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EVALUATION OF
Draft
RCRA FACILITY INVESTIGATION REPORT
Operable Unit 3/5
RCRA FACILITY INVESTIGATION
NAVAL STATION ROOSEVELT ROADS
CEIBA, PUERTO RICO

Submitted to:

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1.0 INTRODUCTION

The U.S. Environmental Protection Agency (EPA) has requested support for technical review of documents associated with the RCRA Facility Investigation (RFI) of the U.S. Naval Station Roosevelt Roads (NSRR) located in Ceiba, Puerto Rico. TechLaw has assigned this project to TRC, a TechLaw Team member under the REPA Contract under Work Assignment No. R02020.

The NSRR is located on the east coast of Puerto Rico in the municipality of Ceiba, approximately 33 miles southeast of San Juan. The primary mission of NSRR is to provide full support for the Atlantic Fleet weapons training and development activities. NSRR is currently operating under a Draft RCRA Corrective Action Permit that includes varying degrees of work at 28 Solid Waste Management Units (SWMUs) and three Areas of Concern (AOCs).

EPA requested the TechLaw Team to review the *Draft RCRA Facility Investigation Report for Operable Unit 3/5, Volumes 1 and 2*, dated March 20, 1998.

The TechLaw Team's report presents evaluations of the Draft RFI Report for Operable Unit 3/5. The method and objective of this evaluation are presented in Section 2.0. General comments are presented in Section 3.0. Page-specific comments are detailed in Section 4.0. Editorial comments are detailed in Section 5.0; and, recommendations are presented in Section 6.0.

2.0 METHODOLOGY

Pursuant to the EPA Work Assignment Manager's (WAM's) Technical Directive dated March 25, 1998, the TechLaw Team reviewed the Draft RFI Report, in particular Sections 3.0, 4.0, 5.0, 6.0, and 7.0 with respect to the adequacy and acceptability of investigation activities and conclusions and analytical results. The following documents were considered during the review:

- Final RCRA Facility Investigation, NSRR, P.R. prepared by Baker Environmental, Inc., dated September 1995;
- Interim Final RCRA Facility Investigation Guidance, OSWER Directive 9502.00-60, EPA 530/SW-89-031, May 1989;
- *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final*, OSWER Directive 9355-3-01, October 1988;
- *Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites*, EPA/540/P-91/001, February 1991;

- *Risk Assessment Guidance for Superfund (RAGS), Volume I: Human Health Evaluation Manual; (Part A) Interim Final, 540/1/-89, December 1989; and, Development of risk-Based Preliminary Remediation Goals (Part B) publication 9285.7-01B, December 1991, PB92-963333;*
- *EPA Region III Risk-Based Concentration Table, October 22, 1997;*
- *Human Health Evaluation Manual, supplemental Guidance: "Standard Default Exposure Factors" OSWER Directive 928.6-03 (EPA, March 25, 1991);*
- *Supplemental Guidance to RAGS: Calculating the Concentration Term, (publication 9285.7-08I, June 22, 1992);*
- *Dermal Exposure Assessment: Principles and Applications (EPA 600/8-91/001B, January 1992);*
- *Superfund Exposure Assessment Manual. Office of Remedial Response. EPA, 1988. (EPA/540/1-88/001); and*
- *Exposure Factors Handbook. Office of Health and Environmental Assessment. EPA, 1989. (EPA/600/8-89/043).*

3.0 GENERAL COMMENTS

The following is a list of general comments regarding the report.

1. The quality of the analytical data cannot be independently confirmed by review of this report. The report does not present sufficient raw data to confirm the accuracy of the tabulated data presented in Appendix F. The tabulated results appear to be validated based on the data qualifiers presented in the tables but cannot be verified without validation reports which are not included in the report. A statement on the usability of the data presented in the RFI report cannot be made without first verifying the quality and accuracy of the reported results. In order to review the accuracy and quality of the reported results, the following items must be included in the RFI report:
 - Copies of the analytical data packages which include tabulated results and all associated raw data including QA/QC information, standards information, laboratory notebooks, instrument printouts, and detailed example calculations which would enable the data reviewer to reproduce all results reported.
 - Copies of the data validation reports to assess the data qualifier actions that were utilized to the reported results.

