Responses to Comments
Draft Feasibility Study Report for Site 2
St. Juliens Creek Annex
Chesapeake, Virginia

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Comments from EPA, provided 5 January 09.
RPM Comments

1. ***Comment:*** *General.* It seems that alternatives that do not include treatment (i.e. containment alternatives) should be screened out (or at least given lower consideration) because they do not address what would be categorized by EPA as a "Principal Threat" in subsurface soils. In instances where a Principal Threat is present, treatment alternatives are more appropriate.

   Response: Due to the complexity of the site, remedial technologies were initially screened against individual or combinations of site media, then appropriate technologies to address the site as a whole were combined for full development and evaluation. The screening process and alternative evaluation were conducted in accordance with the NCP (40 CFR Section 300.430), which identifies the expectation for the use of a combination of methods (e.g., treatment and containment), as appropriate to achieve protection of human health and the environment, along with the use of administrative controls (e.g., land use controls) to supplement engineering controls as appropriate for short- and long-term management to prevent or limit exposure to hazardous substances, pollutants, or contaminants. The selection of alternatives for full evaluation was conducted by the SJCA project management team during partnering meetings.

   In the detailed evaluation, remedial alternatives which did not include a treatment component were scored lower under the Reduction of Toxicity, Mobility, and Volume through Treatment and Short-Term Effectiveness criteria. This is summarized in Table 5-1 and briefly discussed in Sections 5.2.4 and 5.2.5 of the FS report. Containment alternatives were carried through for evaluation in compliance with the NCP, which allows for the use of engineering controls, such as containment, for wastes that pose a relatively low long-term threat or where

treatment is impracticable. Additional text regarding the expectations of the NCP will be added to Section 3.1 of the text.

EPA guidance defines principal threat wastes as those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur (EPA[1], 1991). Within the FS, "waste" refers to the mixed municipal waste, burnt refuse, abrasive blast media, and waste ordnance (Section 1.3) reportedly disposed at the site. This waste is consistent with the material described within EPA's guidance for containment as a presumptive remedy for CERCLA municipal landfill sites, and is not consistent with the definition of principal threat waste. Preamble to the NCP notes that treatment may be less practicable or limited when the principle threat waste is very difficult to handle or treat and/or when severe effects to other environmental media from implementation may occur. Additionally, EPA guidance indicates that contaminated groundwater generally is not considered to be a principal threat waste. The DNAPL likely present at Site 2 may be considered a principal threat waste; however, the decision of whether or not to treat a principal threat waste is to be determined on a site-by-site basis. In accordance with the Rules of Thumb for Superfund Remedy Selection (EPA[2], August 1997), in some situations it may be appropriate to contain rather than treat principal threat wastes due to difficulties in treating them. These situations, listed below, are applicable to Site 2 and provide justification for the detailed evaluation of the containment alternatives:

- Treatment technologies are not technically feasible or are not available within a reasonable time frame
- The extraordinary volume of materials or complexity of the site may make implementation of the treatment technologies impracticable (e.g., large landfills)
- Implementation of a treatment-based remedy would result in greater overall risk to human health and the environment due to risks posed to workers, the surrounding community, or impacted ecosystems during implementation (to the degree that these risks cannot be otherwise addressed through implementation measures)
- Implementation of the treatment technology would have severe effects across environmental media

The Rules of Thumb for Superfund Remedy Selection (EPA, August 1997) also provide specific discussion regarding NAPL as Principal Threat Waste. The guidance indicates that although NAPLs are generally viewed as principal threat wastes, program experience has shown that removal and/or in-situ treatment of NAPLs may not be practicable. Hence, EPA generally expects that the quantity of free-phase NAPL should be reduced to the extent practicable and that an

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[1] USEPA. 1991. *A Guide to Principal Threat and Low Level Threat Wastes*, Superfund Publication 9380.3-06FS.

[2] USEPA. 1997. *Rules of Thumb for Superfund Remedy Selection*, OSWER 9355.0-69.

appropriately designed containment strategy should be developed for NAPLs that cannot be removed from the subsurface.

2. ***Comment:*** *Executive Summary, Page V. Alternatives 1-8.* Please list the media to be addressed before listing the remedial alternatives in this manor. i.e. waste, high concentration area, low concentration area. Not doing so makes this somewhat unclear.

   Response: The alternative titles have been renamed in order to better distinguish between the alternatives.

3. ***Comment:*** *Site 17 NFA document.* As part of the Site 17 NFA document, it was concluded that further investigation of this area should be done as part of the Site 2 investigation. However, it does not seem that any further samples were taken to delineate the risk that was found during the Site 17 investigation. For example PCB's, identified as a COPC in the Site 17 NFA document, were not further delineated, nor does it appear that this area is included in what has been defined as the extent of waste.

   Response: Although the Site 17 NFA document recommended further delineation, during scoping of additional investigation activities at the site, most recently the investigation using the Triad approach in 2007, the SJCA partnering team did not elect to collect additional samples. The former Site 17 area is underneath a building foundation and access is limited. The initial samples were collected within a drainage swale where the topographical depression allowed access and was the most likely pathway for surficial contaminant migration. Because additional samples were not collected, the remediation area was established based on physical boundaries beyond which contamination is unlikely to extend (the asphalt parking lot) (Section 3.2.2) and therefore includes the entire Site 17 area (Figure 3-1).

4. ***Comment****: 2.1 Nature and Extent of Contamination.* This section states that there is uncertainty associated about the extent. EPA believes it would be in the Navy's best interest to determine the nature and extent prior to making cost estimates.

