UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
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OCT 24 2002

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Kevin Cloe
Navy Technical Representative
Installation Restoration Section (South)
Environmental Program Branch
Environmental Division,
Atlantic Division (LANTDIV), Code EV23KC
Naval Facilities Engineering Command
1510 Gilbert Street
Norfolk, VA 23511-2699

Re: Naval Station Roosevelt Roads - EPA I.D. Number PRD2170027203
Draft Corrective Measure Study Task I Report for Tow Way Fuel Farm (SWMUs 7 & 8)

Dear Mr. Cloe:

The United States Environmental Protection Agency (EPA) Region 2 has completed its review of the three volume Draft Final Corrective Measure Study (CMS) Task I Report for Tow Way Fuel Farm (the Report) which covers releases associated with SWMUs 7 & 8. The Report was developed pursuant to requirements of the 1994 RCRA Permit issued to Naval Station Roosevelt Roads, and submitted on behalf of the Navy by Baker Environmental Inc's letter of July 11, 2002. As part of our review, EPA requested our contractor, Booz Allen, to review the Task I Report, including the Additional Data Collection Investigation Report (Appendix E of the Report).

While EPA finds the Report to be largely acceptable, our review has indicated that certain items need revised, clarified, or expanded. These items are discussed in the enclosed Technical Review prepared by our contractor, Booz Allen. Although the entire Task 1 Report does not need to be resubmitted, within 45 days of your receipt of this letter, please submit an Addendum to the Task 1 Report addressing the comments in the enclosed Technical Review.

EPA has determined that the Screening-Level Ecological Risk Assessment (ERA) given in Section 3.0 of the Report generally presents an adequate characterization of ecological exposures and ecological risk posed by releases from Tow Way Fuel Farm (SWMUs 7 & 8); however, EPA has several comments on the ERA. These comments are discussed in Specific Comments 3 through 12 of the enclosed Technical Review. Although the ERA does not need to be resubmitted, please address those comments in the Addendum to the Report, as discussed above.

Section 4.0 (Establishment of Corrective Action Objectives) of the Report has a number of deficiencies that are discussed in Specific Comments 13 through 25 of the enclosed Technical Review. In addition, the Corrective Action Objective (CAO) Calculations given in Appendix H of the Report need revised to incorporate comments 44 through 46 of the enclosed Technical Review. As part of the Addendum discussed above, please submit revised CAO calculations and all necessary changes to Section 4.0 (Establishment of Corrective Action Objectives) of the Report, to address Specific Comments 13 through 25 and 44 through 46 of the enclosed Technical Review.

Section 5.0 (Identification of COCs) of the Report has several deficiencies that are discussed in Specific Comments 26 through 30 of the enclosed Technical Review. Although Section 5.0 (Identification of COCs) of the Report does not need to be resubmitted, please address those comments in the Addendum to the Report, as discussed above.

Several comments regarding Sections 6.0 (Preliminary Corrective Measure Technologies), 7.0 (Screening of Corrective Measure Technologies), and 8.0 (Identification of the Corrective Measure Alternative) of the Report are discussed in Comments 31 through 35 of the enclosed Technical Review. Although these Sections of the Report do not need to be resubmitted, please address those comments in the Addendum, as discussed above.

In addition, the Draft Groundwater Model Report (Appendix G of the Report) has a number of deficiencies that preclude EPA from fully assessing its usability. These deficiencies are discussed in Comments 37 through 44 of the enclosed Technical Review. Because an accurate portrayal of groundwater flow is critical to designing any final remedy, EPA requests that the Groundwater Model Report be revised and resubmitted to address the deficiencies discussed in Comments 37 through 44 of the enclosed Technical Review. Please submit the revised Groundwater Model Report as part of the Addendum discussed above.

Also, it is stated in Section 8.0 (Identification of the Corrective Measure Alternative) of the Report that the known TCE plume will not be addressed in this CMS, but "...will be addressed under a separate cover after the source identification/soil delineation field effort is complete." If the known TCE plume is not addressed in the present CMS [for the phase separated hydrocarbon and dissolved hydrocarbon and

inorganic constituents], please be advised that completion of this CMS [for the phase separated hydrocarbon and dissolved hydrocarbon and inorganic constituents] will not complete the CMS requirements for Tow Way Fuel Farm. Rather, a separate CMS for the TCE plume will still be required.

As indicated above, within 45 days of your receipt of this letter, please submit an Addendum to the Task 1 Report addressing all comments in the enclosed Technical Review.

If you have any questions, please telephone me at (212) 637- 4167.

