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April 7, 2011

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

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

Re: Contract N62470-10-D-3000
IQC for A/E Services for Multi-Media
Environmental Compliance Engineering Support
Delivery Order (DO) JM01
U.S. Naval Activity Puerto Rico (NAPR)
EPA I.D. No. PR2170027203
Revised Final Full RCRA Facility Investigation Work Plan for SWMU 70

Dear Mr. Everett:

Michael Baker Jr., Inc. (Baker), on behalf of the Navy, is pleased to provide you with one hard copy of the replacement pages for the Final Full RCRA Facility Investigation Work Plan for SWMU 70, Naval Activity Puerto Rico for your review and approval. These replacement pages make up the Revised Final Full RCRA Facility Investigation Work Plan for SWMU 70. Directions for inserting the replacement pages into the Final Full RCRA Facility Investigation Work Plan for SWMU 70 are provided for your use. Also included with the copy of the replacement pages is one electronic copy provided on CD of the Revised Final Full RCRA Facility Investigation Work Plan for SWMU 70.

This document is being submitted in accordance with EPA comments dated February 9, 2011. The Navy responses to these comments are attached for your review.

If you have questions regarding this submittal, please contact Mr. Mark Davidson at (843) 743-2124. Additional distribution has been made as indicated below.

Sincerely,
MICHAEL BAKER JR., INC.

Mark E. Kimes

Mark E. Kimes, P.E.
Activity Coordinator

MEK/vk
Attachments

cc: Ms. Debra Evans-Ripley, BRAC PMO SE (letter only)
Mr. David Criswell, BRAC PMO SE (letter only)
Mr. Mark E. Davidson, BRAC PMO SE (1 hard copy and 1 CD)
Mr. Pedro Ruiz, NAPR (1 CD)
Mr. Tim Gordon, US EPA Region II (1 hard copy and 1 CD)
Mr. Carl Soderberg, US EPA Caribbean Office (1 hard copy and 1 CD)
Ms. Bonnie Capito, NAVFAC Atlantic – Code EV42 (1 hard copy for Administrative Record)
Ms. Gloria Toro, PR EQB (1 hard copy and 1 CD)
Ms. Wilmarie Rivera, PR EQB (1 CD)
Mr. Felix Lopez, US F&WS (1CD)
Ms. Brenda Smith, TechLaw, Inc. (1 CD)

NAVY RESPONSES TO EPA AND PREQB COMMENT LETTER DATED FEBRUARY 9, 2011
FINAL FULL RCRA FACILITY INVESTIGATION WORK PLAN
SWMU 70 (DISPOSAL AREA NORTHWEST OF LANDFILL) DATED NOVEMBER 5, 2010
APRIL 15, 2011

(Regulator comments are provided in italics, while Navy responses are provided in regular print.)

EPA COMMENTS

GENERAL COMMENTS

General Comment 1. *The Work Plan is lacking several elements required by EPA Requirements of Quality Assurance Project Plans (QAPP), dated March 2001 (QA/R-5). These elements are necessary to evaluate the proposed Work Plan:*

- *Laboratory specific information including standard operating procedures, method detection limits, reporting limits (RLs), quality control (QC) acceptance limits, analytical calibration procedures and acceptance criteria, and corrective actions should the calibration/QC criteria be exceeded must be provided for the currently proposed analytical methods.*
- *Specific procedures for data verification and validation of the proposed methods must be provided. While the referenced Management Plan provides validation procedures, it does not include how data generated by Methods 6020A, 8260B, 6010C, 9012A, 1010/1030, 9040B/9045C, 9034, 9060 or Acid Volatile Sulfides/Simultaneously Extracted Metals will be validated.*
- *Project specific completeness goals for both the field and laboratory have not been provided. In addition, the Work Plan does not indicate if any proposed samples are deemed critical to this investigation.*
- *There is no project specific discussion of how precision, accuracy, representativeness, comparability and completeness and sensitivity (PARCCS) measures will be incorporated into a data quality assessment, how completeness will be measured for this project, or if an evaluation of significant trends and biases will be included as part of a data quality assessment.*
- *Examples of all forms and checklists to be used have not been provided (e.g., chain-of-custody forms, sample labels, audit checklists, data validation checklists).*

Navy Response: The Navy plans to implement this investigation at NAPR in accordance with the EPA approved Master Project Management Plan (PMP), Master Data Collection Quality Assurance Plan (DCQAP), Data Management Plan (DMP), and Master Health and Safety Plan (HASP) for NAPR (Baker, 1995. Final RCRA Facility Investigation Management Plans, Naval Station Roosevelt Roads, Ceiba, Puerto Rico. September 14, 1995. Coraopolis, Pennsylvania.) The EPA approved the work plan on September 25, 1995. These Master Plans define acceptable data requirements and error levels associated with the field and analytical portions of this investigation. Therefore, to maintain consistency with past Navy work under the Consent Agreement, this work plan has been revised using the Navy's EPA approved Master Plans for this facility.

