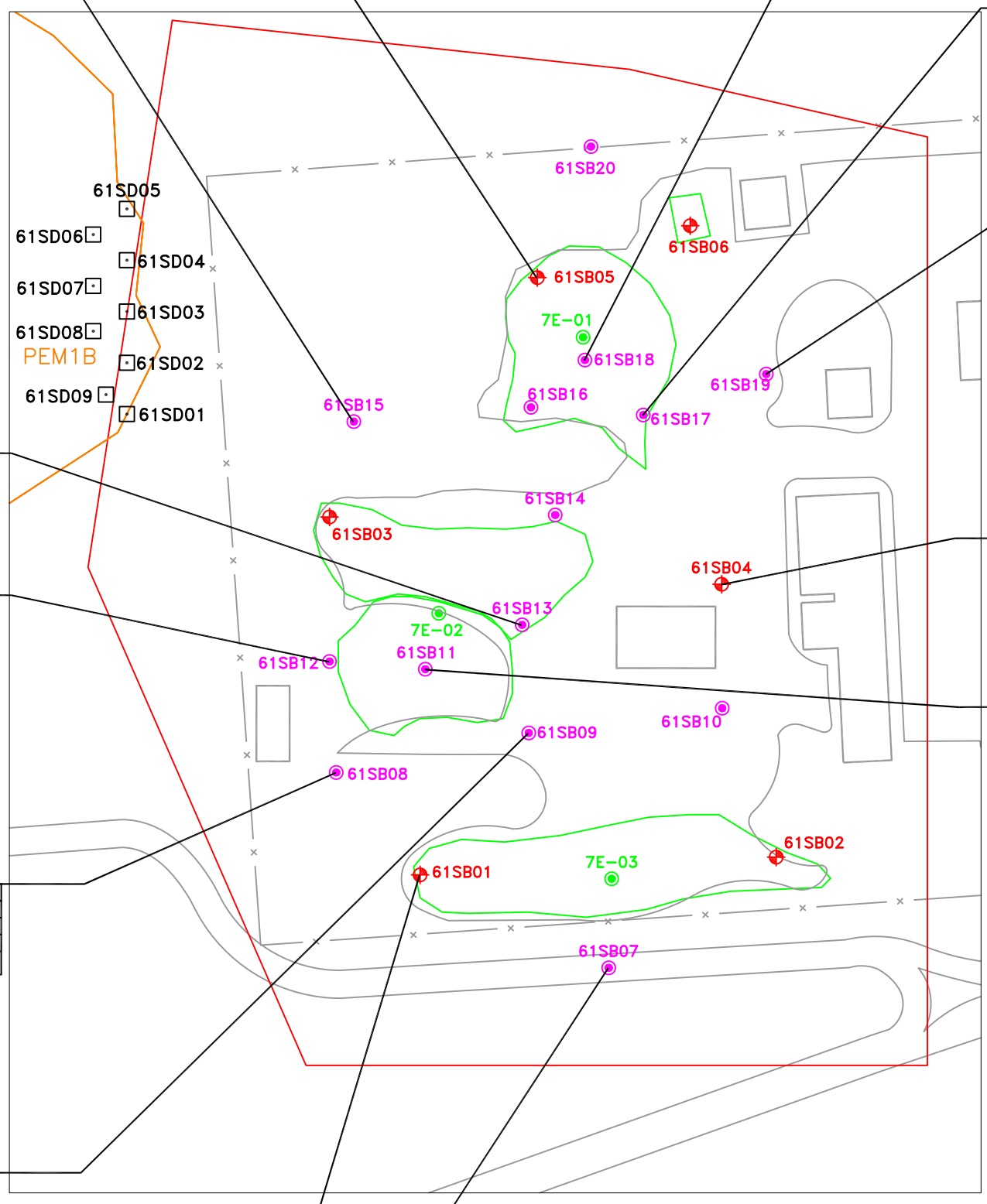

Site ID	61SB15
Sample ID	61SB15-01
Date	6/4/2008
Depth Range	1.0-3.0
Arsenic	*2.3*

Site ID	61SB05
Sample ID	61SB05-01
Date	6/3/2008
Depth Range	1.0-3.0
Arsenic	*1.9*
Barium	350 J

Site ID	61SB18
Sample ID	61SB18-01
Date	6/3/2008
Depth Range	1.0-3.0
Arsenic	*2.3*
Barium	380 J

Site ID	61SB17
Sample ID	61SB17-01
Date	6/3/2008
Depth Range	1.0-3.0
Arsenic	*1.8*

Site ID	61SB19
Sample ID	61SB19-01
Date	6/3/2008
Depth Range	1.0-3.0
Arsenic	*2.4*

Site ID	61SB13
Sample ID	61SB13-01
Date	6/4/2008
Depth Range	1.0-3.0
Arsenic	*2.4*

Site ID	61SB04
Sample ID	61SB04-01
Date	6/4/2008
Depth Range	1.0-3.0
Arsenic	*5.5*

Site ID	61SB12
Sample ID	61SB12-01
Date	6/3/2008
Depth Range	1.0-3.0
Arsenic	*2.2*
Barium	390

