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DEPARTMENT OF THE NAVY

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NOV 12 2000

U. S. Environmental Protection Agency
Region II
Attn: Ms. Nicoletta DiForte
Chief, RCRA Caribbean Section
290 Broadway - 22nd Floor
New York, New York 10007-1866

Re: U.S. Naval Station Roosevelt Roads, Puerto Rico
RCRA Corrective Action Program RCRA/HSWA Permit No. PR2170027203
Navy Response to EPA Comment Letter Dated
September 15, 2000 on Draft CMS Work Plan for SWMU 9
Draft Final CMS Work Plan for SWMU 9

Dear Ms. DiForte:

Enclosed is the Navy Response to EPA Comment Letter dated September 15, 2000 regarding the Draft CMS Work Plan for SWMU 9 and the Draft Final CMS Work Plan for SWMU 9. These documents are being provided as agreed to in the October 16, 2000 monthly conference call.

The Draft Final CMS Work Plan for SWMU 9 reflects all of the Navy responses to your comments. These responses reflect the agreements that were made between the Navy and the EPA during the September 27, 2000 and October 16, 2000 conference calls, which addressed your September 15, 2000 comment letter.

Additionally, it was agreed during the October 16, 2000 conference call that the Navy would provide a list of constituents associated with site operations to be evaluated in the Ecological Risk Assessment (ERA) for SWMU 9. This list was provided to the EPA via e-mail for review on October 20, 2000. On October 24, 2000 the EPA provided comments via e-mail on the list of analytes to be evaluated in the ERA. Included in these comments was the request that in addition to the analytes associated with site operations, that pesticides be evaluated. In response to this request, the Navy feels that although pesticides were used throughout this base, they would have been applied at this site as part of a base wide pest maintenance program and not as a result of site operations. Therefore, the Navy feels that the analytes list for SWMU 9 should be limited to the constituents associated with site operations and not those substances associated with typical base wide application. However, as you indicated as an alternative to sampling for pesticides in your response e-mail on November 3, 2000, the Navy will be glad to provide a discussion of these constituents in the uncertainty section of the ERA.

Pending any unforeseen issues associated with this Draft Final CMS Work Plan, the Navy is asking for a rapid review of this document by the end of November 2000. Having an approved Work Plan for SWMU 9 will allow the Navy to combine fieldwork associated with SWMU 53, SWMU 54 and SWMU 3 scheduled for early December. Grouping this work together will result in a

significant cost saving to the Navy with respect mobilization/ demobilization and subcontractor procurement. Your attention to this matter is much appreciated.

If you have any questions regarding this submittal, please contact me at (757) 322-4815 or Mr. Kevin R. Cloe, P.E. at (757) 322-4736.

Sincerely,

KRCloe FOR

Christopher T. Penny, REM
Navy Technical Representative
Installation Restoration Section (South)
Environmental Programs Branch
Environmental Division
By Direction of the Commander

Copy to:
EPA Region II (Mr. Tim Gordon)
US EPA Caribbean Office (Mr. Carl Soderberg)
Booz Allen & Hamilton (Ms. Constance Crossley)
NAVSTA Roosevelt Roads (Ms. Madeline Rivera)
PREQB (Mr. Jose J. Lajara)
Baker Environmental, Inc. (Mr. Mark E. Kimes, P.E.)
CH2M Hill Virginia Beach (Mr. John Tomik)

Draft Corrective Measures Study (CMS) Work Plan for SWMU #9, dated July 14, 2000.

EPA Comments

EPA has reviewed the above Draft CMS Work Plan for S WMU #9 submitted on behalf of the Navy by Baker Environmental Inc., on July 14, 2000, as well as the July 13th Response to EPA's comments of May 4, 2000 on the RFI Final Report for SWMU #9.

EPA has a number of comments on the Draft CMS Work Plant and your July 13th Response document. These comments are given in the enclosed Technical Reviews (Enclosures 2 and 3) prepared by our contractor, Booz Allen & Hamilton, which EPA has reviewed and concurs with. Within 45 days of your receipt of this letter, please submit a revised CMS Work Plan for S WMU #9, which addresses those comments.

Navy Response

According to the agreement made between the EPA and the Navy during the September 27, 2000 and the October 16, 2000 conference calls the following response to comments will reflect the agreements and discussions conducted during the conference calls.

BAH COMMENTS ON THE NAVY RESPONSES (7/13/00) TO EPA/BAH COMMENTS (5/4/00) ON THE DRAFT RFI FOR SWMU 9

BAH General Comment No. 1

1. *The response is partially adequate. Naval Station Roosevelt Road (NSRR) has addressed the concerns regarding the analytical detection limits and the limited sample locations proposed for surface water and sediment. NSRR has also agreed to address the appropriateness of the sample locations selected for establishing background concentrations of chemicals in surface soil. However, NSRR has not agreed to collect additional surface soil samples. NSRR's rationale is that the suspected contaminant sources are below ground and most chemicals posing ecological risks have similar concentrations in background samples. This rationale is not adequate because (1) the number of samples collected (three to four in each area) may be too low to characterize the nature and extent of surface soil contamination in the large areas represented by areas A, B, and C, and (2) the background sample locations may be down gradient of source areas, and may not be appropriate for evaluating site-related risks.*

Navy Response to BAH General Comment No. 1

An additional three surface soil samples will be collected from Area B in the vicinity of 9SS04 to address the high detection of lead in the sample. These samples will be analyzed for metals, PAHs, and TPH (DRO and GRO). It is believed that the high level of lead in this sample is from potential lead paint flaking from the adjacent valve pit box. This additional sampling will assist in determining whether or not the lead in surface soil sample 9SS04 is from the paint or from site activities.

