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November 7, 2011

U.S. Environmental Protection Agency
Region 2
290 Broadway-22nd Floor
New York, NY 10007-1866
Attn: Mr. Timothy Gordon

Subject: Contract N62470-08-D-1000
Navy CLEAN 1000 Program
Contract Task Order JMO5
Resource Conservation and Recovery Act Facilities Assessment Data Evaluation, Solid Waste Management Unit 67 – Former Gas Station, Naval Activity Puerto Rico November 2011

Dear Mr. Gordon:

In accordance with the September 29, 2011 scoping session, enclosed please find the revised Resource Conservation and Recovery Act Facilities Assessment Data Evaluation, Solid Waste Management Unit 67—Former Gas Station, Naval Activity Puerto Rico, dated November 2011.

If you have any questions or comments, please feel free to contact me at brett.doerr@ch2m.com or by phone at 757-671-6219.

Sincerely,

CH2M HILL

Linda Jahnig, P.E. / for

Brett Doerr
Activity Manager

Enclosures

cc: (Hard copy and e-mail)

BRAC PMO SE (Mark Davidson)
USEPA (Dale Carpenter, Tim Gordon)
USEPA Caribbean Environmental Protection Division (Carl Soderberg)
US Fish & Wildlife Service (Mr. Felix Lopez)
PREQB (Wilmarie Rivera, Gloria Toro-Agrait)
NAVFAC Atlantic (2 hard copies)

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PMO SE (Dave Criswell, Debbie Sanders)
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Resource Conservation and Recovery Act Facilities Assessment Data Evaluation, Solid Waste Management Unit 67—Former Gas Station, Naval Activity Puerto Rico

PREPARED FOR: NAPR Project Team

PREPARED BY: CH2M HILL

DATE: November 7, 2011

Introduction

Although the Phase I Resource Conservation and Recovery Act Facility Investigation (Phase I RFI) Report for Solid Waste Management Unit 67 (SWMU 67) was finalized in June 2011 (Baker, 2011), the Navy felt an evaluation of the analytical data to help determine if additional samples as part of a full RFI are warranted based on the context of the conceptual site model (CSM). Therefore, the purpose of this technical memorandum is to present an evaluation of all relevant historical information and data for SWMU 67, including those collected during the Phase I RFI. The evaluation of historical data is performed in the context of the conceptual site model (CSM), which is developed at the outset of this memorandum. The data evaluation process utilized herein considers multiple lines of evidence and is a similar process approved by the US Environmental Protection Agency (EPA) and Puerto Rico Environmental Quality Board (PREQB) for use on environmental cleanup projects performed on Vieques.

It is important to note that with the exception of Figure 1, the figures presented herein are reproduced directly from existing documents contained in the Administrative Record File for Naval Activity Puerto Rico (NAPR) and were not renumbered or otherwise updated for the purpose of this technical memorandum; therefore, figure numbers in this technical memorandum do not follow sequential order. However, tables generated as part of this supplemental evaluation are numbered in sequential order beginning with Table 1 and proceeding through Table 21.

Conceptual Site Model

Location

SWMU 67 is located south of the airfield, at the intersection of Langley Drive and Munda Street (Figure 2-3 of Baker, 2011).

Description

SWMU 67 encompasses 2.5 acres. Surface features consist of a small parking area and tennis courts with a concrete pad and building foundation just north of the tennis courts. The building was reportedly used as gas station and the concrete pad may have been a service center for vehicle maintenance, although no evidence of a fuel storage tank has been discovered (LANTDIV, 2004) and the petroleum-related constituent data collected at the site do not support the past presence of fuel storage tanks. The remnant of a potential vehicle maintenance pit is located within the building foundation and extends to a depth of approximately 8 feet (ft) or more below ground surface (bgs). An 8 inch drainage pipe is located near the bottom of the north end of the pit; the drain pipe extends north and discharges in an earthen drainage feature.

Site Characteristics

The SWMU 67 area is described as part of the inland flat area (airfield and golf course area), as defined by regional stratigraphic trends observed during the Environmental Condition of Property (ECP) evaluation (LANTDIV, 2004).

The lithologic media at SWMU 67 comprises clay, sand and gravel fill, with thickness ranging from approximately 1.6 to 9 ft bgs, underlain by weathered bedrock (Baker, 2011). Groundwater is encountered approximately 7-13 ft bgs in weathered bedrock with the exception of 67GW02 on the eastern portion of the site where groundwater is situated within the fill (7 ft bgs). Groundwater flows gently eastward toward the forested wetlands. Runoff from Langley Drive, the tennis courts, and the small parking area is conveyed through a system of culverts and an earthen drainage feature (Figure 2-4 of Baker, 2011) toward the forested wetland area east of SMWU 67 (Baker, 2011).

Environmental History

Phase I ECP – March 2004

The Phase I ECP consisted of records search and aerial photographic analysis in which the area was identified as a gas station. However, the ECP indicated records were not available regarding details or location of fuel storage tanks (LANTDIV, 2004). Sampling was recommended to determine if an environmental release occurred. SWMU 67 was identified as Site 13 in the ECP.

Phase II ECP – May 2004

The Phase II ECP investigation consisted of soil and groundwater sampling (Baker, 2011). Subsurface soil samples were collected from three locations and two temporary groundwater monitoring wells were installed for groundwater sample collection (Figure 2-4 of Baker, 2011). Soil and groundwater samples were analyzed for Appendix IX volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), inorganics (dissolved for groundwater), and total petroleum hydrocarbons (TPH) diesel range organics (DRO)/ gasoline range organics (GRO).

In subsurface soil, three VOCs (tetrachloroethene, chlorobenzene, and acetone) and SVOCs (dibenzo(a,h)anthracene, indeno(1,2,3-CD)pyrene, and benzo(g,h,i)perylene) were detected at concentrations below the residential EPA Region III Risk Based Criteria (RBC). Twelve inorganics were also detected in subsurface soil with arsenic, chromium, and vanadium exceeding the RBCs for residential and/or industrial land use. The maximum TPH concentration in subsurface soil was 2.3 mg/kg, which is well below the Puerto Rico Environmental Quality Board (PREQB) underground storage tank (UST) program screening level of 100 milligrams per kilogram (mg/kg).

In groundwater, acetone and carbon disulfide were detected below residential and industrial RBCs. Low level TPH concentrations were detected in groundwater with the maximum total TPH value of 0.824 milligrams per liter (mg/l), which is below the PREQB standard of 50 mg/l for contaminated groundwater at UST sites. SVOCs were not detected in groundwater. Six inorganics were detected in groundwater samples collected from temporary wells. Vanadium and mercury exceeded the tap-water RBC with a maximum concentration of 0.067 mg/l of vanadium and 0.0012 mg/l of mercury. The report concluded the site was impacted by historical activities warranting additional evaluation (Baker, 2011).

RCRA Consent Order – 2007

The US Environmental Protection Agency (EPA) issued a Resource Conservation and Recovery Act (RCRA) Administrative Order on Consent (EPA Docket No. RCRA -02-2007-7301). The site was identified as SWMU 67 with documented releases of solid and/or hazardous waste requiring a Phase I RFI.

Phase I RFI –June 2011

Field activities consisted of the collection of 8 surface soil, 16 subsurface soil, 8 groundwater, and 5 sediment samples (Figure 4-1 of Baker, 2011). Sample locations were biased toward areas where potential releases may have occurred and where contaminants may have been transported via runoff and groundwater migration (Baker, 2011). A surface water sample was also collected based on the observation of the presence of standing water near a culvert outlet. Samples were analyzed for Appendix IX VOCs, SVOCs, herbicides, explosives, inorganics (total and dissolved for groundwater), TPH (DRO/GRO), and total organic carbon (sediment only).The Final Phase I

RFI report indicated the potential for an environmental release in surface soil, subsurface soil, groundwater and estuarine sediment with recommended analyses of these media for VOCs, SVOCs, TPH GRO, TPH DRO and inorganics. Additionally, a potential data gap associated with soil beneath the tennis courts was identified (Baker, 2011).

Phase I RFI Data Evaluation

The historical data for SWMU 67 was further evaluated using a modified version of the 7-step decision analysis process developed by the Vieques Environmental Restoration Program technical subcommittee (consisting of representatives from the US Navy, US EPA, PREQB, US Fish and Wildlife Service, and National Oceanographic and Atmospheric Administration) to evaluate sites similar to SWMU 67 and in a similar phase of investigation (CH2MHILL, 2010). The process was developed to determine whether a site-related release likely occurred and, if so, whether the suspected release warrants further evaluation. The first step of the 7-step decision analysis process, as developed by the Vieques Technical Subcommittee, is to determine whether the site is eligible under the assigned regulatory program–; since SWMU 67 is operating under a RCRA Consent Order, this determination is not necessary. Therefore, the Vieques decision process was modified to remove Step 1 (program eligibility determination), resulting in a 6-step decision analysis process for NAPR SWMU 67. The data evaluation process for SWMU 67 is presented on Figure 1 and the results of the decision analysis are presented below.

Step 1 - Does the data quality evaluation indicate the dataset as a whole is available and useful for the intended purpose?

- **Phase II ECP –** Three subsurface soil samples and two groundwater samples were collected during the 2004 ECP study (LANTDIV, 2004). Surface soil samples were not collected during this investigation effort. At the time of this 6-stepdata evaluation, ECP data were not available in native format and PDF files only included the detected concentrations. Although the data are discussed in Steps 2, 3, and 4 as part of the screening value consideration, the data were not presented as part of the calculated HHRA levels. However, the data were considered in the Step 6 human health evaluation and would not change the outcome of the assessment.
- **Phase I RFI –** The location and sampling methods to collect surface soil, subsurface soil, groundwater, and sediment are useful for their intended purpose to evaluate the potential release of hazardous substances as a result of historical gasoline and vehicle maintenance activities. As noted previously, sample locations were biased toward areas where potential releases may have occurred and where contaminants may have been transported via runoff and groundwater migration (Baker, 2011). The majority of the data are usable with only 4.5% of the total results “R” qualified as rejected. It is notable that the surface water sample was collected from an area with standing water near the culvert and does not represent a viable habitat for ecological receptors. This location is within the earthen drainage feature, which did not otherwise contain water during the investigation. Further, the location was dry at the time of the March 2011 site visit, which further supports that any surface water present is transient. Therefore, surface water was not evaluated further in this decision process. Further, the drainage ditch samples are more appropriately characterized as soils rather than sediments. Therefore, for the purposes of the 6-step decision process, the drainage ditch samples are screened as soils, not sediments.

Step 2 – Were any inorganics detected above the Naval Activity Puerto Rico (NAPR) background screening value (Baker, 2011) or were any non-inorganics detected?

Consistent with the Phase I RFI, analytical data for inorganics were compared to the upper limit of the mean background (mean plus 2 standard deviations referred to herein as the mean +2S), as presented in the Revised Final II Summary Report for Environmental Background Concentrations of Inorganic Compounds (Baker, 2010). The maximum background concentration was used when a mean +2S was not calculated for a specific analyte, as noted below. Additionally, the maximum background concentrations are considered in Step 5. The analytical data summary is presented in Tables 1 through 4.

- **Table 1 -** Surface Soil: 10 VOCs, 17 SVOCs and TPH-DRO were detected in surface soil. TPH is not typically a RCRA constituent, is not strictly risk based, and SVOC and VOC data are available for media collected at SWMU 67. Therefore, TPH is not considered quantitatively in the 6-step decision process. Eight inorganics were detected above the NAPR surface soil mean+2S background value. Of the eight, silver was not detected in background surface soil samples and is present in surface soil from SWMU 67 at a maximum estimated concentration of 0.082 mg/kg. Thallium was detected in one background surface soil sample (at a concentration of 0.1 mg/kg); therefore, a statistical background value was not established for thallium. However, the detection of thallium in surface soil from SWMU 67 above the detected concentration in background surface soil (estimated at 0.3 mg/kg) has been considered an exceedance of background for the purpose of the decision process.

- **Table 2 -** Subsurface Soil: 11 VOCs, 16 SVOCs, and TPH were detected in ECP and RFI subsurface soil samples. Thirteen inorganics were detected in the ECP and RFI samples above the NAPR subsurface soil-clay mean+ 2S background value. Silver was detected in one background subsurface soil sample (at a concentration of 0.16 mg/kg); therefore, a mean+2S background value was not established for silver. However, the detection of silver in subsurface soil from SWMU 67 above the detected concentration in background subsurface soil-clay (0.69 mg/kg) has been considered an exceedance of background for the purpose of the decision process. **Table 3 –** Sediment (considered as soil in this 6-step decision process): 7 VOCs, 10 SVOCs, and TPH were detected in sediment. Five inorganics were detected above the NAPR surface soil mean+2S background value. Silver was not detected in background surface soil samples and is present in sediment from SWMU 67 at a maximum estimated concentration of 0.15 mg/kg. Thallium was detected in one background surface soil sample (at a concentration of 0.1 mg/kg); therefore, a mean +2S background value was not established for thallium. However, the detection of thallium in sediment from SWMU 67 above the detected concentration in background surface soil (estimated at 0.18 mg/kg) has been considered an exceedance of background for the purpose of the decision process.

- **Table 4 –** Groundwater: 5 VOCs and 12 SVOCs were detected in site groundwater collected during the RFI. Acetone and carbon disulfide were also detected in groundwater during the ECP. Although TPH was detected at a concentration of 0.824 mg/l (the PREQB UST program screening level is 50 mg/l) during the ECP, additional groundwater samples collected during the RFI did not indicate the presence of TPH at detectable concentrations. Three (one total and three dissolved) inorganics were detected in the RFI samples above the NAPR groundwater mean+ 2S background value. Thallium was not detected in background groundwater samples and is present in groundwater from SWMU 67 at a maximum estimated concentration of 0.61 µg/l (dissolved).

Step 3 – Are there any inorganic constituents above background or non-inorganic constituents that are potentially attributable to a historic RCRA release from SWMU 67?

Based on the reported historic use of the site as a gas station and vehicle maintenance facility, the presence of VOCs, SVOCs, and inorganics in the vicinity of the former building and concrete pad may be attributable to historic RCRA-related releases. However the following considerations are noteworthy:

- TPH is not generally considered a RCRA constituent; however, its distribution and concentrations can be used to assess the likelihood of the use of the area as a gas station, For example, if TPH was detected in significant concentrations, the location of former USTs (and use of the area as a gas station) may be suggested. At SWMU 67, TPH slightly exceeded the PREQB UST program screening value of 100 mg /kg in soil at one location (67SB05) with a concentration of 110 mg /kg. However, the exceedance occurred in surface soil and TPH did not exceed the PREQB UST program screening value in subsurface soil, sediment, or groundwater. In fact, no TPH was detected in groundwater during the RFI. LNAPL was not observed during well installation or groundwater sample collection efforts. Additionally, PAHs (which are typically the most toxic fraction of the TPH) were not detected at concentrations that indicate a release occurred above EPA threshold, as discussed in further detail in the following sections. All of this information, in conjunction with the lack of evidence that a UST was used at the site, suggests a release associated with a UST did not occur. In fact, the low levels of

petroleum constituents detected in site media are likely representative of normal vehicular traffic in and around the site.

- Soil boring/monitoring well SB08/67GW08 is west of Langley Drive and upgradient of SWMU 67, so the detected concentrations of VOCs, SVOCs, and inorganics at above background at this location are not attributable to releases associated with the SMWU and are, in fact, more representative of local background. Therefore, the presence of VOCs, SVOCs, and inorganics in samples east of Langley Drive around the tennis courts and in the vicinity of the concrete pad (i.e., at SWMU 67) at similar concentrations to those detected from SB08/67GW08 may represent localized background conditions for the inland flat area.
- Although considered further in the decision process, the site-wide arsenic concentrations may not be attributable to a release. A 2003 Agency for Toxic Substances and Disease Registry (ATSDR) study indicated the presence of naturally occurring arsenic up to 22 mg/kg on the island of Puerto Rico (ATSDR, 2003). Another study at NAPR has indicated arsenic may be attributable to background at detected concentrations up to 4.3 mg/kg (Agviq/CH2MHILL, March 2011). Only one surface soil sample exceeded 4.3 mg/kg at SWMU 67 (5.0 mg/kg). This information suggests that arsenic concentrations in soil at SWMU 67 are wholly or primarily attributable to background.
- Although several inorganics were detected above the NAPR background values, the relatively few and minor concentrations exceeding background complimented by the general absence or low levels of organic concentrations indicate the potential releases from site activities were minimal, especially considering the sampling was biased to the most likely locations of releases and associated contaminant transport pathways.

Step 4 – Are there any exceedances (over that of background) of the most conservative screening values?

In this step of the decision analysis, non-inorganic constituents and inorganic constituents above the background values in soil and sediment were compared to the adjusted USEPA residential and industrial soil regional screening levels (RSLs) and residential soil to groundwater soil screening levels (SSLs) at a DAF of 1 (meaning there is no dilution attenuation and the concentration at the receptor point is the same as that in the soil leachate). Groundwater non-inorganics and inorganics detected above the background screening values were compared to the Federal Maximum Contaminant Levels (MCLs) and the USEPA adjusted Tap-Water RSLs. Surface soil and sediment samples were also screened against ecological soil screening values, as discussed in Step 5 and referenced below. Those constituents that exceed one or more criteria (and background for inorganics) are listed below by medium. Tables 1 through 4 present the RFI exceedances of screening criteria for surface soil, subsurface soil, sediment, and groundwater, respectively.

Surface Soil (Table 1):

- VOCs: No VOCs were detected in surface soil above the adjusted USEPA industrial and residential RSLs or SSLs at DAF 1.
- SVOCs: No SVOCs were detected above the adjusted USEPA industrial and residential RSLs. One SVOC, benzo(a)anthracene, is present at a concentration (11 µg/kg) slightly above the SSL (10 µg/kg) at SS01.
- Inorganics: Arsenic is present above the residential and industrial RSL in surface soil from within and adjacent to the earthen drainage swale. Arsenic, barium, copper, lead, selenium, thallium, and vanadium are present above the SSL of DAF 1. The maximum concentration of arsenic is 5 mg/kg. As noted above, arsenic is likely associated with background. Barium was detected in one sample at 203 mg/kg which is slightly above the mean+2S background concentration of 199 m/kg but is below the maximum background concentration of 220 mg/kg. Although selenium was detected above the SSL at DAF 1, the maximum concentration is 1.6 mg/kg which is just over the mean+2S background value of 1.48 mg/kg. Vanadium exceeds the residential RSL in surface soil at SB08; however, this location is west of Langley Drive and not representative of site conditions. Copper, lead, selenium, and vanadium exceeded soil screening values for lower trophic level soil organisms (Table 7).

Subsurface Soil (Table 2):

- VOCs: No VOCs were detected above the USEPA adjusted industrial and residential RSLs or SSLs at DAF 1.
- SVOCs: No SVOCs were detected above the USEPA adjusted industrial and residential RSLs or SSLs at DAF 1.
- Inorganics: Arsenic, chromium, cobalt, copper, nickel, and vanadium are present above the residential RSLs. These inorganics, with the exception of copper and nickel, also exceed the industrial RSLs. Twelve inorganics also exceed the SSLs at DAF 1. Although the inorganics exceeding the regulatory screening values were detected sporadically across the site with cobalt being the most common, the maximum concentrations of inorganics exceeding these criteria generally were localized to a single subsurface soil sample collected from 5-7 ft bgs at 67SB01, which is just north of the concrete pad.

Sediment (Table 3)

- VOCs: No VOCs were detected above the adjusted residential and industrial RSLs or SSLs at DAF 1.
- SVOCs: Benzo(a)pyrene and dibenz(a,h) anthracene are present at 67SD05 above the adjusted residential RSLs, but below the adjusted industrial RSLs. Benzo(a)anthracene, benzo(b)fluoranthene, and dibenz(a,h)anthracene exceeded the SSLs at DAF 1.
- Inorganics: Vanadium is present in sediment at three of the five sediment sampling locations above the residential RSL, but concentrations are below the industrial RSL. Lead, selenium, and vanadium exceeded soil screening values for lower trophic level soil organisms (Table-9).