Sincerely,

Timothy R. Gordon

Timothy R. Gordon
Remedial Project Manager
Caribbean Section
RCRA Programs Branch

Enclosure

cc: Mr. Carmelo Vazquez, P.R. Environmental Quality Board w/encl.
Ms. Madeline Rivera, Public Works Department, Naval Station Roosevelt Roads w/encl.
Ms. Kathy Rogovin, Booz Allen & Hamilton, w/o. encl.
Mr. Mark Kimes, Baker Environmental w/encl.

TECHNICAL REVIEW

DRAFT FINAL CORRECTIVE MEASURES STUDY (CMS) TASK I REPORT FOR TOW WAY FUEL FARM (TWFF)

NAVAL STATION ROOSEVELT ROADS CEIBA, PUERTO RICO

REPA3-0203-002
September 4, 2002

GENERAL COMMENTS

1. EPA has reviewed the July 9, 2002 Draft Final Corrective Measures Study (CMS), Task I Report (Task I Report), for Tow Way Fuel Farm (TWFF), Naval Station Roosevelt Roads (NSRR). The screening of soil remediation technologies requires additional detail. As currently written, it is unclear why bioventing was the only active treatment technology retained as part of a potential alternative for further evaluation in Task 2. Similarly, it is not clear why many of the groundwater and phase separated hydrocarbon (PSH) remedial technologies were ultimately excluded from the alternatives identified for further study. Additional discussion should be added to Sections 7 and 8 to further develop/justify the rationale provided for exclusion of the majority of the technologies in Section 7 and to describe the rationale for selection of each of the alternative components in Section 8.

2. The water table elevations depicted on many of the figures present in the Task I Report and its appendices begin at the edge of Ensenada Honda facility with elevations of 100 feet (ft) mean sea level (msl) or more. However, the figures in the Groundwater Modeling Report depict water levels approaching zero ft msl at the water edge. This seem to be a more appropriate depiction. If some other datum than msl is being used to present water level and other elevation data, this datum should be clearly identified in all figures and tables where it is used.

3. As EPA guidance is updated based on recent advances in science, it is important that current EPA guidance be considered throughout the corrective action process. Subsequent to NSRR's submittal and EPA's review of the January 31, 2001 revised Section 3.0 of the Task I Report, EPA has released new and/or updated guidance, including *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment* (EPA/540/R/99/005, September 2001) (RAGS Part E), and *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* (SSL) (OSWER 9355.4-24, March 2001) (Supplemental SSL Guidance). As a result, methodologies applied in the Task I Report for assessing dermal and inhalation exposures are not in accordance with the more recent guidance. Specifically, equations used by NSRR to calculate the dermal exposures and assumptions regarding dermal absorption factors are not in keeping with RAGS Part E. NSRR should correct the dermal exposure equations and recalculate the corrective action objectives (CAOs) for soil and groundwater. Additionally, EPA's Supplemental SSL Guidance,

which updates the 1996 SSL guidance, provides an updated method for calculating a site-specific Q/C term that is specific to the increased particulate emissions that would be expected during site construction due to earth moving activities and construction related traffic on unpaved roads. NSRR should consider this guidance with respect to the Q/C term, and if it appears that these types of activities might be performed that would result in increased particulate emissions, then NSRR should correct the inhalation exposure equations and recalculate the CAOs considering the potential for increased particulate emissions exposures in the final CMS Report.

4. With regards to the ecological risk assessment (ERA), the Task I Report presents an adequate characterization of ecological exposures and appropriate characterization of ecological risks. However, EPA requests clarification of several aspects of the ERA, as detailed in the specific comments below.

SPECIFIC COMMENTS

2.3.1Soil Contamination, Page 2-11

1. Soil contamination is discussed on page 2-11, but total petroleum hydrocarbons (TPH) measurements are not discussed. NSRR should clarify if TPH data are available for surface soils at TWFF and present any data in the final Corrective Measures Study (CMS) Report.

2.3.3Surface Water Analytical Results, Page 2-12

2. Page 2-12 states that polycyclic aromatic hydrocarbons (PAHs) were detected in surface water samples 7SW4 and 7SW4D. Sample 7SW4D could not be located on Figure 2-3. The sample location should be clarified and Figure 2-3 should be revised in the final CMS Report.

3.7 Step 3a of the Baseline Risk Assessment (Refinement of Conservative Exposure Assumptions), Pages 3-19 to 3-31

3. Page 3-31 states that a dilution factor of 10 was used to estimate surface water concentrations of contaminants from groundwater concentrations. NSRR should clarify how conservative this assumption is by comparing near-shore groundwater concentrations of selected analytes to measured surface water concentrations in proximity to a selected well.