In response to previous comments by the EPA on Phase I RFI Work Plans for SWMUs 62, 71 and 78 (see the April 17, 2008 letter from Baker on behalf of the Navy to the EPA); the Navy provided an evaluation of the Master Project Plans (Baker, September 14, 1995) in relation to the QA/R-5 requirements ("EPA Requirements for Quality Assurance Project Plans." EPA/240/B-01/003. [EPA, March 2001]). Table 1 of the April 17, 2008 letter provides a map between the DCQAP sections, the work plan content and the sections required by QA/R-5 and illustrates that although there are format and minor content differences, the DCQAP is generally consistent with and includes all of the main elements required by QA/R-5. For

example, data validation is discussed in Section 10 of the DCQAP; PARCCS measures are discussed in Section 4 of the DCQAP; and forms and checklists are provided in the tables and appendices of the DCQAPP. Some additional examples of forms and checklists that may be found in the DCQAP are shown in the following table:

Item	Location in the DCQAP
System Audit Checklist	Table 12-1
Test Boring Record	Appendix B – SOP F101 – Borehole and Sample Logging
Typical Monitoring Well Construction Details and Test Boring and Well Construction Records	Appendix B – SOP F103 – Monitoring Well Installation
Chain of Custody Form	Appendix B – SOP F302 – Chain of Custody
Sample Label	Appendix B – SOP F302 – Chain of Custody
Data Validation Checklists	Appendix D – Data Validation Methodologies

The analytical methods, analyte lists, detection limits, etc. may have changed to some degree since publication of the DCQAP. Consequently, the Full RFI Work Plans contain the following tables specifying the sampling and analytical program requirements so that data of sufficient quality for future risk management decisions is collected:

- Table 3-1 Summary of Sampling and Analytical Program – Environmental Samples
- Table 3-2 Summary of Sampling and Analytical Program – QA/QC Samples
- Table 3-3 Method Performance Limits

The information provided in these tables has been reviewed against screening levels and have been determined to generally meet these levels. Table 3-3 has been revised to include preparation methods. Ecological screening values for soil, groundwater / surface water, and sediment are presented on Tables 4-1, 4-2, and 4-3, respectively. In addition, tables with Human Health Screening Values (Table 4-4) and NAPR Background Screening Values (Table 4-5) have been added for easy comparison to the analytical method detection limits. These quantitation limits have also been reviewed by the analytical laboratory to ensure that they can be met. In all cases, the quantitation limits are the lowest achievable by the laboratory for the specified analytical method. These tables are then provided to the analytical laboratory subcontractor as part of their scope of work so that the laboratory is clearly aware of the analytical requirements of the project. Additionally, only laboratories capable of providing an acceptable Laboratory Quality Manual (LQM) will be selected for this project. The LQM will be provided to USEPA after selection of the analytical laboratory.

This evaluation (presented in the April 17, 2008 letter), which was approved by EPA on May 13, 2008, indicated that the Phase I RFI Work Plan structure, with reference to the 1995 Master Project Plans and inclusion of project-specific tables summarizing the sampling and analysis program for environmental and QA/QC samples and method performance limits, and other factors as discussed in the April 17, 2008 letter, when taken together provide the information and guidance necessary for the project team to generate good quality data and to use that data for developing risk management based recommendations and decisions. The structure of the Full RFI Work Plans for SWMU 70 is identical to the Phase I RFI structure and therefore meets the QA/R-5 QAPP requirements.

EPA Evaluation of Response to General Comment 1*: The response partially addresses the comment. However, because the laboratory has not been selected, laboratory specific standard operating procedures (SOPs), quality control (QC) limits, and quantitation limits (QLs) have not been included in the Work Plan. Additionally, Table 3-3 states that the QLs listed for soil are based on wet weight and that the quantitation limits calculated by the laboratory on a dry weight basis will be higher. Since screening levels are based on dry weight calculations, it is unclear whether the chosen laboratory's dry weight QL will be able to meet screening levels. Ensure that when a laboratory is selected, laboratory specific SOPs, QC limits, and QLs are included in the Work Plan as an addendum. Also, revise the Work Plan to clarify how it can be ensured that the laboratory will be able to meet screening levels when reporting results are on a dry weight basis.*

Navy Response: The comment is noted. As indicated in our previous response, to help ensure that screening levels are met, required quantitation limits are provided to the laboratory as part of their contractual scope of work. Upon the selection of the subcontracted analytical laboratory for this investigation, laboratory specific SOPs and QC limits will be reviewed to confirm they will be able to meet the applicable screening levels. Additionally, upon further review of Table 3-3, it was discovered that outdated QLs were included in error for SW-846 Method 6020A (ICP/MS) analysis of groundwater. Therefore, Table 3-3 will be revised to include the most current QLs available for Method 6020A.

General Comment 2. *A data quality objective (DQO) section should be provided in the Work Plan. The DQO section should clearly define the problem and the environmental questions that should be answered for the current investigation. Project decision "If…, then…" statements should be developed, linking data results with possible actions. The DQOs should also identify the type, quantity, and quality of data needed to answer the study questions. The following information should be added to the Work Plan so that complete DQOs are presented;*

- *Provide project decision conditions ("If…, then…" statements) for each matrix and/or decision area.*
- *Specify how "good" the data need to be in order to support the environmental decision (e.g., definitive-data with 100% validation).*
- *Provide the rationale for the proposed number of samples for each area of interest, matrix, and interval. In addition, provide the rationale for the proposed type of sample (e.g., grab samples vs. composite samples as well as random samples vs. judgmental samples). The rationale should provide sufficient detail to explain why each of these will address the environmental questions being asked.*

Navy Response: Although the seven-step DQO process was not applied rigorously, elements essential to the process (with the exception of statistically determining the number of samples) have been considered in the development of the sampling design. Because the investigation is designed to determine the extent of impacts that have occurred to soil and groundwater at the site, the sample locations have been selected to reflect the most likely impacted areas based on site history and professional judgment.

Detailed sampling rationale, including the number and location of samples from each media, specific rationale for each sample, sampling procedures, and associated laboratory analyses is provided in Section 3.1.

Project decision conditions include comparing analytical data to human health-, ecological-, and background-based screening values. Exceedances of human health and/or ecological screening values and background screening values will result in a recommendation that the site move to a CMS with an initial step being preparation of a CMS Work Plan. A HHRA and ERA will be conducted as part of the CMS. Although human health and ecological risk assessments will not be conducted during the Full RFI, the Full RFI Work Plan was developed with input from our human health and ecological risk assessors to assure that the investigation will provide the data that is needed for future risk management decisions.