An evaluation of background and site surface soil samples will be conducted. This evaluation will include a statistical evaluation of the SWMU 9 site-specific background samples to the NSRR base-wide background samples and to USGS data from across the island of Puerto Rico. It has been agreed that if the comparison of background data indicates that the background soil samples are truly representative of background then the existing site specific background samples will be considered representative of background. This process

of making this determination will be described in the CMS work plan. In addition to the statistical evaluation a better description of the location of the existing site-specific background samples will be provided. This description will explain how the current locations are not impacted by other SWMUs in the vicinity at NSRR.

If the site specific background samples are determined to be representative of background (concentrations are statistically representative of each other), then an evaluation of site specific surface soil samples will be conducted to determine if the surface soil samples have been impacted by site operations at SWMU 9. If this evaluation determines that the site samples are similar to the background samples then it will not be necessary to obtain additional surface soil samples other than the samples indicated in the vicinity of 9SS04.

BAH Specific Comment No. 1

1. *The response is partially adequate. NSRR has addressed concerns regarding the analytical detection limits and number of surface water and sediment samples by proposing additional samples and the use of analytical methods with lower detection limits. NSRR has also agreed to retain chemicals as contaminants of potential concern (COPCs) if their quantitation limits exceed the screening benchmarks. However, it is not clear if this agreement applies to surface soils. In addition, NSRR has not addressed concerns regarding the number of surface soil samples proposed for Areas A, B, and C. As noted in previous correspondence from EPA, three to four samples may not be adequate to characterize the nature and extent of surface soil contamination in these areas. Additional surface soil samples should be collected down gradient of areas A, B, and C, and analyzed for metals, polycyclic aromatic hydrocarbons (PAHs), and total petroleum hydrocarbons (TPH), as well as any other contaminants that may be facility related.*

Navy Response to BAH Specific Comment No. 1

The issue with respect to additional surface soil samples will be addressed as described in the response to BAH General Comment No. 1.

As stated in BAH Specific Comment No. 1 above, the Navy has agreed to retain chemicals as COPCs if sample quantitation limits exceed threshold screening values. However, as agreed upon during our October 16, 2000 conference call and subsequent correspondence, only the following non-detected chemicals will be screened against medium-specific screening values for surface water, sediment, and surface soil:

- Non-detected data for Appendix IX metals.
- Non-detected data for Appendix IX PAHs.
- Non-detected data for benzene, toluene, ethylbenzene, and xylenes (BTEX).
- Non-detected data for Appendix IX VOCs and SVOCs not listed above, which are components of crude oil or refined petroleum products, used in the refinement of crude oil, or used as refined petroleum product additives.
- Non-detected data for Appendix IX VOCs and SVOCs not listed above for which use information could not be identified from the literature.

Chemicals described by the fourth bullet item above were identified by reviewing information available from the literature, including Spectrum Laboratory Inc. chemical fact sheets (Spectrum Laboratories, Inc, 2000). It is noted that many of the Appendix IX metals are not associated with crude oil or refined petroleum products. Furthermore, many Appendix IX PAHs are generated from the combustion of refined petroleum products, not their storage. All non-detected Appendix IX metals and PAHs have been retained for evaluation in the CMS investigation as a measure of conservatism.

Specific chemicals (detected and non-detected) that will be evaluated in the CMS investigation are identified in Table 5-3 of the Revised Draft CMS Work Plan for SWMU 9. Note that the chemicals listed in Table 5-3 are limited to chemicals previously analyzed during the RFI investigation and those that will be analyzed as part of the CMS investigation. Chemical groups that do not include potential site-related chemicals were not included on the RFI analyte lists, nor are they included on the CMS investigation analyte list. This includes anthropogenic chemicals not associated with the storage of refined petroleum fuel products (i.e., gasoline, diesel fuel, and jet fuel). Note that anthropogenic chemicals associated with crude oil and/or refined petroleum products were previously analyzed and will be analyzed in the CMS investigation (i.e., PAHs).

Non-detected data utilized in the upper trophic level dietary intake models will be limited to non-detected data for metals and the non-detected data for the bioaccumulative organic chemicals listed above and identified in Table 5-4 of the Revised Draft CMS Work Plan for SWMU 9. The process used to identify bioaccumulative organic chemicals is discussed in the response to BAH Specific Comment No. 8 on the July 14, 2000 Draft CMS Work Plan for SWMU 9 and Section 5.1.2 of the Revised Draft CMS Work Plan for SWMU 9.