3.7.1.1.1 Risk Evaluation for Surface Soil, Pages 3-32 to 3-33

4. Page 3-32 discusses the comparison of background soil concentrations to site sample results. NSRR should clarify if background data are discussed in detail in other TWFF documents. For example, how does site background compare to regional background?

Where were background samples collected? This information should be presented in the final CMS Report.

3.7.1.3.1 Risk Evaluation for Sediment, Pages 3-36 to 3-38

5. Page 3-36 states that Appendix C and Table 3-39 present sediment benchmarks derived from equilibrium partitioning (EqP). EqP is discussed in Appendix B (not Appendix C). Also, the values presented in Table 3-39 appear to be extremely high and do not appear to be consistent with the PAH benchmarks derived by DiToro and McGrath (2000) using EqP. NSRR should clarify whether these values are correct and have been correctly applied in the ERA. NSRR should also clarify whether the surface water benchmarks used in deriving the sediment EqP screening values were consistent with DiToro and McGrath (2000).

6. Page 3-37 indicates that the available background sediment samples are not applicable to deeper water locations. Page 3-37 also notes that sediment quality in Ensenada Honda is influenced by activities unrelated to the TWFF (e.g., naval shipping, cargo handling, ship repair, storm sewer discharges). NSRR should clarify whether additional deeper water background samples are needed to resolve uncertainties in potential risks from contaminated sediment at deeper water locations Ensenada Honda.

3.6.1.5.2 Aquatic Food Web Exposures, Page 3-25

7. Page 3-35 lists detected metals with hazard quotients (HQs) for upper trophic level receptors. NSRR should clarify why antimony is not included in this section because Table 3-25 shows an HQ of 1.29 for the manatee. Although this HQ is a marginal exceedence, EPA requests clarification because of the special status of the manatee.

3.7.2 Uncertainties Associated with the Refined Screening-Level Risk Characterization, Pages 3-39 to 3-42

8. Pages 3-39 to 3-49 present a general discussion of uncertainties in the ERA. The ERA has concluded that there are no risks to manatees but does not specifically discuss uncertainties in the risk characterization for the manatee. EPA requests that NSRR clarify the level of certainty in this risk conclusion and the level of conservatism used to assess risks to manatees.

9. Pages 3-41 and 3-42 state that risks were only evaluated for individual chemicals, and the ERA did not consider interactions from the complex mixtures at the site (e.g., additive toxicity of chemicals with the same mode of action). NSRR should clarify whether mixtures of PAHs would have posed a risk if assessed using screening values for total PAHs (tPAH) rather than on an individual compound basis. For example, the screening value listed for the PAH 7,12-dimethylbenz(a)anthracene in sediment (203 mg/kg) is nearly 100 times higher than the probable effect concentration for total PAHs (22.8 mg/kg; MacDonald et al., 2000).

3.7.3Conclusions and Recommendations, Pages 3-42 to 3-43

10. Page 3-42 recommends additional soil sampling downgradiant from MW17-00 to characterize ecological risks in this area. NSRR should clarify whether this recommendation has been incorporated into future corrective measures work at the site.

11. Page 3-42 notes that stormwater Outfall 011 may be a migration pathway from site source areas to the Ensenada Honda, and that the TWFF is not considered a significant source of contamination. NSRR should clarify whether the Outfall 011 transport pathway will be investigated as part of other site activities.

12. Page 3-42 states that trichloroethylene (TCE) has increased from 2 to 28 mg/L at 7MW07. Using the dilution factor of 10, as applied in the ERA, results in an estimated surface water/pore water concentration of TCE of 28 mg/L, which exceeds the surface water screening value of 0.2 mg/L used by NSRR. NSRR should clarify why ecological risks were not considered for TCE. NSRR should also clarify if TCE levels have increased at 7MW10 and whether they exceed the surface water screening value.

4.3 Summary of Human Health Risk Assessment and Selection of Contaminants of Potential Concern, page 4-2

13. The Task I Report does not adequately explain how high detection limits were factored into the decision to select or eliminate constituents of potential concern (COPCs). A review the data summaries in Tables 4-4 through 4-6 indicates that the following constituents had reported detection limits exceeding EPA Region 3 risk-based criteria (RBCs) used as screening criteria, but were not among selected COPCs. Revise the final CMS report to provide additional rationale for why the following constituents were not selected as COPCs, with specific consideration of high detection limits:

    - Table 4-4 surface soil data: benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate
    - Table 4-5 subsurface soil data: 5-nitro-o-toluidine, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, and dibenzofuran
    - Table 4-6 groundwater data: 1,2-dibromo-3-chloropropane, 2-butanone, acetone, acetonitrile, acrolein, acrylonitrile, carbon tetrachloride, cis-1,2-dichloroethene, methyl methacrylate, stryrene, tert-butylbenzene, trichlorofluoromethane, 2,4-dimethylphenol, 2-methylphenol, acenaphthene, acetophenone, bis(2-ethylhexyl)phthalate, fluoranthene, fluorene, ideno(c,d)pyrene, isophorone, and antimony.