Site ID	61SB11
Sample ID	61SB11-01
Date	6/3/2008
Depth Range	1.0-3.0
Arsenic	*2.7*
Barium	490 J
Cobalt	36 J

Site ID	61SB08
Sample ID	61SB08-01
Date	6/2/2008
Depth Range	1.0-3.0
Arsenic	*2.3*

Site ID	61SB09
Sample ID	61SB09-01
Date	6/4/2008
Depth Range	1.0-3.0
Arsenic	*4.1*

Site ID	61SB01
Sample ID	61SB01-01
Date	6/2/2008
Depth Range	1.0-3.0
Arsenic	*2*

Site ID	61SB07
Sample ID	61SB07-01
Date	6/3/2008
Depth Range	1.0-3.0
Barium	770 J

NOTES/COWARDIN WETLAND CLASSIFICATION/QUALIFIERS:

1. PEM1B - PALUSTRINE, EMERGENT, PERSISTENT SATURATED
2. ft bgs - FEET BELOW GROUND SURFACE
3. mg/kg - MILIGRAMS PER KILOGRAM
4. NAPR - NAVAL ACTIVITY PUERTO RICO
5. J - ESTIMATED VALUE
6. **BOLD** - EXCEEDS REGIONAL SCREENING LEVEL FOR RESIDENTAL SOIL
7. *ITALICS* -EXCEEDS REGIONAL SCREENING LEVEL FOR INDUSTRIAL SOIL
8. SHADE - EXCEEDS ECOLOGICAL SOIL SCREENING CRITERIA

ALL VALUES SHOWN EXCEED THEIR RESPECTIVE NAPR BASEWIDE BACKGROUND SOIL SCREENING VALUE

INGANIC CONCENTRATIONS GIVEN IN mg/kg

SOURCE: GEO-MARINE, INC., SEPTEMBER 6, 2000.

80 0 40 80

1 inch = 80 ft.

Baker

LEGEND

- —WETLAND DELINEATION
- —1958 POLYGON FEATURE
- —PREVIOUS SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION, ECP 2004
- —CMS INVESTIGATION SURFACE AND SUBSURFACE SOIL SAMPLING LOCATIONS
- —CMS INVESTIGATION SURFACE AND SUBSURFACE SOIL AND GROUNDWATER SAMPLING LOCATIONS
- —SEDIMENT SAMPLE LOCATIONS
- —SWMU BOUNDARY

FIGURE 6
INORGANIC EXCEEDANCES OF SCREENING CRITERIA AND BACKGROUND IN SHALLOW (1 TO 3 ft bgs) SUBSURFACE SOIL
SWMU 61-FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO

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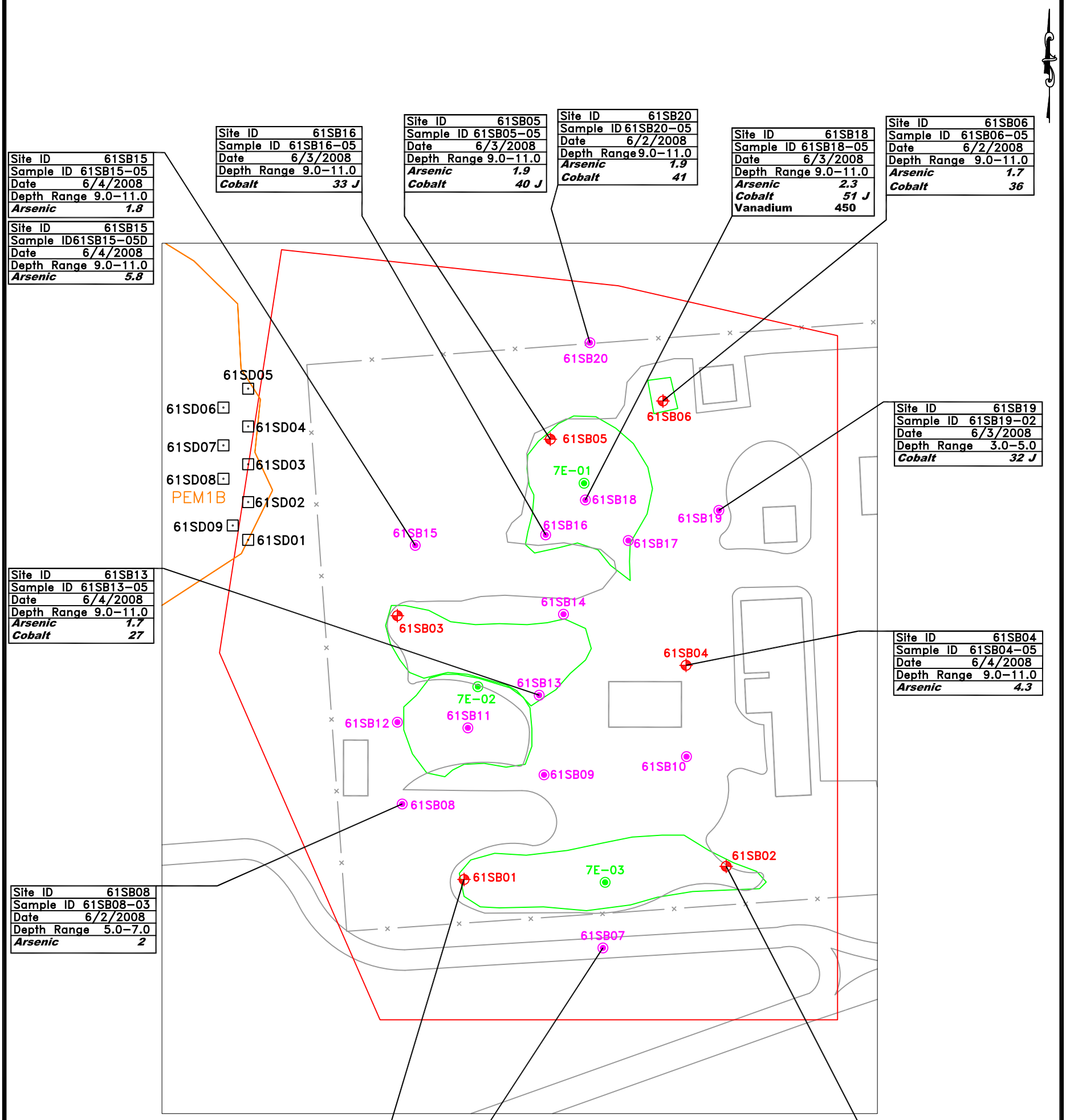