Groundwater (Table 4):

- VOCs: No VOCs were detected above the USEPA adjusted tap-water RSLs or federal drinking water maximum contaminant levels (MCLs).
- SVOCs: One SVOC, naphthalene, was detected in groundwater from one monitoring well at 1 µg/l, which is above the adjusted residential RSL of 0.14 µg/l (no federal MCL available).
- Inorganics: Dissolved vanadium was detected in groundwater above the mean+2S background and also exceeded the USEPA adjusted tap-water RSL (no federal MCL available). However, concentrations are below the maximum basewide background value.

Step 5 – Can more realistic evaluations of the data be performed, and if so, do they suggest contaminant levels warrant no further investigation or action?

Human Health Evaluation

As a conservative approach, risk estimates were prepared for future residential (i.e., unrestricted) scenario as well as the industrial scenario at SWMU 67. All soil, groundwater, and sediment data collected as part of the Phase I RFI were included in this evaluation. The sediment samples are not covered with water year-round and are available for contact by humans. Therefore, the sediment samples were treated as surface soil samples in the human health risk screening evaluation.

- Soil – Residential Evaluation

  Chromium and cobalt in soil were detected above mean+2S background and adjusted RSLs at concentrations exceeding 100 times the screening levels (see Table 5). However, due to the small site size (2.5 acres), the lack of preferential exposure areas onsite, and the aerial extent of exceedances at various locations across the site, no hot spots were identified and all soil data were merged in the residential evaluation.

  Six inorganics (arsenic, chromium, cobalt, copper, nickel, and vanadium) and two PAHs were detected in surface soil (0-2 ft) or total soil (0-6 ft) above both human health screening levels for residential land use and background levels (inorganics only; see Table 5). An iterative approach was used where if the maximum detected concentration caused an exceedance of EPA's acceptable risk levels, EPA's ProUCL software was

used to calculate the 95 percent upper confidence limit (95% UCL) on the mean concentration if more than 8 analytical results were available for the chemical.

- Arsenic was detected in 12 of 15 surface soil samples and 20 of 26 total soil samples above its RSL (0.39 mg/kg). Based on the 95% UCL concentration (1.9 mg/kg) in surface soil, the ELCR is 5×10^{-6} and the non-cancer HQ is 0.1, which are within EPA's acceptable levels and arsenic would not be identified as a risk driver. Further, as noted previously, arsenic concentrations at the site are likely attributable to background.

- Chromium was detected in all 15 surface soil samples and all 26 total soil samples above its RSL (0.29 mg/kg based on Cr^{6+}). Based on the maximum detected concentration (233 mg/kg) and the expected form of chromium (Cr^{3+}) at the site, the non-cancer HQ is 0.002, which is within EPA's acceptable level and chromium would not be identified as a risk driver. In addition, with the exception of one subsurface soil sample, chromium concentrations are at or below background levels.

- Cobalt was detected in all 15 surface soil samples and all 26 total soil samples above its adjusted RSL (2.3 mg/kg). Based on the 95% UCL concentration (128 mg/kg) in total soil, the ELCR is 4×10^{-7} and the non-cancer HQ is 6, which exceed EPA's target HQ and cobalt would be identified as a risk driver. However, cobalt from manmade sources is primarily from burning of coal or oil, or production of cobalt alloys, neither of which likely occurred at the site. Therefore, its presence is not likely related to a release.

- Copper was not detected above the adjusted RSL in surface soil and was detected in only 1 of 26 total soil samples above its adjusted RSL (310 mg/kg). Based on the maximum detected concentration (681 mg/kg), the non-cancer HQ is 0.2, which is within EPA's acceptable level and copper would not be identified as a risk driver.

- Nickel was detected in no surface soil samples and 1 of 26 total soil samples above its adjusted RSL (150 mg/kg). Based on the maximum detected concentration (310 mg/kg), the ELCR is 2×10^{-8} and the non-cancer HQ is 0.2, which are within EPA's acceptable levels and nickel would not be identified as a risk driver.

- Vanadium was detected in all 15 surface soil samples and all 26 total soil samples above its adjusted RSL (39 mg/kg). Based on the 95% UCL concentration (480 mg/kg) in total soil, the non-cancer HQ is 1.2, which is just above EPA's acceptable level and vanadium would be identified as a risk driver. However, vanadium from manmade sources is primarily from burning fuel oils which likely did not occur at the site. Therefore, its presence is not likely related to a release.

- Benzo(a)pyrene (B(a)P) was detected in 1 of 15 surface soil and 1 of 26 total soil samples above its residential RSL (15 ug/kg). Based on the 95% UCL concentration (18 ug/kg), the ELCR is 1×10^{-6}, which is within EPA's acceptable range, and B(a)P would not be identified as a risk driver.

- Dibenz(a,h)anthracene (D(a,h)A) was detected in 1 of 15 surface soil and 1 of 26 total soil samples above its residential RSL (15 ug/kg). Based on the 95% UCL concentration (4.5 ug/kg), the ELCR is 3×10^{-7}, which is within EPA's acceptable range, and D(a,h)A would not be identified as a risk driver.

  Based on maximum detected concentrations of chromium, copper, and nickel, and 95% UCLs of arsenic, cobalt, vanadium, B(a)P, and D(a,h)A, the cumulative ELCR is 7×10^{-6} and the maximum target organ-specific HI is 6 (see Table 5); the cumulative ELCR is within EPA's acceptable range, while the target organ-specific HI is above EPA's acceptable level. Consequently, there is a concern for potential effects from cobalt and vanadium in soil at SWMU 67 for a residential land use scenario. However, as noted above, the manmade sources and uses of cobalt and vanadium make their presence at SWMU 67 likely unrelated to a release.

- Soil – Industrial Evaluation

  No chemicals in soil were detected above background and adjusted RSLs at concentrations exceeding 100 times the screening levels (see Table 6). Therefore, no hot spots were identified and all soil data were merged in the industrial evaluation.

  Four inorganics (arsenic, chromium, cobalt, and vanadium) were detected in surface soil (0-2 ft) or total soil (0-6 ft) above both human health screening levels for industrial land use and background levels (see Table 6). An iterative approach was used where if the maximum detected concentration caused an exceedance of EPA's acceptable risk levels, EPA's ProUCL software was used to calculate the 95% UCL on the mean concentration if more than 8 analytical results were available for the chemical.

  - Arsenic was detected in 2 of 15 surface soil samples and 3 of 26 total soil samples above its RSL (1.6 mg/kg). Based on the 95% UCL concentration (1.9 mg/kg) in surface soil, the ELCR is 1×10^{-6} and the non-cancer HQ is 0.007, which are within EPA's acceptable levels and arsenic would not be identified as a risk driver. Further, as noted previously, arsenic concentrations at the site are likely attributable to background.

  - Chromium was detected in all 15 surface soil samples and all 26 total soil samples above its RSL (5.6 mg/kg based on Cr^{6+}). Based on the maximum detected concentration (233 mg/kg) and the expected form of chromium (Cr^{3+}) at the site, the non-cancer HQ is 0.0002, which is within EPA's acceptable level and chromium would not be identified as a risk driver. In addition, as noted previously, with the exception of one subsurface soil sample, chromium concentrations are at or below background levels.

  - Cobalt was detected in 5 of 15 surface soil samples and 11 of 26 total soil samples above its adjusted RSL (30 mg/kg). Based on the 95% UCL concentration (128 mg/kg) in total soil, the ELCR is 7×10^{-8} and the non-cancer HQ is 0.4, which are within EPA's acceptable levels and cobalt would not be identified as a risk driver. Further, at noted previously, cobalt's presence is not likely related to a release.

  - Vanadium was detected in no surface soil samples and 1 of 26 total soil samples above its adjusted RSL (520 mg/kg). Based on the maximum detected concentration (1480 mg/kg) in total soil, the non-cancer HQ is 0.3, which is within EPA's acceptable level and vanadium would not be identified as a risk driver. Further, at noted previously, vanadium's presence is not likely related to a release.

    Based on maximum detected concentrations of chromium and vanadium, and 95% UCL concentrations of arsenic and cobalt, the cumulative ELCR is 1×10^{-6} and the maximum target organ-specific HI is 0.4 (see Table 6), which are within EPA's acceptable levels. Consequently, there is not a concern for potential cumulative effects from chemicals in soil at SWMU 67 for an industrial land use scenario.

- Groundwater

  No chemicals in groundwater were detected above both background (for inorganics) and adjusted RSLs at concentrations exceeding 100 times the screening levels (see Tables 5 and 6). Therefore no hot spots were identified and all groundwater data were merged in the evaluation of potable use of groundwater.

  Naphthalene was the only organic constituent detected in groundwater above its human health screening level (0.14 µg/l; see Tables 5 and 6). Based on the single detected concentration (1 µg/l), the ELCR is 7×10^{-6} and the non-cancer HQ is 0.2, which are within EPA's acceptable levels and naphthalene would not be identified as a risk driver.

  Five inorganics (arsenic, chromium, cobalt, selenium, and vanadium) were detected in groundwater above adjusted human health screening levels but below background levels. Based on maximum detected concentrations of naphthalene and the five inorganics (the higher of the "total" and "dissolved" results was used for each inorganic), the cumulative ELCR is 2×10^{-4} and the maximum target organ-specific HI is 3 (see Tables 5 and 6), which exceed EPA's acceptable levels. Consequently, there is a concern for potential cumulative effects from multiple inorganics in groundwater at SWMU 67 if the groundwater is used as a

potable source. However, the inorganics are attributable to background levels; therefore, the potable use concern is not site-related.

- Cumulative Soil and Groundwater

  Potential cumulative risks from residential and industrial exposure to soil/sediment and potable use of groundwater were evaluated. As indicated on Tables 5 and 6, the cumulative ELCR is 2×10^{-4} for both residential and industrial land use and the maximum target organ-specific HI is 9 (residential) and 4 (industrial) due to cobalt in soil (residential land use) and cobalt in groundwater (potable use). Therefore, there is a concern for cumulative effects from soil and potable groundwater use under a hypothetical residential scenario. However, potential soil exposures associated with industrial use of the property are within EPA's acceptable levels and, as discussed in the previous bullet, contaminant levels contributing to potable use concern are not site-related and potable use is not applicable.

Ecological Evaluation

The primary complete ecological exposure pathways at SWMU 67 are to surface soils on the site and in the drainage ditch. Thus, only soil data within the 0 to 1 foot interval from the site are screened for direct exposures (of all detected chemicals) to soil organisms (plants and soil invertebrates). The hydrology of the drainage ditch is irregular and the presence of standing or flowing water is highly transitory. Thus, the drainage ditch samples are more similar to soils than to sediments, even though most of this area is within the wetland boundary, and these samples are screened as soils, not sediments. Also, the one water sample collected near the culvert was not screened since this area is too small and the water too transitory to provide habitat for aquatic receptors.

Based upon site size and habitat characteristics, exposure of bioaccumulative chemicals in surface soils to upper trophic level receptors (birds and mammals) was also considered. Evaluation of the surface soil samples (0 to 1 foot) from the site was conducted in two steps. In the first step, maximum surface soil concentrations were compared to bird and mammal Eco-SSLs. Chemicals that exceeded either the bird or mammal Eco-SSL (or if the bioaccumulative chemicals did not have a bird or mammal Eco-SSL) were modeled for site-specific food web exposures to the Norway rat, Indian mongoose, pearly-eyed thrasher, common ground dove, and red-tailed hawk, in accordance with the ERA Protocol developed for the Navy's Vieques facility (CH2M HILL, April 2010). Food web model calculations and the resulting hazard quotients (HQs) based upon 95% UCL and mean surface soil concentrations are presented.

- Copper, mercury, lead, selenium, and vanadium exceeded soil screening values for lower trophic level soil organisms (plants and soil invertebrates) in site and/or ditch surface soils (Tables 7 through 10). Soil screening values were not available for four detected VOCs and TPH-DRO. None of these constituents poses an unacceptable risk to plants and soil invertebrates based upon the following:
  - The non-developed portion of SWMU 67 and adjacent area is heavily vegetated, with no signs of stressed vegetation.
  - Copper exceeded both the ecological screening value for soil organisms and background in just 1 of 10 site surface soil samples, at a maximum ratio to background of 1.65 (Table 8). The mean ratio to the mean+2S background was less than 1. This information suggests that exposures to copper in surface soil on the site are not significant ecologically relative to background.
  - Mercury exceeded both the ecological screening value for soil organisms (maximum HQ of 1.70) and mean +2S background (maximum ratio of 1.56) in just 1 of 10 site surface soil samples (Table 8). However, the one exceedance was in sample 67SB08-00, which is located off of the site on the other side of Langley Drive in a maintained grass area. In addition, the mean mercury concentration was less than the ecological screening value for soil organisms and the background value. This information suggests that exposures to mercury in surface soil on the site are not significant ecologically.

- Lead exceeded the ecological screening value for soil organisms (maximum HQ of 1.12) in 1 of 5 drainage ditch samples, although the field duplicate of the exceeding sample was less than the screening value (Table 9). The mean lead concentration was less than the ecological screening value for soil organisms. This information suggests that exposures to lead in drainage ditch soils are not significant ecologically.

- Selenium exceeded both the ecological screening value for soil organisms (maximum HQ of 4.23) and mean +2S background (maximum ratio of 1.49) in 2 of 10 surface soil samples (Table 8). The soil organism screening value, however, is based upon potential impacts to plants. As noted previously, the non-developed portion of the site is heavily vegetated and there is no sign of stress to plants. The maximum surface soil concentration is less than soil screening values based upon other receptors (e.g., 4.10 mg/kg for soil invertebrates). In addition, the maximum surface soil concentration was in sample 67SB08-00, which is located off of the site on the other side of Langley Drive in a maintained grass area. This information suggests that exposures to selenium in surface soil on the site are not significant ecologically.

  Selenium also exceeded both the ecological screening value for soil organisms (maximum HQ of 3.08) and mean +2S background (maximum ratio of 1.08) in 3 of 5 drainage ditch samples (Table 9). The relative uniformity of the concentrations (the mean background ratio was 1.00) does not suggest that a release has occurred, rather that these concentrations are attributable to background. Also, the soil organism screening value is based upon potential impacts to plants. However, the area surround the ditch is heavily vegetated and there is no sign of stress to plants. The maximum ditch soil concentration is less than soil screening values based upon other receptors (e.g., 4.10 mg/kg for soil invertebrates). This information suggests that exposures to selenium in drainage ditch soils are not significant ecologically.

- Vanadium exceeded both the ecological screening value for soil organisms and mean +2S background in just 1 of 10 surface soil samples (Table 8). The maximum ratio to background was only 1.24 and the mean ratio was less than 1. However, the one exceedance was in sample 67SB08-00, which is located off of the site on the other side of Langley Drive in a maintained grass area. This information suggests that exposures to vanadium in surface soil on the site are not significant ecologically relative to background.

- Vanadium exceeded both the ecological screening value for soil organisms and mean +2S background in 2 of 5 drainage ditch samples (Table 9). The maximum ratio to background was 1.43 and the mean ratio was less than 1. The relative uniformity of the ditch concentrations and the surface soil data from the site do not suggest that a release has occurred, rather that the ditch concentrations are attributable to background. This information suggests that exposures to vanadium in drainage ditch soils are not significant ecologically relative to background.

- Four VOCs (2-butanone, acetone, carbon disulfide, and iodomethane) were detected in surface soil and ditch samples but could not be evaluated quantitatively because soil screening values were not available. However, the maximum concentrations of these VOCs were less than soil screening values for other, similar VOCs.
- There are no available soil screening values for TPH. However, PAHs (which are typically the most toxic fraction of the TPH) did not exceed screening values in surface soil or ditch samples.

Antimony, cadmium, chromium, copper, lead, selenium, vanadium, and zinc exceeded soil screening values (Eco-SSLs) protective of upper trophic level organisms (Table 11) and were retained for site-specific food web modeling using the five bird and mammal receptors listed at the beginning of this section and 95% UCL and mean surface soil concentrations. Calculations and HQs are shown in Tables 12 through 21). Based upon a comparison to NOAELs, the 95% UCL exposure dose for lead resulted in a HQ above 1 for the dove, and both the 95% UCL and mean exposures doses for vanadium resulted in a HQ above 1 for the dove and thrasher. The HQ for lead was less than 1 based upon the MATC for both the 95% UCL and mean exposure doses. Therefore, lead does not pose an unacceptable risk to upper trophic level receptors based upon the decision rule in the Vieques ERA protocol (acceptable risk if the mean exposure HQ based upon the MATC is less than 1 for all receptors).Both the 95% UCL and mean exposure doses for vanadium resulted in exceedances of the MATC for the dove and thrasher.

However, vanadium exceeded background in just 1 of 10 surface soil samples. The maximum ratio to mean+2S background was only 1.24 and the mean ratio was less than 1. The one background exceedance was in sample 67SB08-00, which is located off of the site on the other side of Langley Drive in a maintained grass area. This information suggests that exposures for upper trophic level receptors to vanadium in surface soil on the site are not significant ecologically relative to background.

Soil to Groundwater Pathway Evaluation

An evaluation of soil and sediment data was completed to compare residential soil to groundwater SSLs at a DAF of 1 (meaning there is no dilution attenuation and the concentration at the receptor point is the same as that in the soil leachate).

- Organics: No VOCs exceeded the SSLs at a DAF 1. In surface soil, benzo(a)anthracene is present in one sample at a concentrations of (11 µg/kg), just above the SSL of 10 µg/kg. However, it was not detected in subsurface soil above the SSL at a DAF of 1. In sediment samples, benzo(a)anthracene, benzo(b)fluoranthene, and dibenz(a,h) anthracene are also present at 67SD05 above the SSL at DAF 1. Although these polycyclic aromatic hydrocarbons (PAHs) are present above the SSL at a DAF of 1 in soil/sediment, these constituents are not detected above the tap-water RSLs in groundwater. This suggests the SSL at a DAF of 1 overestimates the leaching potential, which has been demonstrated at other sites in Puerto Rico.
- Inorganics: Twelve inorganics are present in soil/sediment at SWMU 67 above the SSL at a DAF 1. All of these constituents also exceed the mean +2S background in various locations. However, concentrations of these constituents in groundwater do not exceed the MCLs and although some constituent exceed the tap-water RSLs and the mean_2S background, concentrations are less than the maximum background level. Therefore leaching of inorganic contamination in soil (if present) to groundwater as a result of site releases is not a concern.

Step 6 – Does the historic information and/or spatial distribution of data indicate the potential source area was sufficiently sampled?

Historical information indicates the most likely source of RCRA-related contamination would be from the former pit in the concrete pad and use of the site as a gas station and service area. Samples were biased to these areas and in the drainage features conveying runoff from this area and direct discharge from the trough. In addition if there had been a release as a result of historical activities that was not identified by the soil sampling effort, the spatial distribution of monitoring wells is sufficient to have identified historical releases. However, groundwater data support the soil data indications that a site-related release warranting further investigation or action did not occur. In addition, the results of sample data adjacent to the tennis courts (especially the immediately downgradient groundwater) and historical photographic reviews (i.e., just a cleared area likely used for parking) indicate the absence of data directly beneath the tennis courts is not a data gap warranting further investigation.

Conclusions and Recommendations

The decision analysis described above indicates that based on the conceptual site model of SWMU 67, the data collected were sufficient to characterize the site with respect to whether releases occurred warranting further investigation or action and are also sufficient to assess nature and extent of contamination and associated human health and ecological risks. The data suggest that although potential human health risks were identified under the conservative residential land use scenario for soil and potable use of site groundwater, potential ecological risks are acceptable and there are no unacceptable cancer risks or non-cancer hazards associated with industrial land use. In addition, the constituents contributing to unacceptable risk for residential soil exposure are not likely attributable to a site related release. Although several inorganics are present in soil above background with the potential to leach to groundwater when compared to the SSL at DAF 1, this evaluation is conservative and assumes no dilution attenuation is occurring. Evaluation of subsurface soil data and groundwater data indicate leaching to groundwater is not a concern (i.e., concentrations in groundwater are either below MCLs, below tap-water RSLs, or attributable to background).

Based on the results of this decision analysis, no additional soil or groundwater sampling is warranted. Although the Phase I RFI was finalized in June 2011, a revised Phase I RFI is recommended to incorporate the decision analysis as presented herein to support a no action determination for SWMU 67.