   Response: Comment noted. The Navy recognizes the uncertainty with the waste delineation but feels the current waste boundary is a conservative estimate and leaves open the option for refinement. However, the Navy is comfortable with the cost estimates because further refinement of the extent would impact each alternative equally.

5. ***Comment:*** *Section 3.2 RAO's. 5th overall bullet.* EPA believes that this should be reworded to say, "Prevent migration of CVOCs in the Columbia aquifer to the underlying Yorktown aquifer".

   Response: The ERI concluded that migration of CVOCs from the Columbia aquifer to the Yorktown aquifer is not currently occurring because of the presence of the competent confining unit. The team previously developed this RAO to prevent activities that may compromise the integrity of the confining

unit and potentially allow downward migration. The suggested revision would alter the intent of the RAO and therefore has not been made.

6. ***Comment:*** *Development of Remediation Area. Page 3-6 1st bullet.* DDE and DDT exceed the ecological PRG (and presumably screening criteria?), but were not further investigated. Please provide additional information to support this statement.

   Response: Based on BTAG Comment #4, the surface soil PRGs have been revised. The revised PRGs are 532 µg/kg for DDE and 237 µg/kg for DDT. Therefore, the DDE and DDT concentrations detected at sample location SJS02-SS01 no longer exceed the PRGs, and Figure 3-6 will be revised to remove the location as an ecological PRG exceedance. The DDE concentration (560 J µg/kg) at SJS02-SS19 slightly exceeds the ecological PRG of 532 µg/kg. However, the concentration is consistent with concentrations detected throughout the SJCA facility during the background investigation. Sample location SJS02-SS19 is located outside of the site boundary, which was developed based on identification of potentially impacted areas through a review of historical aerial photographs and refined based in investigation activities, as documented in the Site 2 RI and Expanded RI. Therefore, the concentration detected is likely associated with historical basewide application of pesticides and the area is not included within the Site 2 remediation area. The text will be clarified.

7. ***Comment:*** *Section 4.2.1, 1st sentence.* The proposed cover would extend over approximately 3.4 acres. Please include wording in this statement that says this may extend beyond the 3.4 acres once the nature and extent of the waste is determined.

   Response: If additional delineation is conducted the cover extent may either increase or decrease and therefore, **t**he first two sentences of the paragraph will be replaced with the following text: **"**The proposed cover would extend over the waste area with the exception of the portion that is currently covered by the existing asphalt parking lot. The area of the cover is estimated at 3.4 acres, as shown on Figure 4-2, and may be refined as described in Section 3.2.2."

8. ***Comment:*** *Section 4.2.1 Page 4-5 Last full paragraph.* "Because IR Site 19 has been closed with no further action, no analytical testing would be required". EPA does not agree with bringing in fill material that has not been certified to be used as such.

   Response: Site 19 was closed with no further action required on the basis that no human health or ecological risks remain. The decision and site data are summarized in the Final Closeout Report for Site 19 (CH2M HILL, 2006). Therefore, soil at the site is acceptable for use at Site 2 without additional testing.

9. ***Comment:*** *Section 4.2.3, Page 4-7.* Please mention the gene analysis done to ensure the correct genes were present for complete dechlorination.

   Response: A gene analysis was not performed at Site 2. Based on the presence of the degradation products (cis-1,2-DCE, VC, ethane, and ethane) and the

subsurface geochemical conditions, complete reductive dechlorination of TCE in groundwater is occurring, which suggests the presence of the appropriate microorganisms. cis-1,2-DCE and VC are also being attenuated as evidenced by lower contaminant concentrations in the downgradient wells. Based on the presence of elevated carbon dioxide concentrations downgradient, mineralization of these degradation products may additionally play a role as the plume makes contact with more aerobic groundwater. The degradation products (cis-1,2-DCE, VC, ethane, and ethane) will be listed in the sentence "Based on the presence of degradation products at Site 2, complete dechlorination of TCE has been occurring in groundwater and is expected to continue (CH2M HILL, 2008)" to show that the final reductive dechlorination products are being produced.

10. ***Comment:*** *Section 4.2.5 EOS, 1st partial paragraph Page 4-10.* The FS states that "Each line would consist of 3 to 6 injection wells set at 20ft centers." It goes on to say that barriers would be placed 50ft apart. Further, in the following paragraph the FS states that, "a radius of influence of 10ft is assumed". As the injection network is proposed, it does not appear to allow for adequate coverage.

    Response: The proposed injection network in the FS provides overlapping coverage along the entire width of the CVOC high-concentration area. Since a multiple "barrier" injection design was proposed over a multi-grid point design, the initial radius of influence at each injection point will not overlap along the length of the target treatment area. However, dissolved ERD substrate will be carried downgradient, increasing the area of influence and treating CVOCs between the barrier zones. A multiple "barrier" injection design was selected for Site 2 due to the size of the CVOC high-concentration and low-concentration target areas, the confidence in the groundwater flow direction at the site, and the expected longevity of the remedial action. Multi-grid point injection designs are typically not cost-effective for larger areas unless an accelerated remediation is required. The multiple barrier approach will allow for a more rapid recharge of electron acceptors and require less operation and maintenance, which is favorable for longer timeframes. Because of the fewer number of injection points required, the locations of the injection lines may be more easily modified to accommodate for facility operations and identification of buried waste and potential MEC.

11. ***Comment:*** *Cover alternative in general.* EPA does not believe the wiping out the current monitoring well network is the best approach for the Navy. Currently, wells at the site have existing data that would be useful in monitoring trend data as the remediation continues. EPA would more favorably agree with extending the risers on the existing well and continue monitoring these well (along with the addition of wells) as part of the monitoring strategy. Additionally, laying down a geotextile cover prior to adding the 2ft soil cover may help to determine whether significant erosion is occurring at Site 2 for the purpose of maintenance.