When data for a non-detected chemical are evaluated in the CMS investigation during Step 2 of the USEPA (1997) and CNO (1999) ecological risk assessment (ERA) guidance, one-half of the maximum detection limit for that chemical will be used as the exposure point concentration for direct comparison to medium-specific threshold screening values. One-half of the maximum detection limits will also be used as the exposure point concentrations for upper trophic level receptor dietary exposures from ingestion of surface water, sediment, and surface soil. Finally, one-half of the maximum detection limit will be used to estimate the concentration of a non-detected chemical in the prey of upper trophic level receptors. For Sub-Step 3a, exposure point concentrations for a given non-detected chemical will be based on an arithmatic mean of the one-half detection limit values.

Chief of Naval Operations (CNO). (1999). Navy policy for conducting ecological risk assessments. Department of the Navy. (SER N453E-9U95355).

Spectrum Laboratory, Inc. 2000. http://www.speclab.com/search.html.

USEPA. 1997a. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments (Interim Final). EPA/540/R-97-006.

BAH Specific Comment No. 2

2. *The response is partially adequate. NSRR has agreed to evaluate the appropriateness of the background data, and to not eliminate COPCs in surface water and sediment based on background concentrations. However, it is not clear if this approach applies to surface soil samples. Furthermore, the evaluation of background data should include a review of other potentially*

applicable information, such as United States Geological Survey (USGS) data on metals concentrations in soils in the area.

Navy Response to BAH Specific Comment No. 2

The Navy has not eliminated COPCs based on background data. The RFI and CMS Work Plan never indicated that they did. Therefore this is not an issue as it was not done in the RFI and will not be done in the CMS.

The issue of background will be addressed as discussed in the response to BAH General Comment No. 1.

BAH Specific Comment No. 3

3. *The response is partially adequate. NSRR has agreed to re-evaluate pathways previously considered incomplete. However, it appears that this agreement applies only to sediment and surface water, as NSRR has only proposed new sample data for these media. NSRR should perform additional surface soil sampling as specified in Specific Comment No. 1, as well as re-evaluate exposure terrestrial pathways based on these new data.*

Navy Response to BAH Specific Comment No. 3

The issue of obtaining additional surface soil samples is described in the response to BAH General Comment No. 1. For a given underground storage tank area, new surface soil data will be combined with existing surface soil data into a unified database. The unified database will then be used to re-evaluate potential risks to terrestrial receptors. .

BAH Specific Comment No. 4

4. *The response is partially adequate.- As stated in General Comment No. 1, NSRR has addressed concerns regarding surface water and sediment, but not surface soils. Specific Comment Nos. 1, 2, and 3 above identify the steps necessary to address surface soil concerns.*

Navy Response to BAH Specific Comment No. 4

Please see the responses to BAH General Comment No. 1 and BAH Specific Comments 1, 2, and 3.

BAH COMMENTS ON THE JULY 14, 2000, DRAFT CORRECTIVE MEASURES STUDY WORK PLAN FOR SWMU 9

BAH General Comment No. 1

1. *In general, the July 14, 2000, Draft Corrective Measures Study Work Plan for SWMU 9 (Work Plan) addresses concerns regarding characterization of surface water and sediment contamination by proposing additional surface water and sediment samples with lower detection limits than previously used in the March 10, 2000, Draft RCRA Facility Investigation (RFI) for SWMU 9. However, as noted in the specific comments below, the Work Plan does not address concerns regarding the nature and extent of contamination in Areas A, B, and C surface soil. In addition, the proposed background locations for evaluating contamination of surface water and sediment appear inappropriate based on their proximity to potential source areas (see Specific Comment No. 2).*

Navy Response to BAH General Comment No. 1

The issue with regard to the surface soils has been described in the previous response to BAH General Comment No. 1 of the Navy Response to comments above. The response to the locations of the proposed background locations for the surface water and sediment being inappropriate is provided in the response to BAH Specific Comment No. 2.

BAH Specific Comment No. 1

1.2.1 Findings of the Investigations

1. The Work Plan (p. 1-2, and 1-3) summarizes the findings of the screening level ecological risk assessment for surface water and sediments, but does not mention surface soils. The Work Plan should summarize these findings and note that soil background locations and exposure pathways will be re-evaluated in the Corrective Measures Study (CMS).

Navy Response to BAH Specific Comment No. 1

The issue of surface soils is described in the response to BAH General Comment No. 1 of the Navy Resposne to EPA comments presented above. The Draft CMS Work Plan for SWMU 9 will be revised to include a summary of findings of the screening-level ecological risk assessment for surface soils. The Work Plan will also be revised to indicate that the surface soil exposure pathway will be re-evaluated based on new surface soil data.

BAH Specific Comment No. 2

3.0 CMS Investigation

2. The proposed sampling locations (p. 3-2, Fig. 3-1) for determining background concentrations of chemicals in surface water and sediment may not be appropriate. The Work Plan states that these locations "are sufficiently far from Areas B and C...yet representative of site-specific background conditions." However, the information provided in the RFI Report is inadequate to conclude these areas are appropriate for background locations. Specifically, the proposed locations are in close proximity to Tow Way Fuel Farm, the hazardous waste storage area, as well as other potential contaminant sources (e.g., AOCs 13 and 25). In addition, the conclusion that the proposed locations represent site-specific background conditions appears to be unsupported. No previous sampling data or summaries of other background data have been provided to support this statement. Background locations should be representative of natural background that has not been influenced by facility releases. Alternative background sampling locations should be selected that are more clearly representative of unimpacted areas. One area that may be more representative, and should be considered, is the area located 2000 feet north of the currently proposed sample locations, at the perimeter of the mangroves (see Figure 3-1).