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Tables

TABLE 1
SWMU 67 Surface Soil Detected Concentrations and Exceedances of Screening Criteria

Station ID	CLEAN NAPR Background Maximum Surface Soil	CLEAN NAPR Background Arithmetic Mean 2S Surface Soil	CLEAN RSLs Industrial Soil Adjusted 1110	CLEAN RSLs Residential Soil Adjusted 1110	SSLs (DAF 1)	67GW01	67GW02	67GW03	67GW04	67GW05	67GW06	67GW07	67GW08	67SS01	67SS02
Sample ID						67SB01-00	67SB02-00	67SB03-00	67SB04-00	67SB05-00	67SB06-00	67SB07-00	67SB08-00	67SS01	67SS02
Sample Date						03/24/10	03/25/10	03/26/10	03/25/10	03/24/10	03/23/10	03/23/10	03/22/10	03/30/10	03/30/10
Chemical Name															
Volatile Organic Compounds (UG/KG)															
2-Butanone	--	--	20,000,000	2,800,000	1,500	19	19 U	12	5.6 J	13 U	11 U	20 J	6.8 J	14 U	14 U
Acetone	--	--	63,000,000	6,100,000	4,500	240	220	140	63	79	110	280 J	110	14 R	14 R
Benzene	--	--	5,400	1,100	3	3.8 U	4.2 U	3.5 U	4.4 U	5.1 U	4.2 U	0.59 J	5.2 U	5.5 U	5.7 U
Carbon disulfide	--	--	370,000	82,000	310	3.8 U	4.2 U	3.5 U	0.92 J	5.1 U	4.2 U	6.4 UJ	5.2 U	5.5 U	5.7 U
Chloroform	--	--	1,500	290	22	3.8 U	4.2 U	0.24 J	0.3 J	5.1 U	4.2 U	6.4 UJ	5.2 U	5.5 U	5.7 U
Chloromethane	--	--	50,000	12,000	49	3.8 U	4.2 U	3.5 U	4.4 U	5.1 U	0.42 J	6.4 UJ	5.2 U	5.5 UJ	5.7 UJ
Iodomethane	--	--	--	--	--	1.9 J	0.7 J	1.1 J	4.4 U	5.1 U	1.6 J	6.4 UJ	1.8 J	5.5 U	5.7 U
m- and p-Xylene	--	--	390,000	340,000	9,800	7.6 U	0.12 J	7 U	8.8 U	10 U	8.5 U	13 UJ	10 U	11 U	11 U
Methylene chloride	--	--	53,000	11,000	1.3	3.8 U	4.2 U	0.35 J	4.4 U	5.1 U	4.2 U	6.4 UJ	5.2 U	5.5 U	5.7 U
Xylene, total	--	--	260,000	63,000	9,800	3.8 U	0.12 J	3.5 U	4.4 U	5.1 U	4.2 U	6.4 UJ	5.2 U	5.5 U	5.7 U
Semivolatile Organic Compounds (UG/KG)															
2-Methylnaphthalene	--	--	370,000	31,000	750	9.4 U	0.81 J	8.9 U	8.8 U	9.5 U	9.5 U	10 UJ	11 UJ	9.5 U	9.5 U
Acenaphthene	--	--	3,300,000	340,000	22,000	9.4 U	9.8 U	8.9 U	8.8 U	9.5 U	9.5 U	10 U	11 U	1.1 J	0.75 J
Acenaphthylene	--	--	3,300,000	340,000	22,000	9.4 U	1.2 J	8.9 U	1.4 J	9.5 U	9.5 U	10 U	11 U	3.6 J	1.9 J
Anthracene	--	--	17,000,000	1,700,000	360,000	0.5 J	0.69 J	0.72 J	1.4 J	9.5 U	9.5 U	10 U	11 U	2.5 J	1.5 J
Benzo(a)anthracene	--	--	2,100	150	10	1.2 J	2.7 J	3.8 J	4.7 J	9.5 U	1 J	10 U	11 U	11	8.6 J
Benzo(a)pyrene	--	--	210	15	240	1.6 J	9.8 U	4.8 J	6.9 J	0.6 J	1.6 J	10 U	11 U	11	10
Benzo(b)fluoranthene	--	--	2,100	150	35	1.4 J	4.1 J	5.1 J	5.2 J	9.5 UJ	2.5 J	10 UJ	11 UJ	6.7 J	6.5 J
Benzo(g,h,i)perylene	--	--	1,700,000	170,000	120,000	1.7 J	3.4 J	3.7 J	4.9 J	0.47 J	1.6 J	10 U	11 U	9.2 J	8.8 J
Benzo(k)fluoranthene	--	--	21,000	1,500	350	1.9 J	3.1 J	8.9 U	8.8 U	0.55 J	1.6 J	10 U	11 U	8 J	6.6 J
bis(2-Ethylhexyl)phthalate	--	--	120,000	35,000	1,400	190 U	200 U	360 U	39 J	200 U	200 U	210 U	220 U	100 J	64 J
Chrysene	--	--	210,000	15,000	1,100	1.5 J	3.5 J	3.1 J	6.8 J	9.5 U	0.96 J	10 U	11 U	10	7.4 J
Dibenz(a,h)anthracene	--	--	210	15	11	0.5 J	9.8 UJ	0.81 J	1.2 J	9.5 U	9.5 UJ	10 U	11 U	2 J	1.6 J
Di-n-butylphthalate	--	--	6,200,000	610,000	9,200	190 U	200 U	360 U	180 U	200 U	200 U	23 J	220 U	200 U	200 U
Fluoranthene	--	--	2,200,000	230,000	160,000	9.4 U	5.9 J	5.9 J	17	9.5 U	9.5 U	10 U	11 U	17	15
Indeno(1,2,3-cd)pyrene	--	--	2,100	150	120	2 J	4.5 J	3.6 J	6.9 J	0.62 J	1.9 J	10 UJ	11 UJ	8.8 J	9.6
Phenanthrene	--	--	17,000,000	1,700,000	360,000	9.4 U	2.8 J	2.7 J	6.1 J	9.5 U	1.6 J	10 U	11 U	8.2 J	6 J
Pyrene	--	--	1,700,000	170,000	120,000	1 J	4.7 J	6 J	13	9.5 U	1.2 J	10 U	11 U	16	16
Total Metals (MG/KG)															
Antimony	2.8	3.17	41	3.1	0.27	1.1 UJ	0.52 J	0.14 J	0.26 J	1.1 UJ	1.2 UJ	1.2 UJ	1.2 UJ	0.21 J	0.17 J
Arsenic	2.5	2.65	1.6	0.39	0.29	0.23 J	1	0.52 U	0.99	0.49 J	0.57 U	0.73	1.4	**2.9**	**5**
Barium	220	199	19,000	1,500	82	127	130	203	94.7	56.2	31.8	59.1	48.1 J	116	108
Beryllium	0.58	0.59	200	16	3.2	0.29 J	0.35 J	0.4 J	0.25 J	0.19 J	0.14 J	0.19 J	0.38 J	0.34 J	0.3 J
Cadmium	0.92	1.02	80	7	0.38	0.26 J	0.36 J	0.17 J	0.24 J	0.18 J	0.13 J	0.18 J	0.14 J	0.35 J	0.35 J
Chromium	47.0	49.8	5.6	0.29	0.00083	41.8	41.3 J	47.4 J	33.6 J	13	16.4 J	24.1	25.2	28 J	47.9 J
Cobalt	50.2	46.2	30	2.3	0.49	23.2 J	38.1 J	24.7	26.5	21 J	15.6 J	24.4 J	10.6 J	28.9	25.7
Copper	180	168	4,100	310	46	115 J	277 J	50.7	99.2	80.1 J	55.7 J	78.4 J	44.4 J	102	150
Lead	21	22	800	400	27	13.4 J	62.4	4.3	9.3	2.2 J	2.1	3.7 J	4.2 J	23.8	31.5
Mercury	0.12	0.109	31	2.3	0.57	0.041	0.066	0.037	0.037	0.011	0.038 U	0.011	0.015	0.081	0.054
Nickel	19.0	20.7	2,000	150	48	13.6	16.3 J	11.5	15.2	6.7	12 J	9.8	7.4 J	11.2	16.6
Selenium	1.2	1.48	510	39	0.26	1.2 J	1.5 J	0.58 J	0.42 J	0.43 J	0.34 J	0.49 J	1.6 J	1.3 J	1 J
Silver	ND	ND	510	39	1.6	0.57 U	0.082 J	0.52 U	0.057 J	0.56 U	0.57 U	0.59 U	0.61 U	0.077 J	0.049 J
Thallium	0.1	--	--	--	0.14	0.085 J	0.3 J	0.037 J	0.047 J	0.022 J	0.57 U	0.04 J	0.61 U	0.075 J	0.051 J
Vanadium	230	259	520	39	180	147 J	213 J	150	170	177 J	88.5 J	151 J	**320 J**	227	149
Zinc	120	115	31,000	2,300	680	46.3	85.7 J	32.8 J	67.1 J	61.2	36.8 J	61.3	25.5	71.5 J	63.8 J
Total Petroleum Hydrocarbons ()															
TPH-diesel range (UG/KG)	--		--	--		11,000 U	12,000	11,000 U	11,000 U	110,000	11,000 U	12,000 U	23,000	11,000 U	11,000 U

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Notes:

Exceeds max background criteria

Exceeds mean 2s background criteria

Bold indicates exceedance of RSLand background criteria (if applicable)

Red indicates exceedance of SSL and background mean 2s criteria (if applicable)

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

MG/KG - Milligrams per kilogram

UG/KG - Micrograms per kilogram

TABLE 2
SWMU 67 Subsurface Soil Detected Concentrations and Exceedances of Screening Criteria

Station ID	CLEAN NAPR Background Maximum Subsurface Soil- Clay	CLEAN NAPR Background Arithmetic Mean 2S Subsurface Soil - Clay	CLEAN RSLs Industrial Soil Adjusted 1110	CLEAN RSLs Residential Soil Adjusted 1110	SSLs (DAF 1)	67GW01			67GW02		67GW03		67GW04		67GW05		67GW06		
Sample ID						67SB01-01	67SB01-01D	67SB01-03	67SB02-01	67SB02-02	67SB03-01	67SB03-04	67SB04-01	67SB04-03	67SB05-01	67SB05-05	67SB06-01	67SB06-01D	67SB06-05
Sample Date						03/24/10	03/24/10	03/24/10	03/25/10	03/25/10	03/26/10	03/26/10	03/25/10	03/25/10	03/24/10	03/24/10	03/23/10	03/23/10	03/23/10
Chemical Name																			
Volatile Organic Compounds (UG/KG)																			
2-Butanone	--	--	20,000,000	2,800,000	1,500	11 U	9.6 U	13 U	11 U	17 U	11 U	8 J	9.3 U	7.2 J	12 U	12 U	11 U	9.9 U	12 U
2-Hexanone	--	--	140,000	21,000		11 U	9.6 U	13 U	11 U	1.5 J	11 U	11 U	9.3 U	11 U	12 U	12 U	11 U	9.9 U	12 U
Acetone	--	--	63,000,000	6,100,000	4,500	130	120	61	54	150	23 J	120 J	19 U	61	47	12 U	88	52	21 U
Benzene	--	--	5,400	1,100	3	4.5 U	0.3 J	5.3 U	4.3 U	0.44 J	0.4 J	4.5 U	0.45 J	4.6 U	4.7 U	4.7 U	4.2 U	4 U	4.7 U
Carbon disulfide	--	--	370,000	82,000	310	4.5 U	3.8 U	4.9 J	4.3 U	0.72 J	4.4 U	0.95 J	3.7 U	5	4.7 U	4.7 U	4.2 UJ	4.7 J	4.7 U
Chloromethane	--	--	50,000	12,000	49	4.5 U	3.8 U	0.92 J	0.3 J	4.2 U	4.4 UJ	0.44 J	3.7 U	4.6 U	4.7 U	4.7 U	4.2 U	4 U	4.7 U
Iodomethane	--	--	--	--	--	1.9 J	1 J	5.3 U	0.78 J	4.1 J	4.4 U	1.6 J	3.7 U	1.5 J	4.7 U	4.7 U	1.3 J	4 U	4.7 U
m- and p-Xylene	--	--	390,000	340,000	9,800	9 U	7.6 U	11 U	8.5 U	8.5 U	8.8 U	9.1 U	7.5 U	9.1 U	9.3 U	9.3 U	8.5 U	7.9 U	9.4 U
Xylene, total	--	--	260,000	63,000	9,800	4.5 U	3.8 U	5.3 U	4.3 U	4.2 U	4.4 U	4.5 U	3.7 U	4.6 U	4.7 U	4.7 U	4.2 U	4 U	4.7 U
Semivolatile Organic Compounds (UG/KG)																			
2-Methylnaphthalene	--	--	370,000	31,000	750	9 U	8.8 U	10 U	10 U	9.3 U	8.9 U	10 U	8.9 U	10 U	10 U	11 U	9.7 U	9.3 U	0.93 J
Acenaphthylene	--	--	3,300,000	340,000	22,000	9 U	8.8 U	10 U	10 U	0.67 J	8.9 U	10 U	1.2 J	10 U	10 U	11 U	9.7 U	9.3 U	10 U
Anthracene	--	--	17,000,000	1,700,000	360,000	9 U	0.63 J	10 U	10 U	9.3 U	8.9 U	10 U	1.5 J	10 U	10 U	11 U	0.52 J	9.3 U	10 U
Benzo(a)anthracene	--	--	2,100	150	10	9 U	1.5 J	10 U	10 UJ	9.3 UJ	0.9 J	0.78 J	4.8 J	10 U	10 U	11 U	0.83 J	9.3 U	10 UJ
Benzo(a)pyrene	--	--	210	15	240	0.45 J	1.6 J	10 U	10 U	9.3 U	0.66 J	10 U	5.6 J	10 U	10 U	11 U	0.47 J	9.3 U	10 U
Benzo(b)fluoranthene	--	--	2,100	150	35	9 UJ	1.1 J	10 UJ	10 UJ	9.3 UJ	1 NJ	0.84 NJ	4.6 J	10 U	10 UJ	11 UJ	0.79 J	9.3 UJ	10 UJ
Benzo(g,h,i)perylene	--	--	1,700,000	170,000	120,000	9 U	1.5 J	0.56 J	10 UJ	9.3 UJ	8.9 U	10 U	3.6 J	0.79 J	10 U	11 U	1 J	9.3 U	10 U
Benzo(k)fluoranthene	--	--	21,000	1,500	350	0.48 J	1.5 J	10 U	10 UJ	9.3 UJ	0.95 NJ	0.79 NJ	8.9 U	10 U	10 U	11 U	0.51 J	9.3 UJ	10 UJ
bis(2-Ethylhexyl)phthalate	--	--	120,000	35,000	1,400	180 U	61 J	210 U	200 U	190 U	46 J	210 U	49 J	61 J	210 U	220 U	200 U	190 U	200 U
Chrysene	--	--	210,000	15,000	1,100	9 U	1.3 J	10 U	10 U	9.3 U	0.8 J	10 U	6.4 J	10 U	10 U	11 U	0.74 J	9.3 U	10 U
Di-n-butylphthalate	--	--	6,200,000	610,000	9,200	180 U	180 U	210 U	200 U	190 U	180 U	210 U	180 U	210 U	210 U	220 U	200 U	190 U	200 U
Fluoranthene	--	--	2,200,000	230,000	160,000	9 U	8.8 U	10 U	10 U	9.3 U	8.9 U	10 U	16	10 U	10 U	11 U	1.6 J	9.3 U	10 U
Indeno(1,2,3-cd)pyrene	--	--	2,100	150	120	0.49 J	1.8 J	0.67 J	10 UJ	9.3 UJ	8.9 U	0.55 J	5.4 J	10 U	10 U	11 U	0.5 J	9.3 U	10 UJ
Naphthalene	--	--	18,000	3,600		9 U	8.8 U	1.4 J	10 U	9.3 U	8.9 U	10 U	8.9 U	10 U	10 U	11 U	9.7 U	9.3 U	10 U
Phenanthrene	--	--	17,000,000	1,700,000	360,000	9 U	8.8 U	10 U	10 U	9.3 U	8.9 U	2.2 J	6.3 J	10 U	10 U	11 U	2.2 J	9.3 U	10 U
Pyrene	--	--	1,700,000	170,000	120,000	9 U	1.1 J	0.74 J	0.68 J	9.3 U	0.99 J	1.5 J	13	0.73 J	10 U	11 U	1.4 J	9.3 U	10 U
Total Metals (MG/KG)																			
Antimony	2.7	--	41	3.1	0.27	1.1 UJ	1.1 UJ	6.2 UJ	1.2 UJ	1.1 UJ	0.14 J	6.1 UJ	1.1 UJ	0.2 J	1.2 UJ	1.2 UJ	1.2 UJ	1.1 UJ	1.2 UJ
Arsenic	1.7	1.59	1.6	0.39	0.29	0.66	0.63	3.1 U	0.6 U	1.2	0.37 J	3.1 U	0.85	0.95	1.4	0.97	**1.8**	0.6	0.28 J
Barium	246	220	19,000	1,500	82	114	153	652	251	282	58.8	18.3 J	66.9	139	22.6	55.4	122 J	174 J	4.5 J
Beryllium	0.7	0.596	200	16	3.2	0.32 J	0.35 J	4.9	0.78	0.55 J	0.19 J	0.32 J	0.18 J	0.57	0.21 J	0.097 J	0.63	0.31 J	0.23 J
Cadmium	0.48	0.54	80	7	0.38	0.22 J	0.2 J	0.85 J	0.2 J	0.45 J	0.21 J	3.1 U	0.27 J	0.4 J	0.13 J	0.59 U	0.38 J	0.21 J	0.068 J
Chromium	148	115	5.6	0.29	0.00083	34.7	37.6	**233**	57.6 J	48.8 J	6.7 J	11.5 J	41.7 J	22.4 J	20.4	9.6	36.6 J	14.6 J	2.5 J
Cobalt	34.0	26.9	30	2.3	0.49	27.4 J	30.7 J	**472 J**	28.8 J	**99.2 J**	27.1	15	22.7	**39.5**	11.6 J	1.9 J	**105 J**	**44 J**	5.2 J
Copper	260	246	4,100	310	46	91.4 J	98.2 J	**681 J**	138 J	56.2 J	78.4	28.7	92.3	42.1	34.5 J	29.3 J	44.9 J	37.8 J	13.6 J
Lead	6.6	6.3	800	400	27	142 R	7.5 R	12.3 J	4.5	8.5	1.1	1.7 J	8.3	4.4	4.7 J	2.1 J	9 J	4.3 J	2.5
Mercury	0.17	0.108	31	2.3	0.57	0.024	0.027	0.041 U	0.02 J	0.098	0.035 U	0.082	0.035 U	0.12	0.22	0.043 U	0.13	0.032 J	0.04 U
Nickel	35.6	24.7	2,000	150	48	12.5	14.3 J	**310**	26.6 J	15.4 J	5.3	4.7	15.8	6.6	3.4	1.3	9.4 J	5.3 J	1.6 J
Selenium	3.8	5.94	510	39	0.26	0.95 J	0.96 J	5.9 J	1 J	1.7 J	0.22 J	1.4 J	0.37 J	2.2 J	2.4 J	1.3 J	2.4 J	1.1 J	0.59 J
Silver	0.16	--	510	39	1.6	0.69	0.53 U	3.1 U	0.6 U	0.56 U	0.05 J	3.1 U	0.54 U	0.099 J	0.62 U	0.59 U	0.58 U	0.56 U	0.6 U
Thallium	0.29	0.92	--	--	0.14	0.26 J	0.31 J	4.2	0.58 J	0.21 J	0.055 J	3.1 U	0.039 J	0.059 J	0.061 J	0.035 J	0.2 J	0.076 J	0.6 U
Vanadium	410	434	520	39	180	196 J	200 J	**1,480 J**	228 J	306 J	160	176	143	233	267 J	155 J	325 J	188 J	105 J
Zinc	98	88	31,000	2,300	680	62.8	72	541	97 J	67.4 J	64.5 J	48.1 J	55.5 J	63.4 J	19.6	15.6	72.7 J	36.8 J	40 J
Total Petroleum Hydrocarbons ()																			
TPH-diesel range (UG/KG)	--		--	--		11,000 U	11,000 U	12,000 U	12,000 U	13,000	11,000 U	13,000 U	11,000 U	12,000 U	18,000	13,000 U	12,000 U	11,000 U	12,000 U

