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FISC WILLIAMSBURG  
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LETTER AND ATTACHED U S NAVY RESPONSE TO U S EPA REGION III COMMENTS ON  
THE TIER II SAMPLING AND ANALYSIS PLAN FOR SITE 4 REMEDIAL INVESTIGATION  
WILLIAMSBURG FISC VA  
6/27/2012  
CH2M HILL

**From:** [Sawyer, Stephanie/VBO](#)  
**To:** [John Burchette](#)  
**Cc:** [Park, Scott R CIV NAVFAC MIDLANT, EV](#); [Smith, Wade \(DEO\)](#); [Ivester, Marlene/VBO](#); [Sawyer, Stephanie/VBO](#)  
**Subject:** Response to EPA Comments on the Draft Site 4 RI UFP-SAP  
**Date:** Wednesday, June 27, 2012 8:18:00 AM  
**Attachments:** [image001.jpg](#)  
[Site 4 RI SAP EPA RTCs\\_062612.pdf](#)

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John,

Attached are the Navy's responses to the EPA's comments on the Draft Site 4 RI UFP-SAP. The USEPA comments were received via email on June 13, 2012. These RTCs were sent out yesterday in preparation for the CAX Partnering Team Meeting on June 28<sup>th</sup>, however that submittal did not include the figure attachment, the attached version does.

Once we have resolved these comments, we will submit the draft final Site 4 RI UFP-SAP (red-lined for easy review) for review.

We will be discussing these RTCs on June 28th, during our Partnering Meeting, however if you have any questions prior to the meeting please let us know.

Thanks,  
Stephanie

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**Response to Comments**  
**Tier II Sampling and Analysis Plan**  
**Site 4 – Remedial Investigation**  
**Naval Weapons Station Yorktown Cheatham Annex**  
**Williamsburg, VA**  
**June 26, 2012**

*EPA Tox Comment 1: Page 17. The response to Question 4 proposes sampling gw for VOCs, PAHs and inorganics (total and dissolved) during the RI. According to the report, this proposal for limited analyses is based on the findings of the 2009 SI conducted at Site 4. However, during the SI, gw samples were collected from temporary wells; data collected from such wells can not be duplicated. For this reason, I suggest conducting a full suite analysis of the permanent mws that will be installed for the RI.*

Response: Analyzing the monitoring wells for full suite is unnecessary for the following reasons:

- As described in the SI Report (CH2M HILL, 2011), the temporary monitoring wells at Site 4 were installed using one-inch PVC casing with 0.010-inch machine-slotted screen surrounded by a pre-installed sand filter pack. Following installation, each temporary monitoring well was developed and purged prior to groundwater sampling (as is done with permanent monitoring wells). The monitoring well construction and development/purging process was conducted to ensure the temporary monitoring wells were as similar to permanent monitoring wells as possible so that the groundwater was adequately characterized and the data collected could be used to adequately assess potential risk to human health and ecological receptors.
- There are no issues with the quality of that data that would require the duplication/confirmation of the SI results. During the completion of the SI Report (during which the Navy addressed three rounds of EPA comments), no comments were received from the regulatory agencies indicating that there were concerns with the quality of the SI data that would require duplication/confirmation.
- Based on the number and location of the groundwater samples evaluated in the SI, Site 4 is already adequately characterized and enough groundwater chemical data have been collected to assess potential risks to human health and ecological receptors without installing and sampling additional monitoring wells. However, since groundwater flow and velocity information will be needed to complete the RI, the team agreed that the monitoring wells installed to collect these data will be sampled for those contaminants identified in the SI as potentially posing risk to human health or ecological receptors (VOCs, PAHs, and inorganic constituents).

No changes to the SAP were made.

*EPA Tox Comment 2: Pages 24, 26, 31, and Figure 4. For soil and gw, if on-site metal concentrations pose an unacceptable risk, the report indicates that a comparison to 95 percent UTLs for bg will be performed. This type of statistical evaluation of on-site and bg conditions is acceptable and defensible. The report continues, however, to state that if 95 percent UTLs are exceeded, then a comparison to maximum bg concentrations will be conducted to eliminate any CoPCs that are present below maximum bg levels. This step completely negates the previous step, does not represent sound science, and should be eliminated from the DQO process.*

Response: Clarification to the text in the final bullet under the decision logic for soil and groundwater is proposed as presented below, but the Navy does not agree with eliminating a comparison of site data to maximum background concentrations as a potential evaluation criterion in determining whether or not a release has occurred. The larger the background data set, the less the 95 percent UTL becomes an estimate of the upper range of background concentrations and the more it becomes a more focused estimate of the 95<sup>th</sup> percentile. In other words, when a larger background data set is available, the more likely the calculated 95 percent UTL is to be less than some of the very background concentrations used in its calculation. Therefore, using a 95 percent UTL

calculated with a large background data set produces a virtual guarantee of potential false positives in point-by-point comparisons to site data. As a result, the 95 percent UTLs will be utilized for initial background screening purposes, but will conduct additional evaluation of site concentrations exceeding background 95 percent UTLs, including potentially comparing concentrations to maximum background concentrations, before determining if these exceedances represent evidence of a release. This is consistent with Navy guidance for environmental background data analysis, which states: "Select the background threshold value as the value that represents the upper range of ambient conditions. In the case of an adequate and comprehensive background dataset, the maximum concentration should be used as the background threshold value. If the number of background measurements is small, the threshold value should be selected either as the highest measured value, or the pth percentile (such as 95th or 99th percentile) of measured values, whichever is higher." (U.S. Navy, 2002).

