



Environmental  
Quality Board

COMMONWEALTH OF PUERTO RICO / OFFICE OF THE GOVERNOR

May 28, 1998

Ms. Nicoletta DiForte, Chief  
Caribbean Permit Section  
Hazardous Waste Facilities Branch  
US Environmental Protection Agency  
290 Broadway  
New York, NY 10007-1866

Dear Ms. DiForte:

Re: RCRA Facility Investigation Report  
for Operable Unit 3/5  
US Naval Station Roosevelt Roads  
Ceiba, Puerto Rico-PR2170027203

The Puerto Rico Environmental Quality Board (PREQB) has evaluated the RCRA Facility Investigation (RFI) Report for the Operation Unit (OU) 3/5 submitted by Baker Environmental on behalf of US Naval Station Roosevelt Roads.

The Operational Unit 3/5 consists of SWMU 1, SWMU 2, and SWMU 11/45. The SWMU 1 is the former Army Cremator disposal site, which consists of abandoned, unlined waste-pile/landfill, on the edges of, and encroaching into the mangrove swamps along the shoreline of the Ensenada Honda Bay. The Langley Drive disposal site (SWMU 2), is also abandoned unlined waste-pile/landfill, on the edges and protruding into the mangroves along the shoreline of the Ensenada Honda Bay. The SWMU 11/45 includes the Building 38, a former powerhouse and related underground storage tanks and cooling water tunnels.

The Navy commenced preliminary investigations during the RFI-Phase 1 in the fall of 1996 which was generally limited in scope and was designed to identify whether releases of hazardous waste had occurred. These investigations performed in the Operation Unit (OU) 3/5 detected several hazardous constituents in sediments, soil (surface/subsurface) and groundwater samples. Sediment and soil (surface/subsurface) samples contained high concentrations of metals such as Arsenic, Beryllium, Mercury and Lead. Surface soil samples detected these metals above their Residential and Industrial RBC action level. Volatile Organic Compounds (VOCs) and Dioxins were found at concentrations that exceeded the Residential RBC level. Whereas groundwater samples collected at the OU 3/5, indicated that VOCs, Semivolatiles Organic Compounds (SVOCs), Dioxins and Pesticides and Metals have been released into the uppermost aquifer at the facility. Groundwater samples were found in concentrations above the MCL and Tap water action/levels.

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Additional investigations for the RFI-Phase II Operational Unit 3/5 were conducted in the fall of 1997. The RFI Phase II included a collection of surface, subsurface soil samples, and groundwater samples from permanent and temporary wells. In addition, sediments samples at the nearby areas of Ensenada Honda and Puerca Bays were collected for SWMUs 1, 2 and 11/45. The analyses performed for SWMUs 1, 2 and 11/45 contained low to high concentrations of VOCs, SVOCs, Inorganic Compounds (Total and Soluble), Dioxins, Chlorinated Herbicides, and Pesticides/PCBs.

After evaluating the report submitted by Baker, EQB concurs with the Navy that a Corrective Measure Study (CMS) is required for SWMU 11/45 due to the extended contamination of TPH and PCBs on the surface water in the Puerca Bay. As proposed by the Navy, the CMS will focused on the tunnel soils, Puerca Sediments and Building 38 UST area. In the letter of March 8, 1998, EQB recommended the approval of the closure activities of the Building 38 Underground Storage Tanks. The activities related to the Interim Corrective Measure (ICM) has been achieved and completed eliminating the USTs and the cooling lines as potential release source in the SWMU 11/45 and therefore it is expected that no further action will be required for the Building 38 UST. The CMS should address corrective measure alternatives such as filter fences to remediate or to contain further spread of the contaminated sediments found in the Puerca Bay.

However, EQB does not agree with the conclusions and recommendations (given in section 7.3.1 and 7.3.2), that no further investigations are necessary at the study area for SWMUs 1 and 2. The analytical results clearly indicated that SWMUs 1, 2 contained high concentrations of contaminants, demonstrating that releases of these compounds have occurred and contaminated the sites, affecting the quality of their respective soil, sediments and groundwater media. Although, as the report described that for most of the constituents, their concentrations are not above the regulatory standards, sediment samples, soil samples up to 12 ft. deep and groundwater samples did indeed contained high concentrations of contaminants that exceeded the RBC (Industrial and Residential), RBC Tap Water standard, MCL action level and the 2X Average Detected Screening Values.