Navy Response to BAH Specific Comment No. 2

As discussed in the conference call additional rationale and discussion will be provided in the text describing how the proposed locations are representative of unimpacted areas. The areas chosen are not impacted from

the TWFF, SWMUs 13 and 25 as they are all down gradient of SWMU 9 and are separated by roadways and drainage swales which discharge towards Ensenada Honda.

BAH Specific Comment No. 3

3. *The Work Plan (p. 3-1) does not propose additional surface soil samples in areas A, B, and C. As noted previously in EPA's comments on the RFI report, the number of samples collected (three to four) may not be adequate to fully characterize surface soil contamination in the large areas represented by areas A, B, anal C. Additional surface soil samples should be collected down gradient of areas A, B, and C. Furthermore, these samples should be analyzed for metals, PAHs, and TPH, as well as any other contaminants that may be facility related.*

Navy Response to BAH Specific Comment No. 3

Please see the response to BAH General Comment No. 1 on the Navy Response to Comments.

BAH Specific Comment No. 4

3.5 Data Evaluation

4. *The Work Plan proposes (p. 3-4) five additional background samples to "further enhance the statistical population of the site-specific background database." The Work Plan should clarify that only surface water and sediment will be collected for additional background data; additional background samples for surface soil are not proposed. As noted in Specific Comment No. 3, the proposed sample locations for determining background concentrations of chemicals in surface water and sediment may not be appropriate. Alternative sampling locations should be selected if background data will be used to evaluate site-related risks.*

Navy Response to BAH Specific Comment No. 4

Please see the response to BAH Specific Comment No. 2 addressing the appropriateness of the surface water and sediment background sample locations. The Work Plan will be modified to read that the additional background samples are only for surface water and sediment. See the attached text from the Work Plan. The rationale with respect to the issue on surface soils has been previously discussed. See Navy Response to BAH General Comment No. 1 on the Navy Response to comments.

BAH Specific Comment No. 5

5. *As noted in previous EPA's comments on the RFI report, the existing proposed surface soil background sample locations may be down gradient of potential source areas or areas of uncharacterized contamination. In addition, the Work Plan does not specifically state that surface soil background data will be re-evaluated in the CMS. The Work Plan should note the procedures that will be used to evaluate the appropriateness of the proposed background data. The evaluation of background data should also include a review of other potentially applicable information, such as USGS data on metals concentrations in soils in the area.*

Navy Response to BAH Specific Comment No. 5

See the response provided in the Navy Response to BAH General Comment No. 1 on the Navy Response to Comments.

BAH Specific Comment No. 6

4.4 Screening Level Ecological Risk Assessment

6. The Work Plan states (p. 4-2) that data from the additional surface water and sediment samples will be incorporated into the screening level risk assessment. However, the work Plan does not mention surface soil data. The Work Plan should state that additional surface soil data (see Specific Comment No. 3) and information (background evaluation, see Specific Comment No. 5) will be incorporated into the screening level risk assessment.

Navy Response to BAH Specific Comment No. 6

See the response to BAH Specific Comments No. 3 and 5.

BAH Specific Comment No. 7

5.0 Screening Level Ecological Risk Assessment

7. The Work Plan should include a Table with a preliminary species list, similar to those provided in other CMS Work Plans for the site (e.g., July 14, 2000, Revised Final II, Corrective Measures Study Work Plan, SWMU 45).

Navy Response to BAH Specific Comment No. 7

The July 14, 2000 Draft Corrective Measures Study Work Plan will be revised to include a table listing birds known to exist at Naval Station Roosevelt Roads. An example of this table can be found in the Revised Final II CMS Work Plan for SWMUs 1 and 2. It is noted that the screening-level ecological risk assessment for SWMU 9, included as Section 7.0 of the March 10, 2000 Draft RCRA Facility Investigation Report, contained a detailed discussion of potential ecological receptors at SWMU 9.

BAH Specific Comment No. 8

8. The Work Plan proposes to use dissolved metals concentrations in surface water to estimate contaminant concentrations in the prey of avian piscivores (p. 5-3). This procedure is satisfactory if prey concentrations are also estimated from sediment contaminants (i.e., pathway from sediment to benthic invertebrates to fish or wildlife).

Navy Response to BAH Specific Comment No. 8

The concentration of chemicals in the prey of avian piscivores (i.e., fish) will be estimated using the following equation:

$$C_f = [(C_{sw})(BCF_{sw\text{-}f})(FCM) + (C_{sed})(BAF_{sed\text{-}f})] \qquad \text{(Equation 1)}$$

Where:

C_f	=	Chemical concentration in fish (mg/kg))
C_{sw}	=	Chemical concentration in surface water (mg/L)
BCF_{sw-f}	=	Surface water-fish bioconentration factor (L/kg)
FCM	=	Food chain multiplier
C_{sed}	=	Chemical Concentration in sediment (mg/kg)
BAF_{sed-f}	=	Sediment-fish biaccumulation factor (unitless)

The surface water concentration (C_{sw}) used for metals will be based on the dissolved fraction in the water column (i.e., dissolved metals concentrations). Dissolved metals data will be used in place of total recoverable concentrations since the dissolved fraction more closely approximates the bioavailable fraction in the water column (USEPA 1995a and 1999). Furthermore, based on the information summarized below, only those detected and non-detected organic chemicals retained for evaluation (see Table 5-3 of the Revised Draft CMS Work Plan for SWMU 9) with a log K_{ow} value greater than 3.0 will be evaluated in the avian piscivore upper trophic level dietary intake models.