    Response: Abandonment and replacement of select wells was assumed for purposes of the cost estimate, but it was acknowledged in the FS that the wells may be extended instead of abandoned. The details of the monitoring plan will be developed in the remedial design. There is no requirement to include a

geotextile layer in the soil cover, but it will be considered when details of the soil cover, are developed in the remedial design.

12. ***Comment:*** *Section 4.2.6 ERD area of influence. Page 4-11.* Barriers are proposed to be set 50ft apart and at 20 ft centers. Considering the area of influence, does this provide adequate coverage?

    Response: See response to EPA RPM Comment 10. The spacing has been assumed for cost estimating purposes and is believed to be adequate. Additional evaluation will be conducted and details will be developed in the remedial design.

13. ***Comment:*** *Section 4.2.6.* Please discuss the bench testing in this alternative.

    Response: Bench testing is assumed to support the evaluation of alternatives and development of cost estimates. Details will be developed in the remedial design. Additional text will be added to clarify the following assumptions: Bench testing will be conducted prior to ERD injection. It will include collection of site soil and groundwater and a microcosm study to determine if Emulsified Oil Substrate (EOS®) is an effective substrate at enhancing the reductive dechlorination of site CVOCs.

Comments from EPA, provided 5 January 09.
BTAG Comments

1. ***Comment:*** As a result of our review of the April 2008 Draft Site 2 Expanded Remedial Investigation Report we recommended that the FS include an objective to restore the areas impacted by contaminants at the site or from remedial actions. We further stated that particular attention should be provided for tidal wetland habitat and associated riparian habitats.

   Response: The SJCA partnering team considered the Draft Site 2 Expanded RI comment; however, the restoration/replacement of impacted wetland areas was not added as a RAO because it is an ARAR and must be met regardless.

2. ***Comment:*** *Section 3.2.1* states that since remediation of other media will address the ecological risks identified in sediment pore water and surface water, no PRGs were developed for these media. Clean up levels will ultimately need to be developed for these media. These will be needed to evaluate the success of the remedial action and the data from the long term monitoring activities and that which will be collected for Five Year Reviews.

   Response: Each alternative evaluated in the FS consists of installation of a soil cover over the Site 2 tidal inlet, resulting in removal of surface water and sediment pore water as media within the site. Therefore, establishing PRGs for these media is not necessary and the media could not be monitored to evaluate the success of the remedial action.

3. ***Comment:*** The aforementioned section states that the highest of the literature-based toxicity screening values, sediment bioassay results, and background

values was selected as the PRG. This approach is too simplistic. While PRGs should not be below naturally occurring background levels, it is not always appropriate to select the highest of the three values. A sediment bioassay-derived value should generally be utilized if lower than a literature-based value.

Response: Agreed. The sediment PRGs have been revised to establish the PRG at the bioassay value in instances where the bioassay value is lower than the literature-based value. This revision does not result in the need to include additional areas within the established remediation area.

4. ***Comment:*** The FS states that sediment PRGs were used to establish surface soil PRGs. While it is prudent to consider soil transport and subsequent deposition, it is also important to ensure that soil PRGs are also protective of terrestrial receptors. PRGs based on terrestrial exposure must also be considered. The final PRG should be the lower of the sediment and soil PRGs.

   Response: The soil PRGs have been revised to consider terrestrial exposure. PRGs for surface soil have been established as the greater of the risk-based screening value for soil[3] and the 95% Munden-Tetoteum Background UTL. The majority of the sample locations that exceed the soil PRGs fall within the waste boundary and are therefore being addressed with that remediation area. The following sample locations are located outside of the waste boundary and exceed one or more of the ecological screening values: SJS02-SS02 and SS07. Each of the sample locations exceeds the soil PRG for one or more inorganics.

   SJS02-SS02 and SJS07 are proposed for exclusion from the remediation based on the following:

   - The concentrations of some inorganics exceed the soil PRGs, but are similar in magnitude to the PRG and outside of the areas where CERCLA-related activities were conducted.
   - The site wide average concentration for the inorganics will be well below the soil PRG after remediation of the waste area. Site-wide averaging is appropriate for terrestrial receptors, as wildlife generally don't remain in discrete locations. Regarding soil invertebrates, site-wide averaging is not intended to be protective of soil invertebrates within a localized area, but is instead intended to provide a site-wide indication of potential impacts to soil invertebrate populations. Using an average concentration is reasonable since the primary objective of the soil invertebrate assessment endpoint is to maintain an invertebrate population which is robust enough to serve as a viable food source to higher trophic-level predators (e.g., shrew). Because higher trophic-level predators are mobile and can forage throughout the site, localized impacts will not affect the viability of soil invertebrates as a food source. An average concentration, which provides an indication of overall site-wide impact, therefore provides the best indication of potential risk associated with this assessment endpoint.

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[3] USEPA. 2007. *Ecological Screening Levels for Polycyclic Aromatic Hydrocarbons (PAHs)*. Interim Final. OSWER Directive 9285.7-78 for PAHs or USEPA.1995. *Revised Region III BTAG Screening Levels*. Memorandum from R.S. Davis to Users for pesticides/PCBs and inorganics.