The final bullet under the decision logic for soil and groundwater was revised (blue text) to state the following:

If the COC concentrations exceed the background 95 percent UTL, further evaluation will be conducted to consider whether the COC concentrations may be attributed to a release or may be associated with background conditions (such as comparing site data to the maximum base background concentrations). If the results of this evaluation potentially indicate that site concentrations are not consistent with background conditions, then recommendations for additional investigation and/or action will be made in the RI report.

*EPA Tox Comment 3: Page 29. According to the last sentence of the second paragraph, based on spatial coverage of the current data set (that is, the SI data), no additional sampling is necessary to adequately assess potential risks to human health. However, other sections of this report indicate that additional sampling conducted during the RI will be combined with SI data in the Baseline Risk Assessment. The language on page 29 should be clarified in this regard.*

Response: The spatial coverage of the 2009 SI dataset is adequate to conduct a Baseline Human Health Risk Assessment (HHRA); therefore, no additional sampling would be required for this specific purpose. However, since additional data are being collected to answer the questions *What is the nature and extent of contamination in soil?*, *What is the nature and extent of contamination in groundwater and the groundwater flow direction and velocity?*, and *Do soil, sediment or surface water pose a potentially unacceptable risk to ecological receptors?*, the data collected to answer these questions will also be used in completing the HHRA. The referenced sentence was revised (blue text) to read:

Based on spatial coverage of the current data set, no additional sampling (in addition to the sampling proposed in this UFP-SAP) is necessary to adequately assess the potential risk to human health.

*EPA Tox Comment 4: Based on data from the SI, chromium was identified as a CoPC in soil (surface and subsurface) and gw. As a consequence, the SAP for Site 4 states that during the RI, two surface soil samples will be collected from the areas of highest total chromium contamination (per page 19) and analyzed for hexavalent chromium. This type of analysis should also be performed for subsurface soil. With regard to gw, no analysis for hexavalent chromium is proposed; therefore, irrespective of the soil investigation findings, chromium in gw will have to be assumed to be present in the more toxic form (unless valence-specific analysis is conducted).*

Response: Agreed. A scoping session was held via e-mail with the CAX Partnering Team regarding the addition of two subsurface (6-24 inches) soil samples to the SAP. The EPA and DEQ agreed on the locations of the proposed sampling locations on June 20, 2012 and June 26, 2012, respectively. The SAP was revised to include the results of the scoping session and the addition of these two samples.

*EPA RPM Comment 1: Please include a figure in the SI showing all SI exceedances of screening criteria and previous sampling locations.*

Response: Figures showing the exceedances of the screening criteria at Site 4 were included in the Site 4, Site 9, and AOC 3 Site Inspection Report. Since a single figure showing all SI exceedances of screening criteria and

previous sampling locations would be extremely difficult to interpret due to the number of sampling locations and volume of results, Appendix B was added to the SAP and includes figures showing soil, groundwater, sediment, and surface water exceedances.

*EPA RPM Comment 2: Page 19. Didn't we later discuss the 100ppb with John M. and lower the number to 50 or so?*

Response: The referenced page is a summary of the discussion the team had during the scoping session conducted in November 2011 (at which time no agreement was reached regarding the pesticide threshold number to use); however, since the team did later discuss lowering the intended pesticide usage number from 100 ppb to 50 ppb (during the November 16, 2011 Partnering Meeting), the SAP was revised to include discussion of this agreement in an Action Items and Results section of the November 2011 Scoping Session.

*EPA RPM Comment 3: Pages 22 and 23. Was the area with the railroad ties and drum sampled.*

Response: Surface debris, including railroad ties (among other debris), was encountered throughout Burial Investigation Area 2 as indicated in the SAP. During a recent site visit, the locations of a few of the areas where railroad ties were observed at the ground surface were recorded with a GPS. These locations are shown on the attached figure and show that several site samples were collected in the vicinity of or downgradient of the railroad ties (specifically, CAS04-SD06, CAS04-SW06, CAS004-4-SD03, and CAS004-4HA03). No changes to the SAP were made.

*EPA RPM Comment 4: Page 25. Human Health Risk Decision Logic. Why wasn't a recreational user scenario evaluated? Are there currently any engineering controls present at the site (e.g. fence)?*

Response: While access to Site 4 is not restricted, it is located between CAD buildings 11 and 12 and access to the CAD area is restricted (the CAD area is surrounded by a fence and access can only be gained through check-in at a guard shack). In addition, the site is not used for recreational purposes; therefore an evaluation of the trespasser/visitor scenario as opposed to a recreational user scenario is more applicable for this site.