4.4.2Quantitative CAOs, page 4-4

14. The Q/C term used by NSRR to calculate particulate inhalation risks addresses only windborne particulates. EPA's Supplemental SSL Guidance provides methodology for calculating a Q/C term that is specific to the increased particulate emissions that would

be expected during site construction due to earth moving activities and construction related traffic on unpaved roads. The Task I Report indicates that the construction scenario assumes only trenching for utility repair, which will not generate a lot of dust as defined by site construction activities. However, if large-scale earth moving activities involving construction traffic over unpaved areas is anticipated at TWFF, then a construction-related health and safety risk assessment using EPA's current guidance must be performed.

4.4.2Quantitative CAOs, pages 4-5 and 4-6, Target Risk Levels

15.Page 4-6 states that it is necessary to set the CAO target risk level for PAHs at 1×10^{-5}, because the more conservative risk level of 1×10^{-6} that is used for all other COPCs will result in a CAO that is less than PAH detection limits. This statement does not appear to be true, based on information presented in the draft CMS report itself. Specifically, by combining the surface soil 1×10^{-6} CAOs for PAHs reported in Tables H-1 through H-4 would result in a final (combination) CAO of 3380 ug/kg each for benzo(a)anthracene, benzo(a)fluoranthene, and ideno(1,2,3-cd)pyrene and a combination CAO of 337 ug/kg for benzo(a)pyrene. These CAOs are clearly within both the range of detection limits and the range of positive detections reported in Table 4-4. The text should be revised to discuss and/or clarify this issue in the final CMS Report.

Table 4-1 Cancer Risks and Hazard Indices from the RFI

16. Footnote 3 in Table 4-1 states that the future on-site resident cancer risk is the sum of the adult and child cancer risks. However, Table 4-3 presents the separate adult and child cancer risks, which do not sum to the value presented in Table 4-1. Also, Table 4-1 presents the total hazard index for the future construction worker as "029." Clarify whether this value should actually read "29" or "0.29" in the final CMS Report.

Table 4-6 Groundwater Data and COPC Selection

17. The tap water RBC for chloroform should be 0.0627 based on noncarcinogenic effects at a hazard quotient of 0.1. This correction should be reflected in the final CMS Report.

Table 4-10 Summary of Soil-to-Air Volatilization Factor (VF) Calculation

18. EPA's Supplemental SSL Guidance recommends calculation of a separate volatilization factor (VF) for construction workers that reflects their subchronic exposures. The final CMS Report should either use this more up-to-date methodology or discuss why a calculation of a subchronic VF for construction workers is not necessary.

Table 4-10 Summary of Soil-to-Air Volatilization Factor (VF) Calculation

19.The site-specific Q/C term corresponding to data for Miami is taken from EPA's 1996 *Soil*

Screening Guidance. As noted in the general review comment above, EPA has updated the air dispersion modeling used to derive the Q/C term and presented the updated methodology in EPA's Supplemental SSL Guidance. Using this updated methodology with data for Miami and an assumed source of 0.5 square acres, the Q/C term would be calculated as 74.70 g/m^2-s per kg/m^3, rather than the 85.61 g/m^2-s per kg/m^3 used in the Task I Report. Subsequent use of this lower Q/C term results in a calculation of a more protective CAO for inhalation exposure to volatiles from soil. Revise the final CMS Report to use the updated Q/C calculation methodology and recalculate the inhalation CAOs accordingly.

Table 4-12 Summary of Quantitative CAO Calculations, Exposure Via Dermal Absorption of Chemicals in Soil

20. The final CMS Report should incorporate EPA's RAGS Part E. This guidance does not recommend use of a default inorganic constituent absorption factor (ABS) of 0.01. This guidance also recommends use of an ABS of 0.001 for cadmium, 0.13 for benzo(a)pyrene, and 0.13 for other PAHs. The final CMS Report should recalculate the CAOs to incorporate the most recent guidance recommendations regarding the ABS parameter.

Table 4-16 Determination of Dermal Absorption Factor (DAF) for Use in Calculating Dermal Absorption of Organic Chemicals from Water

21. The equations to calculate the Kp, B, and Dsc parameters are not consistent with the equations recommended in EPA's RAGS Part E. Additionally, none of the equations shown in Step 5 of Table 4-16 are correct relative to the new guidance. The equations shown in Step 6 of Table 4-16 are missing a parameter reflecting the concentration in water. The final CMS Report should recalculate the CAOs using the methodology and equations provided in this guidance.