Site ID	61SB15
Sample ID	61SB15-05
Date	6/4/2008
Depth Range	9.0-11.0
Arsenic	*1.8*

Site ID	61SB15
Sample ID	61SB15-05D
Date	6/4/2008
Depth Range	9.0-11.0
Arsenic	*5.8*

Site ID	61SB16
Sample ID	61SB16-05
Date	6/3/2008
Depth Range	9.0-11.0
Cobalt	*33 J*

Site ID	61SB05
Sample ID	61SB05-05
Date	6/3/2008
Depth Range	9.0-11.0
Arsenic	*1.9*
Cobalt	*40 J*

Site ID	61SB20
Sample ID	61SB20-05
Date	6/2/2008
Depth Range	9.0-11.0
Arsenic	*1.9*
Cobalt	*41*

Site ID	61SB18
Sample ID	61SB18-05
Date	6/3/2008
Depth Range	9.0-11.0
Arsenic	*2.3*
Cobalt	*51 J*
Vanadium	450

Site ID	61SB06
Sample ID	61SB06-05
Date	6/2/2008
Depth Range	9.0-11.0
Arsenic	*1.7*
Cobalt	*36*

Site ID	61SB19
Sample ID	61SB19-02
Date	6/3/2008
Depth Range	3.0-5.0
Cobalt	*32 J*

Site ID	61SB13
Sample ID	61SB13-05
Date	6/4/2008
Depth Range	9.0-11.0
Arsenic	*1.7*
Cobalt	*27*

Site ID	61SB04
Sample ID	61SB04-05
Date	6/4/2008
Depth Range	9.0-11.0
Arsenic	*4.3*

Site ID	61SB08
Sample ID	61SB08-03
Date	6/2/2008
Depth Range	5.0-7.0
Arsenic	*2*

Site ID	61SB01
Sample ID	61SB01-02
Date	6/2/2008
Depth Range	3.0-5.0
Arsenic	*1.7*

Site ID	61SB07
Sample ID	61SB07-04D
Date	6/3/2008
Depth Range	7.0-9.0
Arsenic	*2.4*

Site ID	61SB02
Sample ID	61SB02-05
Date	6/3/2008
Depth Range	9.0-11.0
Arsenic	*2.1*

NOTES/COWARDIN WETLAND CLASSIFICATION/QUALIFIERS:

1. PEM1B - PALUSTRINE, EMERGENT, PERSISTENT SATURATED
2. ft bgs - FEET BELOW GROUND SURFACE
3. mg/kg - MILIGRAMS PER KILOGRAM
4. NAPR - NAVAL ACTIVITY PUERTO RICO
5. J - ESTIMATED VALUE
6. **BOLD** - EXCEEDS REGIONAL SCREENING LEVEL FOR RESIDENTAL SOIL
7. *ITALICS* -EXCEEDS REGIONAL SCREENING LEVEL FOR INDUSTRIAL SOIL
8. SHADE - EXCEEDS ECOLOGICAL SOIL SCREENING CRITERIA

ALL VALUES SHOWN EXCEED THEIR RESPECTIVE NAPR BASEWIDE BACKGROUND SOIL SCREENING VALUE

INGANIC CONCENTRATIONS GIVEN IN mg/kg

SOURCE: GEO-MARINE, INC., SEPTEMBER 6, 2000.

80 0 40 80

1 inch = 80 ft.