The trespasser/visitor scenario evaluation is basically the same scenario evaluation as a recreational user for surface water and sediment (i.e., exposure parameters such as exposure frequency, exposure duration, ingestion rate, etc. would be the same for the recreational user). Therefore, an evaluation of the trespasser/visitor scenario would cover the same exposure parameters as the recreational user. No changes were made to the SAP.

*EPA RPM Comment 5: Page 39. Offsite reference pond. What pond will be used? Will data be compared against Eco Screening Levels as well?*

Response: The specific offsite reference pond cannot be identified at this time because data from the two potential reference ponds (Jones Mill Pond and Cheatham Pond) will need to be collected during the biological survey and evaluated in order to finalize the selection. As stated in Section 3.2.12 of the SAP, a reconnaissance survey of these two ponds will be conducted prior to the beginning of field work to determine suitability for use as a reference pond in terms of how similar one or both of these ponds (or portions of the pond) are to Upstream Pond in terms of habitat, water depth, substrate type, etc. Results of sediment sampling during the 2000 Pond Study will also be used to evaluate suitability. For clarification, Section 2.3.3 (the proposed work to answer the question, *Do soil, sediment, or surface water pose a potentially unacceptable risk to ecological receptors?*) was revised (blue text) to state the following:

- Eleven surface sediment samples from Upstream Pond and three surface sediment samples from an upgradient drainage channel (**Figure 5**) will be collected. In addition, two surface sediment samples will be collected from a reference pond (anticipated to be either Jones Mill Pond or Cheatham Pond [Figure 1]; the specific pond and sample locations are to be determined based on the results of the biological survey [described in Section 3.2.12]). All of these samples will be analyzed for PAHs, PCBs, metals, pH, TOC, grain size, and AVS/SEM.

- Six surface sediment samples from Upstream Pond and two surface sediment samples from a reference pond (anticipated to be either Jones Mill Pond or Cheatham Pond [Figure 1]; the specific pond and sample locations are to be determined based on the results of the biological survey [described in Section 3.2.12]) will be evaluated for toxicity using laboratory-based 28-day sediment tests (endpoints of survival and growth) with the invertebrate *Hyalella azteca*. The SOP for this toxicity test is referenced in **Table 3-2**. Sulfide and ammonia will also be analyzed in sediment samples submitted for toxicity testing.

In addition, all site sample concentrations will be compared with ecological screening values, as well as with the resulting reference concentrations.

*EPA RPM Comment 6: Page 40. "risk posed frogs". Typo.*

Response: The typo was corrected.

*EPA RPM Comment 7: Page 44. Reference Ponds (2?). The Site 4 sediment data should be compared to Eco screening data as well as the reference pond samples. Reference pond samples should not show elevated concentrations of contaminants and data that do should not be utilized.*

Response: The plural of reference ponds is a typo and was revised. All site sample concentrations will be compared with ecological screening values as well as with the resulting reference concentrations. The reference samples will not be formally compared with ecological screening values, but they will be qualitatively reviewed to ensure that they do not contain highly elevated levels of chemical constituents (e.g., PCBs, explosives). Section 2.3.4 of the SAP was revised to include the information above.

*EPA RPM Comment 8: Comparison to Maximum Background should not be used to screen out COPCs. This should only be used as a supporting line of evidence as part of possible risk management decisions.*

Response: See the response to EPA Tox Comment 2.

*EPA BTAG Comment 1: Page 16: The second bullet indicates that Youth Pond will be investigated later in its own study. It is not clear why this is decision was made. Based on culverts alone, the Upstream Pond drains into Youth Pond which subsequently drains into the York River. This was also acknowledged in the draft SLERA (June 29, 2001) for Site 4. The text of this document needs to specifically address why these ponds will be addressed separately.*

Response: The referenced text documents part of the discussion the CAX Partnering Team had during the September 2011 scoping session. As Section 2.1 is entirely a summary of the discussions the Partnering Team had during the various scoping sessions and not a presentation of the work to be performed, it may not provide the level of detail or entirely reflect the actual sampling plan proposed in Sections 2.3 and 2.5 of the SAP.

There are also other sections of the SAP that refer to Youth Pond being investigated in its own study. Youth Pond is being investigated as its own investigation as a result of team discussions on July 16, 2009 and team agreement on July 21, 2009 as documented in the *Response to Additional EPA Comments Regarding the Navy's July 2009 Response to Comment Letter for the Draft Sampling and Analysis Plan, Sites 4, 9, and AOC 3 Site Investigation*, dated August 28, 2009. The UFP-SAP for Youth Pond (submitted to the EPA on 6/7/12) contains elements that are not relevant to the Site 4 investigation and describes how Site 4 is not the only surface feature that could potentially contribute to constituents detected in Youth Pond. Since this is the case, Youth Pond is being investigated separately in order to identify all other potential contaminant sources. If it is determined that the other surface features that may impact Youth Pond do not contribute to contamination, the CAX Partnering Team will discuss the potential of combining the Youth Pond investigation with the investigation of Site 4. No changes to the SAP were made.