Table 4-17 Dermal Absorption Factor Parameter Values for Groundwater COPCs

22. It is preferred that Kp values from EPA's RAGS Part E. Where Kp values are not available, they should be calculated using the equation provided in this 2001 guidance. Additionally, the 2001 dermal risk guidance does not recommend an across-the-board Kp of 0.001 for all inorganics. Hexavalent chromium, cobalt, lean, nickel, potassium, silver, and zinc have been assigned Kp values other than 0.001. The final CMS report should use the appropriate Kp values for inorganics.

Table 4-18 Toxicological Data Summary

23. The latest EPA Region 3 RBC table (April 2002) recommends an NCEA provisional inhalation cancer slope factor (SF) for ethylbenzene of 3.85E-03 kg-d/mg. This should be incorporated into the final CMS report. Additionally, EPA Region 3 RBC table identifies the NCEA provisional inhalation SF for trichloroethene as 4.0E-01 kg-d/mg, which is considerably more conservative than the SF used in the Task I Report. The

RBC table also identifies an NCEA provisional oral reference dose (RfD) for trichloroethene of 3.0E-04 mg/kg-d and an oral SF of 4.0E-01 kg-d/mg. The final CMS Report should either use the latest Region 3 RBC table provisional values or provide a reference source for the alternate provisional toxicity data provided in Table 4-18.

Table 4-19 Quantitative Soil CAOs

24. The proposed CAOs for semi-volatiles PAHs in surface soil are those that have been calculated considering a target risk of 1×10^{-5}, while those CAOs for semi-volatile PAHs presented for total soil are based on a target risk of 1×10^{-6}. The target risk for PAHs should be consistent for both surface soil and total soil. The table and CAOs should be revised accordingly in the final CMS Report.

4.5.3Approach to Evaluating Carcinogenic PAHs, page 4-9

25. Page 4-6 indicates that the CAOs for Polynuclear Aromatic Hydrocarbons (PAHs) in soil are developed assuming a 1×10^{-5} target risk level. It should be noted that NSRR is not aggregating all PAHs to derive a benzo(a)pyrene (BaP) equivalent and then applying a 1×10^{-5} target risk level. Although this text is consistent with the January 31, 2001 Revised Task I CMS Report, which was reviewed and approved by EPA, the text states that this methodology is consistent with the Task I CMS Report (Baker, 2000). However, the Baker 2000 Task I CMS Report explicitly states "a risk-based clean up goal was established for all cPAHs at an ICR of 1×10^{-5}," thereby implying that a target risk level for total cPAHs was 1×10^{-5}. In the January 31, 2001 Revised Section 3.0 Task I CMS Report, soil CAOs for future construction worker (Table A-10) are calculated for PAH CAOs considering individual constituents at a 1×10^{-6} target risk level, while soil CAOs for a future industrial worker (Table A-5) are calculated for PAH CAOs considering individual constituents at a 1×10^{-5} target risk level.

The argument for using a 1×10^{-5} target risk level would be much stronger if a BAP- equivalent was used. Rather, NSRR wishes to apply the less conservative target risk level for <u>each</u> PAH constituent on the basis that it is consistent with the previous CMS draft, and on the basis that use of the lower target risk level will result in CAOs that are lower than detection limits and/or lower than background. The following issues should be addressed:

- Explain more clearly how the previous draft of the CMS report (Baker 2000) supports the argument that a less conservative constituent-specific target risk level should be used for PAHs.

- Tables 4-4 through 4-6 indicate that detection limits for PAHs were enormously variable, and in many cases exceeded the screening criteria used to select constituents of potential concern. However, it is not clear how it is known that using a 1×10^{-6} target risk level for individual PAHs would definitively

result in CAOs that are lower than detection limits. Clarify which type of laboratory detection limit is being discussed in the text on page 4-6 of the Task I Report. Explain why a procedure was not proposed to set the CAO as either the higher of the laboratory detection limit or the 1×10^{-6} target risk level for each PAH.

- The Task I Report does not present any explicit comparison data on background PAHs to support the argument that CAOs established at a 1×10^{-6} target risk level would exceed background. Furthermore, anthropogenic sources of background contamination (listed as including fossil fuel combustion sources and asphalt) would only be expected to impact surface soils due to deposition from the air and subsurface soils in the immediate vicinity of asphalt paved areas. Screening against PAH background would not be generally appropriate for subsurface soils. Explain why a procedure was not proposed to set the CAO as either the higher of the established anthropogenic background level (for surface soils only) or the 1×10^{-6} target risk level for each PAH.