EQB agrees with the recommendations provided by the Navy to limit and restrict the land areas for SWMUs 1 and 2. The facility should install a security fence around the perimeter of the site, warning signs and other measures to limit access to the SWMUs. The report indicated that the Navy may consider the sites for industrial land use in the future, the facility should be noted the presences of contaminants at high concentrations above the RBC Industrial standard and therefore, for any construction or excavation operations, there is still a threat to construction workers at both SWMUs.

Furthermore, due to the uncertainties in the data collected by Baker, that can be derived from the absence of field duplicates and the presence of contaminants in the equipment rinsate blanks, field blanks and trip blanks during the RFI Phase I and II, EQB recommends to continue on-going monitoring the contamination and migration pathways for groundwater, soil and sediment environmental media in SWMUs 1 and 2. Notwithstanding, a cleanup remedy may not be viable and technical practicable for SWMUs 1 and 2, and the contaminants detected in the soil, sediment and groundwater samples (may not migrate far), it may still threaten human health/the environment by direct contact or by leaching contaminants to groundwater.

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The Navy mentioned that the Mangroves near the sites have not been affected by the contamination due to visible condition of the vegetation, these comments are only assumptions based on visual observations. EQB recommends to the US Navy, to performed an Ecological Risk Assessment for soil, sediments and groundwater media in Ensenada Honda Bay and Puerca Bay for Operational Unit 3/5 to determine any potential for risk to aquatic environment at SWMUs 1, 2, and 11/45. The Ecological Risk Assessment must include an evaluation of environmental risk caused by impact of contaminated groundwater discharges to the Ensenada Honda Bay and Puerca Bay.

If you have any questions regarding this matter, please do not hesitate to contact Ms. Luz A. Muriel, of my staff, at (787) 766-2817 or (787) 767-8181 ext. 2820.

Cordially,



Israel Torres Rivera  
Director  
Land Pollution Regulation Program

Enclosure

## Comments on the Operation Unit 3/5

### Background Samples

Soil (surface/subsurface) and groundwater were collected for Background samples during the RFI-Phase II investigation. Samples were analyzed for Volatiles (VOCs), Semivolatiles (SVOCs), Polychlorinated Biphenols (PCBs), Chlorinated Herbicides, and Metals-Appendix IX (Totals, Solubles). Analytical analyses performed in surface soil samples detected low concentrations of Butylbenzylphthalate, Bis(2-ethylhexyl) phthalate and Fluoranthene. In addition, subsurface soil samples contained low concentrations of SVOCs, VOCs (xylene), Dioxins (total HxCDD), Chlorinated Herbicides (2,4,5-T). Only inorganic compounds such as Arsenic and Beryllium were found to be exceeding their Residential Risk Based Concentrations (RBC) action level in surface and subsurface soil samples. All the constituents detected in these samples contained concentrations significantly below the Industrial RBC level. For Groundwater samples, VOCs (Acetophenone), SVOCs, (Bis(2-ethylhexyl)phthalate and Dimethyl phthalate) and Inorganic Compounds (Vanadium, Beryllium and Cadmium) were detected with concentrations that exceeded their respective USEPA MCLs and Tap Water-RBCs Region III levels. The groundwater samples did not contain Dioxins, chlorinated herbicides, or pesticides/PCBs compounds.

### Comments

- Sample BGMW03-03 contained HxCDD with a concentration of 0.31J ppb. Although this concentration is below the industrial soil RBC of 0.38 ppb, the value of 0.31J ppb is estimate (above and below the given value) and can be considered as a potential contaminant exceeding the industrial RBC standard as well as the residential RBC for soil of 0.043 ppb.
- Volatiles Organic Compounds, Semivolatiles Organic Compounds, PCBs/ Pesticides are not commonly found in the environment, and therefore it is uncomplicated to determine the extent to which a site or contaminate source area has impacted its surrounding, this is not the case for metals that are naturally occurring. Due to their natural occurrence, it is necessary for hazardous site environmental investigations to determine what levels of metals are in the soil that is beyond the influence of the site.
- Therefore, EQB recommends to include confirmatory samples at the background area to verify if this site should be consider as a representative background sample location. All of the constituents detected in this investigation were previously found in the RFI-Phase I investigation. These detected constituents exceeded their Industrial RBC for soil. In addition, groundwater samples contained SVOCs, and inorganic compounds that exceeded their USEPA MCL and Tap Water RBC levels.
- Based on the definition of background samples described in the RCRA Sampling Procedure Handbook, 1995, *a sample taken from media characteristic of the facility, but outside the zone of contamination. Yield information to determine the natural background concentrations of constituents inherent to that area*, the background site selected by the Navy it is not recommended to be used as background samples for soil and groundwater media for constituents such as Dioxins, VOCs, SVOCs and Chlorinated Herbicides which are unlikely (not commonly found in the environment) to occur in natural soil-volcanic rock and

groundwater at the site.