The human health and ecological risk assessors review the sampling (number, frequency, location and collection methods) and analytical programs (analytical methods, parameter lists, detection limits) and compare applicable screening values to method performance limits to maximize the usability of the resultant data. The decision criteria for this project (comparison of environmental media analytical results to screening criteria), is discussed extensively in Sections 4.6.1, 4.6.2 and 4.6.3 of the Full RFI Work Plan. Additional data quality criteria are provided in Section 4.1.1.2 (data quality levels) and Section 14.3 (data completeness and other criteria) of the approved final DCQAP. Based on the above, no revisions to the text of the Full RFI Work Plan for SWMU 70 are required.

EPA Evaluation of the Response to General Comment 2*:* *The response partially addresses the comment. However, the decision process behind the selection of sample locations and depths and why it will address study goals is not clearly stated. Revise the Work Plan to include a more specific rationale behind why the number and locations of samples is sufficient to meet study goals.*

Navy Response: The following paragraph has been added to Section 3.0 of the Work Plan:

> "The locations of the proposed samples completely encircle the Phase I RFI sample locations in the northern portion of the SWMU (70SB01, 70SB02, 70SB04, and 70SB05) and sample location 70SB07 in the southern portion of the SWMU. This approach will provide an even distribution of the metals concentrations from a known point. This even distribution of sample locations will encompass the four radial directions, assuring to meet the objectives of this Full RFI which is to delineate metals, and to further characterize the groundwater and wetland sediment. By completely encircling existing soil sample locations, all directions will be analyzed. The number of samples proposed is intended to provide sufficient data that is needed for future risk management decisions. The depth of the samples proposed is reasonable based off known conditions of groundwater depth, surface and subsurface soil."

General Comment 8. *MCLs should not be used to screen groundwater data; MCLs are not solely risk-based. Groundwater exceedances of risk-based screening criteria warrant an HHRA unless land use controls and/or institutional controls are in place at SWMU 70 to prevent consumption of groundwater (e.g., residential development). Further, if a HHRA is warranted, note that groundwater COPCs should be selected based on comparison of analytical results to the applicable Tap Water Regional Screening Level (RSL) and not the MCL during the HHRA conducted as part of the CMS. Revise the Draft RI Work Plan to update Section 4.6.2, Human Health Screening Values, accordingly and omit Section 4.6.2.2, Federal Drinking Water MCLs, or provide adequate justification for not doing so.*

Navy Response: MCLs will be used only as one of the screening tools in the Full RFI. As indicated in Section 4.6.2, USEPA Regional Tap Water SLs and inorganic background levels also will be used for groundwater screening in the Full RFI for SWMU 70. It is acknowledged in Section 4.6.2.2 that MCLs are not solely risk-based. Note that it is not the objective of the Full RFI to evaluate the potential for human health risks. Further evaluation of the potential for human health risks will be conducted as part of a CMS investigation. In HHRAs conducted for NAPR, only risk-based screening criteria are used in the COPC selection process. As such, MCLs are not used to identify groundwater COPCs. No revisions to the text of the Full RFI Work Plan for SWMU 70 are required.

EPA Evaluation of the Response to General Comment 8*:* *The Navy's response does not fully address the intent of EPA General Comment 8. EPA and TechLaw are aware that Section 4.6.2, Human Health Screening Values, indicates that Tap Water Regional Screening Levels (RSLs) will be used in the Full RFI screening for groundwater, but acknowledges that Maximum Contaminants Levels (MCLs) will also be used. The intent of EPA General Comment 8 was to recommend that where EPA Tap Water RSLs are more protective than MCLs, EPA Tap Water RSLs be used in determining and delineating the nature and*

extent of contamination in groundwater. Given that a human health risk assessment (HHRA) will not be conducted as part of the RFI, it is important the RFI data evaluation confirms or justifies the decisions about whether or not SWMU 70 will be recommended for a Corrective Measures Study (CMS). It is recommended that such justifications be risk-based for all media; therefore, the use of EPA Tap Water RSLs rather than MCLs (when EPA Tap Water RSLs are more protective) is recommended. While MCLs are the regulatory limit, delineating to the EPA Tap Water RSL, when RSLs are more protective than MCLs, will allow for a more protective data evaluation in the RFI in support of a decision for/against performing a CMS. Revise the Work Plan to clarify that EPA Tap Water RSLs will be used to delineate any groundwater contamination when EPA Tap Water RSLs are more protective than MCLs, or alternatively, provide justification for not following this approach either in the RFI Work Plan or the subsequent RFI Report.

Navy Response: Section 4.6.2 has been revised to state the following:

> "It should be noted that in the case of groundwater comparison to human health screening criteria conducted as part of the Full RFI, the Regional Tap Water RSLs will be used to delineate the nature and extent of contamination in groundwater when the RSLs are more protective."

General Comment 9. *Ensure that contract-required quantitation limits (QLs) are low enough to meet human health and ecological screening criteria. Revise the Work Plan to show that QLs will be low enough to meet data quality standards for risk assessment purposes. The requested revision can be addressed by simply adding/updating tables that compare the QLs to applicable human health and ecological screening values.*

Navy Response: Human health screening values (Regional Screening Levels and MCLs) are provided in Table 4-4 and ecological screening values are provided in Tables 4-1 to 4-3. The information provided in Table 3-3 has been reviewed against project-specific screening levels and has been determined to generally meet these levels. The quantitation limits have also been reviewed by an analytical laboratory to ensure that they can be met. In all cases, the quantitation limits are the lowest achievable by the laboratory for the specified analytical method. The project-specific screening values are then provided to the analytical laboratory subcontractor as part of their scope of work so that the laboratory is clearly aware of the analytical requirements of the project.