5.0Identification of COCs, Pages 5-1 to 5-2

26. Page 5-1 states that human health and ecological CAOs were compared to each other. Page 3-42 provides a comparison for TCE, but no other comparisons could be located. NSRR should clarify where this comparison is provided. Section 5 does not discuss surface water or sediment, which should also be clarified by NSRR.

27. Page 5-1 states that all inorganic background levels were below their respective CAOs, and only risk-based CAOs were used to select Constituents of Concern (COCs). This contradicts what is reported on page 4-10, Section 4.6, which states that background-based CAOs were used for arsenic in soil and groundwater and lead in groundwater. The final CMS Report must resolve this discrepancy.

5.2Soil COCs, page 5-2

28. Section 5.2 dismisses arsenic in soil as a COC on the seemingly arbitrary basis that the target risk level for this constituent should really be set at 1×10^{-5}, since establishing the CAO for arsenic using a target risk level of 1×10^{-6} causes this constituent to be selected as a COC. It is unacceptable to mix and match target risk levels for CAOs simply as a means to minimize the list of COCs. Additionally, the referencing of EPA's target risk range of 10^{-6} to 10^{-4} refers to multi-pathway, multi-chemical cummulative risk, and should not be used as a tool to argue away risk to a single constituent in a single media. Revise the final CMS Report to retain arsenic as a COC, so that the selection process for COCs is consistently applied to all constituents.

Table 5-1 Groundwater COCs and CAOs

29. The CAOs reported in Table 5-1 do not correspond to the CAOs reported in Table H-14. The

values should be identical. Revise the final CMS report to eliminate the inconsistency and confirm that the COCs were selected using the correct CAOs.

Table 5-2 Soil COCs and CAOs

30. As previously discussed, derived CAOs for PAHs in surface soil are based on a 1×10^{-5} risk level, while CAOs for PAHs in total soil are based on a 1×10^{-6} risk level. The CAOs must be revised to be based upon a consistent target risk level in the final CMS Report.

Table 6-1 Potentially Applicable Corrective Measure Technologies, Soil Matrix

31. The majority of the technologies identified on Table 6-1 appear appropriate. However, some of the identified technologies appear to be of questionable use, while other potentially relevant technologies have not been identified. For example, soil vapor extraction would be appropriate for removing many of the fuel components, but would be a poor candidate for removing PAH contamination, such as benzo(a)pyrene, due to the limited volatility of these constituents. Similarly, low temperature thermal desorption (LTTD) would have limited effectiveness for PAHs such as benzo(a)pyrene. High temperature thermal desorption (HTTD) would likely be more effective. In addition, technologies that require chemical injection, such as CleanOx are generally limited to treatment of groundwater and saturated soil. If the contamination resides above the saturated zone, these technologies may have very limited effectiveness. The table should be revised to include HTTD as a potential alternative, and the evaluations in Sections 7 and 8 should address contaminant and technology specific issues, such as those described above.

6.0Preliminary Corrective Measures Technologies

Table 6-2 Corrective Measures Treatment Technology Descriptions, Soil Matrix

32. Table 6-2 does not include some of the technologies identified in Table 6-1. CleanOx and asphalt incorporation are missing. If these technologies were dropped as part of an initial screening, this should be described in the text. Otherwise, the list of technologies should remain consistent among Tables 6-1, 6-2, 7-1, 7-2, and 8-1.

7.0Screening of Corrective Measures Technologies

Table 7-1 Treatment Technologies Screening Matrix

33. The screening matrix that has been used in the assessment is based on the second edition of the *Remediation Technologies Screening Matrix and Reference Guide* (EPA/542/B-94/013, October 1994). A more current edition of the screening matrix is available on the Federal Remediation Technologies Roundtable (FRTR) web site at www.frtr.gov and incorporates some revisions relevant to this evaluation. For example, the rating for the effectiveness of soil vapor extraction (SVE) in treating semi-volatile organic compounds (SVOCs) has been reduced from average to worse. Table 7-1 should be updated to be consistent with the current screening matrix.

Also, the table should be expanded to evaluate all technologies identified in Table 6-1. CleanOx, asphalt incorporation, and electrochemical geooxidation (ECGO) are listed as potential technologies in Table 6-1, but are missing from this table.