2. It is unclear whether or not rejected data has been used in the statistical analysis of the sample results. This fact must be clarified and if rejected data has been used, the statistical analysis must be revised. The report should discuss the rejected data and determine the significance of these lost data points with regard to the completeness objectives of the RFI.
3. The Navy estimates that all three sites pose unacceptable increased risk for future residential users. While residential use of the three SWMUs appears unlikely, the Navy needs to provide documentation on the following:
 - Data (salinity and aquifer yield) demonstrating that the aquifer is not a potable water source;
 - Long term groundwater monitoring plan to verify that concentrations do not increase, as increased levels may result in risks via other pathways such as migration through soil into indoor air or ecological risks; and,
 - Deed restrictions on the site which will effectively prevent any development of the site for uses other than its current use, without further evaluation of risk to human health.
4. It is unclear why an Environmental Risk Assessment was not conducted at SWMUs #1 and #2 due to the presence of elevated concentrations of metals within sediments. The Environmental Risk Assessment provided in the Facility Investigation for Operable Units 1, 6, and 7 (Phase I) specifically identified SWMU 2 (Langley Drive Disposal Area) as of particular ecological concern due to the elevated metals. This report also recommended additional sediment characterization in conjunction with sampling of surface and subsurface soils and groundwater to determine the source of the contamination. The additional characterization should have included sediment samples from the harbor side of the mangroves as well as additional shoreline areas located south of 2SD03 to determine the extent of contamination. An Environmental Risk Assessment must be conducted.

In order to demonstrate that no unacceptable risk to the environment exists, the assessment should determine whether ecological receptors may be exposed to site-related contaminants by describing conditions at the site, potential receptors, and potential exposure pathways. If exposure pathways are present, then the risk to ecological receptors must be characterized in accordance with the following guidance:

- Framework for Ecological Risk Assessment. 1992. Risk Assessment Forum, U.S. Environmental Protection Agency. EPA/630/R-92/001.

- Proposed Guidelines for Ecological Risk Assessment. Risk Assessment Forum, U.S. Environmental Protection Agency. EPA/630/R-95/002B.

4.0 PAGE-SPECIFIC COMMENTS

Page 3-8, Section 3.4.1.1, Paragraph 2

The work plan for the “characterization” of the buildings interior must be submitted for regulatory review.

Page 5-1, Section 5.0, Paragraph 1

The text indicates that the objective of Section 5 “...is to characterize the nature and delineate the extent of potential contamination.” The characterization information presented in Section 5 summarizes analytical results and presents comparisons of the data to applicable criteria. The information in Section 5, however, is not sufficient to fully characterize the nature, extent, and rate of migration of release(s). Based on strategies, tasks, and techniques, presented in EPA RFI guidance, the following additional activities must be completed to adequately characterize the nature and extent of contamination.

SWMU 1

- The fill material must be characterized from various depths throughout the site. Note that this landfill was the main station landfill for approximately 20 years. Due to the length of operating time, various “cells” may be present. Degradation of contaminants may be variable across the site. “Hot spots” may be present. This characterization must attempt to delineate any potential cells and/or hot spots.
- The physical characteristics and chemical composition of cover material on-site must be documented.
- Storm water runoff swales and on-site drainage channels must be delineated and presented on the site plan.
- The vertical and lateral extent of the disposal site must be delineated and documented. This information must be surveyed and presented in site plans. This information must be correlated with cross-sections to provide a three-dimensional picture of the disposal site.
- Ground water flow direction and hydraulic conductivity must be documented as related to the entire disposal site. This activity must clearly define ground water flow onto the site, through the fill material, and off-site directions and rates.
- Potential off-site migration pathways via all media must be documented. Confirmatory media sampling must be completed at all potential migration pathways.
- Ground water must be characterized at hydrogeologic upgradient locations and hydrogeologic downgradient locations from the documented disposal site boundaries.
- Additional on-site sediment sampling must be completed to delineate the extent of contamination. At a minimum, additional sediment samples must be collected from the

area of the PCB detection at 1SD02 to further delineate a potential source, and from surface water hydrogeologically down gradient locations of the disposal site perimeter.