EPA Evaluation of the Response to General Comment 9: *The response is partially adequate. The Work Plan has been revised to include the human health screening values (i.e., RSLs and MCLs) and background screening values in Table 4-4 and Table 4-5, respectively. However, please clarify in the footnotes why soil RSLs are not listed for volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) in Table 4-4 (e.g., soil will not be analyzed for VOCs and SVOCs). Additionally, the footnotes reference the May 2010 RSLs. Note that the RSLs were updated in November 2010. Ensure that the most current RSLs are used in the RFI.*

Navy Response: The Table 4-4 notes have been revised to elaborate on the definition of "NA" as follows: *NA - Not applicable (soil will not be analyzed for VOCs).* The most current version of the RSLs available at the time the SWMU 70 Full RFI is completed will be used for screening purposes.

General Comment 14*. Appendix C of the Work Plan shows that several bioaccumulative COPCs, those with log Kow above 3.5, were detected in soil samples from SWMU 70 and open water sediment samples from Ensenada Honda during the Phase I RFI. These COPCs include benzo(a)anthracene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, fluoranthene, and pyrene. Many of these detections were estimated. Although the previously detected concentrations did not exceed risk-based ecological screening levels, bioaccumulation of these contaminants may occur through food webs and impact upper*

trophic level receptors. However, the Work Plan does not discuss this issue, and no additional soil or sediment samples will be analyzed for these COPCs in the Full RFI. The potential impact to ecological receptors via bioaccumulation of COPCs should be addressed in order to be protective. Revise the Work Plan accordingly to explain why additional sampling is not warranted to address COPCs that bioaccumulate.

Navy Response: Section 3.4 of the work plan has been revised to explain why additional sampling was not warranted to address COPCs that bioaccumulate.

EPA Evaluation of the Response to EPA General Comment 14: *The revised Work Plan does not address the original concerns about the evaluation of bioaccumulative compounds in soil and sediment samples. Sections 3.1 (Soil Sampling and Analysis Program) and 3.4 (Sediment Sampling and Analysis Program) do not include discussion on bioaccumulative compounds (specifically benzo(a)anthracene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, fluoranthene, and pyrene) or a justification to remove the analysis of the compounds from future sediment or soil samples. Also, Sections 3.1 and 3.4 indicate that soil and sediment samples will be analyzed for Appendix IX metals, but not the bioaccumulative compounds identified above. Revise the Work Plan to address the concerns identified in the original comment.*

Navy Response: The Navy acknowledges that PAHs were detected at low concentrations in environmental media collected at SWMU 70 during the Phase I RFI, including surface soil, subsurface soil, and Ensenada Honda sediment. However, as stated in Attachment 4-1 of the Guidance for Developing Ecological Soil Screening levels (Eco-SSLs): Exposure Factors and Bioaccumulation Models for Derivation of Wildlife Eco-SSLs (2007), PAHs are rapidly metabolized after ingestion by birds and mammals and bioaccumulation is expected to be minimal. Therefore, it is unlikely that PAH concentrations detected in environmental media at SWMU 70 would impact upper trophic level receptors. This can be illustrated by example calculations estimating the dietary intake of PAHs detected in surface soil by the American robin (i.e., 2-methylnaphthalene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, fluoranthene, indeno[1,2,3-cd]pyrene, naphthalene, and pyrene). The American robin was selected since this species represents a highly exposed bird typically selected as an avian receptor for ecological risk assessments (ERAs) at NAPR.

American robin dietary intakes can be estimated using the following formula (Equation 1) modified from USEPA (1993):

$$DI_x = \frac{[[\sum_i [(FIR)(BAF_x)(SC_x)(PDE)]] + [(FIR)(SC_x)(PDS)]][AUF]}{BW}$$

where:

DI_x	=	Dietary intake of chemical x (mg chemical/kg body weight/day)
FIR	=	American robin food ingestion rate (kilograms per day [kg/day]; dry-weight)
BAF_x	=	Soil-to-earthworm bioaccumulation factor for chemical x (unitless; dry weight)
PDE	=	Proportion of diet composed of earthworms (unitless; dry weight basis)
SC_x	=	Maximum concentration of chemical x in soil (mg/kg; dry weight)
PDS	=	Proportion of diet composed of soil (unitless; dry weight basis)
BW	=	Minimum American robin body weight (kg; wet weight basis)
AUF	=	American robin Area Use Factor (unitless)

Conservative input parameters are summarized below. Values for *FIR*, BAF_x, *PDE*, *PDS*, *BW*, and *AUF* are used for screening level ERAs at NAPR (see Baker, 2010):

- Food ingestion rate (*FIR*): 0.01503 kg/day-dry weight (maximum food ingestion rate [Nagy, 2001])

- Body weight (*BW*): 0.056 kg (minimum body weight [Dunning, 2008])

- Soil-to-earthworm bioaccumulation factor (BAF_x): 2.264 for 2-methylnaphthalene, 1.417 for benzo(a)anthracene, 1.274 for benzo(a)pyrene, 1.245 for benzo(b)fluoranthene, 1.093 for benzo(g,h,i)perylene, 1.245 for benzo(k)fluoranthene, 1.417 for chrysene, 1.096 for dibenz(a,h)anthracene, 1.648 for fluoranthene, 1.107 for indeno(1,2,3-cd)pyrene, 2.606 for naphthalene, and 1.653 for pyrene. The BAF values listed above were derived using the model developed by Jager (1998) and cited in Section 3.2.2 of USEPA (2007).