- Although the Navy continuously use these background sampling points, it is known that the occurrence of these metals arsenic, barium, chromium, copper, lead, nickel and zinc is likely the result of nature. Whereas, the occurrence of these metals antimony, cadmium, mercury, selenium, silver and thallium is likely the result of man's impact at the site. Therefore, the background site used in this investigation may have been impact by contamination and will not be a useful background comparison point.

### SWMU 1 - Former Army Cremator Disposal Site

#### Surface and Subsurface Samples

Only Subsurface soil samples were collected and analyzed for full Appendix IX list, Explosives and Asbestos. A total of four (4) soil samples were collected at this SWMU during RFI-Phase II. Only Di-n-butly phthalate (Semivolatile) was detected in soil samples at low concentrations below the screening criteria. Total HxCDF (Sample 1MW05-05, 0.14J ppb) was the only organic compound exceeded the Residential and Industrial RBCs levels of 0.0043 ppb and 0.038 ppb, respectively. No Chlorinated Herbicides, Pesticides/PCBs, Explosives, Asbestos or Volatiles were detected in the subsurface soil samples. All the inorganic constituents listed in Appendix IX were found in the subsurface soil samples. Antimony and Silver were detected above the 2X Average Detected background screening criteria. None of them exceeded their respective RBCs for Industrial and Residential levels. Only Beryllium was found to be exceeding the EPA Region III Residential RBCs (150 ppb) with a concentration range from 120 - 200 ppb.

#### Groundwater Samples

Two permanent groundwater monitoring wells were installed during the RFI-Phase II activities. These wells were sampled for VOCs, SVOCs, Pesticides/PCB, Dioxins, Chlorinated Herbicides, Explosives and Asbestos. Total and Soluble Metals analyses were performed to detect any inorganic compounds on the groundwater. Inorganic compounds such as Arsenic, Barium, Beryllium, Chromium, Cobalt, Cadmium, Cooper, Lead, Mercury, Nickel, Silver, Sodium, Tin, Vanadium and Zinc were the only compounds found in the analyses at relative low concentrations below their screening criteria. Groundwater samples from monitoring wells 1GW05 and 5GW02 contained Beryllium (0.82J - 0.67J ppb) and Vanadium (330 - 344 ppb) at concentrations above their EPA Region III Tap Water RBC of 0.16 ppb and 260 ppb, respectively.

#### Comments

- Chemical analyses submitted by the Navy indicated the presence of inorganic compounds (Total and Soluble) in subsurface soil and groundwater samples. No Pesticides, Herbicides, Volatiles Organic Compounds (VOCs), Semivolatiles Organic Compounds (SVOCs), Dioxins were found in the samples.