- The potential for organic chemicals to accumulate in organisms has been shown to correlate well with the octanol-water partition coefficient (K_{ow}). USEPA (1985), as sited in USEPA/ACOE (1998), recommends that only chemicals for which the log k_{ow} is greater than 3.5 be considered for evaluation of bioaccumulation potential since chemicals with log K_{ow} values less than 3.5 are not likely to bioaccumulate to a significant degree.

- Although organic chemicals with log K_{ow} values in the 2 to 7 range have at least some potential to bioconcentrate (Connell 1990), significant bioconcentration does not generally occur for chemicals with log K_{ow} values less than 3.0 (e.g., Maki and Duthie 1978) to 5.0 (e.g., Gobas and Mackay 1990). Most work with bioconcentration (uptake from the surrounding medium, such as water) and bioaccumulation (uptake from all exposure routes, including via food) of organic chemicals has concerned chemicals with log K_{ow} values of 3 or more (USEPA 1995b), since organic chemicals with lower log K_{ow} values generally have little potential for significant bioaccumulation.

- The USEPA has developed a number of scoring algorithms to evaluate the relative hazard of chemicals to human or ecological receptors. All of these algorithms have a component that addresses bioaccumulation potential. The evaluation of bioaccumulation potential is generally based on measured or estimated (using log K_{ow} values) BCFs or BAFs, or less commonly using log K_{ow} itself. For example, USEPA (1980) developed a bioaccumulation potential scoring system that considered organics with BCF values of less than 100 (equivalent to a log K_{ow} of approximately 3.0) to have negligible potential to bioaccumulate in aquatic food webs while organic chemicals with BCFs in the 100 to 1,000 range (equivalent to log K_{ow} values of about 3.0 to 4.3) to have low bioaccumulation potential. The more recent Scoring and Ranking Assessment Model (SCRAM), developed by USEPA Region 5 for the Great Lakes, has similar bioaccumulation scoring cut-offs (USEPA 1997).

- The proposed categorization of persistent, bioaccumulative, and toxic (PBT) chemicals under TSCA defines chemicals with a tendency to accumulate in organisms as those with a BCF or BAF of greater than 1,000 (Federal Register 63(192):53417; 10/5/98). Using the equation listed below (USEPA 1995a), a BCF/BAF of 1,000 equates to a log K_{ow} value of approximately 4.3.

$$\text{Log BCF} = [(0.79)(\log K_{ow}) - 0.40] \qquad \text{(Equation 2)}$$

- The Beta Test Version 1.0 (1997) of the USEPA Waste Minimization Prioritization Tool (WMPT), used to develop a list of PBTs for the RCRA program, defined organic chemicals with a low potential to bioaccumulate as those with log K_{ow} values of less than 3.5 and those with a high potential to bioaccumulate as those with log K_{ow} values greater than 5.0 (USEPA 1998). The 1998 version of this tool now defines bioaccumulation potential based on BCF or BAF values (rather than on log K_{ow} values directly), with a scoring "fenceline" for organic chemicals with a low bioaccumulation potential defined as a BCF or BAF of less than 250. Although the tool no longer uses log K_{ow} directly, log K_{ow} values can be used to estimate a BCF or BAF value. Using the equation log BCF = [(0.79)(Log K_{ow}) – 0.40] (USEPA 1995a), a BCF/BAF of 250 equates to a log K_{ow} value of approximately 3.5.

- Garten and Trabalka (1983) have reviewed terrestrial food web data and concluded that only organic chemicals with log K_{ow} values greater than 3.5 have the potential to significantly bioaccumulate from food to birds to mammals.

The information listed above indicates that a log K_{ow} of 3.0 to 3.5 is a reasonable, non-arbitrary parameter value to use in defining an organic chemical with the potential to bioaccumulate. For conservatism, the low end (3.0) of this log K_{ow} range will be used to define a bioaccumulative organic chemical. Log K_{ow} values for the Appendix IX VOCs and SVOCs retained for evaluation in the CMS investigation are summarized in Table 5-4 of the Revised Draft CMS Work Plan for SWMU 9. Log K_{ow} values were primarily obtained from USEPA documents (1995c and 1996). The recommended value from these sources generally represents a "high-end" or best estimate from empirical data. The organic chemicals that will be evaluated in the dietary intake models are those with a log K_{ow} value of greater than or equal to 3.0. For conservatism, the maximum value in the log K_{ow} range, if reported, is used for this determination not the recommended value.