Sediment PRGs were removed from consideration in establishing the soil PRGs. However, soil locations outside of the remediation areas were evaluated on a case-by-case basis to ensure that excluding the locations from the remediation would not allow for future transport and deposition of the soil as sediment. Two PAHs were detected at concentrations at SJS02-SS02 that are below the soil PRG but exceed the sediment PRG; however, the location is not upgradient of the Site 2 inlet. One PAH was detected at a concentration at SJS02-SS05 that is below the soil PRG but exceeds the sediment PRG; however, the detected concentration is estimated and similar in magnitude to the PRG, outside of the site boundary, and not upgradient of the Site 2 inlet. One PAH was detected at a concentration at SJS02-SS07 that is below the soil PRG but above the sediment PRG; however, the concentration is estimated and similar in magnitude to the sediment PRG, and the location is far enough from the Site 2 inlet sediment that deposition as sediment exceeding the sediment PRG is unlikely. Therefore, inclusion of SJS02-SS02, SS05, and SS07 within the remediation areas is not recommended.

The preceding information will be incorporated into the text, tables, and figures of the FS report.

5. ***Comment:*** It is inappropriate to not develop PRGs for surf soil COCs because they were not detected in sediment. Surface soil PRGs must be developed for all contaminants posing an ecological risk.

   Response: PRGs were developed for all surface soil COCs within the draft FS; however, the approach has been revised based on the response to BTAG Comment 4.

6. ***Comment:*** *The last paragraph of Section 3.2.2* states that contamination below 1 ft. would not be attributed to deposition from Site 2. Given the 80 year disposal history of this site, this statement is unsupported. It seems very reasonable that contamination detected below 1 foot could be attributable to the site. Information supporting the statement in the text must be presented or the remedial action must consider addressing any contamination at depth.

   Response: The sediment samples collected within St. Juliens Creek were collected over a 0 to 6-inch depth interval based on the sampling strategy developed by the team. The approach was developed with consideration of the contaminant transport pathway, the culvert outfall, and the fact that contaminants would mix with the St. Juliens Creek water or would be deposited on the sediment surface. No ground disturbing or disposal activities were conducted within the creek to suggest contamination would be deeper and therefore, subsurface sediment samples were not collected. The proposed 1-foot excavation will conservatively address the surface sediment contamination.

7. ***Comment:*** The costs for the creation of the mitigation wetland are not apparent.

   Response: The costs of the creation of the mitigation wetland is included as a line item on the cover cost estimate worksheet and details are provided on the wetland mitigation worksheet in the cost estimate appendix. Due to the

complexity of the cost estimates, line items for each component can not be included on the summary sheet.

8. ***Comment:*** The conceptual wetlands mitigation plan states that the habitat created is likely to be of higher quality than the one being destroyed. This statement is not supported, particularly when the habitat quality of the Site 2 wetland is considered if it had not been impacted by disposal activities.

   Response: The conceptual wetland mitigation plan text will be revised to clarify that the mitigation wetland is likely to be of higher functional value than the existing wetland at Site 2. The quality of the wetland prior to the disposal activities, which began in 1921 prior to the establishment of the Clean Water Act, is not known and therefore can not be quantified. The proposed wetland will increase the diversity and size of the existing wetlands (Site 19) and include measures to discourage the invasion of alien non-native vegetation, which are currently present at both Sites 2 and 19.

9. ***Comment:*** Based on the aforementioned comment, the time required for the establishment of a mature wetland, and the uncertainty of successful establishment of the entire wetland as planned, BTAG strongly advocates increasing the ratio to 1.5 acres created wetland to 1 acre of impacted wetland.

   Response: Comment noted. The size of the compensation area will be developed in the Compensatory Mitigation Plan in consultation with the United States Army Corps of Engineers, VDEQ, and EPA. A conceptual plan to augment an existing wetland at SJCA at a ratio greater than 1 to 1 (approximately 1.3 to 1) was included within the FS to evaluate the feasibility and cost of the compensation. However, because the compensation will be equivalent for each of the alternatives evaluated, further details are not necessary at this time and will not impact the outcome of the FS. The conceptual plan complies with Superfund policy, which requires a minimum of one acre of wetland mitigation for each acre of wetland filled, and is adequate for the purpose of this FS. No changes to the conceptual plan have been made.

10. ***Comment:*** The rationale behind the inclusion, size and orientation of the "Open Ditch" should be provided.

    Response: The conceptual wetland plan within this FS is provided for cost estimating purposes and to evaluate the feasibility of its construction. Details of the wetland will be provided within the Compensatory Mitigation Plan. The open ditch is intended to promote tidal flooding and will be refined within the future plan.

11. ***Comment:*** *Appendix D.* Rather than top soil high in organics, course sand is a better planting media and is sufficient to support growth in tidal wetlands.

    Response: The intent is to replace the top layer of soil with a soil type similar to what is present in the existing, adjacent wetlands. Rappahannock muck has an "A" horizon of over 15", which is the primary root zone depth of most salt marsh species. In salt marsh habitats, a good soil growing medium would have fines

content in the range of 70-80%. Organic matter content would range from 10-40% or less in sandy soils. Accordingly, a top soil was assumed to be high in organic content to better mimic existing site conditions. Further details will be established within the Compensatory Mitigation Plan.

12. ***Comment:*** *Appendix D.* The following recommendations are offered for the planting scheme:

    a. Replace red maple (*Acer rubrum*) and sweet gum (*Liquidambar styraciflua*) to willow oak (*Quercus phellos*) and eastern red cedar (*Juniperus virginiana*).
    b. Add switchgrass (*Panicum virgatum*) on two foot centers between trees in the upland
    c. Replace the small area of high marsh on the north end with low marsh and plant *Spartina alterniflora*.

    Response:

    Details of the vegetation plan will be established in the Compensatory Mitigation Plan. However, the following recommendations will be incorporated:

    a. Red maple and sweet gum will be replaced as noted.

    b. Switchgrass will be added to the upland area between the specified upland trees as requested.