- Due to contaminant levels above ERM screening values from the preliminary sediment sampling results, toxicological sampling must be completed on-site, and an ecological risk evaluation must be completed.

SWMU 2

- The fill material must be characterized from various depths, throughout the site. Note that this landfill was in operation from 1939-1959. Characterization must be completed to delineate any potential cells and/or hot spots. Contaminant concentrations directly on-site must be documented.
- The extent of dioxin contamination in soils, identified in soil samples 2SB05 and 2SB04, must be delineated.
- The extent of elevated arsenic levels in soils in the area of 2MW03 must be delineated.
- The physical characteristics and chemical composition of cover material on-site must be documented.
- The vertical and lateral extent of the disposal site must be delineated and documented. This information must be surveyed and presented in site plans. The current disposal site boundary is not supported by the site data provided. Additionally, analysis of soil samples at the perimeter of the site indicates the additional soil data is necessary to delineate the site boundary.
- Storm water runoff swales and on-site drainage channels must be delineated and presented on the site plan.
- Potential off-site migration pathways via all media must be documented. Confirmatory media sampling must be completed at all potential migration pathways.
- The source and extent of the trichloroethene detections in ground water must be delineated.
- Ground water located hydrogeologically downgradient of the disposal site boundary must be characterized further to demonstrate no off-site migration of contaminants.
- Additional on-site sediment sampling must be completed. Additional sediment samples must be collected from the areas associated with 2SD02 & 2SD03 to determine the extent of sediment contamination.
- Due to contaminant levels above ERM screening values from the preliminary sediment sampling results, toxicological sampling must be completed on-site, and an ecological risk assessment must be completed.

SWMU 11/45 - Building 38

- The extent of soil and ground water contamination outside Building 38 must be determined. The site boundary must be delineated by analytical data and presented on a site plan. Ground water elevations and flow directions onto and off the site must be

delineated. The extent of inorganic and PCB contamination in ground water must be delineated.

- The source and extent of mercury contamination at monitoring well 11GW16 must be delineated. Additional soil and ground water sample data must be provided to document this delineation.
- Confirmatory soil sampling must be completed at the soil removal ICM area to document the amount of any remaining PCBs in site soils. The extent of soil contamination at the underground storage tanks must be documented. Soil north and south of the intake where the tunnel intersects the access road (in plan view) must be sampled to document any potential migration along the preferential pathway of the road base materials.
- All media must be sampled at the cooling water discharge tunnel outfall. If contamination is evidenced, the extent of contamination must be documented, to include down gradient extent of contamination and characterization of soil along the entire run of the tunnel from Building 38 to the outfall.

Page 5-7, Section 5.2.1.3, Paragraph 2

Based on the analytical results in Table 5-11, dioxins were detected in all analyzed sediment samples (1SD01 and 1SD02). Therefore the extent of dioxin at the SWMU does not appear to have been delineated. Additional sampling is warranted to delineate the extent of dioxin contamination.

Pg. 5-27, Section 5.5.1.1.3

This section states that TB04 contained isobutanol and propionitrile. QC sample results presented in Appendix G show that the isobutanol and propionitrile for TB04 are flagged rejected and must not be used. The results must be considered lost data points that cannot be verified present or absent without resampling and reanalysis. Reference to isobutanol and propionitrile must be removed from the discussion of TB04. The report should provide an assessment of the impact of rejected data on the site characterization. The report should also present any corrective actions which would be required if the assessment identifies an adverse impact to site characterization.

Page 6-9, Section 6.1.2.1, Paragraphs 3 & 4; Page 6-14, Section 6.1.2.2, Paragraphs 3 & 4; Page 6-17, Section 6.1.2.3, Paragraphs 3 & 4; and Pages 6-19 and 6-20, Section 6.1.3

Total, rather than dissolved, inorganic results (and also organic results) must be quantitatively evaluated in the risk assessment. It is not appropriate to assume that dissolved constituents more closely approximate exposure conditions at the tap when the actual characteristics of a possible future water supply are unknown. The quantitative risk assessment must be revised to include total rather than dissolved (filtered) results.