For a given chemical (metals and the organic chemicals retained for evaluation), Equation 1 will be modified to eliminate surface water bioaccumulation if that chemical is not detected in surface water. However, metals and the organic chemicals listed in Table 5-4 of the Revised Draft CMS Work Plan for SWMU 9 with log K_{ow} values greater than or equal to 3.0 not detected in sediment will still be evaluated in the belted kingfisher and great blue heron dietary exposure models. Under this scenario, fish tissue concentrations will be estimated by the following equation:

$$C_f = (C_{sed})(BAF_{sed\text{-}f}) \qquad \text{(Equation 3)}$$

The rational for elimination of surface water bioaccumulation for non-detected chemicals is presented below:

- Sediments are the primary repository for chemicals with high log K_{ow}s (i.e., bioaccumulative chemicals).

- Use of non-detected surface water data in the estimation of fish tissue concentrations from surface water bioaccumulation will result in unrealistic and inappropriately high site and background risk estimates for avian piscivores.

The issue raised by the second bullet item above is exemplified by the examples presented in Table 1 and Table 2 for the belted kingfisher and great blue heron, respectively. The tables present risk calculation summaries for two organic chemicals (i.e., bis(2-ethylhexyl)phthalate and di-n-butylphthalate). These organic chemicals were not detected in surface water samples previously collected from Area A and the background station. As evidenced by the tables, if a surface water concentration equivalent to one-half the

reported detection limit was used to estimate fish tissue concentrations from surface water bioaccumulation, the estimated dietary intake from fish ingestion would result in Area A and background NOAEL-based Hazard Quotient values ranging from 138 for di-n-butylphthalate (great blue heron) to 12,200 for bis(2-ethylhexyl)phthalate (belted kingfisher). There is no merit in reporting Hazard Quotient values at these levels for non-detected chemicals.

If a situation is encountered where a chemical (metal or bioaccumulative organic) was detected in surface water but not detected in sediment, bioaccumulation from surface water and sediment will be considered in the estimation of fish tissue concentration (see Equation 1).

Identical to the avian piscivore dietary intake models, chemicals evaluated by the surface soil dietary intake models for the American robin and the red-tailed hawk will be limited to the detected and non-detected metals, detected organics, and the non-detected bioaccumulative organic chemicals retained for evaluation (i.e., non-detected organic chemicals listed in Table 5-4 of the Revised Draft CMS Work Plan for SWMU 9 with log K_{OW} values greater than or equal to 3.0).

It is noted that the conservative assumptions identified in the Revised Draft RFI Report and applied to the upper trophic level dietary intake models with regard to mercury and selenium will also be applied to the dietary intake models in the CMS investigation. Specifically, modeled dietary intakes will be screened against NOAELs based on organic forms (i.e., methylated mercury and selenium). Furthermore, if dissolved mercury and selenium are detected in surface water, the surface water to fish bioaccumulation factors used in the estimation of fish tissue concentrations will be based on methylated forms.

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USEPA. 1998. Waste Minimization Prioritization Tool spreadsheet document for the RCRA Waste Minimization PBT Chemical List Docket (# F-98-MMLP-FFFFF). http://www.epa.gov/wastemin

USEPA. 1999. National recommended water quality criteria – correction. EPA-822-Z-99-001.

USEPA/ACOE. 1998. Evaluation of dredged material proposed for discharge in waters of the U.S. - testing manual (inland testing manual). EPA/823/B-98/004.

BAH Specific Comment No. 9

9. *The Work Plan, proposes to use BAF (bioaccurnulation factor) values for inorganic mercury and selenium. if dissolved concentrations of methyl mercury and methylated selenium are not detected (p. 5-3). This procedure is unacceptable as these compounds may bioaccumulate in fish from both water exposure and dietary exposure (incidental sediment ingestion or sediment to benthic invertebrate pathway). Wildlife risks should be screened at one half of the sample quantitation limit if the methylated forms are not detected, unless site-specific information is provided that shows that only the inorganic -forms are present in sediment and surface water. A useful document for estimating prey concentrations is provided below:*

   Bechtel Jacobs Company. 1998. *Biota sediment accumulation factors for invertebrates: review and recommendations for the Oak Ridge Reservation.* BJC/OR-1 12. US Department of Energy. http://www.hsrd.oml.gov/ecorisk/reports.html

Navy Response to BAH Specific Comment No. 9

For the reason discussed in the response to Specific Comment No. 10 below, surface water and sediment will not be collected and analyzed for methylated forms of mercury and selenium. As such, the Draft CMS Work Plan for SWMU 9 will be revised to eliminate reference to the collection and analysis of surface water and sediment samples for methylated forms of these two metals. In addition, the Draft CMS Work Plan will be revised to eliminate reference to the use of BAF values based on inorganic forms. Finally, language will be added to the Draft CMS Work Plan identifying the use of surface water to fish BAF values based on methylated forms of selenium and mercury [Note: if dissolved mercury and selenium are not detected in surface water samples collected from SWMU 9, surface water bioaccumulation for these metals, as well as all non-detected chemicals in surface water, will not be considered in the estimation of fish tissue concentrations (see response to BAH Specific Comment No. 8)].