- Maximum detected concentration in surface soil (SC_x): 84J µg/kg for 2-methylnaphthalene, 6.2J µg/kg for benzo(a)anthracene, 8.7 µg/kg for benzo(a)pyrene, 9.1 µg/kg for benzo(b)fluoranthene, 6.7J µg/kg for benzo(g,h,i)perylene, 9.3 µg/kg for benzo(k)fluoranthene, 7.3J µg/kg for chrysene, 2.7J µg/kg for dibenz(a,h)anthracene, 4.1J µg/kg for fluroanthene, 4J µg/kg for indeno(1,2,3-cd)pyrene, 4,2J µg/kg for naphthalene, and 4.8J µg/kg for pyrene

- Proportion of American robin diet composed of earthworms (*PDE*): 0.895 (assumed)

- Proportion of American robin diet composed of soil (*PDS*): 0.105 (assumed)

- Area Use factor (AUF): 1.0 (assumed)

It is noted that ingestion of surface water is not considered since there are no fresh surface water drinking sources at the SWMU. Risk estimates (i.e., hazard quotient values [HQs]) for dietary exposures to PAHs in surface soil can be estimated by the following equation:

$$HQ_x = (DI_x)/(TRV_x) \qquad \textit{(Equation 2)}$$

where HQ_x is the hazard quotient value for chemical x (unitless), DI_x is the dietary intake of chemical x (mg/kg-BW/day; estimated by Equation 1), and TRV_x is the toxicity reference value for chemical x (mg/kg-BW/day; No Observed Adverse Effect Level [NOAEL]). The NOAEL-based TRV for PAHs is 39.5 mg/kg-BW/day (Rigdon and Neal, 1963; reproduction-based TRV for benzo[a]pyrene applied to all PAHs). This value is used as the NOAEL-based TRV for ERAs conducted at NAPR (see Table 7-8 in Baker, 2010). As evidenced by the HQ values summarized within the table below, PAHs detected in SWMU 70 surface soil do not present an unacceptable risk to American robins feeding exclusively at the site.

PAH	Hazard Quotient
2-Methylnaphthalene	<0.01
Benzo(a)anthracene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(g,h,i)perylene	<0.01
Benzo(k)fluoranthene	<0.01
Chrysene	<0.01
Dibenz(a,h)anthracene	<0.01
Fluroanthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Naphthalene	<0.01
Pyrene	<0.01

The extremely low HQ values illustrate that additional sampling for PAHs is not warranted in surface soil at the SWMU. Although dietary intakes for ecological receptors potentially feeding within the Ensenada Honda adjacent to SWMU 70 were not calculated and compared to TRVs, such an evaluation would yield similar results since maximum detected PAH concentrations in Ensenada Honda sediment are low, ranging from 3J ug/kg for phenanthrene to 14 ug/kg for pyrene7J µg/kg for pyrene). These conclusions are supported by ecological risk assessments (ERAs) conducted at SWMUs 1, 2, and 45 (Baker, 2006a and 2006b). Individual PAH compounds were detected in SWMU 45 open water sediment at concentrations up to two orders of magnitude greater than concentrations measured in SWMU 70 open water sediment, while individual PAH compounds were detected in SWMUs 1 and 2 surface soil at concentrations up to three orders of magnitude greater than concentrations measured in SWMU 70 surface soil. At each SWMU, estimated dietary intakes using maximum concentrations did not exceed NOAEL-based TRVs (i.e., HQs < 1.0), indicating acceptable risk.

In summary, given that PAHs are rapidly metabolized after ingestion by birds and mammals and the low concentrations detected in environmental media at SWMU 70 would not impact upper tropic level receptors (as illustrated by the example calculations presented above using SWMU 70 surface soil data and results of upper trophic level dietary exposure modeling for ERAs conducted at SWMUs 45, 1 and 2), the Navy does not believe additional sampling for PAHs is warranted. Sections 3.1 and 3.4 will be revised to include the following text:

Section 3.1 text:

"Although PAHs were detected at low concentrations in SWMU 70 surface and subsurface soil during the Phase I RFI field investigation (see Appendix C), the proposed soil sampling program will not include analyses for these compounds. PAHs are rapidly metabolized after ingestion by birds and mammals (USEPA, 2007b) and the low concentrations detected in soil at SWMU 70 would not be expected to impact upper tropic level receptors based on dietary exposure modeling performed as part of an ecological risk assessment (ERA) conducted at SWMUs 1 and 2 (Baker, 2006a). Individual PAHs were detected in surface soil collected at SWMUs 1 and 2 at concentrations up to three orders of magnitude greater than concentrations detected in soil collected at SWMU 70. However, at each SWMU, estimated dietary intakes using maximum concentrations did not exceed NOAEL-based TRVs (i.e., hazard quotient [HQ] values less than 1.0)."

Section 3.4 text:

"Although PAHs were detected at low concentrations in Ensenada Honda sediment during the Phase I RFI field investigation (see Appendix C), the proposed sediment sampling program will not include the collection and analysis of open water sediment for these compounds. PAHs are rapidly metabolized after ingestion by birds and mammals (USEPA, 2007b) and the low concentrations detected in open water sediment at SWMU 70 would not be expected to impact upper tropic level receptors based on dietary exposure modeling performed as part of an ERA conducted at SWMU 45 (Baker, 2006b). Individual PAHs were detected in sediment collected at SWMU 45 at concentrations up to two orders of magnitude greater than concentrations detected in open water sediment collected at SWMU 70. However, estimated dietary intakes using maximum concentrations did not exceed NOAEL-based TRVs (i.e., HQ values less than 1.0)."