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Notes:

Exceeds background maximum criteria

Exceeds background mean 2S criteria

Bold indicates exceedance of regulatory criteria and background criteria (if applicable)

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NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

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R - Unreliable Result

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

MG/KG - Milligrams per kilogram

UG/KG - Micrograms per kilogram

TABLE 2
SWMU 67 Subsurface Soil Detected Concentrations and Exceedances of Screening Criteria

Station ID	CLEAN NAPR Background Maximum Subsurface Soil- Clay	CLEAN NAPR Background Arithmetic Mean 2S Subsurface Soil - Clay	CLEAN RSLs Industrial Soil Adjusted 1110	CLEAN RSLs Residential Soil Adjusted 1110	67GW07		67GW08		
Sample ID					67SB07-01	67SB07-05	67SB08-00D	67SB08-01	67SB08-05
Sample Date					03/23/10	03/23/10	03/22/10	03/22/10	03/22/10
Chemical Name									
Volatile Organic Compounds (UG/KG)									
2-Butanone	--	--	20,000,000	2,800,000	2.2 J	14 U	13	9.6 UJ	11 U
2-Hexanone	--	--	140,000	21,000	11 U	14 U	12 U	9.6 UJ	11 U
Acetone	--	--	63,000,000	6,100,000	29	17 U	170	61 J	11 U
Benzene	--	--	5,400	1,100	4.3 U	5.5 U	4.6 U	3.8 UJ	4.4 U
Carbon disulfide	--	--	370,000	82,000	0.65 J	5.5 U	4.6 U	3.8 UJ	4.4 U
Chloromethane	--	--	50,000	12,000	4.3 U	5.5 U	4.6 U	3.8 UJ	4.4 U
Iodomethane	--	--	--	--	4.3 U	5.5 U	2.9 J	3.8 UJ	4.4 U
m- and p-Xylene	--	--	390,000	340,000	8.5 U	0.32 J	9.2 U	7.7 UJ	8.8 U
Xylene, total	--	--	260,000	63,000	4.3 U	0.31 J	4.6 U	3.8 UJ	4.4 U
Semivolatile Organic Compounds (UG/KG)									
2-Methylnaphthalene	--	--	370,000	31,000	9.5 UJ	11 UJ	11 UJ	9.7 UJ	11 UJ
Acenaphthylene	--	--	3,300,000	340,000	9.5 U	11 U	11 U	9.7 U	11 U
Anthracene	--	--	17,000,000	1,700,000	9.5 U	11 U	11 U	9.7 U	11 U
Benzo(a)anthracene	--	--	2,100	150	9.5 U	11 U	11 U	9.7 U	11 U
Benzo(a)pyrene	--	--	210	15	9.5 U	11 U	11 U	9.7 U	11 U
Benzo(b)fluoranthene	--	--	2,100	150	9.5 UJ	11 UJ	11 UJ	9.7 UJ	11 UJ
Benzo(g,h,i)perylene	--	--	1,700,000	170,000	9.5 U	11 U	11 U	9.7 U	11 U
Benzo(k)fluoranthene	--	--	21,000	1,500	9.5 U	11 U	11 U	9.7 U	11 U
bis(2-Ethylhexyl)phthalate	--	--	120,000	35,000	200 U	220 U	220 U	200 U	220 U
Chrysene	--	--	210,000	15,000	9.5 U	11 U	11 U	9.7 U	11 U
Di-n-butylphthalate	--	--	6,200,000	610,000	24 J	29 J	220 U	21 J	220 U
Fluoranthene	--	--	2,200,000	230,000	9.5 U	11 U	11 U	9.7 U	11 U
Indeno(1,2,3-cd)pyrene	--	--	2,100	150	9.5 UJ	11 UJ	11 UJ	9.7 UJ	11 UJ
Naphthalene	--	--	18,000	3,600	9.5 U	11 U	11 U	9.7 U	11 U
Phenanthrene	--	--	17,000,000	1,700,000	9.5 U	11 U	11 U	9.7 U	11 U
Pyrene	--	--	1,700,000	170,000	9.5 U	11 U	11 U	9.7 U	11 U
Total Metals (MG/KG)									
Antimony	2.7	--	41	3.1	1.1 UJ	5.9 UJ	1.3 UJ	1.1 UJ	1.2 UJ
Arsenic	1.7	1.59	1.6	0.39	0.71	3 U	1.4	0.95	0.62 U
Barium	246	220	19,000	1,500	99	87.4	23.9 J	112	58.6
Beryllium	0.7	0.596	200	16	0.15 J	1.4 J	0.2 J	0.42 J	0.071 J
Cadmium	0.48	0.54	80	7	0.16 J	0.31 J	0.16 J	0.33 J	0.15 J
Chromium	148	115	5.6	0.29	7.5	76.9	32.8	10.8	7.1
Cobalt	34.0	26.9	30	2.3	29.6 J	**75.2 J**	10 J	**58.8 J**	20.3 J
Copper	260	246	4,100	310	71 J	**493 J**	37.6 J	36 J	39.5 J
Lead	6.6	6.3	800	400	0.91 J	5.2 J	8.7 J	**27.4 J**	0.62 U
Mercury	0.17	0.108	31	2.3	0.038 U	0.043 U	0.17	0.093	0.042 U
Nickel	35.6	24.7	2,000	150	6	26	4.1 J	5	5.6
Selenium	3.8	5.94	510	39	0.41 J	2.6 J	2.2 J	1.8 J	0.33 J
Silver	0.16	--	510	39	0.53 U	3 U	0.63 U	0.57 U	0.62 U
Thallium	0.29	0.92	--	--	0.036 J	3 U	0.024 J	0.066 J	0.62 U
Vanadium	410	434	520	39	161 J	**821 J**	272 J	174 J	196 J
Zinc	98	88	31,000	2,300	68.3	298	33.3	64.6	56.8
Total Petroleum Hydrocarbons ()									
TPH-diesel range (UG/KG)	--		--	--	14,000	14,000	17,000	16,000	20,000

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Notes:

Exceeds background maximum criteria

Exceeds background mean 2S criteria

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U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

MG/KG - Milligrams per kilogram

UG/KG - Micrograms per kilogram

TABLE 3

SWMU 67 Sediment Detected Concentrations and Exceedances of Screening Criteria

Station ID	CLEAN NAPR Background Maximum for Surface Soil	CLEAN NAPR Background Arithmetic Mean 2S Surface Soil	CLEAN RSLs Industrial Soil Adjusted 1110	CLEAN RSLs Residential Soil Adjusted 1110	SSLs (DAF 1)	67SD01		67SD02	67SD03	67SD04	67SD05
Sample ID						67SD01	67SD01D	67SD02	67SD03	67SD04	67SD05
Sample Date						03/22/10	03/22/10	03/22/10	03/22/10	03/22/10	03/22/10
Chemical Name											
Volatile Organic Compounds (UG/KG)											
2-Butanone	--	--	20,000,000	2,800,000	1,500	11 J	20	9.4 J	13 J	15 J	15 J
Acetone	--	--	63,000,000	6,100,000	4,500	95	170	120 J	200 J	190	210 J
Carbon disulfide	--	--	370,000	82,000	310	5.1 J	36 J	0.86 J	2.7 J	15	1.7 J
Chloromethane	--	--	50,000	12,000	49	6.6 U	6 U	0.76 J	6.8 UJ	8.2 U	0.82 J
Iodomethane	--	--	--	--	--	1.2 J	0.77 J	2.5 J	2.9 J	2.3 J	2.5 J
m- and p-Xylene	--	--	390,000	340,000	9,800	13 U	0.24 J	0.42 J	0.34 J	0.38 J	17 UJ
Xylene, total	--	--	260,000	63,000	9,800	6.6 U	0.23 J	0.42 J	0.33 J	0.38 J	8.3 UJ
Semivolatile Organic Compounds (UG/KG)											
Benzo(a)anthracene	--	--	2,100	150	10	13 UJ	28 J	14 U	13 U	14 U	52
Benzo(a)pyrene	--	--	210	15	240	13 U	12 U	14 U	13 U	14 U	70
Benzo(b)fluoranthene	--	--	2,100	150	35	13 U	12 U	14 U	13 U	14 U	110
Benzo(g,h,i)perylene	--	--	1,700,000	170,000	120,000	13 U	12 U	14 U	23	14 U	73
Benzo(k)fluoranthene	--	--	21,000	1,500	350	13 U	12 U	14 U	13 U	14 U	74
Chrysene	--	--	210,000	15,000	1,100	13 UJ	24 J	14 U	13 U	14 U	77
Dibenz(a,h)anthracene	--	--	210	15	11	13 U	12 U	14 U	13 U	14 U	**28**
Fluoranthene	--	--	2,200,000	230,000	160,000	13 UJ	43 J	14 U	13 U	14 U	95
Indeno(1,2,3-cd)pyrene	--	--	2,100	150	120	13 U	12 U	14 U	13 U	14 U	100
Pyrene	--	--	1,700,000	170,000	120,000	13 UJ	51 J	14 U	13 U	14 U	90
Total Metals (MG/KG)											
Antimony	2.8	3.17	41	3.1	0.27	1.2 J	1.4 UJ	1.5 UJ	1.5 UJ	1.7 UJ	2 UJ
Arsenic	2.5	2.65	1.6	0.39	0.29	1.2	0.99	0.93	0.89	1.6	1.3
Barium	220	199	19,000	1,500	82	62	53.3	44.8	68.3	61.8	113
Beryllium	0.58	0.59	200	16	3.2	0.27 J	0.24 J	0.28 J	0.25 J	0.31 J	0.31 J
Cadmium	0.92	1.02	80	7	0.38	0.79	0.7	0.51 J	0.32 J	0.35 J	0.79 J
Chromium	47	49.8	5.6	0.29	0.00083	28.2	21	27.5	23.8	36	37.2
Cobalt	50.2	46.2	30	2.3	0.49	44.5 J	35.9 J	45.6 J	32.8 J	41.8 J	25.7 J
Copper	180	168	4,100	310	46	77.1 J	58.3 J	63.4 J	64 J	65.4 J	133 J
Lead	21	22	800	400	27	134 J	119 J	36 J	11 J	21 J	31 J
Mercury	0.12	0.109	31	2.3	0.57	0.028 J	0.04	0.033	0.023	0.041	0.084
Nickel	19	20.7	2,000	150	48	12.8	10.1	11.7	9.8	12.3	12.3
Selenium	1.2	1.48	510	39	0.26	1.4 J	1.2 J	1.4 J	1.5 J	1.5 J	1.6 J
Silver	ND	ND	510	39	1.6	0.15 J	0.69 U	0.77 U	0.76 U	0.85 U	0.99 U
Thallium	0.1	--	--	--	0.14	0.069 J	0.048 J	0.048 J	0.047 J	0.051 J	0.18 J
Vanadium	230	259	520	39	180	**232 J**	190 J	**371 J**	170 J	**282 J**	214 J
Zinc	120	115	31,000	2,300	680	86.8	75	68.7	81.4	65.1	98.1
Wet Chemistry											
Total organic carbon (TOC) (mg/kg)	--	--	--	--		NA	NA	25,440	14,030	25,600	47,770
Total Petroleum Hydrocarbons ()											
TPH-diesel range (UG/KG)	--	--	--	--		31,000 J	20,000 J	27,000 J	28,000 J	34,000 J	41,000 J

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Notes:

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Exceeds background mean 2S criteria

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MG/KG - Milligrams per kilogram

UG/KG - Micrograms per kilogram

TABLE 4
SWMU 67 Groundwater Detected Concentrations and Exccedances of Screening Criteria

Station ID	CLEAN MCL-Groundwater	CLEAN NAPR Background Maximum	CLEAN NAPR Background Arithmetic Mean 2S SS	CLEAN RSLs Tapwater Adjusted 1110	67GW01	67GW02	67GW03	67GW04	67GW05	67GW06	67GW07	67GW08	
Sample ID					67GW01	67GW02	67GW03	67GW04	67GW05	67GW06	67GW07	67GW08	67GW08D
Sample Date					03/27/10	03/28/10	03/30/10	03/28/10	03/27/10	03/27/10	03/26/10	03/26/10	03/26/10
Chemical Name													
Volatile Organic Compounds (UG/L)													
2-Butanone	--	--	--	710	2.5 R	2.5 R	2.5 R	2.5 R	5.2 J	2.5 R	2.5 R	2.5 R	2.5 R
Acetone	--	--	--	2,200	11 J	12 J	2.5 R	7.9 J	30 J	6 J	3.9 R	2.5 R	2.5 R
Benzene	5	--	--	0.41	0.031 J	0.5 U	0.5 U	0.5 U	0.11 J	0.053 J	0.5 U	0.5 U	0.5 U
Carbon disulfide	--	--	--	100	0.35 J	0.72	0.32 J	0.87	2.2	0.82	0.04 J	0.048 J	0.048 J
Iodomethane	--	--	--	--	0.5 UJ	0.5 UJ	0.5 U	0.5 UJ	0.25 J	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
Semivolatile Organic Compounds (UG/L)													
2-Methylnaphthalene	--	--	--	15	0.042 J	0.033 J	0.21 U	0.037 J	0.22 U	0.21 U	0.22 U	0.21 U	0.21 U
Acenaphthylene	--	--	--	220	0.2 U	0.046 J	0.21 U	0.21 U	0.22 U	0.21 U	0.22 U	0.21 UJ	0.21 UJ
Benzo(a)anthracene	--	--	--	0.029	0.2 U	0.21 U	0.21 U	0.21 U	0.22 U	0.21 U	0.22 U	0.21 UJ	0.022 J
Benzo(b)fluoranthene	--	--	--	0.029	0.2 U	0.21 U	0.21 U	0.21 U	0.22 U	0.21 U	0.22 U	0.21 U	0.014 J
Benzo(k)fluoranthene	--	--	--	0.29	0.2 U	0.21 U	0.21 U	0.21 U	0.22 U	0.21 U	0.22 U	0.21 U	0.02 J
Chrysene	--	--	--	2.9	0.2 U	0.21 U	0.21 U	0.21 U	0.22 U	0.21 U	0.22 U	0.21 U	0.027 J
Fluoranthene	--	--	--	150	0.01 J	0.034 J	0.016 J	0.01 J	0.017 J	0.015 J	0.22 U	0.21 U	0.035 J
Fluorene	--	--	--	150	0.2 U	0.21 U	0.21 U	0.21 U	0.22 U	0.06 J	0.22 U	0.21 U	0.21 U
Naphthalene	--	--	--	0.14	0.2 U	0.21 U	0.21 U	0.21 U	0.22 U	0.21 U	1	0.21 U	0.21 U
Phenanthrene	--	--	--	1,100	0.2 U	0.068 J	0.21 U	0.21 U	0.22 U	0.042 J	0.22 U	0.21 U	0.21 U
Pyrene	--	--	--	110	0.2 U	0.019 J	0.21 U	0.21 U	0.22 U	0.21 U	0.22 U	0.21 U	0.033 J
Pyridine	--	--	--	3.7	5 U	5.3 U	5.3 U	5.1 U	1.6 J	5.1 U	5.6 U	5.3 U	5.3 U
Total Metals (UG/L)													
Antimony	6	14.2	12.2	1.5	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.23 J	2 U
Arsenic	10	22.4	18.9	0.045	2.2	2.2	2.9	9.8	3.4	3	1.1	1.2	1.3
Barium	2,000	690	686	730	108	24.2	12.4	65.4	60.5	41.2	9 J	4.6 J	5.1 J
Cadmium	5	53.1	16.6	1.8	0.068 J	0.094 J	1 U	0.14 J	0.097 J	0.12 J	1 U	0.055 J	0.051 J
Chromium	100	182	162	0.043	1.7 J	0.52 J	0.37 J	1.4 J	3.6	1 J	0.45 J	0.44 J	0.46 J
Cobalt	--	778	633	1.1	10.4	4.4	4.7	5.5	6.2	2.7	0.66 J	2.6	2.7
Copper	1,300	352	324	150	24.5	7.6	7.4	23.2	16	15.5	5.8	5.6	5.1
Mercury	2	0.21	0.15	1.1	0.19 J	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	--	86.9	95.7	73	3.9	4	3.3	6.3	5.7	3.8	1 U	1.4	1.4
Selenium	50	42.7	29.9	18	7.3	4.5 J	5.3	37.2	12.8	9.6	5.8	7.6	7.8
Thallium	2	ND	ND	--	0.2 J	0.37 J	0.13 J	0.38 J	0.16 J	0.29 J	1 U	0.051 J	1 U
Vanadium	--	549	485	18	15	9.4	87.3	38.4	10.2	13.4	41.4	49.5	52.7
Zinc	--	695	548	1,100	9.2	13	7.6	15.4	14.3	9.3	3.3	2.4	2.2
Dissolved Metals (UG/L)													
Antimony, Dissolved	6	3.8	11.2	1.5	0.48 J	0.35 J	0.41 J	0.48 J	0.84 J	0.52 J	2 U	2 U	2 U
Arsenic, Dissolved	10	17.7	14.0	0.045	2.3	2.1	3.1	6.4	4.6	3	1.2	1.3	1.1
Barium, Dissolved	2,000	271	260	730	84.9	13.6	12.3	36.7	52.7	39.5	9.6 J	4.8 J	4.8 J
Cadmium, Dissolved	5	36.0	36.4	1.8	0.1 J	0.053 J	1 U	0.066 J	0.76 J	0.061 J	1 U	0.062 J	0.059 J
Chromium, Dissolved	100	8	6.5	0.043	0.48 J	2 U	0.28 J	0.6 J	0.77 J	0.73 J	0.45 J	0.34 J	0.49 J
Cobalt, Dissolved	--	591	581	1.1	6.6	3.3	4.5	2.6	35.7	2.3	0.64 J	2.4	2.5
Copper, Dissolved	1,300	496	29	150	42.5	19.2	17.5	36.3	31.3	29.3	11.3	5	9.5
Nickel, Dissolved	--	80.1	84.1	73	3.3	3.3	3.7	3.7	45.8	3.3	0.88 J	1.3	1.5
Selenium, Dissolved	50	27.3	23.9	18	7.6	4.1 J	6	23.7	17.3	10.1	6.3	8.1	7.9
Thallium, Dissolved	2	ND	ND	--	0.34 J	0.39 J	0.15 J	0.26 J	0.61 J	0.27 J	1 U	1 U	1 U
Vanadium, Dissolved	--	265.0	21.0	18	8.6 J	8.1 J	90.9 J	21.4 J	8.3 J	12.6 J	45.5 J	52.8 J	53.2 J
Zinc, Dissolved	--	492	361	1,100	7.3	6.9	5	5.2	181	8.4	2.3	2.5	2.1
Total Petroleum Hydrocarbons (ug/kg))													

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Notes:

Exceeds background maximum criteria

Exceeds background mean 2S criteria

Bold indicates exceedance of regulatory criteria and background criteria (if applicable)

NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
R - Unreliable Result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
UG/L - Micrograms per liter