Baker

LEGEND

- -WETLAND DELINEATION
- -1958 POLYGON FEATURE
- -PREVIOUS SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION, ECP 2004
- -CMS INVESTIGATION SURFACE AND SUBSURFACE SOIL SAMPLING LOCATIONS
- -CMS INVESTIGATION SURFACE AND SUBSURFACE SOIL AND GROUNDWATER SAMPLING LOCATIONS
- -SEDIMENT SAMPLE LOCATIONS
- -SWMU BOUNDARY

FIGURE 7

INORGANIC EXCEEDANCES OF SCREENING CRITERIA AND BACKGROUND IN SUBSURFACE SOIL (>3 ft bgs)

SWMU 61-FORMER BUNDY AREA

MAINTENANCE FACILITIES

CORRECTIVE MEASURES STUDY INVESTIGATION

NAVAL ACTIVITY PUERTO RICO

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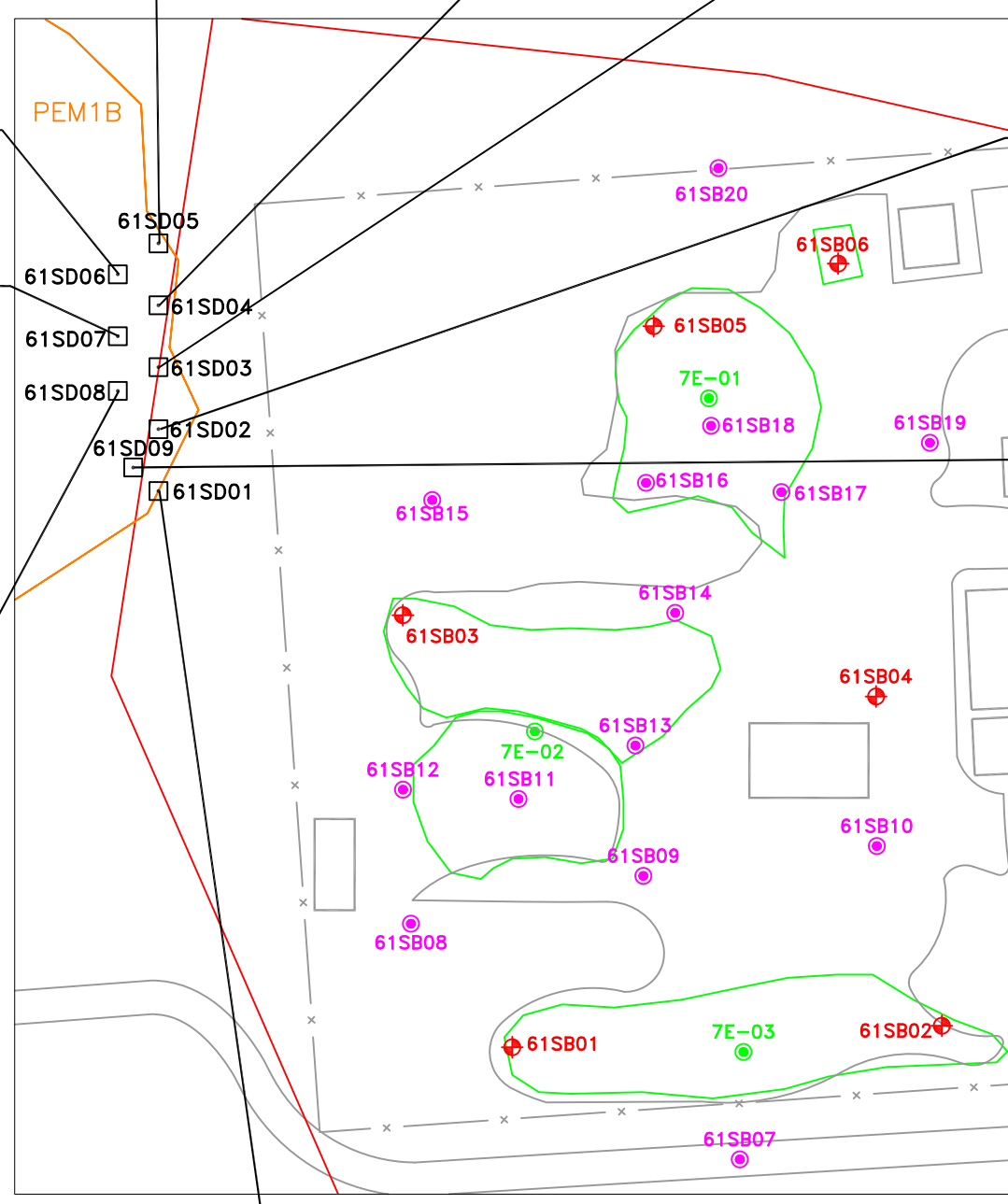

Site ID	61SD06
Sample ID	61SD06
Date	10/1/2008
DEPTH	0.0–0.25
Metals (mg/kg)	
Chromium	**52 J**
Copper	**190 J**
Lead	**120 J**

Site ID	61SD05
Sample ID	61SD05
Date	10/1/2008
DEPTH	0.0–0.25
Metals (mg/kg)	
Lead	**82 J**

Site ID	61SD04
Sample ID	61SD04
Date	10/1/2008
DEPTH	0.0–0.25
Metals (mg/kg)	
Chromium	**47 J**
Lead	**170 J**

Site ID	61SD03
Sample ID	61SD03
Date	10/1/2008
DEPTH	0.0–0.25
Metals (mg/kg)	
Chromium	**52 J**
Copper	**180 J**
Lead	**140 J**

Site ID	61SD02
Sample ID	61SD02
Date	10/1/2008
DEPTH	0.0–0.25
Metals (mg/kg)	
Barium	**400 J**
Chromium	**65 J**
Copper	**220 J**
Lead	**290 J**
Nickel	**27 J**