References cited in Navy Response to EPA General Comment 14:

Baker. 2010. Revised Draft Corrective Measures Study Report for SWMU 56: Volume I – Test, Tables, and Figures and Volume II – Appendices, Naval Activity Puerto Rico, Ceiba, Puerto Rico. October 29, 2010.

Baker. 2006a. Additional Data Collection Report and Screening Level Ecological Risk Assessment and Step 3A of the Baseline Ecological Risk Assessment at SWMUs 1 and 2, Naval Activity Puerto Rico, Ceiba, Puerto Rico. January 11, 2006

Baker. 2006b. Additional Data Collection Report and Screening Level Ecological Risk Assessment and Step 3A of the Baseline Ecological Risk Assessment at SWMU 45, Naval Activity Puerto Rico, Ceiba, Puerto Rico. January 11, 2006.

Dunning, J.B., Jr. (ed.). 2008. CRC Handbook of Avian Body Masses, Second Edition. CRC Press, Boca Raton, FL.

Jager, T. 1998. Mechanistic Approach for Estimating Bioconcentration of Organic Chemicals in Earthworms. Environ. Toxicol. Chem. 17:2080-2090

Nagy, K. A. 2001. Food Requirements of Wild Animals: Predictive Equations for Free-Living Mammals, Reptiles, and Birds. Nutr. Abstr. Rev. Series B. 71:21R-31R.

Rigdon, R.H. and J.Neal. 1963. Fluorescence of Chickens and Eggs Following the Feeding of Benzopyrene Crystals. Texas Reports on Biology and Medicine. 21(4):558-566.

USEPA. 2007. Attachment 4-1 of Guidance for Developing Ecological Soil Screening Levels (Eco-SSLs): Exposure Factors and Bioaccumulation Models for Derivation of Wildlife Eco-SSLs. Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.7-55.

USEPA. 1993. Wildlife Exposure Factors Handbook. Office of Research and Development, Washington, D.C. EPA/600/R-93/187a.

SPECIFIC COMMENTS

Specific Comment 7. *Section 3.2, Monitoring Well Installation, Page 3-4: The text states, "The wells will be developed until the discharged water runs relatively clear of fine-grained materials." The text further indicates that typical limits placed on well development may include, "Clarity of water based on visual*

determination." Since the clarity of the water is a qualitative measure that could be subjective based on the person making observations, it is recommended that three to five borehole volumes be removed to ensure proper development, at a minimum. Revise the Work Plan to require the removal of at least three to five borehole volumes during well development.

Navy Response: Section 3.2, page 3-4, third bullet item states that one of the limits placed on well development, in addition to a visual inspection of clarity, is a maximum borehole volume (typically three to five borehole volumes plus the amount of any water added during the drilling or installation process). No revisions to the text of the Full RFI Work Plan for SWMU 70 are required.

EPA Evaluation of the Response to Specific Comment 7: *The response is not adequate. The text implies that clarity of water based on visual determination may be the only limit placed on well development. Revise the text to clarify that clarity of water based on visual observation may be used in conjunction with other limits but not as a sole limit.*

Navy Response: Section 3.2 has been revised as follows:

"Typical limits placed on well development include the following:

- Clarity of water based on visual determination
- A maximum time period (typically two hours for shallow wells)
- A maximum borehole volume (typically three to five borehole volumes plus the amount of any water added during the drilling or installation process)
- The well development process will be recorded in the field logbook."

Specific Comment 13. *Section 3.6.7, Delineation of Wetland Boundaries, Page 3-9: This section indicates wetland delineation will be performed at the site; however, the timing and any potential effect on sampling locations was not included. For example, proposed sediment sample location 70SD17 is currently shown on Figure 3-1, Proposed Full RFI Sample Location Map, as being located in an upland area. It was not clear if this sample location would contain sediment or soil. Revise the Work Plan to include the timing of the wetland delineation and any potential adjustments to sample locations or media based on the wetland delineation.*

Navy Response: The timing of the wetland delineation and the adjustments to the sample locations based on the wetland delineation are now provided in Section 3.7.7, stating that, "Soil and sediment sampling locations will be altered from those depicted on Figure 3-1 based on field delineated location of wetland."

EPA Evaluation of the Response to Specific Comment 13: *The Navy's response adequately addresses the concern raised in the original specific comment. However, consider adding the statement that "Soil and sediment sampling locations may be altered based on the field delineated location of wetland." as a footnote to Figure 3-1 for clarity.*

Navy Response: A note has been added to Figure 3-1 stating, "Soil and sediment sampling locations may be altered based on the field delineated location of wetland."

Specific Comment 23. *Table 3-3, Method Performance Limits: This table contains analytes that have RLs above ecological screening levels, (e.g., copper, nickel, and silver). However, the Work Plan does not specify how analytes with reporting limits that exceed screening levels will be evaluated or qualified. This is particularly important since the RLs in Table 3-3 are based on wet weight results, and they will be*

elevated when corrected for dry weight. Finally, it is unclear if the laboratory chosen will be able to meet the reporting limits presented in the table. Revise the Work Plan to present the laboratory specific reporting limits, indicate which analytes have screening levels below the reporting limits and clarify how results will be evaluated and/or qualified if screening levels are below the reporting limit.

Navy Response: The Navy is aware that some of the reporting limits exceed the ecological surface soil screening levels. The analytical laboratory chosen for analyzing data provide the lowest reporting limits possible. It is noted that the ERA, conducted as part of the CMS, will quantify risks for non-detected chemicals. Non-detected chemicals with maximum reporting limits greater than ecological screening values will be identified as ecological chemicals of potential concern (COPCs) in Step 2 of the screening-level ERA (SERA) and undergo additional evaluation in Step 3a of the baseline ecological risk assessment (BERA).