BAH Specific Comment No. 10

10. *The Work Plan proposes screening values for inorganic mercury and selenium if dissolved concentrations of methyl mercury and methylated selenium are not detected (p. 5-3). This procedure is unacceptable as these compounds may bioaccumulate in fish from both water exposure and dietary exposure (incidental sediment ingestion or sediment to benthic invertebrate pathway). In addition, methyl mercury is the predominant form of mercury in fish as well as the most toxic. This may also be the case for selenium. Wildlife risks should be screened using benchmarks for the more toxic methylated forms of mercury and selenium, unless site-specific information is provided that shows that only the inorganic forms are present in prey items.*

Navy Response to BAH Specific Comment No. 10

This comment indicates that risks to upper trophic level receptors must be screened using NOAEL values based on methylated forms of mercury and selenium, unless prey items (i.e., fish) are sampled and analyzed to demonstrate that only inorganic forms are present in their tissue. Given that prey items will not be sampled as part of the screening-level ecological risk assessment, there is no benefit to analyzing surface water and sediment samples for methylated forms of mercury and selenium. As such, surface water and sediment samples will not be collected and analyzed for methylated forms of mercury and selenium as proposed in the Draft CMS Work Plan for SWMU 9. Furthermore, NOAEL values based on inorganic forms of mercury and selenium will not be used. Based on this response, the Draft CMS Work Plan will be revised as follows:

- Reference to the collection and analysis of surface water and sediment samples for methylated forms of mercury and selenium will be eliminated.
- Reference to the use of toxicological benchmarks (i.e., NOAELs) based on inorganic forms of mercury and selenium will be eliminated.
- Reference to the use of toxicological benchmarks (i.e., NOAELs) based on organic forms of mercury and selenium (i.e., methylated mercury and selenium) will be added.

BAH Specific Comment No. 11

11. *The Work Plan does not specifically address the surface soil to invertebrates to terrestrial omnivore pathway. The Work Plan should propose quantitatively evaluating this pathway by screening for risks to robins consuming earthworms that have been exposed to contaminated soils. A useful document for estimating prey concentrations is provided below:*

    Sample B. E., Suter G. W., Beauchamp J. J., and Efroymson R.A. *1999. Literature derived bioaccumulation models for earthworms: development and validation.* Environ. Toxicol. Chem. 18:2110-2120.

Navy Response to BAH Specific Comment No. 11

Given that the Draft CMS Work Plan for SWMU 9 did not propose the collection and analysis of additional surface soil samples, a discussion of the surface soil exposure pathway for upper trophic level receptors was not presented. As discussed in the response to General Comment No. 1, additional surface soil samples will be collected at Area B in the vicinity of sample location 9SS04. Additional surface soil samples will also

be collected at Areas A, B, and C if a comparison of SWMU surface soil data to background surface soil data indicates that surface soil samples have been impacted by site operations at SWMU 9. New surface soil data will be combined with existing surface soil data into a unified database. The unified database will then be used to quantitatively evaluate the surface soil exposure pathway for the American robin. The methodology used to quantitatively evaluate the surface soil exposure pathway for the American robin will be identical to the methodology that was presented in the Revised Draft RCRA Facility Investigation Report for SWMU 9. If methodology for the quantitative evaluation of the American robin differs from that presented in the Revised Draft Facility Investigation Report for SWMU 9, a detailed discussion of the new methodology (with supporting documentation) will be included in the CMS investigation ERA report.

Identical to the surface water and sediment exposure pathway for piscivorous birds (see response to Specific comment No. 8), only those detected and non-detected organic chemicals listed in Table 5-4 of the Revised Draft CMS Work Plan for SWMU 9 with Log K_{OW} values greater than or equal to 3.0 will be evaluated by the American robin dietary intake model [Note: all Appendix IX metals will be retained for evaluation in the American robin dietary intake model regardless of their frequency of detection. The toxicological benchmarks (i.e., NOAELs) used to screen mercury and selenium dietary exposures will be based on organic forms of these metals (i.e., methylated mercury and selenium)].

BAH Specific Comment No. 12

12. *The Work Plan does not specifically address the surface soil to small mammal to terrestrial predator pathway. The Work Plan should at a minimum qualitatively evaluate this pathway by screening for risks to carnivorous birds (e.g., peregrine falcon is listed in the SWMU 45 Work Plan) consuming small mammals. A useful document for estimating prey concentrations is provided below:*

    Sample B. E., Beauchamp J. J., Efroymson R.A., and Suter G. *W. 1998. Development and validation of bioaccumulation models for small mammals.* ES/ERJTM-219. US Department of Energy. http://A-"rw.hsrd.ornl.aov/ecorisk/reports.html.

Navy Response to BAH Specific Comment No. 12

The draft CMS Work Plan for SWMU 9 did not propose the collection and analysis of additional surface soil samples. As such, a discussion of the surface soil exposure pathway for a carnivorous bird was not presented. As discussed in the response to General Comment No. 1, additional surface soil samples will be collected at Area B in the vicinity of sample location 9SS04. Additional surface soil samples will also be collected at Areas A, B, and C if a comparison of SWMU surface soil data to background surface soil data indicates that surface soil samples have been impacted by site operations at SWMU 9. New surface soil data will be combined with existing surface soil data into a unified database. The unified database will then be used to quantitatively evaluate the surface soil exposure pathway for a carnivorous bird. The carnivorous bird utilized in the evaluation will be the red-tailed hawk. This species was used in the screening-level ecological risk assessment presented in the Revised Draft RCRA Facility Investigation Report for SWMU 9. The methodology used to quantitatively evaluate the surface soil exposure pathway for the red-tailed hawk will be identical to the methodology that was presented in the Revised Draft RCRA Facility Investigation Report for SWMU 9. If methodology used to quantitatively evaluate the red-tailed hawk differs from that presented in the Revised Draft Facility Investigation Report for SWMU 9, a detailed discussion of the new methodology (with supporting documentation) will be included in the CMS investigation ERA report.