TABLE 5
HHRA COPC Summary Table - Residential Land Use
NAPR, Puerto Rico

Site: SWMU-67
Media: Surface Soil, Total Soil, and Groundwater

Data Summary											Background Comparison		Screening Level (SL) Comparison						Exposure Point Concentrations (EPC)				Risk Estimates		
Exposure Point	CAS Number	Chemical (1)	Minimum Concentration	Qualifier	Maximum Concentration	Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Background Value (2)	Max Exceeds Background	Carcinogenic RSL ELCR=1.0E-6 (3)	Noncarcinogenic RSL HQ=1 (3)	Final Adjusted RSL (4)	Basis	Frequency of SL Exceedance (5)	Max Exceeds 100x SL (5)	EPC (6)	Statistic	Basis	Note	Target Organ	ELCR (9)	HQ (9)
Surface Soil	7440-38-2	Arsenic	0.23	J	5		MG/KG	67SS02	13 / 15	1.80E-01 - 3.60E-01	2.5	Yes	0.39	22	0.39	ca	12 / 15	No	1.9	95% KM (BCA)	UCL	(7)	Skin, Vascular	4.8E-06	0.1
	7440-47-3	Chromium	13		47.9	J	MG/KG	67SS02	15 / 15	1.60E-01 - 3.20E-01	47	Yes	--	120000	0.29	ca	15 / 15	Yes	--	--	--	(7)	--	--	--
	7440-48-4	Cobalt	10.6	J	45.6	J	MG/KG	67SD02	15 / 15	2.10E-02 - 4.30E-02	50.2	No	368	23	2.3	nc	15 / 15	No	--	--	--	(7)	--	--	--
	7440-62-2	Vanadium	88.5	J	371	J	MG/KG	67SD02	15 / 15	2.80E-01 - 5.50E-01	230	Yes	--	390	39	nc	15 / 15	No	--	--	--	(7)	--	--	--
	50-32-8	Benzo(a)pyrene	0.0006	J	0.07		MG/KG	67SD05	8 / 15	4.10E-04 - 8.20E-04	--	No	0.015	--	0.015	ca	1 / 15	No	0.018	95% KM (BCA)	UCL	(7)	--	1.2E-06	--
	53-70-3	Dibenz(a,h)anthracene	0.0005	J	0.028		MG/KG	67SD05	6 / 15	3.50E-04 - 7.10E-04	--	No	0.015	--	0.015	ca	1 / 15	No	--	--	--	(7)	--	--	--
Total Soil	7440-38-2	Arsenic	0.23	J	5		MG/KG	67SS02	22 / 26	1.80E-01 - 1.00E+00	1.7	Yes	0.39	22	0.39	ca	20 / 26	No	--	--	--	(7)	--	--	--
	7440-47-3	Chromium	6.7	J	233		MG/KG	67GW01	26 / 26	1.60E-01 - 9.30E-01	148	Yes	--	120000	0.29	ca	26 / 26	Yes	233	--	Max	(7)	NOE	--	0.002
	7440-48-4	Cobalt	10.6	J	472	J	MG/KG	67GW01	26 / 26	2.10E-02 - 1.20E-01	33.8	Yes	368	23	2.3	nc	26 / 26	Yes	128	95% Chebyshev (Mean, Sd)	UCL	(7)	Thyroid	3.5E-07	5.6
	7440-50-8	Copper	34.5	J	681	J	MG/KG	67GW01	26 / 26	2.90E-02 - 1.70E-01	260	Yes	--	3100	310	nc	1 / 26	No	681	--	Max		GI	--	0.2
	7440-02-0	Nickel	3.4		310		MG/KG	67GW01	26 / 26	2.60E-02 - 1.50E-01	35.6	Yes	13000	1500	150	nc	1 / 26	No	310	--	Max		Body Weight	2.4E-08	0.2
	7440-62-2	Vanadium	88.5	J	1480	J	MG/KG	67GW01	26 / 26	2.80E-01 - 1.60E+00	410	Yes	--	390	39	nc	26 / 26	No	480	95% Chebyshev (Mean, Sd)	UCL	(7)	Hair Cystine	--	1.2
	50-32-8	Benzo(a)pyrene	0.00047	J	0.07		MG/KG	67SD05	12 / 26	4.10E-04 - 8.20E-04	--	No	0.015	--	0.015	ca	1 / 26	No	--	--	--	(7)	NA	--	--
	53-70-3	Dibenz(a,h)anthracene	0.0005	J	0.028		MG/KG	67SD05	6 / 26	3.50E-04 - 7.10E-04	--	No	0.015	--	0.015	ca	1 / 26	No	0.0045	95% KM (BCA)	UCL	(7)	NA	3.0E-07	--
Groundwater	91-20-3	Naphthalene	1		1		ug/L	67GW07	1 / 8	3.00E-02 - 3.30E-02	--	--	0.14	6.2	0.14	ca	1 / 8	No	1	--	Max		Body Weight	7.1E-06	0.2
	7440-38-2	Arsenic	1.1		9.8		ug/L	67GW04	8 / 8	8.80E-02 - 8.80E-02	22.4	No	0.045	11	0.045	ca	8 / 8	Yes	9.8	--	Max	(8)	Skin, Vascular	2.2E-04	0.9
	7440-47-3	Chromium	0.37	J	3.6		ug/L	67GW05	8 / 8	2.40E-01 - 2.40E-01	182	No	--	55000	0.043	ca	8 / 8	No	3.6	--	Max	(8)	NOE	--	0.00007
	7440-48-4	Cobalt	0.66	J	10.4		ug/L	67GW01	8 / 8	4.50E-02 - 4.50E-02	778	No	--	11	1.1	nc	7 / 8	No	--	--	--	(8)	--	--	--
	7782-49-2	Selenium	4.5	J	37.2		ug/L	67GW04	8 / 8	2.90E-01 - 2.90E-01	42.7	No	--	180	18	nc	1 / 8	No	37.2	--	Max	(8)	Selenosis	--	0.2
	7440-62-2	Vanadium	9.4		87.3		ug/L	67GW03	8 / 8	1.70E-01 - 1.70E-01	549	No	--	180	18	nc	4 / 8	No	--	--	--	(8)	--	--	--
	7440-38-2_D	Arsenic, Dissolved	1.2		6.4		ug/L	67GW04	8 / 8	8.80E-02 - 8.80E-02	17.7	No	0.045	11	0.045	ca	8 / 8	Yes	--	--	--	(8)	--	--	--
	7440-47-3_D	Chromium, Dissolved	0.28	J	0.77	J	ug/L	67GW05	7 / 8	2.40E-01 - 2.40E-01	8	No	--	55000	0.043	ca	7 / 8	No	--	--	--	(8)	--	--	--
	7440-48-4_D	Cobalt, Dissolved	0.64	J	35.7		ug/L	67GW05	8 / 8	4.50E-02 - 4.50E-02	591	No	--	11	1.1	nc	7 / 8	No	35.7	--	Max	(8)	Thyroid	--	3.2
	7782-49-2_D	Selenium, Dissolved	4.1	J	23.7		ug/L	67GW04	8 / 8	2.90E-01 - 2.90E-01	27.3	No	--	180	18	nc	1 / 8	No	--	--	--	(8)	--	--	--
	7440-62-2_D	Vanadium, Dissolved	8.1	J	90.9	J	ug/L	67GW03	8 / 8	1.70E-01 - 1.70E-01	265	No	--	180	18	nc	4 / 8	No	90.9	--	Max	(8)	Hair Cystine	--	0.5

Note:
Soil data include estuarine sediment and freshwater sediment data.

(1) Chemical whose maximum detected concentration (MaxDet) exceeds adjusted RSL in the exposure medium are presented on the table.
(2) Background Concentrations for NAPR are the maximum background concentrations for each medium; background soil concentrations of clay were used for total soil.
(3) Regional Screening Levels (RSL) (November 2010) based on an ELCR of $1x10^{-6}$ and an HQ=1.0
- RSLs for residential soil are used for surface soil and total soil.
- RSLs for tapwater are used for groundwater.
(4) The final RSL: the lower of carcinogenic RSLs based on ELCR of $1x10^{-6}$ and noncarcinogenic RSLs adjusted using HQ=0.1.
(5) The final RSL is used as Screening Level (SL).
(6) The MaxDet was initially used as exposure point concentration (EPC). When the risk estimates based on MaxDet exceeds ELCR of $1x10^{-6}$ and/or target organ-specific Hazard Index (HI) of 1.0, upper confidence limit (UCL) on mean is used as EPC for surface and total soil.
(7) When a chemical was detected both in surface soil and total soil, the higher EPCs in two media are used for the risk calculation.
(8) When a metal was detected both in total and dissolved phases, the higher EPCs in two phases are used for the risk calculation.
(9) Noncarcinogenic hazard quotient and ELCR are estimated using the ratio of RSL and EPC.
- HQ = EPC / Noncarcinogenic RSL (based on HQ=1.0)
- ELCR = EPC x $1x10^{-6}$ / Carcinogenic RSL (based on ELCR=$1x10^{-6}$)

The SL for 'Chromium (VI)' was used as the adjusted SL for Chromium. The expected form of chromium is Chromium (III). Therefore, the SL for 'Chromium (III)' was used as the Cancer and Noncancer Toxicity screening value.
The SL for 'Nickel Soluble Salts' was used as the adjusted SL for Nickel.
The SL for 'Vanadium and Compounds' was used as the adjusted SL for Vanadium.

RSL Basis: ca = Carcinogenic; nc = Noncarcinogenic
J = compound was detected below the reporting limit in the sample
Target Organ: NOE = no observed effect; GI=gastrointestinal

SWMU-67 Cumulative Risk	ELCR	Max HI *
Soil	7E-06	5.6
HI is based on effect on thyroid		
Groundwater	2E-04	3.2
HI is based on effect on thyroid		

Total Risk	2E-04	9
* Max HI is the highest HI associated with any target organ.		

TABLE 6
HHRA COPC Summary Table - Industrial Land Use
NAPR, Puerto Rico

Site: SWMU-67
Media: Surface Soil, Total Soil, and Groundwater

Data Summary											Background Comparison		Screening Level (SL) Comparison						Exposure Point Concentrations (EPC)				Risk Estimates		
Exposure Point	CAS Number	Chemical (1)	Minimum Concentration Qualifier		Maximum Concentration Qualifier		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Background Value (2)	Max Exceeds Background	Carcinogenic RSL ELCR=1.0E-6 (3)	Noncarcinogenic RSL HQ=1 (3)	Final Adjusted RSL (4)	Basis	Frequency of SL Exceedance (5)	Max Exceeds 100x SL (5)	EPC (6)	Statistic	Basis	Note	Target Organ	ELCR (9)	HQ (9)
Surface Soil	7440-38-2	Arsenic	0.23	J	5		MG/KG	67SS02	13 / 15	1.80E-01 - 3.60E-01	2.5	Yes	1.6	260	1.6	ca	2 / 15	No	1.9	95% KM (BCA)	UCL	(7)	Skin, Vascular	1.2E-06	0.007
	7440-47-3	Chromium	13		47.9	J	MG/KG	67SS02	15 / 15	1.60E-01 - 3.20E-01	47	Yes	--	1500000	5.6	ca	15 / 15	No	--	--	--	(7)	--	--	--
	7440-48-4	Cobalt	10.6	J	45.6	J	MG/KG	67SD02	15 / 15	2.10E-02 - 4.30E-02	50.2	No	1900	300	30	nc	5 / 15	No	--	--	--	(7)	--	--	--
Total Soil	7440-38-2	Arsenic	0.23	J	5		MG/KG	67SS02	22 / 26	1.80E-01 - 1.00E+00	1.7	Yes	1.6	260	1.6	ca	3 / 26	No	--	--	--	(7)	--	--	--
	7440-47-3	Chromium	6.7	J	233		MG/KG	67GW01	26 / 26	1.60E-01 - 9.30E-01	148	Yes	--	1500000	5.6	ca	26 / 26	No	233	--	Max	(7)	NOE	--	0.0002
	7440-48-4	Cobalt	10.6	J	472	J	MG/KG	67GW01	26 / 26	2.10E-02 - 1.20E-01	33.8	Yes	1900	300	30	nc	11 / 26	No	128	95% Chebyshev (Mean, Sd)	UCL	(7)	Thyroid	6.7E-08	0.4
	7440-62-2	Vanadium	88.5	J	1480	J	MG/KG	67GW01	26 / 26	2.80E-01 - 1.60E+00	410	Yes	--	5200	520	nc	1 / 26	No	1480	--	Max		Hair Cystine	--	0.3
Groundwater	91-20-3	Naphthalene	1		1		ug/L	67GW07	1 / 8	3.00E-02 - 3.30E-02	--	--	0.14	6.2	0.14	ca	1 / 8	No	1	--	Max		Body Weight	7.1E-06	0.2
	7440-38-2	Arsenic	1.1		9.8		ug/L	67GW04	8 / 8	8.80E-02 - 8.80E-02	22.4	No	0.045	11	0.045	ca	8 / 8	Yes	9.8	--	Max	(8)	Skin, Vascular	2.2E-04	0.9
	7440-47-3	Chromium	0.37	J	3.6		ug/L	67GW05	8 / 8	2.40E-01 - 2.40E-01	182	No	--	55000	0.043	ca	8 / 8	No	3.6	--	Max	(8)	NOE	--	0.00007
	7440-48-4	Cobalt	0.66	J	10.4		ug/L	67GW01	8 / 8	4.50E-02 - 4.50E-02	778	No	--	11	1.1	nc	7 / 8	No	--	--	--	(8)	--	--	--
	7782-49-2	Selenium	4.5	J	37.2		ug/L	67GW04	8 / 8	2.90E-01 - 2.90E-01	42.7	No	--	180	18	nc	1 / 8	No	37.2	--	Max	(8)	Selenosis	--	0.2
	7440-62-2	Vanadium	9.4		87.3		ug/L	67GW03	8 / 8	1.70E-01 - 1.70E-01	549	No	--	180	18	nc	4 / 8	No	--	--	--	(8)	--	--	--
	7440-38-2_D	Arsenic, Dissolved	1.2		6.4		ug/L	67GW04	8 / 8	8.80E-02 - 8.80E-02	17.7	No	0.045	11	0.045	ca	8 / 8	Yes	--	--	--	(8)	--	--	--
	7440-47-3_D	Chromium, Dissolved	0.28	J	0.77	J	ug/L	67GW05	7 / 8	2.40E-01 - 2.40E-01	8	No	--	55000	0.043	ca	7 / 8	No	--	--	--	(8)	--	--	--
	7440-48-4_D	Cobalt, Dissolved	0.64	J	35.7		ug/L	67GW05	8 / 8	4.50E-02 - 4.50E-02	591	No	--	11	1.1	nc	7 / 8	No	35.7	--	Max	(8)	Thyroid	--	3.2
	7782-49-2_D	Selenium, Dissolved	4.1	J	23.7		ug/L	67GW04	8 / 8	2.90E-01 - 2.90E-01	27.3	No	--	180	18	nc	1 / 8	No	--	--	--	(8)	--	--	--
	7440-62-2_D	Vanadium, Dissolved	8.1	J	90.9	J	ug/L	67GW03	8 / 8	1.70E-01 - 1.70E-01	265	No	--	180	18	nc	4 / 8	No	90.9	--	Max	(8)	Hair Cystine	--	0.5

Note:
Soil data include estuarine sediment and freshwater sediment data.

(1) Chemical whose maximum detected concentration (MaxDet) exceeds adjusted RSL in the exposure medium are presented on the table.
(2) Background Concentrations for NAPR are the maximum background concentrations for each medium; background soil concentrations of clay were used for total soil.
(3) Regional Screening Levels (RSL) (November 2010) based on an ELCR of $1x10^{-6}$ and an HQ=1.0
- RSLs for residential soil are used for surface soil and total soil.
- RSLs for tapwater are used for groundwater.
(4) The final RSL: the lower of carcinogenic RSLs based on ELCR of $1x10^{-6}$ and noncarcinogenic RSLs adjusted using HQ=0.1.
(5) The final RSL is used as Screening Level (SL).
(6) The MaxDet was initially used as exposure point concentration (EPC). When the risk estimates based on MaxDet exceeds ELCR of $1x10^{-6}$ and/or target organ-specific Hazard Index (HI) of 1.0, upper confidence limit (UCL) on mean is used as EPC for surface and total soil.
(7) When a chemical was detected both in surface soil and total soil, the higher EPCs in two media are used for the risk calculation.
(8) When a metal was detected both in total and dissolved phases, the higher EPCs in two phases are used for the risk calculation.
(9) Noncarcinogenic hazard quotient and ELCR are estimated using the ratio of RSL and EPC.
- HQ = EPC / Noncarcinogenic RSL (based on HQ=1.0)
- ELCR = EPC x $1x10^{-6}$ / Carcinogenic RSL (based on ELCR=$1x10^{-6}$)

The SL for 'Chromium (VI)' was used as the adjusted SL for Chromium. The expected form of chromium is Chromium (III). Therefore, the SL for 'Chromium (III)' was used as the Cancer and Noncancer Toxicity screening value.
The SL for 'Vanadium and Compounds' was used as the adjusted SL for Vanadium.

RSL Basis: ca = Carcinogenic; nc = Noncarcinogenic
J = compound was detected below the reporting limit in the sample
Target Organ: NOE = no observed effect

SWMU-67 Cumulative Risk	ELCR	Max HI *
Soil	1E-06	0.4
HI is based on effect on thyroid		
Groundwater	2E-04	3.2
HI is based on effect on thyroid		

Total Risk	2E-04	4
* Max HI is the highest HI associated with any target organ.		

TABLE 7
Ecological Screening - SWMU 67 Surface Soils - Plants and Soil Invertebrates
Naval Activity Puerto Rico, Ceiba, Puerto Rico