EPA Evaluation of the Response to Specific Comment 23: *The revised Work Plan does not address the original comment's concern about how analytes with screening levels below the reporting limits will be evaluated and/or qualified. Therefore, it is recommended to describe in Section 4.6 (Analytical Results) following the description of media-specific ecological screening values, how both detected and non-detect analytes will be screened. Also the original comment's recommendation to revise Table 3-3 (Method Performance Limits) to include the laboratory specific reporting limits and indicate which analytes have screening levels below the reporting limits has not been completed. Revise the Work Plan to make these changes.*

Navy Response: It is noted that the ERA, conducted as part of the CMS, will quantify risks for non-detected chemicals. Non-detected chemicals with maximum reporting limits greater than ecological screening values will be identified as ecological chemicals of potential concern (COPCs) in Step 2 of the screening-level ERA (SERA) and undergo additional evaluation in Step 3a of the baseline ecological risk assessment (BERA). No changes to Section 4.6 are proposed. The guidelines utilized for conducting both Human Health and Ecological Risk Assessments will be referenced in the CMS report.

Table 3-3 has been revised to include updated method numbers, preparation methods and quantitation limits. Ecological screening values are presented on Tables 4-1 through 4-3. In addition, tables with Human Health Screening Values (Table 4-4) and NAPR Background Screening Values (Table 4-5) were added for easy comparison to the analytical method detection limits.

PREQB COMMENTS

EVALUATION OF RESPONSES TO PREQB COMMENTS

PREQB Evaluation of Comment 1:

<u>Page 2-1, Section 2.2.1</u>: The text of the second bullet states that subsurface soil samples were collected to depths of 15 feet bgs and 5 feet bgs. However, according to the summary of results in Appendix B, both subsurface soil samples were collected from 3-5 feet bgs. Please clarify.

Navy Response: The inconsistency has been corrected. The subsurface soil samples were collected at 16E-01 and 16E-02 at a depth of 15 feet bgs and 5 feet bgs, respectively. Appendix B of the work plan has been revised.

<u>PREQB Evaluation of Response</u>: The response is acceptable. However, Appendix B of the final work plan was not revised as specified in the response.

Navy Response: Upon further review, the text of the second bullet point has been revised to correctly state that subsurface soil sampling at locations 16E-01 and 16E-02 were collected at a depth of 3 – 5 feet bgs. Appendix B of the final work plan needs no further revision.

Section 2.2.1 has been revised as follows:

> "Subsurface soil samples were collected from soil borings 16E-01 and 16E-02 from a depth of 3 to 5 feet bgs. Subsurface soil samples were proposed but not collected from soil boring locations 16E-03 through 16E-06 because the groundwater at these four locations was encountered at depths ranging from 0.3 foot bgs to 1.2 feet bgs."

PREQB Evaluation of Comment 5:

Page 3-1, Section 3.1, Bullet 3: Please consider the addition of VOCs to the analyte list for the soil samples to be collected in the up-gradient direction of location 70SB04. There are two likely scenarios for the detection of vinyl chloride in the ground water at this location: a source in the immediate area that may not have been detected by the original 70SB04 soil samples or migration of impacts in the ground water from a source up-gradient of SWMU 70. Sampling the up-gradient soils for VOCs would shed some light on the likely scenario.

Navy Response: Navy Response to Specific Comment 5: The Phase I RFI report indicated vinyl chloride was detected in one of eight locations at a concentration exceeding the Regional tap water SL. The laboratory analysis indicated vinyl chloride to be slightly greater than the reporting limit. Given no additional groundwater detections and re-sampling/analysis of the well during the upcoming Full RFI, the addition of VOCs to the analyte list for samples upgradient of 70SB04 is not warranted.

PREQB Evaluation of Response: Evaluation of Specific Comment 5: Given the history of this site as a former disposal area with the potential (based on information obtained from interviews) of the historic disposal not only of the construction debris which was observed, but also of petroleum products, oil, lubricants and/or hazardous materials, additional VOC sampling appears to be warranted. It is noted that the ground water samples from locations 70SB04, 70SB31 and 70SB32 will be analyzed for appendix IX VOCs, however, at a minimum, consideration should be given to subjecting ground water sample 70SB42 for VOCs as well. Given the direction of ground water flow identified, this would help to evaluate conditions up-gradient of 70SB04. In turn, these results could be used to evaluate the need to address the initial suggestion made in this comment of conducting additional soil sampling for VOC analysis.

Navy Response: Groundwater samples collected at soil boring locations 70SB04, 70SB31, 70SB32 and 70SB42 will be analyzed for Appendix IX VOCs.

The first paragraph of Section 3.3 has been revised as follows: "In addition, samples 70GW04, 70GW31, 70GW32, and 70GW42 will be analyzed for Appendix IX VOCs to delineate vinyl chloride detected above regular Regional Tap Water SLs during the Phase I RFI."

The fifth bullet item under Section 3.1 has been revised to state the following: "Appendix IX VOCs will be analyzed in the groundwater sample collected from boring 70SB42."

Table 3-1 has been revised to add Appendix IX VOCs to the list of analyses for 70GW42.

PREQB Evaluation of Comment 12:

Table 3-3c:

c. *Groundwater samples from 70GW04, 70GW31, and 70GW32 are being collected for VOCs due to a previous exceedance of a Regional Tap Water Screening Level for vinyl chloride. The current screening level for vinyl chloride is 0.016 ug/L and the quantitation limit (QL) is 1.0 ug/L. Therefore, a more sensitive analytical method (i.e., selective ion monitoring) should be used in order to ensure that the project objectives will be achieved and that the delineation of vinyl chloride is done properly.*

Navy Response: Comment noted.