Site ID	61SD07
Sample ID	61SD07
Date	10/1/2008
DEPTH	0.0–0.25
Metals (mg/kg)	
Chromium	**48 J**
Copper	**210 J**
Lead	**110 J**

Site ID	61SD09
Sample ID	61SD09
Date	10/1/2008
DEPTH	0.0–0.25
Metals (mg/kg)	
Antimony	**6.1 J**
Cadmium	**1.6 J**
Copper	**220 J**
Lead	**94 J**
Mercury	**0.52 J**

Site ID	61SD09D
Sample ID	61SD09D
Date	10/1/2008
DEPTH	0.0–0.25
Metals (mg/kg)	
Antimony	**6.2 J**
Cadmium	**1.8 J**
Chromium	**46 J**
Copper	**240 J**
Lead	**100 J**
Mercury	**0.51 J**

Site ID	61SD08
Sample ID	61SD08
Date	10/1/2008
DEPTH	0.0–0.25
Metals (mg/kg)	
Antimony	**4.3 J**
Copper	**190 J**
Lead	**95 J**
Mercury	**0.26 J**

Site ID	61SD01
Sample ID	61SD01
Date	10/1/2008
DEPTH	0.0–0.25
Metals (mg/kg)	
Lead	**170 J**

Site ID	61SD01D
Sample ID	61SD01D
Date	10/1/2008
DEPTH	0.0–0.25
Metals (mg/kg)	
Chromium	**44 J**
Lead	**190 J**

NOTES/COWARDIN WETLAND CLASSIFICATION/QUALIFIERS:

1. PEM1B - PALUSTRINE, EMERGENT, PERSISTENT SATURATED
2. ft bgs - FEET BELOW GROUND SURFACE
3. mg/kg - MILIGRAMS PER KILOGRAM
4. NAPR - NAVAL ACTIVITY PUERTO RICO
5. J - ESTIMATED VALUE
6. **BOLD** -EXCEEDS FRESHWATER SEDIMENT SCREENING CRITERIAL

ALL VALUES SHOWN EXCEED THEIR RESPECTIVE MAXIMUM BACKGROUND FRESH WATER SEDIMENT CONCENTRATION
INGANIC CONCENTRATIONS GIVEN IN mg/kg

80 0 40 80
1 inch = 80 ft.

SOURCE: GEO–MARINE, INC., SEPTEMBER 6, 2000.

Baker

LEGEND

- –WETLAND DELINEATION
- –1958 POLYGON FEATURE
- –PREVIOUS SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION, ECP 2004
- –CMS INVESTIGATION SURFACE AND SUBSURFACE SOIL SAMPLING LOCATIONS
- –CMS INVESTIGATION SURFACE AND SUBSURFACE SOIL AND GROUNDWATER SAMPLING LOCATIONS
- –SEDIMENT SAMPLE LOCATIONS
- –SWMU BOUNDARY

FIGURE 8
INORGANIC EXCEEDANCES OF SCREENING CRITERIA AND MAXIMUM BACKGROUND CONCENTRATIONS IN SEDIMENT
SWMU 61–FORMER BUNDY AREA
MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION

NAVAL ACTIVITY PUERTO RICO

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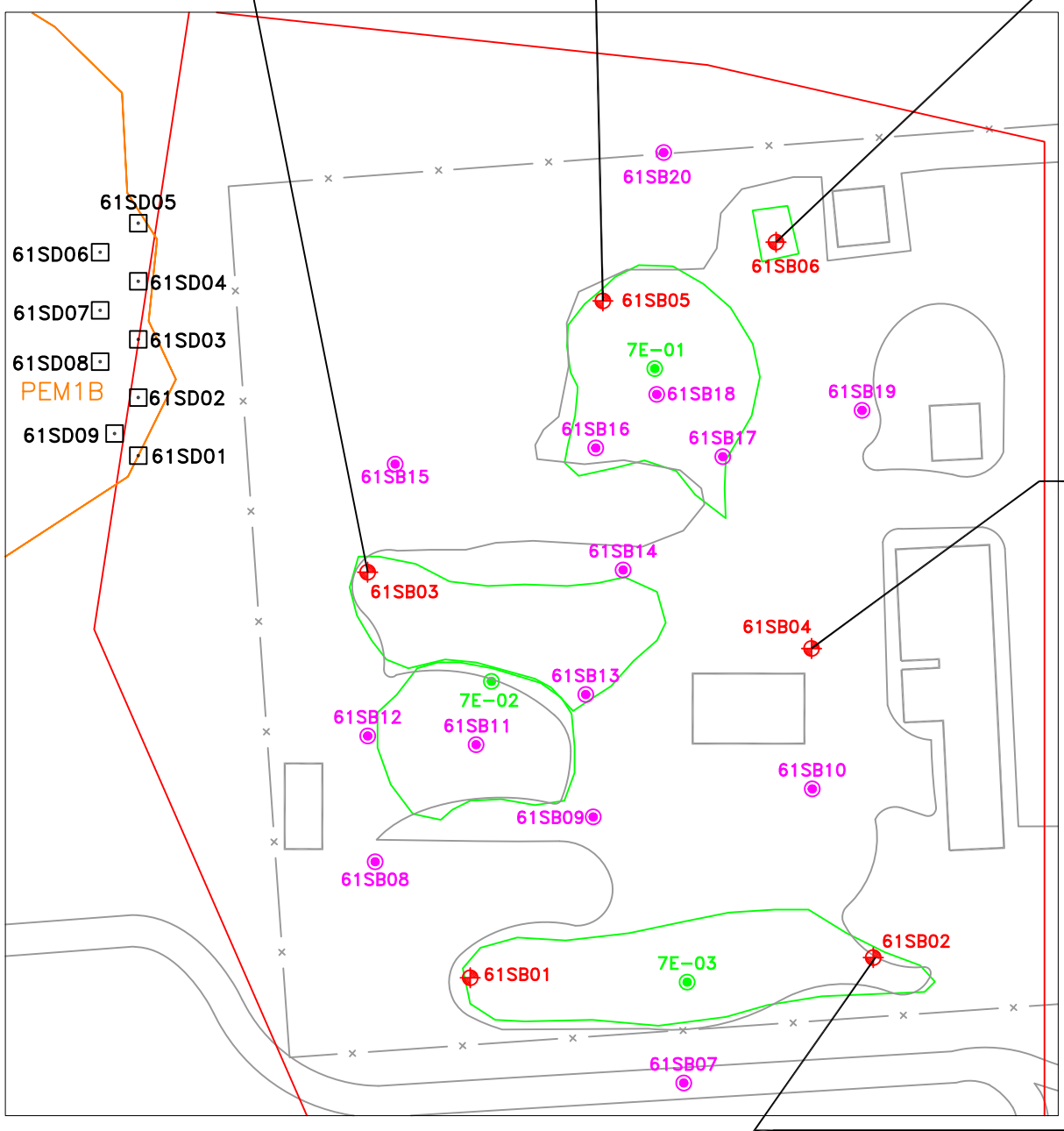
Site ID	61SB03
Sample ID	61GW03
Date	6/11/2008
VOCs (ug/L)	
Chloroform	**0.47 J**
Dissolved Metals (ug/L)	
Vanadium	**45**

Site ID	61SB03D
Sample ID	61GW03D
Date	6/10/2008
VOCs (ug/L)	
Chloroform	**0.43 J**
Dissolved Metals (ug/L)	
Vanadium	**44**

Site ID	61SB05
Sample ID	61GW05
Date	6/10/2008
VOCs (ug/L)	
Chloroform	**3.8**
Trichloroethene	**5.9**
Dissolved Metals (ug/L)	
Vanadium	***28***

Site ID	61SB06
Sample ID	61GW06
Date	6/10/2008
VOCs (ug/L)	
Chloroform	**6.9**
Tetrachloroethene	**2.8**
Trichloroethene	**4.3**
Dissolved Metals (ug/L)	
Vanadium	25



Site ID	61SB04
Sample ID	61GW04
Date	6/11/2008
VOCs (ug/L)	
Chloroform	**0.71 J**
SVOCs (ug/L)	
Bis(2-ethylhexyl) phthalate	0.39 J
Dissolved Metals (ug/L)	
Vanadium	**29**

Site ID	61SB02
Sample ID	61GW02
Date	6/11/2008
VOCs (ug/L)	
Chloroform	**0.58 J**
SVOCs (ug/L)	
Bis(2-ethylhexyl) phthalate	0.43 J
Dissolved Metals (ug/L)	
Vanadium	**53**

NOTES/COWARDIN WETLAND CLASSIFICATION/QUALIFIERS:
1. PEM1B - PALUSTRINE, EMERGENT, PERSISTENT SATURATED
2. ft bgs - FEET BELOW GROUND SURFACE
3. ug/L - MICROGRAMS PER LITER
4. NAPR - NAVAL ACTIVITY PUERTO RICO
5. J - ESTIMATED VALUE
6. **BOLD** - EXCEEDS REGIONAL SCREENING LEVEL FOR TAPWATER
7. *ITALICS* -EXCEEDS USEPA MCLs
8. SHADE - EXCEEDS ECOLOGICAL GROUNDWATER SCREENING VALUES

ALL VALUES SHOWN EXCEED THEIR RESPECTIVE NAPR BASEWIDE BACKGROUND GROUNDWATER SCREENING VALUE
INGANIC CONCENTRATIONS GIVEN IN ug/L