*EPA BTAG Comment 2: Page 16: Number 1 indicates that one surface and subsurface sediment sample will be collected from Youth Pond. As the Navy has indicated that Youth Pond will be addressed in its own study, the Navy needs to specifically explain why one sediment sample in Youth Pond is proposed in this Site 4 (Upstream Pond)*

*study. If the Navy continues to support the need for sampling Youth Pond, then a minimum of five samples need to be collected.*

Response: As noted in the response to EPA BTAG Comment 1, the referenced text is part of the discussion the CAX Partnering Team had during the September 2011 scoping session. As Section 2.1 is entirely a summary of the discussions the Partnering Team had during the various scoping sessions and not a presentation of the work to be performed, it may not provide the level of detail or entirely reflect the actual sampling plan proposed in Sections 2.3 and 2.5 of the SAP.

However, it should be noted that Section 2.3.3 specifically states the rationale for collecting this one sediment sample in Youth Pond as part of the Site 4 investigation. Section 2.3.3 states “While Youth Pond will be evaluated under a separate investigation [*for the reasons stated above*], one additional surface and subsurface sediment sample is needed to determine if site-related contaminants from Site 4 are migrating into Youth Pond”. This one sample, collected in the immediate vicinity of the outfall connecting Upstream Pond to Youth Pond and analyzed for the Site 4 related contaminants, will definitively answer this question that is relevant with respect to Site 4. This sample is not intended to delineate the nature and extent of contamination in Youth Pond, which may or may not be impacted by Site 4 and/or other potential sources. This latter objective will be addressed in the separate Youth Pond study. No changes to the SAP were made.

*EPA BTAG Comment 3: Page 16: Number 2 states “...the test pit locations are on the opposite shore of the pond from the known extent of debris...” The text needs to clearly inform the reader about the information that was used to select only these two locations. Considering the amount of land extending from the southeast shoreline of the Upstream Pond to both D Street and the street on the southeast side of the pond, it is uncertain if two test pits are adequate. If the concern is that the buried debris extends across the Upstream Pond and into the upland on the southeast side of the pond, then the number and location of the test pits are not adequate. If debris were placed on the southeast side of the pond from either street, the two test pit locations may not be adequate. Lacking further data, eight test pits may be needed to adequately cover the area in question.*

Response: As noted in the response to EPA BTAG Comment 1, the referenced text is part of the discussion the CAX Partnering Team had during the September 2011 scoping session. As Section 2.1 is entirely a summary of the discussions the Partnering Team had during the various scoping sessions and not a presentation of the work to be performed, it may not provide the level of detail or entirely reflect the actual sampling plan proposed in Sections 2.3 and 2.5 of the SAP.

The extent of contamination at Site 4 is described in the first paragraph of Section 2.2.3. As stated in Section 2.3.3 under the question *What is the extent of Buried Debris?*, the nature of buried debris is known; however, the lateral extent of Burial Area 1 requires further delineation. As presented in the Final Site 4, Site 9, and AOC 3 SI Report, only the southeastern and eastern boundaries of buried debris within Burial Area 1 could not be delineated due to the close proximity to Upstream Pond. Accordingly, the team agreed that since additional test pits could not be excavated within Upstream Pond itself, two test pits would be excavated across the Pond in order to eliminate this data gap. In addition, as stated in the SAP, if buried debris is encountered within these test pits, additional test pits will be excavated to determine the extent of buried debris. Therefore, the Navy believes the two proposed test pits are adequate because all other areas of buried debris were defined during the SI. No changes to the SAP were made.

*EPA BTAG Comment 4: Page 17: Number 5 indicates that no additional surface water or sediment samples were needed for Site 4. The current sample locations in the Upstream Pond appear to be along the edge of the pond. It would be helpful to show SI and SLERA sample locations to document better sample coverage than is currently shown on Figure 5. In addition, the text needs to document that historical samples are still valid to use in the BERA. The uncertainty associated with using data that is 11 or more years old needs to be included in this report.*

Response: As noted in the response to EPA BTAG Comment 1, the referenced text is part of the discussion the CAX Partnering Team had during the September 2011 scoping session. As Section 2.1 is entirely a summary of the discussions the Partnering Team had during the various scoping sessions and not a presentation of the work to be

performed, it may not provide the level of detail or entirely reflect the actual sampling plan proposed in Sections 2.3 and 2.5 of the SAP.

In addition, as noted in the response to EPA RPM Comment 1, Appendix B has been added to the SAP that shows not only the locations of all existing sampling locations to be included in the evaluation to characterize the nature and extent of contamination and to determine potential risk to human health and the environment, but the exceedance data presented in the 2009 SI Report to document the spatial coverage of the previous sample locations.

Regarding the uncertainty of using data that is 11 or more years old, only 6 surface soil, 5 subsurface soil, 4 surface sediment, and 4 subsurface sediment samples were collected during the SLERA in 1999. The majority of the data were collected during the SI in 2009 (specifically 15 surface soil, 19 subsurface soil, 9 groundwater, 13 surface sediment, 13 subsurface sediment, and 13 surface water samples). All of these data were presented and evaluated in the Final Site 4, Site 9, and AOC 3 SI. The only uncertainty with including the SLERA data in the BERA is that by including them, the evaluation will be more conservative due to the fact that, in general, the samples collected for the SLERA (1999) show higher detected concentrations of site-related contaminants than those collected in 2009. No changes were made to the SAP.