- Inorganic compounds such as Antimony, Beryllium, Cadmium, Cadmium Soluble, Chromium, Copper, Copper Soluble, Lead, Mercury and Nickel previously detected in the RFI-Phase I at concentrations that exceeded their Tap Water RBC-Region III Standards and USEPA MCL were not found in the groundwater analyses performed for the RFI-Phase II. Except for Beryllium and Vanadium (Total) which were detected at concentrations above the EPA Region III Tap Water RBC level. Chromium (sample-1GW05, 113 ppb) was also found to be exceeding the USEPA MCL of 100 ppb.
- In addition, analytical analyses performed in the groundwater samples collected in the RFI-Phase I detected Chloroform, 4-4'-DDE, Total HxCDD, 2,4,5-TP, 2,4,5-T with concentrations above the EPA Region III Tap Water RBC in four (4) groundwater samples from seven (7) groundwater monitoring wells. None of these constituents were detected in the RFI-Phase II analyses.
- SWMU 1 is considered to be industrial land usage area due to their previous use as a Hazardous-Non Hazardous Waste Disposal area. A site may have been industrial in nature; the land usage judgment is based on the area surrounding the site as well. Mercury and Arsenic occur at significantly higher rates in industrial and mixed land usage areas than rural, suggesting that their occurrence is likely a function of land usage. Vanadium, Beryllium, Copper, Sodium, however, occurs at significantly lower rates in industrial areas than in mixed or rural settings, suggesting its occurrence is likely a soil property (as indicated in the soil borings performed at the site). The soil series (is not a soil series as much as it is simply an indication of severely disturbed (either by cutting or filling). Given the nature of the sites used in this study (Hazardous-Non Hazardous Waste Disposal Sites for SWMU's 1 and 2), which is more an indicator of land usage than soil type, showed significantly higher rates of occurrence for antimony, arsenic, beryllium, cadmium, selenium, and silver, suggesting their occurrences are related to man's activities.
- Although the presence of metals in the groundwater samples can be directly identified with concentrations of the groundwater at the area due to the occurrence of these metals in the soils and volcanic bedrock, many of these metals such as antimony, cadmium, lead, mercury, cobalt and vanadium are unlikely to occur naturally in the groundwater.

### SWMU 2- Langley Drive Disposal Site

#### Soil and Subsurface Samples

Only a RFI-Phase I was conducted for SWMU 2. The investigation consisted of the collection of surface eight (8), subsurface eight (8) soil samples, four (4) groundwater samples and sediments samples.

Surface and subsurface samples detected 1,1,1-Trichloroethane (1.00 ft, 12J) and Acetone (4.00-6.00 ft, 21 ppb). All the Semivolatiles Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(g,h,i)pyrene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene and Pyrene found in the soil samples contained concentrations below the action level except for samples 2SB02-00 (340J ppb) and 2SD04-00 (150J ppb) that exceeded the Benzo(a)pyrene EPA Region III Residential RBCs of 88 ppb.

Pesticides/PCBs were detected at concentrations significantly below the Industrial and Residential RBCs. Dioxins (Total HxCDD and HxCDF) were also found at concentrations in sample 2SB03-00 of 0.377 ppb and 0.173 ppb above both their respective Industrial and Residential RBC screening standards of 0.038 ppb and 0.17 ppb. No Chlorinated Herbicides, Explosives or Asbestos were detected in the soil samples.

All the metals listed in the Appendix IX were detected in the analyses for inorganic compounds performed in the eight (8) surface samples. Sample 2SB05-00 contained inorganic compounds such as Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Lead, Mercury, Nickel, Tin, Vanadium and Zinc were above their 2X Average Detected Background.

Groundwater Samples

Detection of organic compounds in the groundwater included Volatiles: Carbon Tetrachloride, Chloroform, and Trichloroethane; Semivolatiles: Pentachlorophenol; Dioxins: (2,4,5-T); Pesticides: Aldrin, Heptachlor Epoxide and Isodrin. Carbon Tetrachloride was detected with concentrations varying from 1 ppb to 2 ppb above the Tap Water RBC of 0.16ppb. Chloroform concentrations between 4 ppb to 6 ppb were found at two sampling locations 2MW01 and 2MW02. Trichloroethane was detected on samples 2MW01, 2MW02 and 6GW01 with concentrations ranging from 6 ppb to 8 ppb that exceeded both criteria Federal MCL and EPA Region III Tap Water. Only sample 6GW01 contained Pentachlorophenol (5 ppb) that exceeded the USEPA MCL (1 ppb) and Tap Water RBC (0.56 ppb). Aldrin and Heptachlor Epoxide were detected in samples 2MW01 and 2MW03 with concentrations above the Tap Water RBC. Isodrin was found at three sampling points at significant low concentrations ranging from 0.02 ppb to 0.05 ppb. There are no standards established of Federal MCL and EPA Region III Tap Water RBC for Isodrin. No Chlorinated Herbicides, Explosives or Asbestos were found in the groundwater samples.