Page 6-17, Section 6.1.2.3, Paragraphs 3 & 4

Dissolved mercury concentrations are reported at higher numerical values than total mercury. This apparent discrepancy must be clarified

Page 6-28, Section 6.2.3, Paragraph 1; Page 6-46, Section 6.4.3.2, Paragraph 2; Page 6-47, Paragraph 2; and Page 6-48, Paragraph 2

The following is stated within the report “. . . groundwater at NSRR is not being utilized as potable water due to poor quality and low yields . . .” Data or reference documentation must be provided which demonstrates the poor quality and low yields of the aquifer.

Page 6-35

The EPA's Human Health Evaluation Manual, Development of Risk-Based Preliminary Remediation Goals (Part B), dated December 1991, presents a particulate emission factor (PEF) based on standard default assumptions of 4.63×10^9 m³/kg. This value differs from the PEF of 1.32×10^9 m³/kg utilized with this report. The derivation of PEF utilized here must be presented.

Page 6-36, Paragraph 2, and Appendix M

The dermally absorbed dose for organic compounds must be estimated using the nonsteady-state approach presented in the EPA document entitled Dermal Exposure Assessment: Principles and Applications (EPA 600/8-91/001B, dated January 1992). In addition, the text on page 6-36 and Appendix M must be revised to reflect this guidance.

Page 6-46, Paragraphs 1 & 2

The findings must state that lead was detected in site ground water (total concentrations) and sediments at concentrations above applicable screening levels; and, that a possible additional source of risk to current and future receptors is evident.

Page 6-47, Paragraphs 1 & 2

The risk characterization discussion needs to state that lead concentrations in surface soils, sediments, and groundwater exceed applicable screening levels and may present additional risk to current and future receptors. The discussion must also state that detected levels of isodrin could not be evaluated because toxicity criteria do not exist, and therefore the risk posed by isodrin is uncertain.

Page 6-48, Paragraphs 1 & 2

The findings must state lead is present in ground water (total) at levels which exceed the federal MCL.

Page 6-53, Section 6.5.6, Paragraph 6

The maximum reported concentration of total lead in groundwater at SWMU 1 exceeds the federal MCL by almost a factor of 10, while maximum concentrations in SWMU 1 sediments and surface soils exceed the EPA action level by approximately a factor of 2. As a result, the statement "The lack of promulgated toxicological indices for lead does not have significant effects on the underestimation of risk due to the presence of relatively high levels of other COPCs in environmental media, such as arsenic" is not supported and should be rephrased. The text should indicate that the risk presented by site lead concentrations is uncertain. In addition, the uncertainty section should also address the fact that detected levels of isodrin in SWMU 2 groundwater may present additional unquantified risk.

Page 7-1, Section 7.2.1

The conclusion that Phase I and II data indicate minimal site impact is not supported by the analytical data gathered and must be reevaluated.

The Navy states that several inorganic contaminants present at various sites are a result of "leaching of volcanically derived soils." Current background data does not support this conclusion as the elevated levels are above the documented background levels. Additional soil sampling must be completed to support this statement. The location of additional soil samples should be collected from NSRR locations with a surficial geology of similar provenance to that of the site in question, with no historical impact from site activities.

Page 7-3, Section 7.2.2

The conclusion that the analytical data indicate minimal site impact is not supported by the analytical data gathered and must be reevaluated.

Page 7-5, Section 7.2.3

Addenda to this report must be prepared which address the cumulative impacts of exposure at both SWMUs 11 and 45 to current and future receptors.

Page 7-5, Section 7.2.3.1, Paragraph 4

Benzo(a)pyrene in ground water is the major risk driver and results in risk greater than 1×10^{-3} . Therefore, the Navy needs to state that the total ILCR exceeded the target risk range due

primarily to detected levels of benzo(a)pyrene in ground water and that the individual ICLRs for benzo(a)pyrene also exceeded the upperbound of the risk range of 1×10^{-4} .