*EPA BTAG Comment 5: Page 18: Section 2.1.2 mentions the Site 4 SI data set. Since this data set was collected prior to June 2001 (draft SLERA), this data set (e.g., final SLERA) needs to be included as an appendix to this report or the RI.*

Response: As noted in the response to EPA BTAG Comment 1, the referenced text is part of the discussion the CAX Partnering Team had during the September 2011 scoping session. As Section 2.1 is entirely a summary of the discussions the Partnering Team had during the various scoping sessions and not a presentation of the work to be performed, it may not provide the level of detail or entirely reflect the actual sampling or data evaluation proposed in Sections 2.3 and 2.5 of the SAP.

Also, as noted in the response to EPA BTAG Comment 4, only a minority of the Site 4 data set includes data collected in 1999. As stated in the SAP, all data evaluated in the 2009 SI (which includes the 1999 SLERA data) will be combined with the data collected as part of this RI to complete the RI Report. As a result, all data collected from Site 4 will be included in the RI Report in order to complete the RI evaluations.

*EPA BTAG Comment 6: Page 19: Section 2.1.3 in the last paragraph indicates that two, not five, surface soil samples will be collected for total and hexavalent chromium analysis and that groundwater would not be analyzed for hexavalent chromium as scoped in September 2011. The basis of this change should be provided.*

Response: Section 2.1.3 is a summary of the comments/discussions held during the September 2011 scoping session. The team later discussed that collecting two instead of five soil samples and no groundwater samples for hexavalent chromium analysis were acceptable, which is what this section captures. The basis is explained within Section 2.1.3 itself – that the Navy technical folks feel two soil samples for hexavalent chromium are sufficient and that no groundwater samples are needed *unless* there is a known source. The team concurred with this change and there is nothing else to add to the SAP.

*EPA BTAG Comment 7: Page 22: Section 2.2.1 indicates a Screening Ecological Risk Assessment (SERA) was completed for soil, sediment and surface water in 2005. The BTAG has no record of a risk assessment document or involvement in the risk assessment process since its February 10, 2003 comment letter on the draft SLERA for Sites 4 and 9.*

Response: The SERA was finalized in June 2005. Appendix A of the document is the response to BTAG comments on the document. Resolution of comments and the go-ahead to produce the final document was a Partnering Team decision. The SERA recommended additional evaluation at Site 4, thus the 2009 SI and now the RI. The data evaluated in the SERA will be re-evaluated in conjunction with the 2009 SI data and data collected as part of this RI in the BERA.

*EPA BTAG Comment 8: Page 26: Section 2.3.2, under Ecological Risk Decision Logic in bullet 1 and other bullets, notes that ecological risk to soil invertebrates and plants will be determined using mean soil concentrations. Because these ecological receptors groups have limited or no mobility, maximum soil concentrations need to be used to assess risk. Mean soil concentrations can be used to indicate a potential range of risk for these receptor groups, but is inappropriate to use by itself in assessing risk.*

**Response:** As indicated in the last sentence of the referenced bullet (Bullet 1), the magnitude of the maximum HQ will also be considered in determining the list of COPCs.

*EPA BTAG Comment 9: Page 26: Section 2.3.2, under Ecological Risk Decision Logic in the first bullet (under soil analytical sampling), indicates that if the soil concentration "...is below the soil screening values, the chemical will not be considered a COPC, although the magnitude of the maximum hazard quotient (HQ) will also be considered when making this determination." The text needs to specifically detail how this "criteria" (magnitude of the maximum hazard quotient) will be worded.*

**Response:** For chemicals whose maximum HQ exceeds one but whose mean HQ is less than one (and which exceed background), the magnitude of the maximum HQ, the frequency of detection, the frequency of exceedance, and the spatial distribution of exceedances will be considered to determine if the chemical should be retained as a COPC and to account for possible spatially-limited areas of contamination. The SAP was revised to include the information above.

*EPA BTAG Comment 10: Page 26: Section 2.3.2, under sediment toxicity, indicates, in the last bullet, that a "...weight of evidence evaluation will be conducted to determine if the site sample is significantly impacted." This report, the RI, or a separate technical memorandum needs to specifically document how this weight of evidence will be structured and how decisions will be made.*

**Response:** Comment noted. The weight of evidence evaluation will be documented in the RI report.

*EPA BTAG Comment 11: Page 27: Section 2.3.2 indicates in the first bullet that a statistical (correlation) analyses will be conducted on impacted samples to see what is correlated with the reduced endpoint responses. A decision tree should be provided and should address if the statistical analyses are inconclusive.*

**Response:** If the statistical analysis is inconclusive, a weight of evidence evaluation will be used (encompassing all relevant endpoints) to determine overall potential impacts. As indicated in the response to the previous comment, this weight of evidence evaluation will be documented in the RI report and may include a formal decision tree. The SAP was revised to include the information above.