Inorganic Compounds (Total and Soluble) were also detected in the four groundwater samples collected for the RFI-Phase I. The following parameters were found in these samples: Antimony, Antimony Soluble, Arsenic, Barium, Beryllium, Cadmium, Cadmium Soluble, Chromium, Cobalt, Copper, Lead, Mercury, Nickel, Selenium, Selenium Soluble, Sodium, Vanadium, Vanadium Soluble and Zinc. Antimony with concentrations varying from 16.11 ppb to 19.61 ppb exceeded the Federal MCL and EPA Region III Tap Water Standard criteria of 6 ppb and 15 ppb, respectively. Dissolved Antimony showed concentrations of 21.2 ppb. In addition, Lead, Vanadium, Arsenic and Beryllium exceeded the Tap Water Screening criteria in samples 2MW01, 2MW02 and 2MW03. Whereas, sample 2MW02 was the only sample that Lead concentrations exceeded the USEPA MCL.

Sediment Samples

Three sediment samples 2SD01, 2SD02 and 2SD03 were collected for RFI-Phase I. Only sample 2SD02 contained Benzofluoranthene (Semivolatile) at concentration of 631 ppb. No Chlorinated Herbicides, Pesticides, Dioxins, Explosives, Asbestos and TOC were found in the samples. All the metals listed in Appendix IX were detected in the analyses performed in the sediment samples. The higher concentrations found were of Cadmium, Copper, Lead, Nickel and Zinc. All of these parameters are above their background of ERL Sediment Screening Value and ERM Sediment Screening Value.

**Comments**

- Arsenic was detected at ten (10) surface and subsurface sampling points with concentrations ranging from 370 ppb to 18,600 ppb. These concentrations exceeded the EPA Residential RBC of 430 ppb in nine (9) of the soil samples.
- Semivolatiles Compounds were detected in six surface soil samples (6) at concentrations below the EPA Region III Industrial and Residential RBCs. Only Benzo(a)pyrene concentrations varying from 150J ppb to 340J ppb were found in sample 2SB03-00 exceeding the Residential RBC level of 88 ppb.
- The presence of Semivolatiles, Volatiles Compounds, Dioxins and high concentrations of Metals in the surface (0.00-1.00 ft) and subsurface soil (2.00-12.00 ft) samples above the 2X Average Detected Background and EPA Region III Residential RBCs indicated releases of contaminants at the Langley Drive Disposal Site.
- Sediment sample 2SD02 contained the highest concentrations of Semivolatiles: Benzo(b)fluoranthene concentrations of 63J ppb and Inorganic Compounds: Copper (399,000 ppb), Lead (390,000J) and Zinc (841,000) compounds. These metals concentrations exceeded their respective ERM Sediment Screening Values.
- Groundwater samples in five (5) groundwater monitoring wells installed at the site detected high concentrations of Aldrin, Heptachlor Epoxide, Pentachlorophenol, Carbon Tetrachloride, Chloroform, and Trichloroethane and 2,4,5,-T. Due to the presence of these constituents, a release has already occurred and affected the quality of the groundwater due to land usage (man's impact) at SWMU 2.

**SWMU 11/45-Building 38**

The SWMU 11/45 consists of Building 38, a former powerhouse and related underground storage tanks and cooling water tunnels. The cooling water tunnels had undergone Interim Corrective Measure (ICM). During these activities the tunnels were closed and cleaned reducing the potential of continuing releases at the site. Subsurface soils near the tunnel were found to be heavily oil stained. Based on this finding, a soil investigation was performed at the site. This investigation included 18 subsurface soil samples and groundwater samples from 14 temporary wells at the nearby area of the intake tunnel leading to Puerca Bay. For the RFI-Phase II investigations: Total Petroleum Hydrocarbons: Diesel Range Organic and Gasoline Range Organic; Pesticides: (Aroclor-1260); Semivolatiles: (Acenaphthene, Benzoic Acid, Chrysene, Benzo(a)pyrene, Benzoic Acid, Chrysene, Pyrene, Diethylphthalate) and Volatiles (Acetone, Toluene, 2-Hexanone, 4-Methyl-2-pentanone); Inorganic Compounds total: (Arsenic, Barium, Cadmium, Chromium, Lead and Mercury) and Inorganic dissolved: (Arsenic Soluble, Barium Soluble, Cadmium Soluble and Lead Soluble) were found in soil groundwater samples collected from SWMU 11/45.