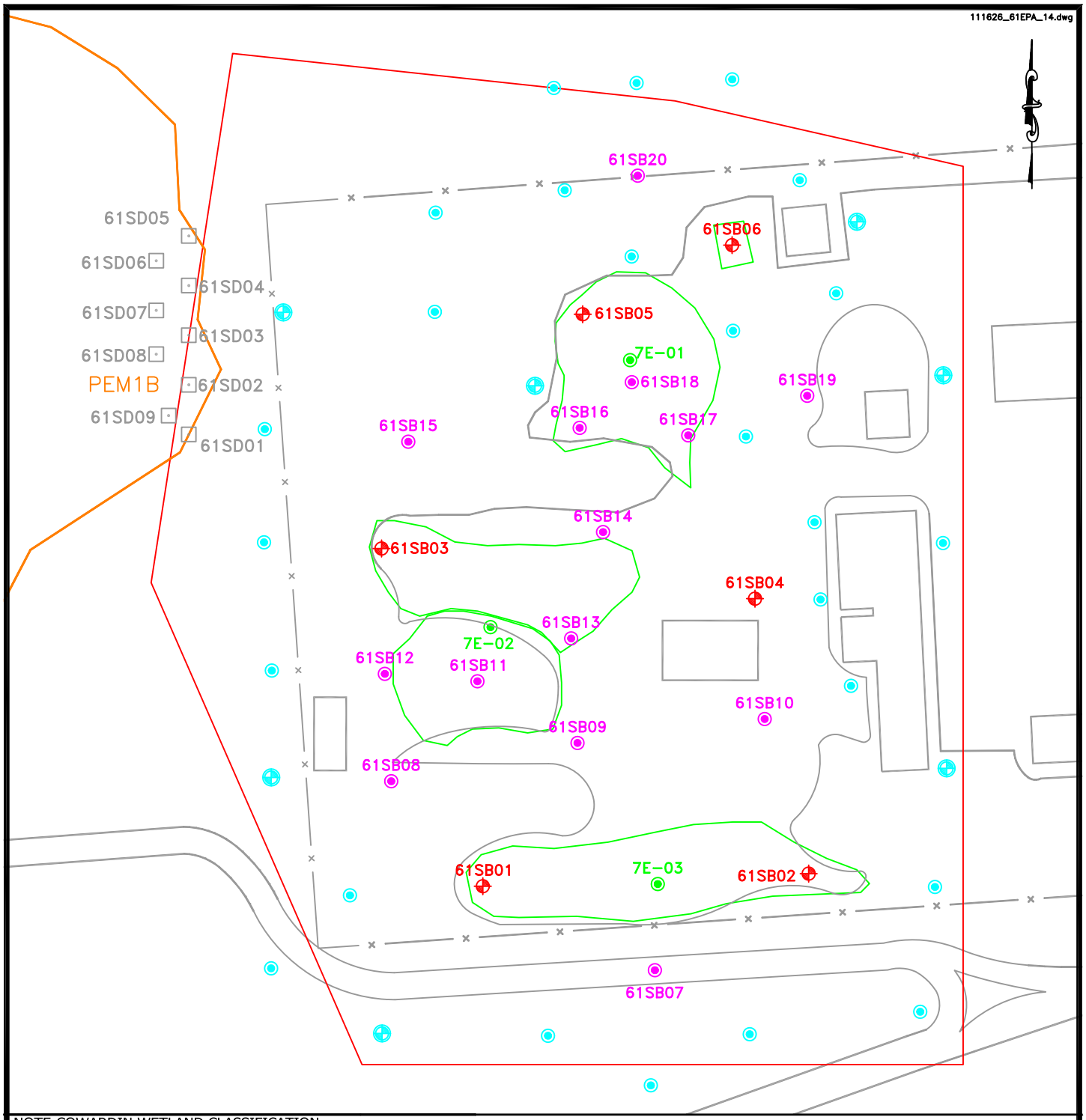
80 0 40 80
1 inch = 80 ft.

SOURCE: GEO-MARINE, INC., SEPTEMBER 6, 2000.

Baker

LEGEND
- WETLAND DELINEATION
- 1958 POLYGON FEATURE
- PREVIOUS SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION, ECP 2004
- CMS INVESTIGATION SURFACE AND SUBSURFACE SOIL SAMPLING LOCATIONS
- CMS INVESTIGATION SURFACE AND SUBSURFACE SOIL AND GROUNDWATER SAMPLING LOCATIONS
- SEDIMENT SAMPLE LOCATIONS
- SWMU BOUNDARY

FIGURE 9
ORGANIC EXCEEDANCES OF SCREENING CRITERIA AND INORGANIC EXCEEDANCES OF SCREENING CRITERIA AND BACKGROUND IN GROUNDWATER
SWMU 61-FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO



NOTE:COWARDIN WETLAND CLASSIFICATION

PEM1B-PALUSTRINE, EMERGENT, PERSISTENT SATURATED

80 0 40 80

1 inch = 80 ft.