*EPA BTAG Comment 12: Page 27: Section 2.3.2, under fish and frog tissue sampling, associates mean site concentrations with bioaccumulative chemicals. The document should indicate which site concentrations will be used with non-bioaccumulative chemicals. In addition, both mean and maximum concentrations need to be run in food web models to fully characterize the potential range of risk.*

**Response:** Non-bioaccumulative chemicals will not be included in the food web models. For bioaccumulative chemicals, the maximum, 95% UCL, and mean concentrations will all be used in the food web models. The SAP was revised to include the information above.

*EPA BTAG Comment 13: Page 27: Section 2.3.2, under fish and frog tissue sampling, states "...fish tissue concentration will be compared with literature-based tissue screening values, if available...." The text needs to describe what will happen when a screening value is not available.*

**Response:** Detected chemicals for which a screening value is not available will be addressed in the uncertainty section of the ERA report if a surrogate value is also not available. The SAP was revised to include the information above.

*EPA BTAG Comment 14: Page 27, Section 2.3.3 indicates that one additional sample in Youth Pond will be added to two other samples reported in 2001 to determine if contaminants from the Upstream Pond are entering Youth*

*Pond. Because the Navy has specifically separated the study of the Upstream Pond (Site 4) from Youth Pond / York River, the Navy needs to specifically identify how these Youth Pond data will be used at Site 4. In addition, the Navy needs to specifically justify the use of data collected before 2001 with the use 2012 / 2013 data to make conclusions about what has entered Youth Pond from the Upstream Pond.*

Response: The proposed surface and subsurface sediment sample will be used to determine if and what site related contaminants are migrating from Site 4 into Youth Pond. As discussed in response to EPA BTAG Comment 1, Site 4 is not the only surface feature that could potentially contribute to constituents detected in Youth Pond, and Youth Pond is being investigated as its own study (for the reasons also outlined in the response to EPA BTAG Comment 1). The results of the two Youth Pond samples reported in 2001 will not be used to determine if contaminants from Upstream Pond are entering Youth Pond (they were collected approximately 90 and 250 feet from the outfall connecting Upstream and Youth Pond and could be related to a contamination source other than Site 4), but will be addressed in the Youth Pond investigation. The SAP has been revised as shown below (blue text) to clarify this.

During the Pond Study (Baker, 2001), two surface water and two surface sediment samples were collected from Youth Pond. While Youth Pond will be evaluated under a separate investigation, one ~~additional~~ surface and subsurface sediment sample is needed to determine if ~~and what~~ site-related contaminants from Site 4 are migrating into Youth Pond

*EPA BTAG Comment 15: Page 28, Section 2.3.3: Groundwater needs to be analyzed for all potential contaminants. The discharge areas (potentially Youth Pond and the York River) for groundwater need to be identified and sampled / analyzed all potential contaminants.*

Response: Please see the response to EPA Tox Comment 1 and EPA BTAG Comment 1.

*EPA BTAG Comment 16: Page 30, Section 2.3.3: The third bullet refers to using one organism (Hyaella azteca) for sediment toxicity tests. Because of the errors that can happen in toxicity testing that can result in data interpretation difficulties, it would be better to utilize at least two species. Differences in sensitivity between test organisms is another reason for testing another species. The other one being Chironomus tentans (dilitus).*

Response: The use of multiple test organisms may actually complicate data interpretation if the multiple tests have inconsistent outcomes. Hyaella azteca is a suitably sensitive test organism for use at Site 4. No changes were made to the SAP.

*EPA BTAG Comment 17: Page 30, Section 2.3.4: Number 2 indicates for subsurface soil that literature based ecological screening values for plants and invertebrates (if less than 2 feet) will be used. Documentation will need to be provided indicating that only the top 2 feet is used by invertebrates.*

Response: The 0 to 2 foot ecological evaluation depth has been the “standard” at CAX and Yorktown and is based upon previous BTAG guidance.

*EPA BTAG Comment 18: Page 30, Section 2.3.4: Number 6 must indicate that both mean and maximum tissue concentrations will be run in food web models to fully characterize the potential range of risk.*

Response: Please see the response to BTAG Comment 12.

*EPA BTAG Comment 19: Page 31, Section 2.3.4: The first paragraph on this page refers to using base background concentrations. Background data for the same soil type will need to be used.*

Response: Comment noted.