Table 7-2 Applicable Corrective Measures Technologies, Soil Matrix

34. The rationale for excluding or retaining individual technologies is inadequate. For example, two-thirds of the technologies (i.e., all ex-situ technologies) have been excluded from further evaluation because it is "unfeasible to excavate soils in an active fuel farm." This evaluation is too general. Although certain areas within the fuel farm may be impractical to excavate, areas that are not directly affected by fuel system infrastructure may be accessible. A discussion should be provided in the text that describes elements of the fuel system that would specifically preclude excavation of the contaminated soil. This discussion should also evaluate the feasibility of other invasive technologies such as bioventing and ECGO. Also, it is unclear how bioventing will allow adequate distribution of oxygen when biodegradation and CleanOx are excluded because "soil heterogeneity may impede O_2." The rationale for exclusion should be expanded to be more contaminant and site specific.

8.0Identification of the Corrective Measure Alternative, Page 8-1

35. When presenting the alternatives that will be evaluated during Task II and Task III of the CMS, the Task I Report (p. 8-1) provides little rational for the development of the two alternative identified. A large number of soil, groundwater, and PSH remedial technologies have been excluded from the alternatives that will be evaluated without any apparent justification. For example, it is unclear why bioventing is included in an alternative for soil remediation but ECGO is not, although both were carried through the initial screening. Bioventing may be a good option for treatment of fuels contamination in general; however, PAHs are more recalcitrant than most fuel components and biodegradation rates may be prohibitively slow. The groundwater and PSH remedial technologies that have been excluded from a remedy include dual phase and vacuum vapor extraction, air sparging, and others. No justification has been provided for these exclusions. It appears to be appropriate to carry many of these technologies forward into the Task II and Task III of the CMS in the context of several additional alternatives. The number of alternatives and included remedial technologies that will be carried forward in the CMS should be expanded.

APPENDIX E ADDITIONAL DATA COLLECTION INVESTIGATION REPORT

GENERAL COMMENTS

36. The Additional Data Collection Investigation Report provides a generally adequate documentation of the additional investigations undertaken and the results of these investigations. However, the report does not provide significant discussion regarding the investigation results. No discussion of any conclusions that can now be drawn from these results is provided, nor is an assessment provided of whether the recently obtained data

address the data gaps intended to be addressed by the additional investigation. In addition, these results have not been placed in the context of the results of previous investigations, and any discrepancies that may exist with previous investigation results have not be identified and discussed. The report should be augmented to include this further analysis.

APPENDIX G DRAFT GROUNDWATER MODEL REPORT - TOW WAY FUEL FARM

GENERAL COMMENTS

37. To provide a more complete documentation of the calibrated model and further potential evaluation of the model, all input files should be provided. These files should be provided in an electronic format on a CD provided with the Groundwater Modeling Report.

SPECIFIC COMMENTS

1.1Groundwater Modeling Objectives

38. The Draft Groundwater Modeling Report (p. 1-1) indicates that "because of the current conclusions of the CMS, the model was not run under a steady state pumping scenario and therefore the PHS flow was not modeled." It is not clear which CMS conclusions are being referred to in this statement. The Task I Report included the screening of a number of remedial technologies and their potential exclusion from the alternatives identified for further study. The evaluation of many of these technologies may have benefitted from study using the model. Moreover, containment/collection through the use of extraction wells has been included in one of the alternatives that will be further evaluated during subsequent tasks of the CMS. Further justification should be provided for not simulating pumping scenarios and developing other aspects of the model such as transport modeling.

3.2Model Grid and Boundary Conditions

39. The Draft Groundwater Modeling Report (p. 3-2) indicates that the bottom of third layer of the groundwater model was set at -300 ft. msl. When discussing the hydraulic conductivities obtained during calibration, the Draft Report (p. 3-3) indicates that "the vertical conductivity was larger than expected at the site," and that "because of the of the deep nature of groundwater flow, vertical conductivity was often modeled at values equal to the horizontal conductivity in order to allow the water to enter the third layer of the model." The Draft Report adds that "this is realistic ... when the fractured nature of the rock is taken into account." However, it is probable that the portion of the bedrock in which significant groundwater flow occurs extends to a depth of much less than 300 feet. Consequently, the model may simulate a much greater flow in bedrock than is actually

occurring. This potentially excessive flow may provide an explanation for the apparently high levels of recharge that were obtained during calibration (see Specific Comment No. 3). The thickness of the bottom layer of the model should be carefully reexamined to determine the potential impact that the assumed thickness may have on model calibration and subsequent use of the model during the CMS.