SOURCE: GEO-MARINE, INC., HISTORIC 1958

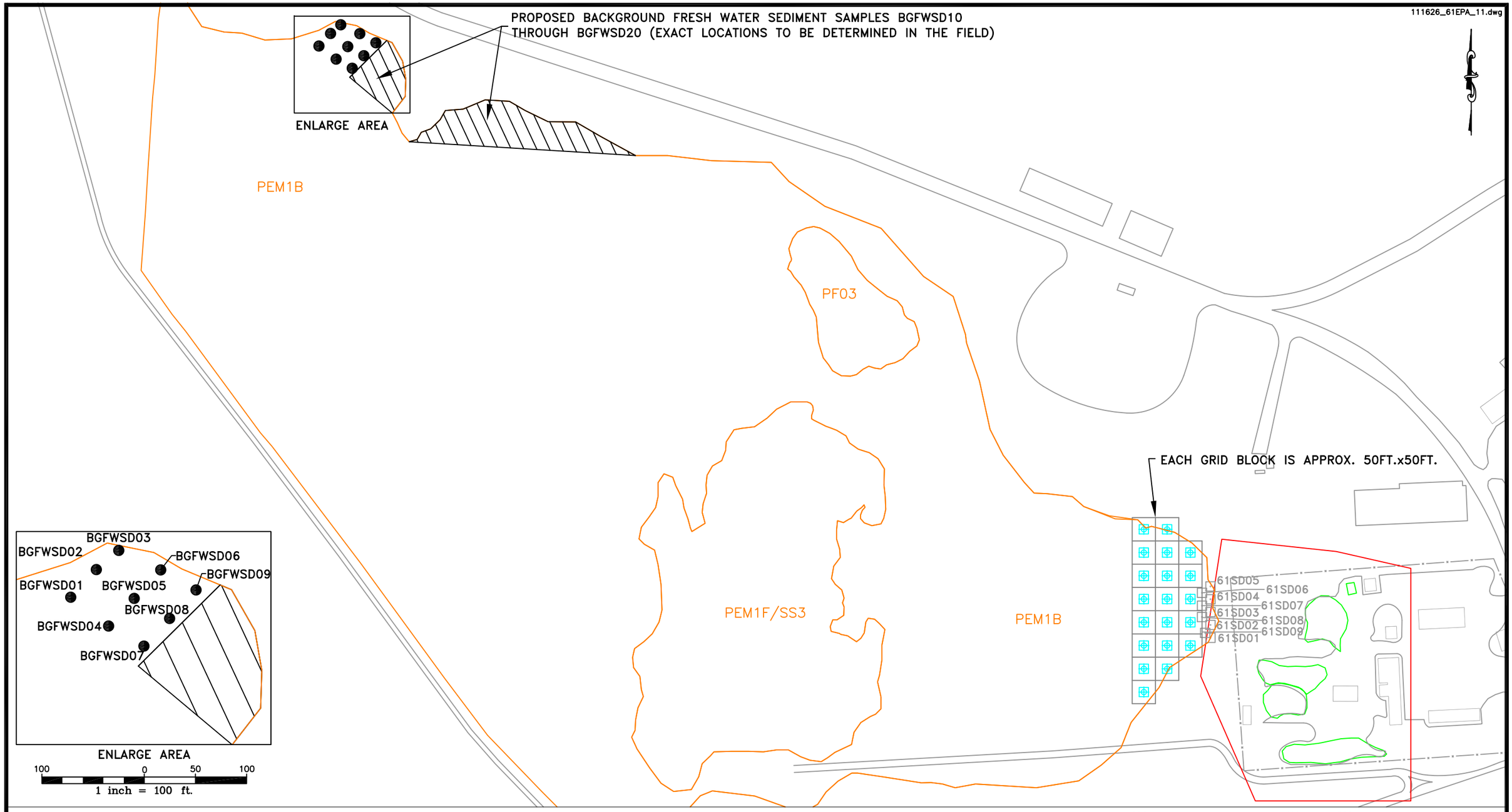
Baker

LEGEND

- -SWMU BOUNDARY
- -1958 POLYGON FEATURE
- -WETLAND DELINEATION
- -SEDIMENT SAMPLE LOCATIONS
- -PREVIOUS SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION, ECP 2004
- -CMS INVESTIGATION SURFACE AND SUBSURFACE SOIL SAMPLING LOCATIONS
- -CMS INVESTIGATION SURFACE AND SUBSURFACE SOIL AND GROUNDWATER SAMPLING LOCATIONS
- -PROPOSED SURFACE, SHALLOW SUBSURFACE, AND SUBSURFACE SOIL SAMPLING LOCATION
- -PROPOSED SURFACE, SHALLOW SUBSURFACE AND SUBSURFACE SOIL AND GROUNDWATER SAMPLING LOCATION

FIGURE 10
PROPOSED SOIL AND GROUNDWATER SAMPLE LOCATION MAP
SWMU 61-FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION

NAVAL ACTIVITY PUERTO RICO



NOTE:COWARDIN WETLAND CLASSIFICATION

PEM1B-PALUSTRINE, EMERGENT, PERSISTENT SATURATED

PFO3-PALUSTRINE, FORESTED, BROAD-LEAVED EVERGREEN

PEM1F/SS3-PALUSTRINE, EMERGENT, PERSISTENT SEMI-PERMANENT FLOODED/ SCRUB-SHRUB, BROAD-LEAVED EVERGREEN

LEGEND

- –WETLAND DELINEATION
- –1958 POLYGON FEATURE
- –SEDIMENT SAMPLE LOCATIONS
- –PROPOSED SEDIMENT SAMPLING LOCATION
- –PROPOSED BACKGROUND SEDIMENT SAMPLING LOCATION
- –BACKGROUND FRESH WATER SEDIMENT APPROXIMATE SAMPLE LOCATION
- –SWMU BOUNDARY

FIGURE 11
PROPOSED SEDIMENT SAMPLE LOCATION MAP
SWMU 61–FORMER BUNDY AREA MAINTENANCE FACILITIES
CORRECTIVE MEASURES STUDY INVESTIGATION
NAVAL ACTIVITY PUERTO RICO