### Surface and Subsurface Soil Samples

Only four (4) Subsurface samples were collected at a depth ranging from 2.00 ft to 13.50 ft. Volatiles and Semivolatiles were detected at significant low levels, below the EPA Region III Residential and Industrial RBC. Samples 11SB01-02, 11SB05-02, 11SB06-02, 11SB07-02, 11SB19-04, 11SB22-04, 11SB26-01, 11SB27-04 and 11SB08-02 contained Volatiles: (Acetone, Toluene, 2-Hexanone, 4-Methyl-2-pentanone); Semivolatiles: (Acenaphthene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(g,h,i)perylene, Di-n-butylphthalate, Diethylphthalate and Pyrene) and PCBs: (Aroclor-1260). Total Petroleum Hydrocarbons (TPH) analyses for Diesel Range Organic (DRO) and Gasoline Range Organic (GRO) were performed on each soil sample. All the inorganic constituents listed in Appendix IX were found in the subsurface soil samples. Antimony, Arsenic, Cadmium, Chromium, Silver and Zinc were detected above the 2X Average Detected background screening criteria. Arsenic and Beryllium exceeded their respective RBCs for Residential levels. Only Arsenic with a concentration of 4500J ppb was found to be exceeding the EPA Region III Industrial RBCs of 1,800 ppb and the Residential RBCs of 430 ppb.

### Groundwater Samples

A series of fourteen (14) groundwater samples were collected from the fourteen (14) temporary wells installed during these activities. The groundwater samples were analyzed for VOCs, SVOCs, PCBs, and Appendix IX metals, TPH GRO, TPH DRO and TOC. The analyses submitted confirm the presences of Volatiles: Acetone; Semivolatiles: Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzoic Acid, Benzyl alcohol, Bis(2-ethylhexyl)phthalate, Diethylphthalate, Dimethylphthalate, m&p Cresol, o-Cresol, Chrysene, Pyrene; TPH: DRO and GRO. Sample 11GW05 contained high levels of Benzo(a)anthracene and Chrysene above the EPA Region III Tap Water RBC screening standard. Only Semivolatile Organic Compounds Benzo(a)pyrene in sample 11GW05 (7J ppb) and Bis(2-ethylhexyl)phthalate in sample exceeded both the Tap RBC and the USEPA MCL standards. TPH for Diesel Range Organic and Gasoline Range Organic were found in five (5) samples collected from 7 (seven) groundwater monitoring wells with concentrations varied from 110 ppb to 71,100 ppb. In addition, 16 different Inorganic Compounds (Total) listed in Appendix IX were found in the groundwater samples. Dissolved Inorganic Compounds such as Arsenic, Barium, Chromium, Mercury, Vanadium and Zinc were also detected in the groundwater samples. TOC and PCBs were not detected in the samples.

### Sediment Samples

A total of nine (9) sediment samples were taken at SWMU 11/45. One sample was collected at the mouth of the tunnel, three samples at 50 feet away from the mouth, three samples at 100 feet away from the mouth and two samples at 200 feet from the tunnel. All the samples were obtained with a used of a sampling dredge and analyzed for Volatiles, and Semivolatiles Organic, PCBs, Appendix IX metals, TPH and TOC. The following constituents were detected on the samples: Volatiles: Acetone; Semivolatiles: Acenaphthylene, Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, Bis(2-ethylhexyl)phthalate, Chrysene, Dibenz(a,h)anthracene, Di-n-butylphthalate, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene and Pyrene; PCBs: Aroclor-1260 and TPH for DRO including all the sixteen (16) inorganic compounds listed in Appendix IX. Several Semivolatile Organic Constituents exceeded the ERL (Effects Range Low) Sediment Screening Value. Only sample 11SD03 collected at a depth

range from 0.0ft to 3.0ft contained Benzo(a)pyrene and Dibenzo(a,h)anthracene concentrations exceeding the ERL and ERM (Effects Range Medium) Sediment Screening Values. Aroclor-1260 was detected in all nine (9) sediment samples with values exceeding the ERL screening criteria.