    The layout will also be refined in the Compensatory Mitigation Plan, with consideration of the following:

    c. The high marsh planned in the central northern area of the proposed wetland was designed to replace high marsh in the impacted wetland at Site-2.

13. ***Comment:*** *Appendix D.* As noted in our previous comments, the rationale behind the inclusion, size and orientation of the "Open Ditch" should be provided. We recommend that the orientation of the ditch be changed and it be reduced in size.

    Response: See response to BTAG Comment 10.

Comments from EPA, provided 5 January 09.
Hydro Comments

1. ***Comment:*** *General Comment:* There are two major problems with the FS as it relates to the DNAPL source and groundwater. First, the waste – which is a principal threat - must be addressed in order to reduce its volume, mobility and toxicity according to the NCP. The waste as a principal threat is not mentioned in the RAOs. The fact that the waste has not been fully characterized (p. 3-5) and will not be done until the RD- after the remedy is picked- is a problem. This would not be as much of a problem if a remedy requiring excavation of the waste will be done. However, if a remedy is chosen that does not address the reduction

of waste, this is a problem. Secondly, groundwater restoration is also not mentioned as a RAO. Although the groundwater beneath the waste is not considered part of the "area of attainment" the deeper aquifer downgradient of the site is an aquifer. Monitoring of this aquifer downgradient of the site and perhaps across the creek should be performed and included in the remedy.

Response: See response to EPA RPM Comment 1 regarding Principal Threat waste. The groundwater RAO, "Reduce contaminant source mass to the maximum extent practicable" was established by the SJCA project management team during partnering meetings to address the DNAPL. Additionally, the statutory preference for treatment is considered during evaluation of alternatives against the 9 NCP criteria.

Waste delineation and characterization was conducted during the RI and Expanded RI and included ABM, burnt/stained soil, concrete, asphalt, brick, metal, glass, wood, solvents, and MEC-related scrap. Although the FS allows for the possibility to refine the extent of the waste, which is currently considered to be conservative, additional characterization of the waste is not planned. Due to the heterogeneity of the waste over the site, limitations for sampling based on potential presence of MEC, and the limitations posed by the shallow water table, the waste cannot be fully characterized unless a complete excavation is conducted. Therefore, it is assumed to pose risk and will be addressed by the remedial alternatives.

CVOCs are not currently detected in any deep groundwater monitoring wells at concentrations above MCLs, and the no further action for the deep groundwater was determined in the Expanded RI. Due to the thickness and competence of the Yorktown confining unit (approximately 30 feet) separating the Columbia and Yorktown aquifers, it is considered an effective barrier to vertical contaminant migration. Furthermore, upward vertical gradients were measured in all Columbia aquifer and Yorktown aquifer groundwater well pairs in June 2007. A RAO ("Prevent activities that might cause migration of CVOCs in the Columbia aquifer to the underlying Yorktown aquifer" has been established to prevent activities that may compromise the integrity of the confining unit. Therefore, no additional monitoring is warranted of this groundwater zone.

The details of the monitoring plan will be developed in the Remedial Design.

2. ***Comment:*** *RAO for protection of human health and the environment.* The RAO for protection of human health and the environment "Reduce VOC concentrations in shallow groundwater to the maximum extent practicable and maintain land use controls until concentrations allow for unlimited use and unrestricted exposure" is confusing. First of all, there is DNAPL in the shallow aquifer in the waste area, so an appropriate RAO here would be to deal with the principal threat waste (noted above). Also noted above, another RAO for the area of attainment in the shallow and deep aquifers should deal with restoration of the drinking water. And third, it is not clear what "unlimited use and unrestricted exposure" refers to. The way I look at it, this refers to a remediated drinking water aquifer.

Response: See response to RPM Comment # 1 and EPA Hydro Comment #1 regarding principal threat waste and RAOs. Because deep groundwater at the site has not been impacted and no further action is required, no RAOs for deep groundwater have been established. However, see response to EPA Hydro Comment #2 regarding prevention of activities that could cause the migration of CVOCs in the Columbia aquifer to the underlying Yorktown aquifer. "Unlimited use and unrestricted exposure" refers to restoration of the groundwater so that the owner can use it for any purpose without institutional controls, including drinking water. The RAO for "unlimited use and unrestricted exposure" was established by the team to meet the ARARs to protect and restore drinking water sources.

3. ***Comment:*** *Land Use Control Implementation, p. 4-6:* If the waste is only covered and not dealt with as a principal threat, then implementation of LUCs would basically be forever, as the waste would still remain in place.

   Response: Comment noted. LUCs will be maintained while the waste remains in place.

Comments from EPA, provided 5 January 09.
Toxicologist Comments

1. ***Comment:*** *Section 2.3, Human Health Risk Assessment.* The report states the following contaminants were eliminated from further consideration because they were not considered to be site related, although risk was exceeded in groundwater; dibenzofuran, 2,6-dinitrotoluene, arsenic, iron, lead, and thallium. EPA strongly disagrees with the decision to not include these constituents as COCs for the following reasons:
   a. Contaminants should only be removed from further consideration if appropriate background statistical testing show the contaminant is within background levels.
   b. Past site history (e.g., waste disposal area and abrasive blast media-ABM) clearly suggest the contaminants listed above could be identified at this site
   c. Frequency of detection can be used but should be supported with additional information.
   d. Child residential ingestion risk (1.7E+00) and both the child (7.7E+00) and adult (1.3E+00) residential dermal risk were identified for dibenzofuran.
   e. Lifetime residential ingestion risk (2.4E-04) and child resident ingestion risk was identified for arsenic. In addition, arsenic is a common contaminant found at many waste disposal and ABM areas.
   f. Child residential ingestion risk (1.3E+00) was identified for 2,6-dinitrotoulene.
   g. Lead is a common contaminant found in ABM.