*EPA BTAG Comment 20: Page 44, Section 3.2.12: Regarding earthworm tissue sampling, it is not clear from this paragraph if the areas from where earthworm tissue will be collected will also have a soil sample (surface and/or subsurface). Also, it is not clear why earthworms from only the “...three areas adjacent to the streams west of Upstream Pond” are proposed for collection / analysis. There appear to be other areas within the Site 4 boundary*

*as well as outside this boundary (southeast of the pond / test pit areas) that would need earthworm tissue sampling. If earthworms are not found (which may be due to temperature and moisture, and/or chemicals) within the first 12 inches of soil bgs, then the next 12 inches bgs should be examined and considered for sampling. If earthworms are not found, the Navy will need to adequately document why this is not related to contaminants from the site.*

Response: Soil/sediment samples (surface only) will also be collected at these three locations (shown as sediment samples on Figure 5 of the draft SAP). The three earthworm tissue sample locations cited in the comment were added at the request of BTAG during the August 31, 2011 site visit (in which representatives from the Navy, BTAG, and CH2M HILL attended) with the focus on potential food web exposures (not on the earthworm community per se); no other potential sampling areas were discussed or requested by BTAG. If earthworms are not found in the top 12 inches at the initial location sampled, areas in the immediate vicinity will be sampled in an attempt to obtain sufficient specimens. If the top 12 inches of soil do not yield specimens and the soil is not saturated, the 12 to 24 inch stratum may be sampled (depending upon conditions). If the earthworm samples are obtained from this deeper depth stratum, the associated soil sample will be collected from 0 to 24 inches (not 0 to 12 inches). If earthworms are not found, habitat conditions will be documented to possibly explain their absence. These data, plus the results of the soil sampling, will be used in the RI to determine if the lack of worms may be due to site-related contaminations.

*EPA BTAG Comment 21: Page 45, Section 3.2.12: Under benthic invertebrate sampling in shallow water a D-frame dip net will be used and the level of effort will be determined in the field and standardized among locations. The level of effort in using this sampling device will also need to be within established protocols.*

Response: It is unclear what “established protocols” are being referenced in the comment. The proposed sampling will be consistent with methods such as the Rapid Bioassessment Protocol (RBP), Level I.

*EPA BTAG Comment 22: Page 45, Section 3.2.12: Under benthic invertebrate sampling, the text indicates that if more than 250 organisms are collected, a 100 organism subsample (randomly selected) will be identified and the results extrapolated to the entire sample. The reference for this technique needs to be included in the text. Standard operating procedures for the benthic assessment must be provided. While the document indicates that the benthic survey will be qualitative, the description of how the data will be used indicates that a more formal approach to the benthic work is warranted. At a minimum, in addition to providing the aforementioned methodology, the individual(s) classifying the invertebrates should have NABS certification and the appropriate documentation should be provided.*

Response: Sub-sampling is a common procedure for reconnaissance-level invertebrate surveys (e.g., 1989 RBP Level I) and references will be added to the text. SOPs are listed in Table 3-1 of the SAP and have been added to the SAP as an appendix (Appendix C). The benthic survey will be qualitative and organisms will be identified and enumerated in the field. However, the standardization of collection among locations will allow a semi-quantitative evaluation of the resulting data. Qualified aquatic biologists will conduct the surveys.

*EPA ESC Comment 1: Under the proposed number of samples to be collected from Site 4, the reviewer fails to understand how the suggested number of samples, including previously sampled areas, can possibly characterize the nature and extent of contamination over the 2,300 acre area.*

Response: As stated in the SAP (the final sentence of the first paragraph under the Section 2.2.1 [Page 21]), Site 4 is approximately 4 acres in size (**Figure 2**). As indicated in the first sentence of Section 2.2.1, CAX in its entirety encompasses 2,300 acres; therefore, the number of existing and proposed samples is adequate to characterize Site 4.

*EPA ESC Comment 2: This Remedial Investigation (RI)/Sampling and Analysis Plan (SAP) does not contain a Decision Threshold. If the analytes are found above action levels, what remediation procedure will be implemented? Section 2.2.1, Site Background and History, mentions the results from the soil, groundwater,*

*sediment, and surface water sampling activities indicated potential risk to human health and ecological receptors and that a RI was recommended, but fails to state if any action had been taken.*

Response: Section 2.3.2, Data Quality Objectives, outlines the decision logic to be used to identify site-related contaminants of concern. As stated in the SAP, the purpose of the RI is to collect additional data to supplement the current SI dataset in order to adequately characterize Site 4 and evaluate potential risks to human health and the environment. Any risk management decisions, including the evaluation or selection of a remediation procedure, cannot be determined until Site 4 is adequately characterized and potential human health and ecological risks are identified, and is outside the scope of this UFP-SAP as the site is in the RI stage of the CERCLA process. However, a final environmental question to be answered (Section 2.3.3) will be added to the SAP, as shown below (blue text), to indicate that further action may be taken based on the results of the RI.

**Is further action (that is, further investigation, removal, or remediation) warranted at this site based on the results of this study?**

Further action may be recommended, based on the nature and extent of buried debris, findings of the HHRA and BERA, exceedances of groundwater MCLs, and the expected future use of the site.