Identical to the surface water and sediment exposure pathway for piscivorous birds and the surface soil exposure pathway for the american robin, only those detected and non-detected organic chemicals listed in Table 5-4 of the Revised Draft CMS Work Plan for SWMU 9 with Log K_{OW} values greater than or equal to 3.0 will be evaluated by the red-tailed hawk dietary intake model [Note: all Appendic IX metals will be retained for evaluation in the red-tailed hawk dietary intake model regardless of their frequency of detection. The toxicological benchmarks (i.e., NOAELs) used to screen mercury and selenium dietary exposures to the red-tailed hawk will be based on organic forms of these metals (i.e., methylated mercury and selenium)].

Table 1
Belted Kingfisher Dietary Exposure and Risk Calculation For Non-Detected Chemicals: Fish Ingestion
(Fish Tissue Concentrations Based on Surface Water Bioconcentration)
Conservative Exposure Assumptions
Naval Station Roosevelt Roads
SWMU 9 (Area A) and Background

$DI = [(C_f * IR_f)][H]/BW$
$C_f = (C_{sw} * BCF * FMC) + (C_{sed} * BAF_{sed\text{-}f})$
$HQ = DI/NOAEL$ or $LOAEL$

Parameter	Description	Value	
DI	Dietary intake (mg/kg/day)	CS	(Chemical Specific)
C_{sw}	Chemical concentration in water (mg/L)	CS	
C_f	Chemical concentration in fish (mg/kg)	CS	
$BCF_{sw\text{-}f}$	Surface water-fish bioconcentration factor (L/kg)	CS	
FCM	Food chain multiplier (unitless)	CS	
IR_f	Fish ingestion rate (kg/day)	0.1075	
H	Ratio of site area to home range area (unitless)	1.0	
BW	Body weight (kg)	0.125	

Chemical	Log Octanol-Water Partition Coefficient (unitless)	One-Half Sample Quantitation Limit (mg/L)	Surface Water-Fish Bioconcentration Factor [1] (L/kg)	Food Chain Multiplier [2] (unitless)	Estimated Fish Tissue Concentration (mg/kg)	Dietary Intake Intake From Fish Ingestion (mg/kg/day)	NOAEL (mg/kg/day)	Hazard Quotient (unitless)	LOAEL (mg/kg/day)	Hazard Quotient (Unitless)
Bis(2-ethylhexyl)phthalate	7.30	0.005	232,809	13.474	1.57E+04	1.35E+04	1.11	1.22E+04	11	1.23E+03
Di-N-octylphthalate	8.06	0.005	927,684	7.278	3.38E+04	2.90E+04	50	5.81E+02	500	5.81E+01

[1] Estimated from the following equation: $\text{Log BCF} = (0.79)(\text{Log } K_{ow}) - 0.40$

[2] Trophic level 3 food chain multiplier

Table 2
Great Blue Heron Dietary Exposure and Risk Calculation For Non-Detected Chemicals: Fish Ingestion
(Fish Tissue Concentrations Based on Surface Water Bioconcentration)
Conservative Exposure Assumptions
Naval Station Roosevelt Roads
SWMU 9 (Area A) and Background

$DI = [(C_f * IR_f)][H]/BW$
$C_f = (C_{sw} * BCF * FCM) + (C_{sed} * BAF_{sed\text{-}f})$
$HQ = DI/NOAEL$ or $LOAEL$

Parameter	Description	Value	
DI	Dietary intake (mg/kg/day)	CS	(Chemical Specific)
C_{sw}	Chemical concentration in water (mg/L)	CS	
C_f	Chemical concentration in fish (mg/kg)	CS	
$BCF_{sw\text{-}f}$	Surface water-fish bioconcentration factor (L/kg)	CS	
FCM	Food chain multiplier	CS	
IR_f	Fish ingestion rate (kg/day)	0.45183	
H	Ratio of site area to home range area (unitless)	1.0	
BW	Body weight (kg)	2.204	

Chemical	Log Octanol-Water Partition Coefficient (unitless)	One-Half Sample Quantitation Limit (mg/L)	Surface Water-Fish Bioconcentration Factor [1] (L/kg)	Food Chain Multiplier [2]	Estimated Fish Tissue Concentration (mg/kg)	Dietary Intake Intake From Fish Ingestion (mg/kg/day)	NOAEL (mg/kg/day)	Hazard Quotient (unitless)	LOAEL (mg/kg/day)	Hazard Quotient (Unitless)
Bis(2-ethylhexyl)phthalate	7.30	0.005	232,809	13.474	1.57E+04	3.22E+03	1.11	2.90E+03	11	2.92E+02
Di-N-octylphthalate	8.06	0.005	927,684	7.278	3.38E+04	6.92E+03	50	1.38E+02	500	1.38E+01

[1] Estimated from the following equation: $\text{Log BCF} = (0.79)(\text{Log } K_{ow}) - 0.40$

[2] Trophic level 3 food chain multiplier.