### Comments

- The most contaminated sediment samples (11SD01, 11SD03 and 11SD09) contained Semivolatiles, PCBs, and Inorganic Compounds with concentrations that exceeded the ERL and ERM Sediment Screening Values.
- All nine (9) samples 11SD01- 11SD09 detected TPH concentrations varying from 19,000 ppb to 65,000 ppb although there are no established ERL and ERM Screening Values for TPH Diesel Range Organic, these concentrations represent releases of these contaminants into the sediments.
- Aroclor-1260 concentrations with a range from 33 ppb to 62 ppb were detected in all nine (9) sediment samples collected for this investigation, exceeded the ERL Sediment Screening Value of 22.7 ppb.
- A total of ten (10) groundwater samples from 14 samples collected at SWMU 11/45 contained high levels of Arsenic Total with 1.7 ppb to 18.9 ppb and Arsenic Dissolved with a range from 1.3J ppb to 15 ppb. All of these concentrations exceeded the EPA Region III Tap RBC level of 0.045 ppb. In addition, Mercury Soluble (2.6 ppb) in sample 11GW16 was detected above the USEPA MCL standard of 2.0 ppb.
- Elevated TPH concentrations (Gasoline Range Organic and Diesel Range Organic) found in the groundwater samples collected at SWMU 11/45 indicated releases of free-product hydrocarbons (oil/fuels spills) from the underground storage tanks and tunnels located near Building 38.
- Fourteen (14) Subsurface soil samples collected at the site at a depth range of 0.00-10.00 ft contained high levels of Arsenic (total) above the Residential RBCs level.
- Subsurface Soil Samples 11SB01-02, 11SB09-02 and 11SB22-04 taken from 2.00 to 9.50 ft contained concentrations of Total Petroleum Hydrocarbons (the sum of Diesel Range Organic and Gasoline Range Organic) varied from 110,540 ppb to 250,140 ppb. These levels exceeded the Industrial and Residential RBC standard of 100,000 for TPH. Although TPH does not have a regulatory level, EQB as well as EPA-Region II usually use 100,000 ppb in soil samples. These standards are use as reference levels, and they should not be consider as clean up action levels. As the report submitted by Baker indicated the EPA Region III Residential and Industrial RBC for individual Gasoline Organic Range (100,000 ppb) and Diesel Organic Range (100,000 ppb) these levels are not included nor established in the Risk Based Concentration Table of January - June 1995.

### Quality Assurance and Quality Control Samples

Quality Assurance and Quality Control (QA/QC) samples were obtained during RFI-Phase I and II for SWMUs 1, 2 and 11/45. The QA/QC samples consisted of equipment rinsate samples, field blank samples and trip blank samples. The samples were analyzed for full Appendix IX parameters (Volatiles, Semivolatiles, Pesticides/ PCBs, Herbicides, Dioxins and Inorganic Compounds), Explosives, and sulfide. The trip blanks were only analyzed for VOCs.

### Equipment Rinsate Blanks

During the RFI-Phase I, a series of five (5) equipment rinsate samples (1RB01-1RB05) were taken for SWMU 1. The analyses performed on these samples reveal low concentrations of Volatiles: Acetone; Semivolatiles: Bis(2-ethylhexyl)phthalate, Diethylphthalate and Phenol; Inorganics Compounds (Soluble): Chromium, Copper, Lead, Mercury and Zinc. No Pesticides/PCBs, Herbicides, Dioxins, Explosives were detected in the equipment samples.

Five (5) samples collected for RFI-Phase I for SWMU 2 detected low concentrations of: Volatiles: Acetone; Semivolatiles: Bis(2-ethylhexyl)phthalate and Inorganic (Soluble) Compounds: Chromium, Copper, Sodium and Zinc. No Pesticides/PCBs, Herbicides, Dioxins and Explosives were detected.

Two equipment rinsate blank samples (45RB01 and 45RB02) were collected during the Phase-I for SWMU 11/45. Minor concentrations of Acetone, Toluene, Barium (Soluble) and Lead (Soluble) were detected in the samples. No Semivolatiles or PCBs were found.

For SWMU 1 RFI-Phase II, only one (1) equipment rinsate sample (1ER01) was collected. The sample contained Bis(2-ethylhexyl)phthalate with 24 ppb in concentration. Several Inorganic (Total) Compounds such as Chromium, Lead and Zinc were also found at low concentrations.

Seven (7) equipment rinsate samples were obtained for SWMU 11/45. These samples contained low levels of the following constituents: Volatiles: 2-Butanone; Semivolatiles: 4-Chloroaniline, Benzoic acid, Bis(2-ethylhexyl)phthalate, Phenol and Pyridine; and Inorganic Compounds (Total): Antimony, Barium, Chromium, Lead, Mercury and Zinc. No Pesticides, Herbicides, Dioxins, Explosives and TPH were found in the samples.

No equipment blanks samples were collected during the RFI-Phase II for SWMU 2.