   Response: Section 2.3 summarizes the results of the Expanded RI human health risk assessment, within which the decision not to carry through the referenced contaminants was reached and agreed to by the partnering team. The section

does not provide any new information or revise the approach from the recommendations of the Expanded RI. The FS text has been revised to more clearly reference the risk management considerations presented in the Expanded RI report and summarized below.

a. Comment noted.

b. Comment noted. The data was evaluated within the Expanded RI report, in which the conclusion was reached that the contaminants were not related to past CERCLA-related activities.

c. Comment noted. The frequency of detection and additional lines of evidence were presented within the Expanded RI.

d. No risk for dibenzofuran was identified in the HHRA. The text and associated table will be revised to remove dibenzofuran.

e. The basis for the team decision not to carry arsenic through as a COC is provided within the Expanded RI. Although RME risk associated with ingestion of arsenic for the lifetime and child resident was identified, no unacceptable CTE risk was identified and arsenic was only detected above the MCL (10 µg/L) and background UTL (8 µg/L total and 2.4 µg/L dissolved) at one well, SJS02-MW09S (31 µg/L total and 28.8 µg/L dissolved). The well is located upgradient of the ABM area and is located adjacent to the identified petroleum impacted area. Most likely, degradation of petroleum compounds has resulted in reducing conditions in this area, as indicated by the low DO and relatively low ORP (below 0 mV) or E_H (below 150 mV). These reducing conditions may have increased the mobility of naturally occurring arsenic, resulting in elevated arsenic concentrations at SJS02-MW09S. If the arsenic detection was associated with the ABM, it should have been detected at monitoring wells within or downgradient of the ABM.

   Some of the alternatives being evaluated may mobilize naturally occurring metals, including arsenic. The natural mobilization of metals has been considered with each alternative through the evaluation of short term effectiveness (environmental impacts). If the team selects a remedy with the potential for the mobilization of metals, those metals that may be mobilized by the remedy will be incorporated into the monitoring plan that will be developed by the partnering team and include. The monitoring plan will include an exit strategy that includes confirmation that concentrations return to an acceptable risk level. The approach will be documented within the ROD.

f. The basis for the team decision not to carry 2,6-dinitrotoluene through as a COC is provided within the Expanded RI. Although RME risk slightly above the USEPA target level associated with ingestion of 2,6-dinitrotoulene was identified for the child resident, no unacceptable CTE risk was identified and 2,6-dinitrotoluene was only detected at one well (20 µg/L at MW10S). Due to the mobile nature of explosives, and the fact that it was only detected at one

location, this constituent is most likely naturally attenuating, which is limiting its migration.

g. The basis for the team decision not to carry lead through as a COC is provided within the Expanded RI. Although total and dissolved lead concentrations were sporadically above both the action level (15 µg/L) and background UTL (3.5 µg/L total and 2.1 µg/L dissolved) at MW02S and MW03S, the average total lead concentration (5.2 µg/L) across the site was below the action level. Additionally, no human health risks were identified.

2. ***Comment:*** *Table 3-1, Human Health Preliminary Remediation Goals.* Please explain why chloroform and methylene chloride are included as COCs when risk was not identified for either contaminant? These contaminants should be removed from the remediation goal listing.

   Response: Although no risk was identified associated with chloroform and methylene chloride, they were retained as COCs because detected concentrations exceeded the MCLs, which is an ARAR, and additional lines of evidence (e.g., background levels, site history, frequency of detection) were not sufficient to allow for their exclusion.

3. ***Comment:*** *Table 3-1, Human Health Preliminary Remediation Goals.* Please keep in mind MCLs alone may not be protective of cumulative risk. Therefore, it is recommended that the groundwater risk be evaluated at the end of the remedy to ensure protectiveness at that time.

   Response: Generally, Federal MCLs are relevant and appropriate as PRGs, and ultimately as final cleanup levels, for groundwater that is determined to be a current or potential source of drinking water (40 CFR 300.430(e)(2)(i)(B and C)). Additional calculations were performed to determine whether use of the MCLs as the PRGs would be protective of human health at Site 21. The total risk level associated with the use of MCLs as the PRGs for the COCs falls within the acceptable range of 10^{-4} to 10^{-6} for each COC for residential use. However, the combined risk level for all of the COCs is 2.1×10^{-4} for residential use, which is slightly outside of the acceptable range. Additionally, the hazard level for each of the COCs is below an HI except for heptachlor epoxide, which has an HI = 1.5 for residential use. Because each of the remedies being evaluated for Site 2 requires land use controls to restrict residential use, the risk calculations were repeated for industrial use. Under the industrial scenario, the risk level with the use of MCLs as PRGs for the COCs falls within the acceptable range of 10^{-4} to 10^{-6}, and the total hazard level is below the HI of 1. Therefore, the use of MCLs as the PRGs for the industrial scenario is acceptable, and land use controls will be established to prevent residential use. The residential and industrial calculations will be incorporated into the FS.

Comments from VDEQ, provided 5 January 09.
Typographical Comments

1. ***Comment:*** *Alternative Titles* – Several of the alternative titles have the same name

making it difficult to distinguish between alternatives. Please rename the alternatives using five different categories for each different portion of the remediation, i.e. Alternative 2 – Cover/Waste, Excavation/SJC sediments, MNA/HC Area, MNA/LC Area, MNA/Naph-HepEpox Area, Alternative 3 – Cover/Waste, Excavation/SJC sediments, Sheet Pile/HC Area, MNA/LC Area, MNA/Naph-HepEpox Area, Alternative 7 – Cover/Waste, Excavation/SJC sediments, Excavation/HC Area, MNA/LC Area, MNA/Naph-HepEpox Area. Please carry the new titles throughout the document.