Page 7-7, Sections 7.3.1 & 7.3.2

In order to justify the “no further action recommendation” for SWMUs 1 and 2, the following information must be provided: 1) Data (salinity and aquifer yield) demonstrating that the aquifer is not a potable water source, 2) A long term monitoring plan for site ground water to ensure levels do not increase (increased levels may result in risks via other pathways such as migration through soil into indoor air spaces or ecological risks), and 3) Presentation of deed restrictions on the site which will effectively prevent any development or use of the sites other than their current use, without further evaluation of risk to human health.

In addition, risks to current on-site workers at SWMU 1 must be addressed further since the nature and extent of site contamination, especially dioxin contamination, is uncertain.

Page 7-7, Section 7.3.1, Paragraph 1

The recommendation for no further action at SWMU 1 is not acceptable at this time. Additional activities must be completed to characterize the nature and extent of contamination at the site were detailed in comments to Section 5.0. Discussions of risk and land use restrictions are premature prior to fully delineating and characterizing the disposal site.

Page 7-7, Section 7.3.2, Paragraph 4

The recommendation for SWMU 2 is not acceptable. Additional activities must be completed to characterize the nature and extent of contamination at the site were in comments to Section 5.0. Prior to fully delineating and characterizing the disposal site, land use restrictions to maintain certain levels of risk cannot be evaluated.

Page 7-8, Section 7.3.3, Paragraph 4

The recommendation for no further action for SWMU 45 is not supported by data gathered and analyzed to date. Additional activities warranted to complete the characterization of the nature and extent of contamination were presented in comments to Section 5.0.

Page 7-8, Section 7.3.3, Paragraph 5

Based on TPH exceedances of Residential and Industrial RBCs in subsurface soil along the cooling water tunnel, additional information is necessary to support the recommendation for natural attenuation of TPH.

Page 7-9, Section 7.3.3, Paragraph 1

The recommendation for no further action is not supported at this time. The facility needs to reevaluate this conclusion following completion of the ecological risk assessment.

Table 6-4

The COC screening value for total PeCDF is incorrect. According to the footnotes, the COC value of 0.08 was determined using a 2,3,7,8-TCDD Toxicity Equivalent Factor (TEF) of 0.5. However, using a TEF of 0.5, a 0.008 critical value is calculated.

Table 6-5

The Risk-Based COC Screening Criteria, Residential Scenario, listed in Table 6-5 for chrysene is 8,800 ug/kg. According to USEPA Region III Risk-Based Calculation Tables, the value should be 88,000 ug/kg.

Table 6-7

Isodrin was incorrectly eliminated as a COPC because it lacked toxicity criteria. Isodrin should be retained as a COPC. The possible impact on risk must be discussed in the uncertainty section.

Table 6-11

The total mercury concentrations are reported at levels which are lower than those reported in this table for dissolved mercury. The Navy must clarify this discrepancy.

Table 6-12

The Residential Soil COC value presented for phenanthrene of 230,000 ug/kg must be changed to 310,000 ug/kg which is the screening value for naphthalene. There is no US EPA toxicity criteria for phenanthrene and data for naphthalene is an appropriate substitute.

Tables 6-14 and 6-16 and Appendix M

The guidance referenced by the Navy for the exposure input parameters for inhalation of contaminated air states that “. . . 20 m³ per 8-hour workday represents a reasonable upper-bound inhalation rate for the occupational setting.” The Navy, however, is using input parameters for respiration rate and exposure time which result in an inhalation rate of 10m³ per 8-hour workday. The input parameters for respiration rate and exposure time must be changed to reflect an inhalation rate of 20 m³ per 8-hour workday for current on-site workers and future construction workers.

Appendix F

Inorganics (Dissolved) Detections that are presented in Section 5 cannot be cross-checked in Appendix F due to the absence of analytical results. For example, no analytical results for organics are presented in Appendix F for samples 1GW05 and 5GW02 (Table 5-19). This information must be provided.