PREQB Evaluation of Response: It is unclear from the Navy's response if a more sensitive analytical method (selective ion monitoring) will now be utilized for vinyl chloride.

Navy Response: The Navy is aware that the reporting limit for vinyl chloride exceeds the Regional Tap Water Screening Value. The analytical laboratory chosen for analyzing data will provide the lowest reporting limits possible. The Navy is not planning to use selective ion monitoring.

PREQB Evaluation of Response (via email from WIlmarie Rivera Otero, March 11, 2011): In accordance with Puerto Rico Water Quality Standards Regulation, all groundwater is considered a potable drinking water source and the applicable standard for vinyl chloride for groundwater is 0.25 ug/L. In order to achieve this project action limit and to delineate the extent of vinyl chloride impacts above this standard, Selective Ion Monitoring is requested. Please ensure that quantitation limits meet PRWQS SG standards.

Navy Response: The Navy will specify using USEPA Method 5030B for sample preparation and Method 8260B for analysis of groundwater samples for VOCs; non-detect analytical results will be reported to the laboratory's specific LOD. An LOD for vinyl chloride which is less than the PRWQS of 0.25 µg/L will be specified as the required quantitation limit for reporting non-detect results. Table 3-3 will be revised to reflect the LOD laboratory reporting requirement for vinyl chloride and the other VOCs.

PREQB Evaluation Comment 12:

Table 3-3d: The QLs listed for metals in aqueous samples appear very high and more appropriate for analysis via 6010C instead of 6020A. Please verify these QLs with the laboratory and/or procure a laboratory that is capable of reporting lower QLs. Most of the listed QLs appear to be high by about one order of magnitude compared to QLs typically reported by method 6020A. It is important to note that many of the aqueous metals QLs exceed the risk screening levels (ecological and EPA Regional Screening Levels [RSLs]) and therefore lower QLs are really needed in order to achieve project objectives. Specific exceedance of risk screening levels are as follows:

Antimony QL (20) > EPA Tap water RSL (1.5)
Arsenic QL (10) > EPA Tap water RSL (0.045)
Cadmium QL (5) > EPA Tap Water RSL (1.8)
Chromium QL (10) > EPA Tap Water RSL (0.043)
Cobalt QL (10) > EPA Tap Water RSL (1.1)
Vanadium QL (10) > EPA Tap Water RSL (0.26)
Copper QL (20) > ecological groundwater screening levels (3.73)

Nickel QL (4) > ecological groundwater screening levels (8.28)
Silver QL (10) > ecological groundwater screening levels (0.23)

Navy Response: The Navy conducted a comparison of quantitation limits from different laboratories and found that the quantitation limits for Method 6020A provide lower reporting limits than method 6010C. The Navy is aware that many of the reporting limits exceed the ecological groundwater screening levels presented in Table 4-2 as well as the May 2010 Regional Screening Levels.

PREQB Evaluation of Response: *It is PREQB's preference for the quantitation limits to meet the data quality objectives. Please note that for all metals, the QLs provided by the Navy for the 6020 analysis of aqueous samples are much higher than QLs typically observed by PREQB for this method. The table below compares typical QLs to those provided by the Navy as well as the standard EPA CLP methodology for ICP/MS. Please provide additional information as to why your lab cannot achieve typical QLs for this method.*

Quantitation Limits for SW-846 Method 6020A (ICP/MS)						
Metals by ICP/MS		***SWMU 70 Proposed QLs***	***Lab (1) QLs***	***Lab (2) QLs***	***Lab (3) QLs***	***EPA CLP Method QLs***
(ug/L) 6020A	*Antimony*	*20*	*0.05*	*1.0*	*0.5*	*2*
	Arsenic	*10*	*0.5*	*0.40*	*0.5*	*1*
	Barium	*10*	*0.05*	*50*	*0.5*	*10*
	Beryllium	*4.0*	*0.03*	*0.40*	*0.5*	*1*
	Cadmium	*5.0*	*0.03*	*0.50*	*0.5*	*1*
	Chromium	*10*	*0.2*	*10*	*0.5*	*2*
	Cobalt	*10*	*0.03*	*NA*	*0.5*	*1*
	Copper	*20*	*0.1*	*NA*	*0.5*	*2*
	Lead	*5.0*	*0.03*	*1.0*	*0.5*	*1*
	Nickel	*40*	*0.2*	*5.0*	*0.5*	*1*
	Selenium	*10*	*1.5*	*5.0*	*1*	*5*
	Silver	*10*	*0.03*	*0.50*	*0.5*	*1*
	Thallium	*10*	*0.03*	*0.20*	*0.5*	*1*
	Tin	*10*	*0.1*	*NA*	*NA*	*NA*
	Vanadium	*10*	*0.3*	*5.0*	*0.5*	*5*
	Zinc	*20*	*0.75*	*20*	*5*	*2*

(1) Columbia Analytical Services, Kelso, Washington (DoD Certified)
(2) Con-test Analytical in East Longmeadow, MA
(3) Alpha Analytical in Westborough, MA

Navy Response: As indicated in our previous response to EPA General Comment 1 (refer to Navy response to EPA Evaluation of Responses to General Comment 1 within this document) , to help ensure that screening levels are met, required quantitation limits are provided to the laboratory as part of their contractual scope of work. Upon the selection of the subcontracted analytical laboratory for this investigation, laboratory specific SOPs and QC limits will be reviewed to confirm they will be able to meet the applicable screening levels. Additionally, upon further review of Table 3-3, it was discovered that outdated QLs were included in error for SW-846 Method 6020A (ICP/MS) analysis of groundwater. Therefore, Table 3-3 will be revised to include the most current QLs available for Method 6020A.