Response: The alternative titles have been renamed in order to better distinguish between the alternatives.

2. ***Comment:*** *Page 2-2, second paragraph, second to last sentence* – Should read "300 times" instead of "30 per cent of".

   Response: The wording is not very clear and will be revised. The detected concentration of TCE (330,000 µg/L) is 30 percent of the pure phase solubility of TCE in water (1,100,000 µg/L), which is greater than 1 percent of the pure phase solubility of TCE in water of 11,000 µg/L. The last three sentences of the paragraph will be replaced with the following text: "However, one "rule of thumb" indicator that DNAPL may be present is the presence of chemicals that are known to behave as DNAPL (because of their hydrophobic nature and density) at concentrations greater than 1 percent of their pure phase solubility in water. One percent of the pure phase solubility of TCE in water is 11,000 µg/L. The maximum TCE concentration in Columbia aquifer monitoring wells (330,000 micrograms per liter [µg/L]) is approximately 30 percent of the TCE solubility level, strongly indicating the presence of DNAPL. The SVOC and pesticide were detected in isolated monitoring wells and were not delineated during investigation activities."

3. ***Comment:*** *Page 3-3, second full paragraph, third sentence* – Front half of the ( ) is missing.

   Response: The "(" in the sentence was erroneous and has been deleted from the text.

4. ***Comment:*** *Page 4-2, LUCs bullet – Replace "to" with "the" and replace "directing" with "direct".*

   Response: The text has been changed as requested.

5. ***Comment:*** *Page 5-5, second paragraph, second sentence* – Replace "Alternatives 3 through 6" with "Alternatives 3 and 6".

   Response: The text has been changed as requested.

6. ***Comment:*** *Appendix C, MNA – Low-conc Target Area* – There are two worksheets for this element and they are different – which one is correct?

   Response: The first worksheet estimates the cost associated with monitored natural attenuation (MNA) of the CVOC low-concentration area. The second

worksheet estimates the cost associated with MNA of the heptachlor epoxide and naphthalene areas. The title of the second worksheet will be corrected.

7. ***Comment:*** *Appendix C, ERD* – Please add "Low Concentration Target Area" to the title.

   Response: The suggested change has been made.

8. ***Comment:*** *Appendix C, Bio Amendment Injection* – Amendment is misspelled in the element title.

   Response: The suggested change has been made.

9. ***Comment:*** *Appendix C, St. Juliens Creek Sediment Excavation* – This element is duplicated and the element for excavation of the high-concentration target area is missing.

   Response: The hardcopy version of the element for the excavation of the high-concentration target area is missing and will be included in the next submittal. The pdf provided on CD with the draft submittal contains the correct file (pages 174 through 175 of 218).

Comments from VDEQ, provided 5 January 09.
Technical Comments

1. ***Comment:*** *Page 3-6, second full paragraph – Exclusion of ecological remediation areas.* As stated in this paragraph, "Although concentrations of DDE and/or DDT exceeded the ecological PRGs in samples collected at location SJS02-SS01 and SJS02-SS19, these locations are not included as ecological risk-based remediation areas because they are located outside of the waste boundary and are not attributed to site-related activities." Please provide additional justification to exclude these areas from the ecological risk-based remediation area.

   Response: See response to EPA RPM Comment 6.

2. ***Comment:*** *Page 4-6, first full paragraph – additional explanation needed.* This paragraph leads the reader to Appendix C for information on the monitored natural attenuation plan details. Please include this information in this section of the text.

   Response: No changes have been made. Assumptions related to the specifics of the MNA sampling were made for the purpose of cost estimating only, and were therefore only included in the cost estimate appendix. The details of the monitoring plan are not included within this document and will be developed in a future monitoring plan.

3. ***Comment:*** *Page 4-6, fourth full paragraph – MNA for heptachlor epoxide.* According to this paragraph, heptachlor epoxide biodegrades very slowly under anaerobic conditions. Please include additional information to support the use of MNA for heptachlor epoxide.

Response: MNA includes physical (dispersion, dilution, volatilization, and adsorption), biological (aerobic and anaerobic biodegradation), and chemical processes (abiotic transformation) which naturally reduce the mass, toxicity, mobility, volume, or concentration of contaminants (EPA, OSWER Directive 9200.4-17P). Due to heptachlor epoxide's low water solubility and high soil-water partition coefficient, adsorption is very strong, resulting in the small, low-concentration, isolated groundwater plume observed at Site 2. Simultaneously, dispersion and dilution reduce contaminant concentration and biodegradation reduces contaminant mass. Therefore, although biodegradation rates are low, the combined natural attenuation processes are effective. Monitoring is proposed to confirm this effectiveness. Additional text will be added to the section to emphasize the importance of the physical natural attenuation processes for this contaminant and the effectiveness of the combined natural attenuation processes.

4. ***Comment:*** *Abandonment and installation of monitoring wells.* Descriptions of monitoring well abandonment, replacement and new well installation are located in several areas throughout the document, making it difficult to get a clear picture of which wells will be used for MNA and/or performance monitoring and which wells will be abandoned altogether. Please provide the following:

   - *Additional section* – Please include a separate section in the text to describe what is proposed for all of the monitoring wells at the site, to include MNA and performance monitoring sampling.
   - *Figures 4-2 through 4-9* – Please distinguish between the monitoring wells that will be abandoned and those that will be abandoned and replaced.
   - *Section 4 and Figures 4-3 through 4-9* – Additional performance monitoring wells will be necessary to monitor the eastern side of the contaminant plume and the western side north of MW03S.