Chemical	Soil Screening Value	Mean + 2SD Background	Maximum Background	67GW01	67GW02	67GW03	67GW04	67GW05	67GW06	67GW07	67GW08		67SS01	67SS02
				67SB01-00	67SB02-00	67SB03-00	67SB04-00	67SB05-00	67SB06-00	67SB07-00	67SB08-00	67SB08-00D	67SS01	67SS02
				03/24/10	03/25/10	03/26/10	03/25/10	03/24/10	03/23/10	03/23/10	03/22/10	03/22/10	03/30/10	03/30/10
Volatile Organic Compounds (UG/KG)														
2-Butanone	NSV	--	--	19.0	19.0 U	12.0	5.60 J	13.0 U	11.0 U	20.0 J	6.80 J	13.0	14.0 U	14.0 U
Acetone	NSV	--	--	240	220	140	63.0	79.0	110	280 J	110	170	14.0 R	14.0 R
Benzene	6.80	--	--	3.80 U	4.20 U	3.50 U	4.40 U	5.10 U	4.20 U	0.59 J	5.20 U	4.60 U	5.50 U	5.70 U
Carbon disulfide	NSV	--	--	3.80 U	4.20 U	3.50 U	0.92 J	5.10 U	4.20 U	6.40 UJ	5.20 U	4.60 U	5.50 U	5.70 U
Chloroform	1,844	--	--	3.80 U	4.20 U	0.24 J	0.30 J	5.10 U	4.20 U	6.40 UJ	5.20 U	4.60 U	5.50 U	5.70 U
Chloromethane	5,000	--	--	3.80 U	4.20 U	3.50 U	4.40 U	5.10 U	0.42 J	6.40 UJ	5.20 U	4.60 U	5.50 UJ	5.70 UJ
Iodomethane	NSV	--	--	1.90 J	0.70 J	1.10 J	4.40 U	5.10 U	1.60 J	6.40 UJ	1.80 J	2.90 J	5.50 U	5.70 U
m- and p-Xylene	2,400	--	--	7.60 U	0.12 J	7.00 U	8.80 U	10.0 U	8.50 U	13.0 UJ	10.0 U	9.20 U	11.0 U	11.0 U
Methylene chloride	1,250	--	--	3.80 U	4.20 U	0.35 J	4.40 U	5.10 U	4.20 U	6.40 UJ	5.20 U	4.60 U	5.50 U	5.70 U
Xylene, total	2,400	--	--	3.80 U	0.12 J	3.50 U	4.40 U	5.10 U	4.20 U	6.40 UJ	5.20 U	4.60 U	5.50 U	5.70 U
Semivolatile Organic Compounds (UG/KG)														
2-Methylnaphthalene	LMW PAH	--	--	9.40 U	0.81 J	8.90 U	8.80 U	9.50 U	9.50 U	10.0 UJ	11.0 UJ	11.0 UJ	9.50 U	9.50 U
Acenaphthene	LMW PAH	--	--	9.40 U	9.80 U	8.90 U	8.80 U	9.50 U	9.50 U	10.0 U	11.0 U	11.0 U	1.10 J	0.75 J
Acenaphthylene	LMW PAH	--	--	9.40 U	1.20 J	8.90 U	1.40 J	9.50 U	9.50 U	10.0 U	11.0 U	11.0 U	3.60 J	1.90 J
Anthracene	LMW PAH	--	--	0.50 J	0.69 J	0.72 J	1.40 J	9.50 U	9.50 U	10.0 U	11.0 U	11.0 U	2.50 J	1.50 J
Benzo(a)anthracene	HMW PAH	--	--	1.20 J	2.70 J	3.80 J	4.70 J	9.50 U	1.00 J	10.0 U	11.0 U	11.0 U	11.0	8.60 J
Benzo(a)pyrene	HMW PAH	--	--	1.60 J	9.80 U	4.80 J	6.90 J	0.60 J	1.60 J	10.0 U	11.0 U	11.0 U	11.0	10.0
Benzo(b)fluoranthene	HMW PAH	--	--	1.40 J	4.10 J	5.10 J	5.20 J	9.50 UJ	2.50 J	10.0 UJ	11.0 UJ	11.0 UJ	6.70 J	6.50 J
Benzo(g,h,i)perylene	HMW PAH	--	--	1.70 J	3.40 J	3.70 J	4.90 J	0.47 J	1.60 J	10.0 U	11.0 U	11.0 U	9.20 J	8.80 J
Benzo(k)fluoranthene	HMW PAH	--	--	1.90 J	3.10 J	8.90 U	8.80 U	0.55 J	1.60 J	10.0 U	11.0 U	11.0 U	8.00 J	6.60 J
bis(2-Ethylhexyl)phthalate	30,000	--	--	190 U	200 U	360 U	39.0 J	200 U	200 U	210 U	220 U	220 U	100 J	64.0 J
Chrysene	HMW PAH	--	--	1.50 J	3.50 J	3.10 J	6.80 J	9.50 U	0.96 J	10.0 U	11.0 U	11.0 U	10.0	7.40 J
Dibenz(a,h)anthracene	HMW PAH	--	--	0.50 J	9.80 UJ	0.81 J	1.20 J	9.50 U	9.50 UJ	10.0 U	11.0 U	11.0 U	2.00 J	1.60 J
Di-n-butylphthalate	40,000	--	--	190 U	200 U	360 U	180 U	200 U	200 U	23.0 J	220 U	220 U	200 U	200 U
Fluoranthene	LMW PAH	--	--	9.40 U	5.90 J	5.90 J	17.0	9.50 U	9.50 U	10.0 U	11.0 U	11.0 U	17.0	15.0
Indeno(1,2,3-cd)pyrene	HMW PAH	--	--	2.00 J	4.50 J	3.60 J	6.90 J	0.62 J	1.90 J	10.0 UJ	11.0 UJ	11.0 UJ	8.80 J	9.60
PAH (HMW)	18,000	--	--	12.8	35.8	35.4	54.0	26.0	17.1	45.0 U	49.5 U	49.5 U	82.7	75.1
PAH (LMW)	29,000	--	--	128	126	212	134	138 U	135	145 U	154 U	154 U	147	139
Phenanthrene	LMW PAH	--	--	9.40 U	2.80 J	2.70 J	6.10 J	9.50 U	1.60 J	10.0 U	11.0 U	11.0 U	8.20 J	6.00 J
Pyrene	HMW PAH	--	--	1.00 J	4.70 J	6.00 J	13.0	9.50 U	1.20 J	10.0 U	11.0 U	11.0 U	16.0	16.0
Herbicides (UG/KG)														
No Detections	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Explosives (UG/KG)														
No Detections	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (MG/KG)														
Antimony	78.0	3.17	2.80	1.10 UJ	0.52 J	0.14 J	0.26 J	1.10 UJ	1.20 UJ	1.20 UJ	1.20 UJ	1.30 UJ	0.21 J	0.17 J
Arsenic	18.0	2.65	2.50	0.23 J	1.00	0.52 U	0.99	0.49 J	0.57 U	0.73	1.40	1.40	2.90	5.00
Barium	330	199	220	127	130	203	94.7	56.2	31.8	59.1	48.1 J	23.9 J	116	108
Beryllium	40.0	0.59	0.58	0.29 J	0.35 J	0.40 J	0.25 J	0.19 J	0.14 J	0.19 J	0.38 J	0.20 J	0.34 J	0.30 J
Cadmium	32.0	1.02	0.92	0.26 J	0.36 J	0.17 J	0.24 J	0.18 J	0.13 J	0.18 J	0.14 J	0.16 J	0.35 J	0.35 J
Chromium	64.0	49.8	47.0	41.8	41.3 J	47.4 J	33.6 J	13.0	16.4 J	24.1	25.2	32.8	28.0 J	47.9 J
Cobalt	13.0	46.2	50.2	23.2 J	38.1 J	24.7	26.5	21.0 J	15.6 J	24.4 J	10.6 J	10.0 J	28.9	25.7
Copper	70.0	168	180	115 J	277 J	50.7	99.2	80.1 J	55.7 J	78.4 J	44.4 J	37.6 J	102	150
Lead	120	22.0	21.0	13.4 J	62.4	4.30	9.30	2.20 J	2.10	3.70 J	4.20 J	8.70 J	23.8	31.5
Mercury	0.10	0.109	0.120	0.041	0.066	0.037	0.037	0.011	0.038 U	0.011	0.015	0.170	0.081	0.054

TABLE 7
Ecological Screening - SWMU 67 Surface Soils - Plants and Soil Invertebrates
Naval Activity Puerto Rico, Ceiba, Puerto Rico

Chemical	Soil Screening Value	Mean + 2SD Background	Maximum Background	67GW01	67GW02	67GW03	67GW04	67GW05	67GW06	67GW07	67GW08		67SS01	67SS02
				67SB01-00	67SB02-00	67SB03-00	67SB04-00	67SB05-00	67SB06-00	67SB07-00	67SB08-00	67SB08-00D	67SS01	67SS02
				03/24/10	03/25/10	03/26/10	03/25/10	03/24/10	03/23/10	03/23/10	03/22/10	03/22/10	03/30/10	03/30/10
Nickel	38.0	20.7	19.0	**13.6**	**16.3 J**	**11.5**	**15.2**	**6.70**	**12.0 J**	**9.80**	**7.40 J**	**4.10 J**	**11.2**	**16.6**
Selenium	0.52	1.48	1.20	**1.20 J**	**1.50 J**	**0.58 J**	**0.42 J**	**0.43 J**	**0.34 J**	**0.49 J**	**1.60 J**	**2.20 J**	**1.30 J**	**1.00 J**
Silver	560	--	--	0.57 U	**0.08 J**	0.52 U	**0.06 J**	0.56 U	0.57 U	0.59 U	0.61 U	0.63 U	**0.08 J**	**0.05 J**
Thallium	1.00	--	0.10	**0.09 J**	**0.30 J**	**0.04 J**	**0.05 J**	**0.02 J**	0.57 U	**0.04 J**	0.61 U	**0.02 J**	**0.08 J**	**0.05 J**
Vanadium	130	259	230	**147 J**	**213 J**	**150**	**170**	**177 J**	**88.5 J**	**151 J**	**320 J**	**272 J**	**227**	**149**
Zinc	120	115	120	**46.3**	**85.7 J**	**32.8 J**	**67.1 J**	**61.2**	**36.8 J**	**61.3**	**25.5**	**33.3**	**71.5 J**	**63.8 J**
Total Petroleum Hydrocarbons (UG/KG)														
TPH-diesel range	NSV	--	--	11,000 U	**12,000**	11,000 U	11,000 U	**110,000**	11,000 U	12,000 U	**23,000**	**17,000**	11,000 U	11,000 U

Notes:

Grey highlighting indicates value greater than screening value or detect and no screening value (NSV)
Yellow highlighting indicates value equal to screening value
Red highlighting indicates value greater than or equal to screening value and exceeds mean + 2SD background

Bold indicates detections
NA - Not applicable

TABLE 8

Ecological Screening Statistics - SWMU 67 Surface Soil - Plants and Soil Invertebrate

Naval Activity Puerto Rico, Ceiba, Puerto Rico

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Soil Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Mean + 2SD Background Value	Frequency of Background Exceedance	Maximum Ratio	Mean Ratio	95% UCL Hazard Quotient	Mean Hazard Quotient
Volatile Organic Compounds (UG/KG)																
2-Butanone	11.0 - 19.0	5 / 10	5.60	20.0	10.5	5.39	13.6	NSV	-- / --	NSV	--	-- / --	--	--	NSV	NSV
Acetone	-- - --	8 / 8	63.0	280	163	78.7	215	NSV	-- / --	NSV	--	-- / --	--	--	NSV	NSV
Carbon disulfide	3.50 - 6.40	1 / 10	0.92	0.92	2.27	0.66	2.65	NSV	-- / --	NSV	--	-- / --	--	--	NSV	NSV
Iodomethane	4.40 - 6.40	5 / 10	0.70	2.90	2.18	0.83	2.66	NSV	-- / --	NSV	--	-- / --	--	--	NSV	NSV
Inorganics (MG/KG)																
Cobalt	-- - --	10 / 10	10.6	38.1	23.9	7.40	28.2	13.0	9 / 10	2.93	46.2	0 / 10	0.82	0.52	--	--
Copper	-- - --	10 / 10	44.4	277	105	68.4	145	70.0	7 / 10	3.96	168	1 / 10	1.65	0.63	2.07	1.50
Mercury	0.038 - 0.038	9 / 10	0.011	0.17	0.053	0.047	0.080	0.10	1 / 10	1.70	0.109	1 / 10	1.56	0.48	0.80	0.53
Selenium	-- - --	10 / 10	0.34	2.20	0.95	0.61	1.30	0.52	6 / 10	4.23	1.48	2 / 10	1.49	0.64	2.50	1.82
Vanadium	-- - --	10 / 10	88.5	320	179	62.5	215	130	9 / 10	2.46	259	1 / 10	1.24	0.69	1.66	1.38
Total Petroleum Hydrocarbons (UG/KG)																
TPH-diesel range	11,000 - 12,000	3 / 10	12,000	110,000	18,400	32,668	37,337	NSV	-- / --	NSV	--	-- / --	--	--	NSV	NSV

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

TABLE 9
Ecological Screening - SWMU 67 Drainage Ditch Samples - Plants and Soil Invertebrate
Naval Activity Puerto Rico, Ceiba, Puerto Rico

Chemical	Soil Screening Value	Mean + 2SD Background	Maximum Background	67SD01		67SD02	67SD03	67SD04	67SD05
				67SD01	67SD01D	67SD02	67SD03	67SD04	67SD05
				03/22/10	03/22/10	03/22/10	03/22/10	03/22/10	03/22/10
Volatile Organic Compounds (UG/KG)									
2-Butanone	NSV	--	--	**11.0 J**	**20.0**	**9.40 J**	**13.0 J**	**15.0 J**	**15.0 J**
Acetone	NSV	--	--	**95.0**	**170**	**120 J**	**200 J**	**190**	**210 J**
Carbon disulfide	NSV	--	--	**5.10 J**	**36.0 J**	**0.86 J**	**2.70 J**	**15.0**	**1.70 J**
Chloromethane	5,000	--	--	6.60 U	6.00 U	**0.76 J**	6.80 UJ	8.20 U	**0.82 J**
Iodomethane	NSV	--	--	**1.20 J**	**0.77 J**	**2.50 J**	**2.90 J**	**2.30 J**	**2.50 J**
m- and p-Xylene	2,400	--	--	13.0 U	**0.24 J**	**0.42 J**	**0.34 J**	**0.38 J**	17.0 UJ
Xylene, total	2,400	--	--	6.60 U	**0.23 J**	**0.42 J**	**0.33 J**	**0.38 J**	8.30 UJ
Semivolatile Organic Compounds (UG/KG)									
Benzo(a)anthracene	HMW PAH	--	--	13.0 UJ	**28.0 J**	14.0 U	13.0 U	14.0 U	**52.0**
Benzo(a)pyrene	HMW PAH	--	--	13.0 U	12.0 U	14.0 U	13.0 U	14.0 U	**70.0**
Benzo(b)fluoranthene	HMW PAH	--	--	13.0 U	12.0 U	14.0 U	13.0 U	14.0 U	**110**
Benzo(g,h,i)perylene	HMW PAH	--	--	13.0 U	12.0 U	14.0 U	**23.0**	14.0 U	**73.0**
Benzo(k)fluoranthene	HMW PAH	--	--	13.0 U	12.0 U	14.0 U	13.0 U	14.0 U	**74.0**
Chrysene	HMW PAH	--	--	13.0 UJ	**24.0 J**	14.0 U	13.0 U	14.0 U	**77.0**
Dibenz(a,h)anthracene	HMW PAH	--	--	13.0 U	12.0 U	14.0 U	13.0 U	14.0 U	**28.0**
Fluoranthene	LMW PAH	--	--	13.0 UJ	**43.0 J**	14.0 U	13.0 U	14.0 U	**95.0**
Indeno(1,2,3-cd)pyrene	HMW PAH	--	--	13.0 U	12.0 U	14.0 U	13.0 U	14.0 U	**100**
PAH (HMW)	18,000	--	--	58.5 U	**139**	63.0 U	**75.0**	63.0 U	**674**
PAH (LMW)	29,000	--	--	182 U	**210**	196 U	187 U	201 U	**338**
Pyrene	HMW PAH	--	--	13.0 UJ	**51.0 J**	14.0 U	13.0 U	14.0 U	**90.0**
Herbicides (UG/KG)									
No Detections	--	--	--	NA	NA	NA	NA	NA	NA
Explosives (UG/KG)									
No Detections	--	--	--	NA	NA	NA	NA	NA	NA
Inorganics (MG/KG)									
Antimony	78.0	3.17	2.80	**1.20 J**	1.40 UJ	1.50 UJ	1.50 UJ	1.70 UJ	2.00 UJ
Arsenic	18.0	2.65	2.50	**1.20**	**0.99**	**0.93**	**0.89**	**1.60**	**1.30**
Barium	330	199	220	**62.0**	**53.3**	**44.8**	**68.3**	**61.8**	**113**
Beryllium	40.0	0.59	0.58	**0.27 J**	**0.24 J**	**0.28 J**	**0.25 J**	**0.31 J**	**0.31 J**
Cadmium	32.0	1.02	0.92	**0.79**	**0.70**	**0.51 J**	**0.32 J**	**0.35 J**	**0.79 J**
Chromium	64.0	49.8	47.0	**28.2**	**21.0**	**27.5**	**23.8**	**36.0**	**37.2**
Cobalt	13.0	46.2	50.2	**44.5 J**	**35.9 J**	**45.6 J**	**32.8 J**	**41.8 J**	**25.7 J**
Copper	70.0	168	180	**77.1 J**	**58.3 J**	**63.4 J**	**64.0 J**	**65.4 J**	**133 J**
Lead	120	22.0	21.0	**134 J**	**119 J**	**35.6 J**	**11.0 J**	**21.2 J**	**31.3 J**
Mercury	0.10	0.109	0.12	**0.028 J**	**0.040**	**0.033**	**0.023**	**0.041**	**0.084**
Nickel	38.0	20.7	19.0	**12.8**	**10.1**	**11.7**	**9.80**	**12.3**	**12.3**
Selenium	0.52	1.48	1.20	**1.40 J**	**1.20 J**	**1.40 J**	**1.50 J**	**1.50 J**	**1.60 J**
Silver	560	--	--	**0.15 J**	0.69 U	0.77 U	0.76 U	0.85 U	0.99 U
Thallium	1.0	--	0.10	**0.07 J**	**0.05 J**	**0.05 J**	**0.05 J**	**0.05 J**	**0.18 J**
Vanadium	130	259	230	**232 J**	**190 J**	**371 J**	**170 J**	**282 J**	**214 J**
Zinc	120	115	120	**86.8**	**75.0**	**68.7**	**81.4**	**65.1**	**98.1**
Total Petroleum Hydrocarbons (UG/KG)									
TPH-diesel range	NSV	--	--	**31,000 J**	**20,000 J**	**27,000 J**	**28,000 J**	**34,000 J**	**41,000 J**

Notes:

Grey highlighting indicates value greater than screening value or detect and no screening value (NSV)

Yellow highlighting indicates value equal to screening value

Red highlighting indicates value greater than or equal to screening value and exceeds mean + 2SD background

Bold indicates detections

NA - Not applicable

TABLE 10

Ecological Screening Statistics - SWMU 67 Drainage Ditch Samples - Plants and Soil Invertebrate

Naval Activity Puerto Rico, Ceiba, Puerto Rico

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Arithmetic Mean	Standard Deviation of Mean	95% UCL (Norm)	Soil Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient	Mean + 2SD Background Value	Frequency of Background Exceedance	Maximum Ratio	Mean Ratio	95% UCL Hazard Quotient	Mean Hazard Quotient
Volatile Organic Compounds (UG/KG)																
2-Butanone	-- - --	5 / 5	9.40	20.0	14.5	3.84	18.1	NSV	-- / --	NSV	--	-- / --	--	--	NSV	NSV
Acetone	-- - --	5 / 5	120	210	178	35.6	212	NSV	-- / --	NSV	--	-- / --	--	--	NSV	NSV
Carbon disulfide	-- - --	5 / 5	0.86	36.0	11.3	15.0	25.5	NSV	-- / --	NSV	--	-- / --	--	--	NSV	NSV
Iodomethane	-- - --	5 / 5	1.20	2.90	2.28	0.64	2.89	NSV	-- / --	NSV	--	-- / --	--	--	NSV	NSV
Inorganics (MG/KG)																
Cobalt	-- - --	5 / 5	25.7	45.6	38.1	8.55	46.2	13.0	5 / 5	3.51	46.2	0 / 5	0.99	0.82	--	--
Copper	-- - --	5 / 5	63.4	133	80.6	29.8	109	70.0	2 / 5	1.90	168	0 / 5	0.79	0.48	--	--
Lead	-- - --	5 / 5	11.0	134	46.6	49.8	94.1	120	1 / 5	1.12	22.0	3 / 5	6.09	2.12	0.78	0.39
Selenium	-- - --	5 / 5	1.40	1.60	1.48	0.084	1.56	0.52	5 / 5	3.08	1.48	3 / 5	1.08	1.00	3.00	2.85
Vanadium	-- - --	5 / 5	170	371	254	76.8	327	130	5 / 5	2.85	259	2 / 5	1.43	0.98	2.52	1.95
Total Petroleum Hydrocarbons (UG/KG)																
TPH-diesel range	-- - --	5 / 5	27,000	41,000	32,200	5,630	37,568	NSV	-- / --	NSV	--	-- / --	--	--	NSV	NSV

NSV - No Screening Value

1 - Count of detected samples exceeding or equaling Screening Value

TABLE 11
Screening Statistics - SWMU 67 Surface Soil - Mammal/Bird Eco-SSLs
Naval Activity Puerto Rico, Ceiba, Puerto Ricc

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	95% UCL (Norm)	Arithmetic Mean	Mammal Eco-SSL	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient	Bird Eco-SSL	Frequency of Exceedance	Maximum Hazard Quotient	95% UCL Hazard Quotient	Mean Hazard Quotient
Inorganics (MG/KG)															
Antimony	1.10 - 1.30	5 / 10	0.52	0.54	0.43	0.27	1 / 10	1.93	2.01	1.57	--	-- / --	--	--	--
Arsenic	0.52 - 0.57	8 / 10	5.00	2.21	1.33	46.0	0 / 10	0.11	0.05	0.03	43.0	0 / 10	0.12	0.05	0.03
Barium	-- - --	10 / 10	203	127	97.4	2,000	0 / 10	0.10	0.06	0.05	--	-- / --	--	--	--
Beryllium	-- - --	10 / 10	0.40	0.33	0.28	21.0	0 / 10	0.02	0.02	0.01	--	-- / --	--	--	--
Cadmium	-- - --	10 / 10	0.36	0.29	0.24	0.36	1 / 10	1.00	0.80	0.66	0.77	0 / 10	0.47	0.38	0.31
Chromium	-- - --	10 / 10	47.9	39.7	32.6	34.0	4 / 10	1.41	1.17	0.96	26.0	7 / 10	1.84	1.53	1.26
Cobalt	-- - --	10 / 10	38.1	28.2	23.9	230	0 / 10	0.17	0.12	0.10	120	0 / 10	0.32	0.23	0.20
Copper	-- - --	10 / 10	277	145	105	49.0	9 / 10	5.65	2.96	2.15	28.0	10 / 10	9.89	5.18	3.76
Lead	-- - --	10 / 10	62.4	27.1	16.1	56.0	1 / 10	1.11	0.48	0.29	11.0	4 / 10	5.67	2.47	1.47
Nickel	-- - --	10 / 10	16.6	14.0	12.0	130	0 / 10	0.13	0.11	0.09	210	0 / 10	0.08	0.07	0.06
Selenium	-- - --	10 / 10	2.20	1.30	0.95	0.63	5 / 10	3.49	2.06	1.50	1.20	4 / 10	1.83	1.08	0.79
Silver	0.52 - 0.63	4 / 10	0.082	0.27	0.20	14.0	0 / 10	0.01	0.02	0.01	4.20	0 / 10	0.02	0.06	0.05
Vanadium	-- - --	10 / 10	320	215	179	280	1 / 10	1.14	0.77	0.64	7.80	10 / 10	41.0	27.6	23.0
Zinc	-- - --	10 / 10	85.7	66.3	56.0	79.0	1 / 10	1.08	0.84	0.71	46.0	7 / 10	1.86	1.44	1.22
Semivolatile Organic Compounds (UG/KG)															
PAH (HMW)	45.0 - 49.5	8 / 10	82.7	52.6	38.6	1,100	0 / 10	0.08	0.05	0.04	--	-- / --	--	--	--
PAH (LMW)	138 - 154	7 / 10	212	149	124	100,000	0 / 10	0.002	0.001	0.001	--	-- / --	--	--	--