### Field Blanks

A total of three (3) field blanks were obtained for SWMUs 1 and 11/45 during the RFI-Phase I. The samples reveal low levels of Volatiles: Acetone, Bromodichloromethane, Chloroform, Methyl methacrylate, Toluene; Semivolatiles: Bis(2-ethylhexyl)phthalate; Metals (Total): Barium, Copper, Lead, Mercury, Zinc. No Dioxins, Pesticides/PCBs, Herbicides and Explosives were found in the three (3) field blanks samples.

For the RFI-Phase II, three (3) samples analyzed for SWMUs 1 and SWMU 11/45 indicated the presence of Volatiles: 1,1-Dichloroethane, Acetone, Bromodichloromethane, Chloroform, Dibromochloromethane, Ethylbenzene and Xylene (Total); Semivolatiles: 2,3,4,6-Tetrachlorophenol,

Acetophene, Bis(2-ethylhexyl)phthalate, Phenol, and sym-Trinitrobenzene; Inorganic (Total) Compounds: Barium, Chromium, Copper, Lead, Vanadium, and Zinc. In addition to these constituents, TPH for Gasoline Range Organic with 25J ppb were also detected in sample FB01. No Dioxins, Pesticides/PCBs, Herbicides and Explosives were found in the three (3) field blanks samples.

No Field blanks samples were collected during the RFI-Phase II for SWMU 2.

#### Trip Blanks

During the RFI Phase-I, fourteen (14) Trip blank samples were collected for SWMUs 1, 2 and 11/45. Various Volatiles (the only constituents analyzed for these samples): Acetone, Isobutanol, Propionitrile and Trichlorofluoromethane were detected at low concentrations. Except for sample TB08 which contained Isobutanol and Propionitrile with high concentrations of 2,000 ppb and 50 ppb, respectively.

A total of nine (9) Trip blanks were collected for the RFI-Phase II. Only Acetone at 11J was detected in sample 13TB02.

No Trip blanks samples were collected during the RFI-Phase II for SWMU 2.

#### Comments

- EQB agrees with the Navy that minor concentrations of Acetone in the equipment blanks, trip blanks and field blanks samples can be consider as laboratory artifacts. However, EQB does not agrees with the determination by the Navy that most of the contaminants such as chloroform and phthalate are due to laboratory artifacts.
- The decontamination procedures performed by the company are not proper and adequate due to the positive detection of Volatiles, Semivolatiles and Metals (Total and Soluble) concentrations in the Equipment blanks samples during the RFI Phase I and II investigations. EQB is concern that contaminant materials have been transported into non contaminated areas during the RFI Investigations for SWMUs 1, 2, and 11/45. Proper decontamination is not only a health and safety concern but also an analytical and sampling consideration. Therefore, the Navy must review these decontamination procedures and prevent possible cross contamination at the site.
- These quality control samples assess the quality of sampling procedures performed by the facility. After reviewing the analytical results from the field blanks, equipment blanks and trip blanks, potential problems during sampling can be deduce from incomplete decontamination; contamination introduced in the field from careless sample handling; container or preservatives contamination, atmospheric contamination; variability in the samples; and incomplete homogenization.
- Field blanks are used to determine whether site conditions are contributing to contamination levels. The field blanks collected from SWMUs 1 and 11/45 indicated contamination levels and numerous air releases from the facility due to the presence of contaminants Volatiles: (Xylene, Toluene, Benzene, Ethylbenzene); Semivolatiles: Acetophenone, Phenol, Bis(2-

ethylhexyl)phthalate including TPH (GRO and DRO constituents) and metals such as Chromium, Lead, Mercury (Total) during RFI Phase I and II investigations.

- A series of Field duplicates (one per ten/media) and Matrix Spike/Matrix Spike duplicates (MS/MSD) (two per twenty/media) samples will be collected at every sampling event for QA/QC purposes as established in the approved RCRA Facility Investigation Work Plan of September, 1995. These samples were not collected during RFI-Phase I and II. The field duplicates and Matrix Spike samples are essential for field quality control checks and necessary to determine the accuracy and precision of the analytical methods performed by the laboratory. If the Navy collected these samples, the analyses were not included as part of the RFI Final Report, if in the other hand the facility did not indeed obtained the samples, the Navy must indicate clearly state, justify and document why these samples were not collected during the RFI investigations for the SWMUs 1, 2 and 11/45.