   Response:

   - A separate section has not been added to describe the proposed purpose for the monitoring wells because the purposes vary by alternative. The assumptions associated with each alternative are provided within Appendix C for cost estimating purposes. The actual monitoring plan will be developed in the remedial design.
   - Figure 4-2 will not be revised because each alternative will vary with respect to which monitoring wells are abandoned or replaced. Figures 4-3 through 4-9 will be revised to clarify the assumptions for which monitoring wells will be abandoned and which will be replaced. The actual monitoring plan will be developed in the remedial design.
   - The details, including the final monitoring well network, of the monitoring plan will be developed in the remedial design

5. ***Comment:*** *Page 5-7, second full paragraph – Clarification for Alternative 3.* Alternative 3 should have the lowest score in this section, lower than Alternatives 1 and 2, due to the lack of groundwater flux through the area. Alternatives 1 and 2 would meet the groundwater RAOs faster than Alternative

3. Please update this paragraph. Also, please update Table 5-1, Alternative 3, Short-term effectiveness, timeframe to achieve groundwater RAOs from moderate to extensive. Tables 5-2 and 5-3 and Figures 5-1 and 5-2 also need to be updated to reflect the new information.

Response: In relation to the timeframe to meet RAOs, the score for Alternative 2 has been increased and the score for Alternative 3 has been decreased. The associated tables and figures will be updated. However, the score for Alternative 1 will remain the lowest because Alternative 3 will meet the RAOs for waste, soil, and sediment within a shorter timeframe than Alternative 1.

6. ***Comment:*** *Table 5-3 – Alternative 7.* Although Alternative 7does not involve treatment, it is expected that there will be a reduction in toxicity, and contamination remaining after the alternative is implemented. Therefore, in Table 5-3, the Degree of Expected Reductions in Toxicity, Mobility, and Volume and the Type and Quantity of Residual Remaining After Treatment should be updated to reflect this information. Table 5-2 and Figures 5-1 and 5-2 should also be updated.

   Response: No change has been made. According to the *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA, 1988), "this evaluation criterion addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce toxicity, mobility, or volume of the hazardous substances as their principal element. This preference is satisfied when treatment is used to reduce the principal threats at a site through destruction of toxic contaminants, reduction of the total mass of toxic contaminants, irreversible reduction in contaminant mobility, or reduction of total volume of contaminated media." Therefore, because treatment is not employed as part of the remedial action in Alternative 7, a low score is given to the alternative.

7. ***Comment:*** *Appendix C – Preliminary Cost Estimates.*

   - *First table* – Please update this table based on changes to the alternatives.
   - *MW Abandonment & Replacement* – Please update to include additional monitoring well installation.
   - *Wetland Mitigation* – Since it may take longer than two years to confirm the success of the mitigation wetland, under Key Assumptions, please add, "At least" before "2 years".
   - *MNA – High-conc Target Area* – Since it has been shown that treatment of CVOC plumes can cause mobilization of arsenic, arsenic should be added to the list of analytes. Please update to include arsenic and additional monitoring wells.
   - *MNA – Low-conc Target Area* – Please add arsenic to list of analytes.

   Response:

   - The table will be updated.

- Costs associated with monitoring well abandonment and replacement have not been updated because no changes have been made to the monitoring well network assumptions. The specifics of the sampling will be developed in a future monitoring plan.
- No changes have been made to the key assumptions of the wetland mitigation. Assumptions are necessary for cost estimates and it's understood that the timeframe may be longer than 2 years. The monitoring plan, including parameters, frequency, and duration, will be developed by the team during the remedial design phase.
- The details, including the final list of analytes, of the monitoring plan will be developed in the remedial design. However, the assumption that arsenic analysis will be performed will be added.
- The details, including the final list of analytes, of the monitoring plan will be developed in the remedial design. However, the assumption that arsenic analysis will be performed will be added.

8. ***Comment:*** *Appendix D – Wetlands Mitigation Plan.* Please clarify if any phragmites currently exists at either Site 2 or Site 19.

   Response: Appendix D indicates the presence of phragmites within Site 2 and in the vicinity of Site 19.

Comments from EPA, provided 5 March 09.
Toxicologist Comment

Comment: EPA would appreciate it if the Navy could include the following language in the Expanded RI and/or FS report in regards to the elimination of lead a COC …"the average total lead concentration (5.2 ug/L) across the site was below the action level."

Response: The requested text will be added to the FS report in Section 2.3.

Comments from EPA, provided 5 March 09.
RPM Comment

***Comment*:** General Comment (summation of RPM comments 1 and 5): From recent research presented at NARPM, EPA is not necessarily comfortable with a containment remedy in instances where DNAPL is present. Although the Navy believes the Yorktown confining unit is contiguous, there is no way to monitor the confining unit to determine whether the DNAPL is penetrating the confining unit into the underlying aquifer. Due to their high density and low viscosity, chlorinated solvent DNAPLs are prone to travel much faster through fractured aquitards than dissolved contaminants (Cherr et. Al 2006) … When free-product DNAPL accumulates on top of the aquitard, the capability of the aquitard to prevent contamination of underlying aquifers is often jeopardized by DNAPL pathways provided by imperceptible fractures, root holes or toher small openings (Cherry et. Al 2006)". Additionally, it is nearly impossible to insure that

the aquitart would be “keyed in” to the confining unit. Please see Attachments. level.”

Response: Comment noted. No revisions to the FS have been made. However, the comment will be considered during remedy selection in association with the regulatory acceptance NCP criterion.