Shaded cells indicate HQ $\geq$ 1

TABLE 12

Summary of Norway Rat Exposure Doses - Baseline (Step 3A) - 95% UCL

Naval Activity Puerto Rico, Ceiba, Puerto Rico

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Antimony	0.54	1.000	5.43E-01	Regresson	2.22E-02	0	2.86E-02	0.059	0.19	0.59	4.84E-01	1.53E-01	4.84E-02
Cadmium	0.29	Regression	3.09E+00	Regresson	3.15E-01	0	1.66E-01	0.77	2.43	7.70	2.16E-01	6.82E-02	2.16E-02
Chromium	39.7	0.320	1.27E+01	0.041	1.63E+00	0	7.77E-01	2.40	5.37	12.0	3.24E-01	1.45E-01	6.47E-02
Copper	145	Regression	1.99E+01	Regresson	1.39E+01	0	1.93E+00	5.60	7.23	9.34	3.44E-01	2.67E-01	2.06E-01
Lead	27.1	Regression	1.15E+01	Regresson	1.69E+00	0	6.97E-01	4.70	6.47	8.90	1.48E-01	1.08E-01	7.83E-02
Mercury	0.08	1.186	9.49E-02	Regresson	9.35E-02	0	9.32E-03	0.032	0.072	0.16	2.91E-01	1.30E-01	5.83E-02
Selenium	1.30	Regression	1.12E+00	Regresson	6.77E-01	0	9.02E-02	0.20	0.26	0.33	4.51E-01	3.51E-01	2.73E-01
Vanadium	215	0.039	8.40E+00	0.005	1.03E+00	0	8.87E-01	4.16	5.88	8.31	2.13E-01	1.51E-01	1.07E-01
Zinc	66.3	Regression	3.39E+02	Regresson	4.96E+01	0	1.90E+01	75.4	169	377	2.52E-01	1.13E-01	5.04E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0207 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.490 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.490 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.020 = Proportion of diet composed of soil
WIR = 0.0242 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.209 = Body weight (kg)

TABLE 13

Summary of Norway Rat Exposure Doses - Baseline (Step 3A) - Arithmetic Mear

Naval Activity Puerto Rico, Ceiba, Puerto Rico

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Antimony	0.43	1.000	4.25E-01	Regresson	1.77E-02	0	2.24E-02	0.059	0.19	0.59	3.79E-01	1.20E-01	3.79E-02
Cadmium	0.24	Regression	2.65E+00	Regresson	2.84E-01	0	1.43E-01	0.77	2.43	7.70	1.86E-01	5.87E-02	1.86E-02
Chromium	32.6	0.320	1.04E+01	0.041	1.34E+00	0	6.38E-01	2.40	5.37	12.0	2.66E-01	1.19E-01	5.32E-02
Copper	105	Regression	1.83E+01	Regresson	1.22E+01	0	1.69E+00	5.60	7.23	9.34	3.02E-01	2.34E-01	1.81E-01
Lead	16.1	Regression	7.59E+00	Regresson	1.26E+00	0	4.62E-01	4.70	6.47	8.90	9.84E-02	7.15E-02	5.20E-02
Mercury	0.053	1.186	6.25E-02	Regresson	7.45E-02	0	6.77E-03	0.032	0.072	0.16	2.12E-01	9.46E-02	4.23E-02
Selenium	0.95	Regression	8.91E-01	Regresson	4.77E-01	0	6.84E-02	0.20	0.26	0.33	3.42E-01	2.66E-01	2.07E-01
Vanadium	179	0.039	6.99E+00	0.005	8.60E-01	0	7.38E-01	4.16	5.88	8.31	1.77E-01	1.25E-01	8.88E-02
Zinc	56.0	Regression	3.20E+02	Regresson	4.51E+01	0	1.79E+01	75.4	169	377	2.37E-01	1.06E-01	4.74E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0207 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.490 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.490 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.020 = Proportion of diet composed of soil
WIR = 0.0242 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.209 = Body weight (kg)

TABLE 14

Summary of Indian Mongoose Exposure Doses - Baseline (Step 3A) - 95% UCL

Naval Activity Puerto Rico, Ceiba, Puerto Rico

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Soil-Mammal BAF	Small Mammal Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Antimony	0.54	1.000	5.43E-01	Regresson	2.22E-02	See footnote	2.88E-01	0	2.21E-02	0.059	0.19	0.59	3.75E-01	1.19E-01	3.75E-02
Cadmium	0.29	Regression	3.09E+00	Regresson	3.15E-01	Regresson	1.06E-01	0	9.81E-02	0.77	2.43	7.70	1.27E-01	4.03E-02	1.27E-02
Chromium	39.7	0.320	1.27E+01	0.041	1.63E+00	Regresson	3.33E+00	0	5.11E-01	2.40	5.37	12.0	2.13E-01	9.52E-02	4.26E-02
Copper	145	Regression	1.99E+01	Regresson	1.39E+01	Regresson	1.63E+01	0	1.17E+00	11.7	13.3	15.1	1.00E-01	8.80E-02	7.75E-02
Lead	27.1	Regression	1.15E+01	Regresson	1.69E+00	Regresson	4.64E+00	0	4.77E-01	4.70	6.47	8.90	1.02E-01	7.38E-02	5.36E-02
Mercury	0.08	1.186	9.49E-02	Regresson	9.35E-02	0.130	1.04E-02	0	3.74E-03	0.15	0.19	0.25	2.49E-02	1.93E-02	1.50E-02
Selenium	1.30	Regression	1.12E+00	Regresson	6.77E-01	Regresson	7.28E-01	0	5.20E-02	0.20	0.26	0.33	2.60E-01	2.02E-01	1.57E-01
Vanadium	215	0.039	8.40E+00	0.005	1.03E+00	0.013	2.83E+00	0	6.34E-01	4.16	5.88	8.31	1.52E-01	1.08E-01	7.63E-02
Zinc	66.3	Regression	3.39E+02	Regresson	4.96E+01	Regresson	1.19E+02	0	1.26E+01	75.4	169	377	1.68E-01	7.49E-02	3.35E-02

It was assumed that the concentration of each chemical in the small mammal's tissues was equal to the chemical concentration in its diet, that is, a diet to whole-body BAF of 1.0 was assumed

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0285 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.564 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.111 = Proportion of diet composed of food item (terrestrial plants)
FCxi = Chemical-specific = Concentration of chemical in food item (small mammals, dry weight basis)
PDFi = 0.297 = Proportion of diet composed of food item (small mammals)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.028 = Proportion of diet composed of soil
WIR = 0.0557 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.528 = Body weight (kg)

TABLE 15

Summary of Indian Mongoose Exposure Doses - Baseline (Step 3A) - Arithmetic Mean

Naval Activity Puerto Rico, Ceiba, Puerto Rico

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Soil-Mammal BAF	Small Mammal Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Antimony	0.43	1.000	4.25E-01	Regresson	1.77E-02	See footnote	2.25E-01	0	1.73E-02	0.059	0.19	0.59	2.94E-01	9.28E-02	2.94E-02
Cadmium	0.24	Regression	2.65E+00	Regresson	2.84E-01	Regresson	9.53E-02	0	8.42E-02	0.77	2.43	7.70	1.09E-01	3.46E-02	1.09E-02
Chromium	32.6	0.320	1.04E+01	0.041	1.34E+00	Regresson	2.88E+00	0	4.22E-01	2.40	5.37	12.0	1.76E-01	7.86E-02	3.52E-02
Copper	105	Regression	1.83E+01	Regresson	1.22E+01	Regresson	1.50E+01	0	1.03E+00	11.7	13.3	15.1	8.80E-02	7.75E-02	6.82E-02
Lead	16.1	Regression	7.59E+00	Regresson	1.26E+00	Regresson	3.69E+00	0	3.23E-01	4.70	6.47	8.90	6.86E-02	4.99E-02	3.62E-02
Mercury	0.053	1.186	6.25E-02	Regresson	7.45E-02	0.130	6.85E-03	0	2.54E-03	0.15	0.19	0.25	1.69E-02	1.31E-02	1.02E-02
Selenium	0.95	Regression	8.91E-01	Regresson	4.77E-01	Regresson	6.46E-01	0	4.18E-02	0.20	0.26	0.33	2.09E-01	1.63E-01	1.27E-01
Vanadium	179	0.039	6.99E+00	0.005	8.60E-01	0.013	2.35E+00	0	5.27E-01	4.16	5.88	8.31	1.27E-01	8.97E-02	6.34E-02
Zinc	56.0	Regression	3.20E+02	Regresson	4.51E+01	Regresson	1.18E+02	0	1.20E+01	75.4	169	377	1.59E-01	7.12E-02	3.18E-02

It was assumed that the concentration of each chemical in the small mammal's tissues was equal to the chemical concentration in its diet, that is, a diet to whole-body BAF of 1.0 was assumed

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0285 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.564 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.111 = Proportion of diet composed of food item (terrestrial plants)
FCxi = Chemical-specific = Concentration of chemical in food item (small mammals, dry weight basis)
PDFi = 0.297 = Proportion of diet composed of food item (small mammals)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.028 = Proportion of diet composed of soil
WIR = 0.0557 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.528 = Body weight (kg)

TABLE 16

Summary of Pearly-eyed Thrasher Exposure Doses - Baseline (Step 3A) - 95% UCL

Naval Activity Puerto Rico, Ceiba, Puerto Rico

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Antimony	0.54	1.000	5.43E-01	Regresson	2.22E-02	0	5.20E-02	NA	NA	NA	NA	NA	NA
Cadmium	0.29	Regression	3.09E+00	Regresson	3.15E-01	0	2.85E-01	1.47	3.29	7.35	1.94E-01	8.67E-02	3.88E-02
Chromium	39.7	0.320	1.27E+01	0.041	1.63E+00	0	1.39E+00	2.66	5.95	13.3	5.23E-01	2.34E-01	1.05E-01
Copper	145	Regression	1.99E+01	Regresson	1.39E+01	0	2.89E+00	4.05	7.00	12.1	7.14E-01	4.13E-01	2.39E-01
Lead	27.1	Regression	1.15E+01	Regresson	1.69E+00	0	1.22E+00	3.85	8.61	19.3	3.16E-01	1.42E-01	6.33E-02
Mercury	0.08	1.186	9.49E-02	Regresson	9.35E-02	0	1.11E-02	0.49	0.77	1.20	2.27E-02	1.45E-02	9.28E-03
Selenium	1.30	Regression	1.12E+00	Regresson	6.77E-01	0	1.24E-01	0.44	0.81	1.50	2.81E-01	1.52E-01	8.23E-02
Vanadium	215	0.039	8.40E+00	0.005	1.03E+00	0	1.95E+00	0.34	0.49	0.69	**5.67E+00**	**4.01E+00**	**2.83E+00**
Zinc	66.3	Regression	3.39E+02	Regresson	4.96E+01	0	3.18E+01	66.1	148	331	4.81E-01	2.15E-01	9.62E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0123 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.754 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.200 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.046 = Proportion of diet composed of soil
WIR = 0.0129 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.104 = Body weight (kg)

TABLE 17

Summary of Pearly-eyed Thrasher Exposure Doses - Baseline (Step 3A) - Arithmetic Mear

Naval Activity Puerto Rico, Ceiba, Puerto Rico

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Antimony	0.43	1.000	4.25E-01	Regresson	1.77E-02	0	4.07E-02	NA	NA	NA	NA	NA	NA
Cadmium	0.24	Regression	2.65E+00	Regresson	2.84E-01	0	2.44E-01	1.47	3.29	7.35	1.66E-01	7.43E-02	3.32E-02
Chromium	32.6	0.320	1.04E+01	0.041	1.34E+00	0	1.14E+00	2.66	5.95	13.3	4.30E-01	1.92E-01	8.59E-02
Copper	105	Regression	1.83E+01	Regresson	1.22E+01	0	2.49E+00	4.05	7.00	12.1	6.16E-01	3.56E-01	2.06E-01
Lead	16.1	Regression	7.59E+00	Regresson	1.26E+00	0	7.96E-01	3.85	8.61	19.3	2.07E-01	9.24E-02	4.13E-02
Mercury	0.053	1.186	6.25E-02	Regresson	7.45E-02	0	7.64E-03	0.49	0.77	1.20	1.56E-02	9.96E-03	6.37E-03
Selenium	0.95	Regression	8.91E-01	Regresson	4.77E-01	0	9.61E-02	0.44	0.81	1.50	2.18E-01	1.18E-01	6.40E-02
Vanadium	179	0.039	6.99E+00	0.005	8.60E-01	0	1.62E+00	0.34	0.49	0.69	**4.72E+00**	**3.33E+00**	**2.36E+00**
Zinc	56.0	Regression	3.20E+02	Regresson	4.51E+01	0	3.00E+01	66.1	148	331	4.54E-01	2.03E-01	9.07E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0123 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.754 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.200 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.046 = Proportion of diet composed of soil
WIR = 0.0129 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.104 = Body weight (kg)

TABLE 18

Summary of Common Ground Dove Exposure Doses - Baseline (Step 3A) - 95% UCL

Naval Activity Puerto Rico, Ceiba, Puerto Rico

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Antimony	0.54	1.000	5.43E-01	Regresson	2.22E-02	0	1.03E-02	NA	NA	NA	NA	NA	NA
Cadmium	0.29	Regression	3.09E+00	Regresson	3.15E-01	0	6.73E-02	1.47	3.29	7.35	4.58E-02	2.05E-02	9.15E-03
Chromium	39.7	0.320	1.27E+01	0.041	1.63E+00	0	7.57E-01	2.66	5.95	13.3	2.85E-01	1.27E-01	5.69E-02
Copper	145	Regression	1.99E+01	Regresson	1.39E+01	0	4.37E+00	4.05	7.00	12.1	**1.08E+00**	6.25E-01	3.61E-01
Lead	27.1	Regression	1.15E+01	Regresson	1.69E+00	0	6.34E-01	1.63	2.31	3.26	3.89E-01	2.75E-01	1.94E-01
Mercury	0.08	1.186	9.49E-02	Regresson	9.35E-02	0	1.99E-02	0.45	0.64	0.90	4.42E-02	3.12E-02	2.21E-02
Selenium	1.30	Regression	1.12E+00	Regresson	6.77E-01	0	1.52E-01	0.29	0.41	0.58	5.23E-01	3.70E-01	2.62E-01
Vanadium	215	0.039	8.40E+00	0.005	1.03E+00	0	2.52E+00	0.34	0.49	0.69	**7.32E+00**	**5.17E+00**	**3.66E+00**
Zinc	66.3	Regression	3.39E+02	Regresson	4.96E+01	0	1.08E+01	66.1	148	331	1.63E-01	7.30E-02	3.27E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0069 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.950 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.050 = Proportion of diet composed of soil
WIR = 0.0059 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.0320 = Body weight (kg)

TABLE 19

Summary of Common Ground Dove Exposure Doses - Baseline (Step 3A) - Arithmetic Mear

Naval Activity Puerto Rico, Ceiba, Puerto Rico

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Antimony	0.43	1.000	4.25E-01	Regresson	1.77E-02	0	8.15E-03	NA	NA	NA	NA	NA	NA
Cadmium	0.24	Regression	2.65E+00	Regresson	2.84E-01	0	6.03E-02	1.47	3.29	7.35	4.10E-02	1.83E-02	8.20E-03
Chromium	32.6	0.320	1.04E+01	0.041	1.34E+00	0	6.22E-01	2.66	5.95	13.3	2.34E-01	1.04E-01	4.67E-02
Copper	105	Regression	1.83E+01	Regresson	1.22E+01	0	3.61E+00	4.05	7.00	12.1	8.92E-01	5.16E-01	2.99E-01
Lead	16.1	Regression	7.59E+00	Regresson	1.26E+00	0	4.29E-01	1.63	2.31	3.26	2.63E-01	1.86E-01	1.32E-01
Mercury	0.053	1.186	6.25E-02	Regresson	7.45E-02	0	1.57E-02	0.45	0.64	0.90	3.49E-02	2.47E-02	1.75E-02
Selenium	0.95	Regression	8.91E-01	Regresson	4.77E-01	0	1.07E-01	0.29	0.41	0.58	3.70E-01	2.62E-01	1.85E-01
Vanadium	179	0.039	6.99E+00	0.005	8.60E-01	0	2.09E+00	0.34	0.49	0.69	**6.09E+00**	**4.30E+00**	**3.04E+00**
Zinc	56.0	Regression	3.20E+02	Regresson	4.51E+01	0	9.77E+00	66.1	148	331	1.48E-01	6.61E-02	2.96E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0069 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.950 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.050 = Proportion of diet composed of soil
WIR = 0.0059 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.0320 = Body weight (kg)

TABLE 20

Summary of Red-tailed Hawk Exposure Doses - Baseline (Step 3A) - 95% UCL

Naval Activity Puerto Rico, Ceiba, Puerto Rico

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Soil-Mammal BAF	Small Mammal Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Antimony	0.54	1.000	5.43E-01	Regresson	2.22E-02	See footnote	2.88E-01	0	9.21E-03	NA	NA	NA	NA	NA	NA
Cadmium	0.29	Regression	3.09E+00	Regresson	3.15E-01	Regresson	1.06E-01	0	3.40E-03	1.47	3.29	7.35	2.32E-03	1.04E-03	4.63E-04
Chromium	39.7	0.320	1.27E+01	0.041	1.63E+00	Regresson	3.33E+00	0	1.07E-01	2.66	5.95	13.3	4.01E-02	1.79E-02	8.01E-03
Copper	145	Regression	1.99E+01	Regresson	1.39E+01	Regresson	1.63E+01	0	5.23E-01	4.05	7.00	12.1	1.29E-01	7.47E-02	4.32E-02
Lead	27.1	Regression	1.15E+01	Regresson	1.69E+00	Regresson	4.64E+00	0	1.49E-01	3.85	8.61	19.3	3.86E-02	1.73E-02	7.72E-03
Mercury	0.08	1.186	9.49E-02	Regresson	9.35E-02	0.130	1.04E-02	0	3.33E-04	0.49	0.77	1.20	6.79E-04	4.34E-04	2.77E-04
Selenium	1.30	Regression	1.12E+00	Regresson	6.77E-01	Regresson	7.28E-01	0	2.33E-02	0.44	0.81	1.50	5.29E-02	2.87E-02	1.55E-02
Vanadium	215	0.039	8.40E+00	0.005	1.03E+00	0.013	2.83E+00	0	9.04E-02	0.34	0.49	0.69	2.63E-01	1.86E-01	1.31E-01
Zinc	66.3	Regression	3.39E+02	Regresson	4.96E+01	Regresson	1.19E+02	0	3.81E+00	66.1	148	331	5.77E-02	2.58E-02	1.15E-02

It was assumed that the concentration of each chemical in the small mammal's tissues was equal to the chemical concentration in its diet, that is, a diet to whole-body BAF of 1.0 was assumed

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0363 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (terrestrial plants)
FCxi = Chemical-specific = Concentration of chemical in food item (small mammals, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (small mammals)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of soil
WIR = 0.0642 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 1.134 = Body weight (kg)