3.3Recharge

40. The Draft Groundwater Modeling Report (p. 3-2 and Figure 3-4) indicates the recharge used in the calibrated model ranges between 0 and 60 inches per year, with large portions of the model area receiving 30 to 36 inches per year of recharge. The Draft Report (p. 2- 1) states that rainfall averages between 60 and 75 inches per year. Based on these numbers, it appears that the model has been calibrated to a net infiltration rate that approaches fifty percent of the average annual rainfall. This appears to be an unusually large amount of infiltration that may result in overestimates of groundwater flux through the model domain. While they may be conservative when estimating travel times for contaminants, such overestimates of the groundwater flux may lead to significant errors in the evaluation of the efficacy of extraction well systems and other containment systems. Generally, the parameter sets obtained during calibration of a groundwater flow model are not unique. Consequently, it may be possible to reduce both infiltration and hydraulic conductivities, while achieving a similar match to the observed water levels. The infiltration rates and hydraulic conductivities used in the model should be closely examined to ensure that they result in realistic groundwater fluxes in the model area.

4.1MODFLOW Results

41. The Draft Groundwater Modeling Report (p. 4-1 and Figure 4-1, 4-2, and 4-3) presents a discussion regarding the residual errors resulting from predictions of the calibrated model. This discussion focuses entirely on the root mean square (RMS) error over the entire model. While the RMS error over the entire model is an important measure of the calibration of the model, it is not the only relevant measure of a model's calibration. It is important to identify any systematic bias in model predictions and, in particular, to identify significant errors in model output in areas of importance to the model intended use. Consequently, the residual errors at each target should be identified in tabular form. Similarly, figures depicting residual error in each model layer should be provided to facilitate the identification of specific areas of the model where significant errors may be prevalent. This can be done by depicting contours of residual errors if the patterns of residual error follow regular patterns, or by labeling residual errors at each target water level location on figures for each model layer. An analysis of the potential impaction of the identified error on potential model uses should similarly be provided.

42. The Draft Groundwater Modeling Report provides no sensitivity analyses of the model calibration to individual parameters or parameter groups. Such analyses is important for evaluating the uncertainty inherent in the calibration and consequently for estimating the reliability of the model results relevant to their intended uses. For example, sensitivity analyses may demonstrate that the model calibration is not sensitive to the hydraulic conductivity in a particular zone or area. This would imply that this hydraulic conductivity value is not well determined in the calibrated model. However, this

hydraulic conductivity value may be important for calculating contaminant transport times through this same area of the model. In such a situation, it may not be possible to place much confidence in the travel times predicted by the model. The sensitivity analyses may also provide some estimate in the potential error inherent in the computed travel time. Sensitivity analyses of the model calibration to specific model parameters should be provided.

4.2MODPATH Pathline Analysis

43. The Draft Groundwater Modeling Report (p. 4-2 and Figure 4-4) states that MODPATH analysis indicates that the travel time from the 470 wells to the Honda is approximately 40 years. However, based on a distance of approximately 500 feet from these wells to the Honda, a loss to hydraulic head of approximately 4 feet, a hydraulic conductivity of 15 feet/day (see calibration values on Figure 3-6), and an assumed porosity of 0.20, the travel time would appear only to be approximately 2.25 years. Further analysis of the calibrated model and MODPATH analysis should be provided to justify the projected travel times from the 470 wells and the TCE spill area to the Honda.

APPENDIX H CORRECTIVE ACTION OBJECTIVE (CAO) CALCULATIONS

Table H-4 Corrective Action Objectives, Soil Dermal Absorption

44. The ABS factors presented in Table H-4 do not correspond with the recommendations in EPA's RAGS Part E. Specifically, incorrect dermal ABS parameters have been used for all PAHs. The ABS value should be 0.13 for all PAHs. Additionally, default values for inorganics (i.e., chromium, thallium and vanadium) are no longer recommended in the guidance. The final CMS Report should consider guidance provided in RAGS Part E and recalculate CAOs accordingly.

Table H-5 CAOs for the TWFF- Surface Soil
Table H-10 CAOs for the TWFF- Total Soil

45.NSRR has applied a target risk level of 1×10^{-5} for PAH CAOs in surface soil and a target risk level of 1×10^{-6} for PAH CAOs in total soil. The final CMS Report must be revised to apply a consistent target risk level for PAHs in both surface soil and total soil.

Table H-13 CAOs Groundwater Dermal Absorption

46. The Dermal Absorption Factors (DAFs) presented in Table H-13 are inconsistent with the DAFs presented in Table 4-17 for every constituent. The final CMS Report must correct this inconsistency and, as appropriate, recalculate CAOs.

Literature Cited

Di Toro DM and McGrath JA. 2000. Technical basis for narcotic chemicals and polycyclic aromatic hydrocarbon criteria. II. Mixtures and sediments. Environ. Toxicol. Chem. 19:1971-1982.

MacDonald D. D., Ingersoll, C. G., and Berger, T. 2000. *Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems*. Arch. Environ. Contam. Toxicol. 39:20-31.