Appendix H, SWMU 1

Sample 1SS06 has a reported result of 0.13JS for Total HxCDF. The data qualifier "S" should be identified.

Appendix H, SWMU 11/45

The table summarizes the number of samples which have results above RBC limits. Page 7 of 8 indicates that 0/17 samples for copper and 0/17 for zinc exceed the limits. Review of the previous pages indicates 14 of the 25 zinc samples presented have results which have been rejected (flagged R) which would result in only 11 valid samples to summarize. Copper also has eight samples rejected. The report must not use any sample results flagged with an R in any statistical analysis. The report must also state that rejected data is not used. The report should provide an assessment of the impact of rejected data on the site characterization. The report should also present any corrective actions which would be required if the assessment identifies an adverse impact to site characterization.

5.0 EDITORIAL COMMENTS

Tables 5-1 through 5-6

Table 5-1 through 5-6 summarizes the inorganic and organic positive detections in background surface soils. The analytical results for the samples do not contain analytical data sheets in Appendix H. Therefore, background analytical results presented in Table 5-1 through 5-6 cannot be verified. The analytical data sheets must be submitted as an addendum to support review of the data.

Tables 5-7 through 5-35

Analytical results in Tables 5-7 through 5-35 should be reviewed for consistency with results in Appendix F. Examples of inconsistencies identified include:

- Table 5-7

The data presented for Samples 1SS06 and 1SS07 are not consistent with data presented in Appendix F. Data should be reviewed and revised as appropriate.

The analytical result for sample 1MW04-00 for bis(2-ethylhexyl)phthalate must read 390 U not 390 J.

- Table 5-11

The analytical result for sample 1SD02 for total HxCDD must read 2.4 J not 2.4 U.

- Table 5-20

The analytical result for sample 2SB04-00 for Fluoranthene must read 420 not 420 U.

- Table 5-26

Analytical compound 2,4,5-T should be presented under chlorinated herbicides rather than dioxins.

- Table 5-35

Since the Table 5-35 presents a summary of dissolved inorganic detections, the title of each analyte should be soluble not "total."

- Table 5-26

Positive analytical results for Total Organic Carbon (TOC), Chemical Oxygen Demand (COD), and Total Suspended Solids (TSS) as presented in Section 5 are not consistent with analytical results reported in Appendix F. For example, the results for GGW01 indicate that TOC, COD, and TSS were detected at 210,000 ug/L, 46,000 ug/L, and 63,000 ug/L, respectively. Table 5-26 should be reviewed and revised as appropriate.

- Figures 5-4

For sample 1MW04, vanadium must be included under total inorganics. Sample 1MW01 must include both copper and vanadium under total inorganics. According to Table 5-14, vanadium was detected at 913 ug/L in sample 1MW04 and copper and vanadium were detected at 1,010 ug/L and 511 ug/L in sample 1MW01, respectively.

- Figure 5-7

The Sample ID in the analytical result table for sample 2SB05 must read 2SB05 not 2SB04, since the sampling location is labeled 25B05 in Figure 5-7.

- Figure 5-13

Sample 11SB01-02 must include analytical results for arsenic and aroclor 1260. According to Table 5-36, arsenic was detected at 2,700J and aroclor 1260 was detected at 320J.

- Figure 5-14

Sample 11SD09 must include analytical results for phenanthrene. According to Table 5-38, phenanthrene was detected at a concentration of 470J.

- Page 7-4, Paragraph 2

The first sentence appears to contain a typographical error and should be corrected to read, "There does appear to be impact . . . "

6.0 RECOMMENDATIONS

The following actions are recommended.

- The RFI should be expanded to include a discussion on data gaps. A work plan should be prepared to address the SWMU-specific data gaps identified in page-specific comments and submitted for regulatory approval. The work plan should use a conceptual understanding of release characteristics and transport mechanisms at each SWMU in order to develop an appropriate number of samples to adequately characterize the extent of contamination at each SWMU. The plan should present the specific locations of the proposed samples for each media. The plan should also present the methodology to address human health and ecological risk assessment concerns.
- The Navy must discuss the rejected data as related to the completeness objectives of the project and the impact to the analysis.