TABLE 21

Summary of Red-tailed Hawk Exposure Doses - Baseline (Step 3A) - Arithmetic Mean

Naval Activity Puerto Rico, Ceiba, Puerto Rico

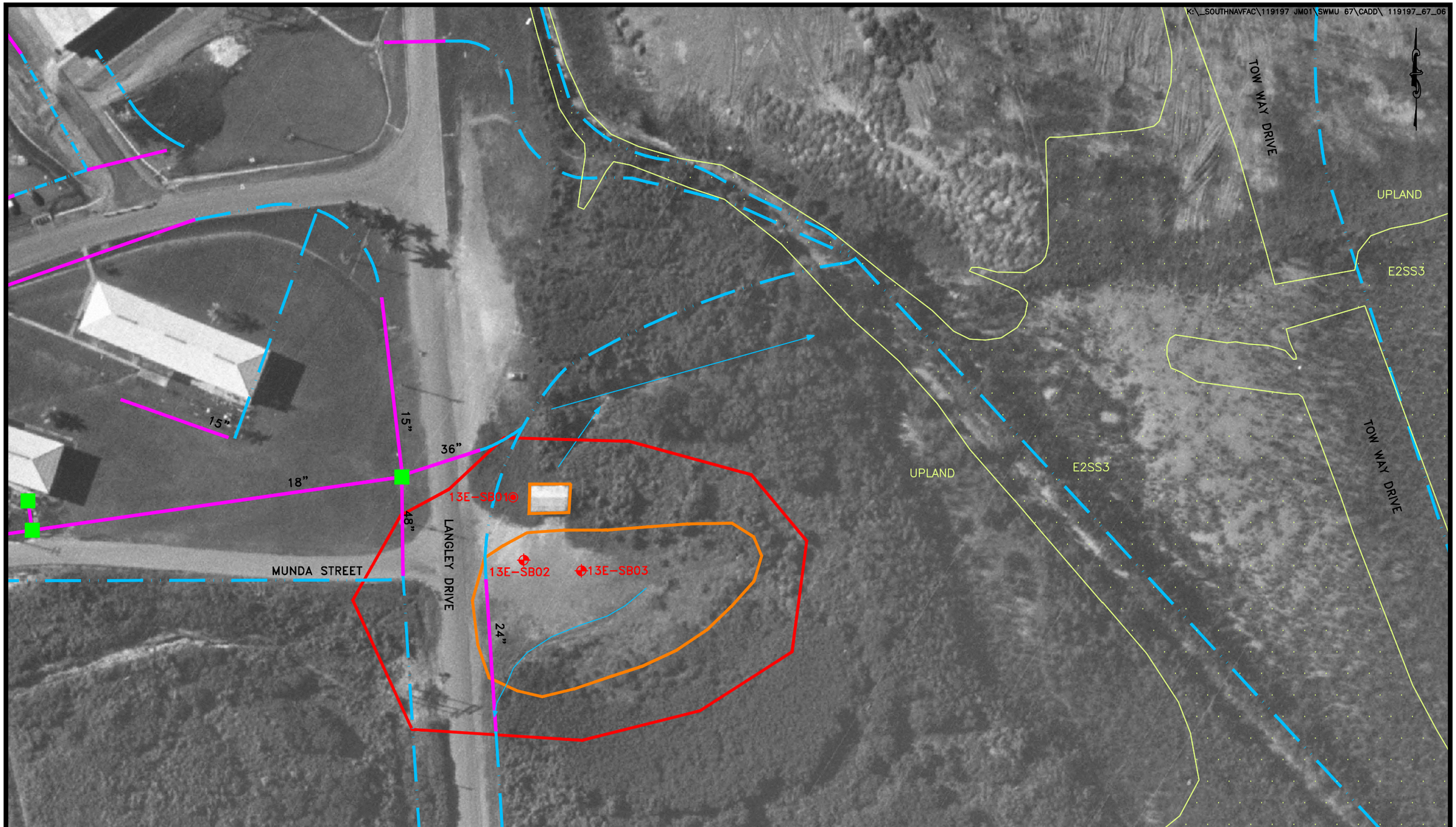
Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Soil-Mammal BAF	Small Mammal Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Antimony	0.43	1.000	4.25E-01	Regresson	1.77E-02	See footnote	2.25E-01	0	7.21E-03	NA	NA	NA	NA	NA	NA
Cadmium	0.24	Regression	2.65E+00	Regresson	2.84E-01	Regresson	9.53E-02	0	3.05E-03	1.47	3.29	7.35	2.07E-03	9.28E-04	4.15E-04
Chromium	32.6	0.320	1.04E+01	0.041	1.34E+00	Regresson	2.88E+00	0	9.23E-02	2.66	5.95	13.3	3.47E-02	1.55E-02	6.94E-03
Copper	105	Regression	1.83E+01	Regresson	1.22E+01	Regresson	1.50E+01	0	4.80E-01	4.05	7.00	12.1	1.18E-01	6.85E-02	3.97E-02
Lead	16.1	Regression	7.59E+00	Regresson	1.26E+00	Regresson	3.69E+00	0	1.18E-01	3.85	8.61	19.3	3.07E-02	1.37E-02	6.14E-03
Mercury	0.053	1.186	6.25E-02	Regresson	7.45E-02	0.130	6.85E-03	0	2.19E-04	0.49	0.77	1.20	4.47E-04	2.86E-04	1.83E-04
Selenium	0.95	Regression	8.91E-01	Regresson	4.77E-01	Regresson	6.46E-01	0	2.07E-02	0.44	0.81	1.50	4.70E-02	2.55E-02	1.38E-02
Vanadium	179	0.039	6.99E+00	0.005	8.60E-01	0.013	2.35E+00	0	7.52E-02	0.34	0.49	0.69	2.19E-01	1.55E-01	1.09E-01
Zinc	56.0	Regression	3.20E+02	Regresson	4.51E+01	Regresson	1.18E+02	0	3.77E+00	66.1	148	331	5.70E-02	2.55E-02	1.14E-02

It was assumed that the concentration of each chemical in the small mammal's tissues was equal to the chemical concentration in its diet, that is, a diet to whole-body BAF of 1.0 was assumed

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0363 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.000 = Proportion of diet composed of food item (terrestrial plants)
FCxi = Chemical-specific = Concentration of chemical in food item (small mammals, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (small mammals)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of soil
WIR = 0.0642 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 1.134 = Body weight (kg)

Figures



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

100 0 50 100

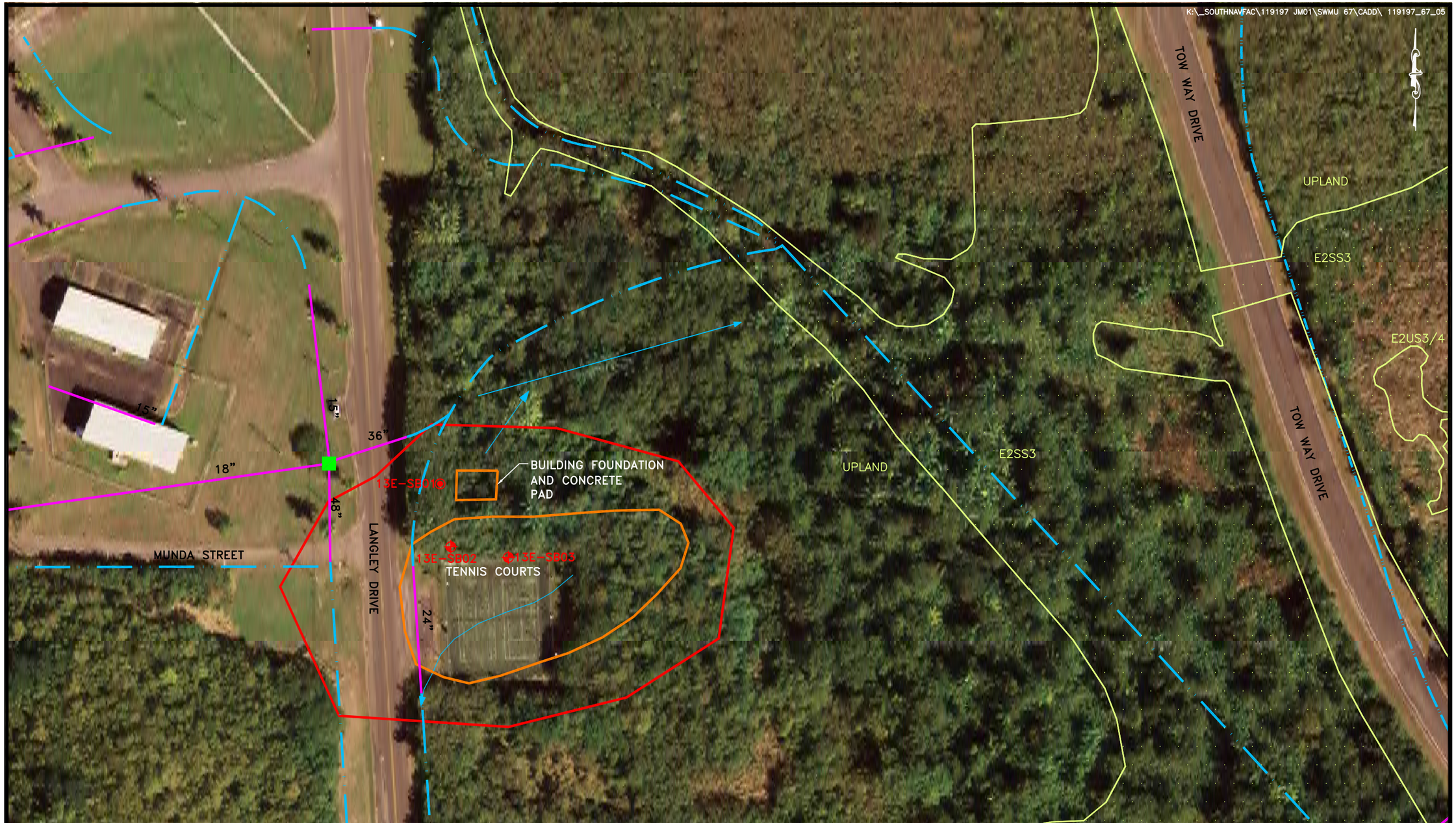
1 inch = 100 ft.

Baker

LEGEND

- –1958 POLYGON FEATURE
- –1958 DRAINAGE AND FLOW DIRECTION
- –SWMU BOUNDARY
- –DITCH
- –INLET
- 24" –STORM SEWER AND SIZE
- –ESTUARINE WETLAND BOUNDARY
- E2SS3 –ESTUARINE WETLAND IDENTIFICATION
- –EXISTING SOIL SAMPLING LOCATION (PHASE II ECP 2004)
- –EXISTING SOIL AND GROUNDWATER SAMPLING LOCATION (PHASE II ECP 2004)

FIGURE 2-3
SITE LAYOUT AND ECP
SAMPLE LOCATION MAP
1958 AERIAL PHOTOGRAPH
SWMU 67-FORMER GAS STATION
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO



LEGEND

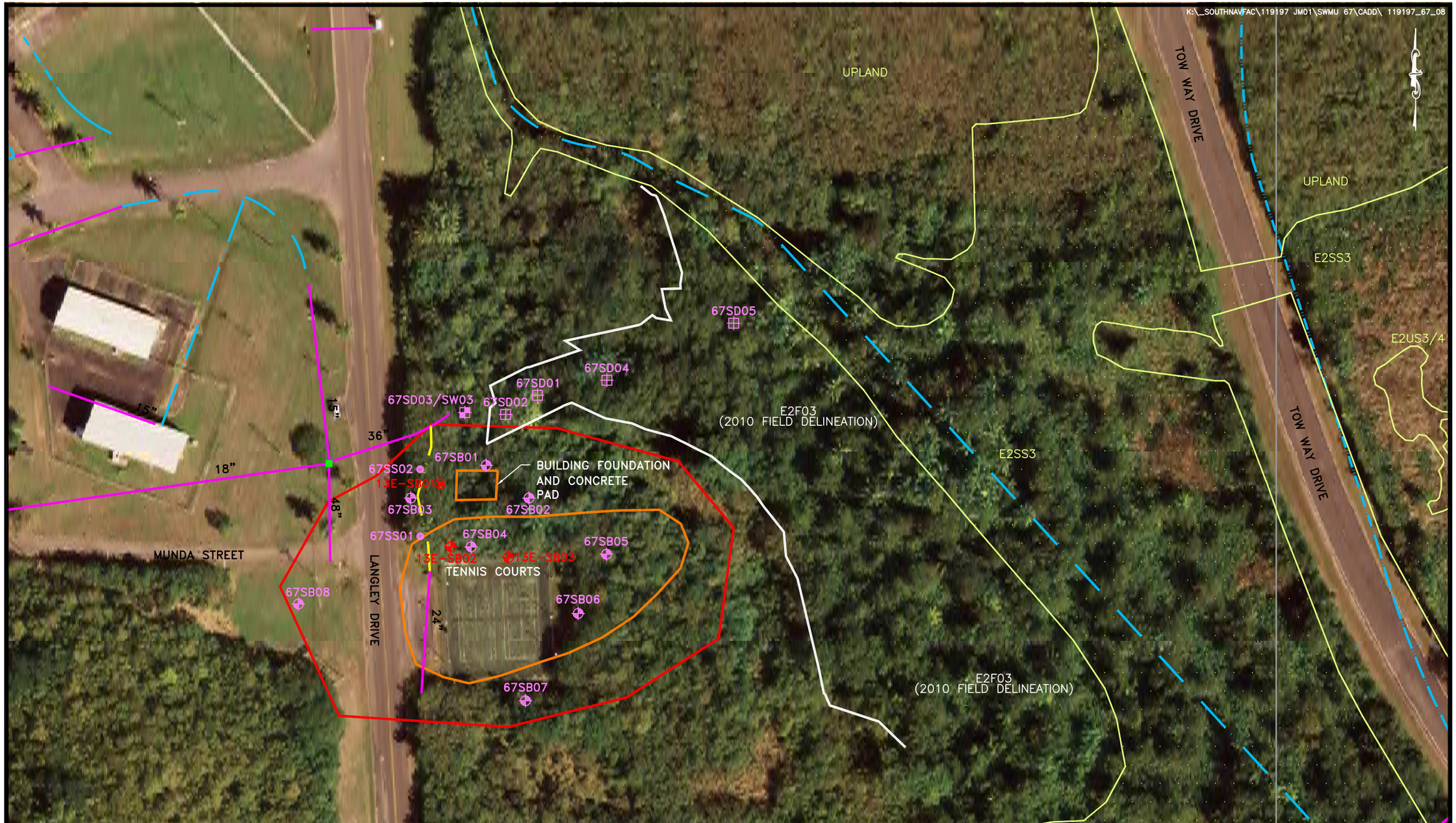
- 1958 POLYGON FEATURE
- 1958 DRAINAGE SWALE AND FLOW
- SWMU BOUNDARY
- DITCH
- INLET
- 24" STORM SEWER AND SIZE
- ESTUARINE WETLAND BOUNDARY
- E2SS3 ESTUARINE WETLAND IDENTIFICATION
- EXISTING SOIL SAMPLING LOCATION (PHASE II ECP 2004)
- EXISTING SOIL AND GROUNDWATER SAMPLING LOCATION (PHASE II ECP 2004)

100 0 50 100
1 inch = 100 ft.

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

Baker

FIGURE 2-4
SITE LAYOUT AND ECP
SAMPLE LOCATION MAP
2000 AERIAL PHOTOGRAPH
SWMU 67-FORMER GAS STATION
PHASE I RFI REPORT
NAVAL ACTIVITY PUERTO RICO



100 0 50 100
1 inch = 100 ft.

Source: USGS, NOVEMBER 2006.

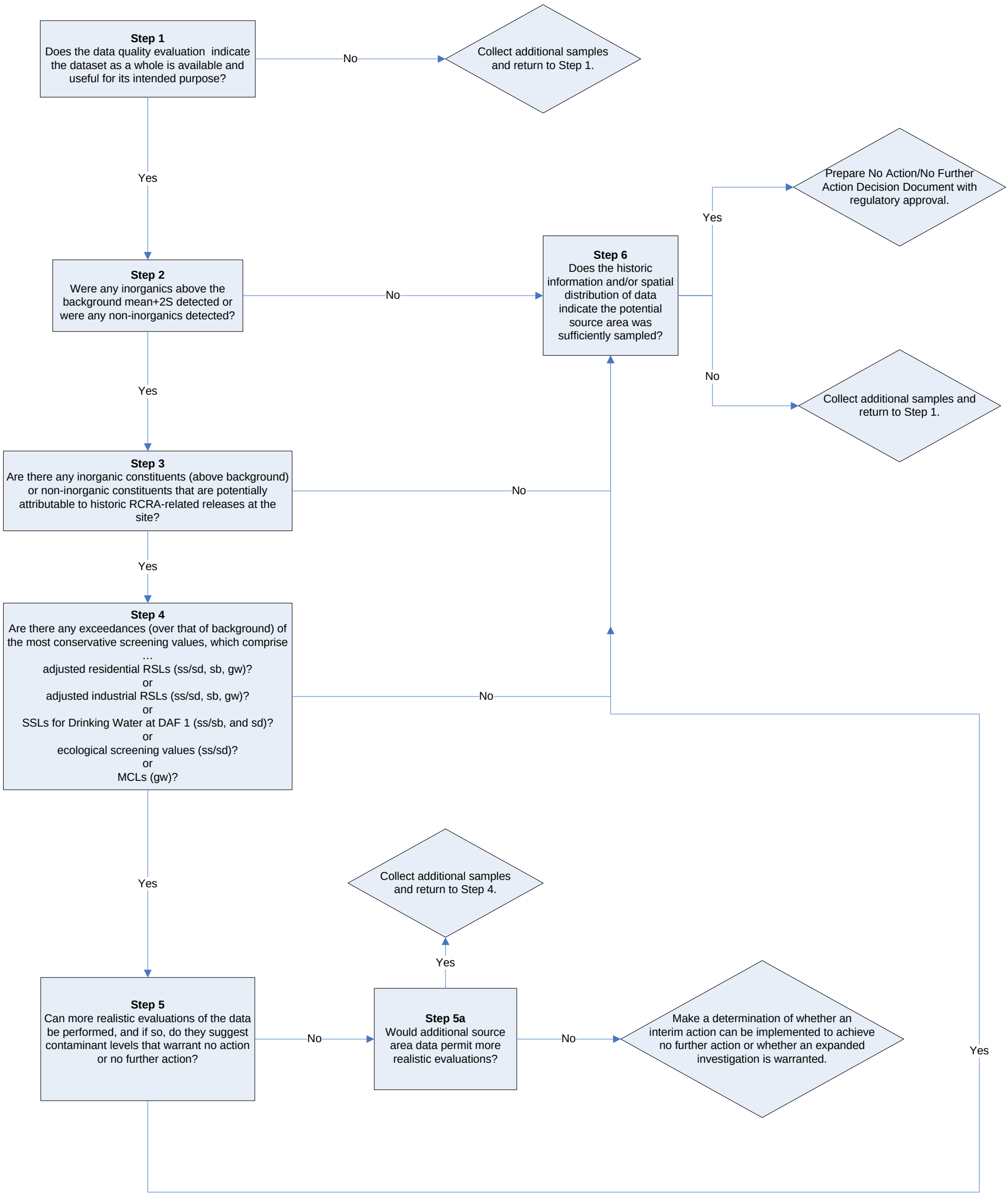
Baker

LEGEND

- –EARTHEN DRAINAGE FEATURE
- –1958 POLYGON FEATURE
- –SWMU BOUNDARY
- –DITCH
- –INLET
- 24" –STORM SEWER AND SIZE
- E2SS3 –ESTUARINE WETLAND IDENTIFICATION
- –2010 FIELD DELINEATED WETLAND BOUNDARY
- –EXISTING SOIL SAMPLING LOCATION (PHASE II ECP 2004)
- –EXISTING SOIL AND GROUNDWATER SAMPLING LOCATION (PHASE II ECP 2004)
- –2010 SOIL AND GROUNDWATER SAMPLING LOCATION
- –2010 SURFACE SOIL SAMPLING LOCATION
- –2010 SEDIMENT SAMPLING LOCATION
- –2010 SEDIMENT/SURFACE WATER SAMPLING LOCATION

FIGURE 4–1
SAMPLE LOCATION MAP
SWMU 67–FORMER GAS STATION
PHASE I RFI REPORT

NAVAL ACTIVITY PUERTO RICO



Notes:
The decision makers associated with this decision tree are the Navy, USEPA, and PREQB.
ss = surface soil; sb = subsurface soil; sd = sediment; gw = groundwater

FIGURE 1
Data Evaluation 6 Step Decision Process
SWMU 67 RFI Evaluation
Naval Activity Puerto Rico