*EPA ESC Comment 3: The language, “these samples will be field determined,” appears throughout the SAP. The third party Utility Clearance Subcontractor, mentioned in section 3.2.1 under utility clearance should be employed to map the entire site which would enable predetermined sample locations to be pinpointed without fear of disrupting buried utility lines. All sampling points should be predetermined and documented using a GPS device listing both the longitude and latitude for each sample location. It is because of the location specific constraints, mentioned in Section 2.5 Sampling Design and Rationale that it is of the utmost importance to have sample locations well defined and predetermined. A grid sampling collection plan is highly recommended. Because of the size of the area, dividing it into quadrants would be beneficial.*

Response: Many of the samples to be collected as part of this SAP will need to be field-determined, as their precise locations cannot be predetermined for reasons that follow:

- The six surface soil samples to be collected from Site 4 in order to determine if soil, sediment, or surface water pose a potentially unacceptable risk to ecological receptors, need to be field-determined because they are to be located based on natural drainage ways and these natural drainage ways will not be identified until the completion of the biological survey.
- All tissue samples to be collected from Site 4 will need to be field-determined because those animals that will be sampled (fish, frogs, and earthworms) move over time and will likely not be in the same location if the sample points were predetermined.
- Reference pond samples will need to be field-determined for the reasons outlined in the response to EPA RPM Comment 5.

In addition, it is by necessity a standard practice that proposed sample locations may require changes based on unknown field conditions. While there are no known location-related constraints and significant deviations from the proposed sampling locations are not anticipated, if a sample location needs to be moved (possible reasons are listed below), any deviation is not anticipated to affect the quality of the data and any new sample location would likely be no more than a few feet from the proposed sample location.

- Sample locations may be within the immediate vicinity of an unknown subsurface utility line.
- Sample locations should be biased towards areas where it is observed that potential contamination may be the greatest; this will not be known prior to the start of field work.
- Sediment sample locations should be biased toward depositional areas, which must be observed during field work.

- Site conditions may change over time (such as, surface water may not be present at a proposed sampling location during the field efforts due to drought conditions, resulting in the need to move the sample location).

Finally, as stated in the SAP (Section 1.2), field changes will be communicated to the CAX Partnering Team and they will have 24 hours to approve or comment on those changes. No changes were made to the SAP.

*EPA ESC Comment 4: Groundwater flow is estimated to be north-northeast towards Upstream Pond. The reviewer fails to understand how the installation of just six monitoring wells over 2,300 acres will be sufficient to characterize the extent of groundwater contamination and determine the direction of flow. This plan does not take into account the possibility of multiple unconnected groundwater networks.*

Response: Please see the response to EPA ESC Comment 1 – the study area is 4 acres, not 2,300.

*EPA ESC Comment 5: In order to properly characterize the site and support the completion of a Human Health Risk Assessment (HHRA) and a Baseline Ecological Risk Assessment (BERA), a more complete and comprehensive list of analyses should be performed on all matrices sampled. The reviewer recommends each sample be analyzed for VOCs, PAHs, PCBs, Total Metals, Aroclors, and Hexavalent Chromium.*

Response: A complete and comprehensive list of sampling analytes (VOCs, SVOCs, pesticides, PCBs, explosives, and metals) was performed on all site samples as part of the 2009 SI. Based on the results of that investigation, the team agreed that the only sampling that needs to be conducted as part of this RI is sampling for those analytes which were determined to be site-related. Site-related contaminants were determined based on exceedances of the conservative screening criteria (RSLs and ESVs). In addition, please refer to the last bullet under the response to EPA Tox Comment 1. No changes were made to the SAP.

*EPA ESC Comment 6: Laboratory generated data should be validated by third party validators, not by CH2MHILL validators as mentioned in Section 2.3.9.*

Response: According to the DoD Quality Systems Manual (QSM) Version 4.2 (dated 10/25/2010), third-party is defined as “from outside the laboratory” or data generator. Additionally, Part 2B of the UFP-QAPP Compendium (March 2005) gives the following guidance on validation, which is similar to the DoD QSM in regards to validation of the analytical data:

**Step II (validation):** Step IIa (Compliance with Methods, Procedures, and Contracts). Validation associated with Step IIa should be conducted by an entity *at least one step removed from the entity that generated the data* (field or analytical). In general, this will mean that validation Step IIa of analytical data will be conducted outside the laboratory, while the validation of the field sampling activities will be conducted by entities working for the prime contractor who are not responsible for the field sampling activities.

While CH2M HILL will collect the samples, they are not the entity that generates the data, that entity is the laboratory specified in the SAP. CH2M HILL has a team of chemists that completes the data validation and is not associated with the project in any other fashion, is 100% completely removed from the sample collection and data generation, and is located in CH’s Gainesville, FL office. The group consists of chemists with decades of laboratory and data validation experience. CH2M HILL has performed data validation for projects on several Region 3 Navy bases for a few years now and with no issues. All data packet and electronic files are accessible to EPA upon request. The use of CH2M HILL to perform data validation is a Partnering Team decision.

*EPA ESC Comment 7: Tentatively Identified Compounds (TICs) should be reported by the laboratory to provide a list of possible contaminants not screened for.*

Response: As stated in the response to EPA ESC Comment 2, the purpose of the RI is to collect additional data to supplement the current SI dataset in order to adequately characterize Site 4 and evaluate potential risks to human health and the environment. As such, the investigation is not a release assessment. Therefore, the analytical suite will consist of constituents already established to be present at the site and TIC analysis is not appropriate.

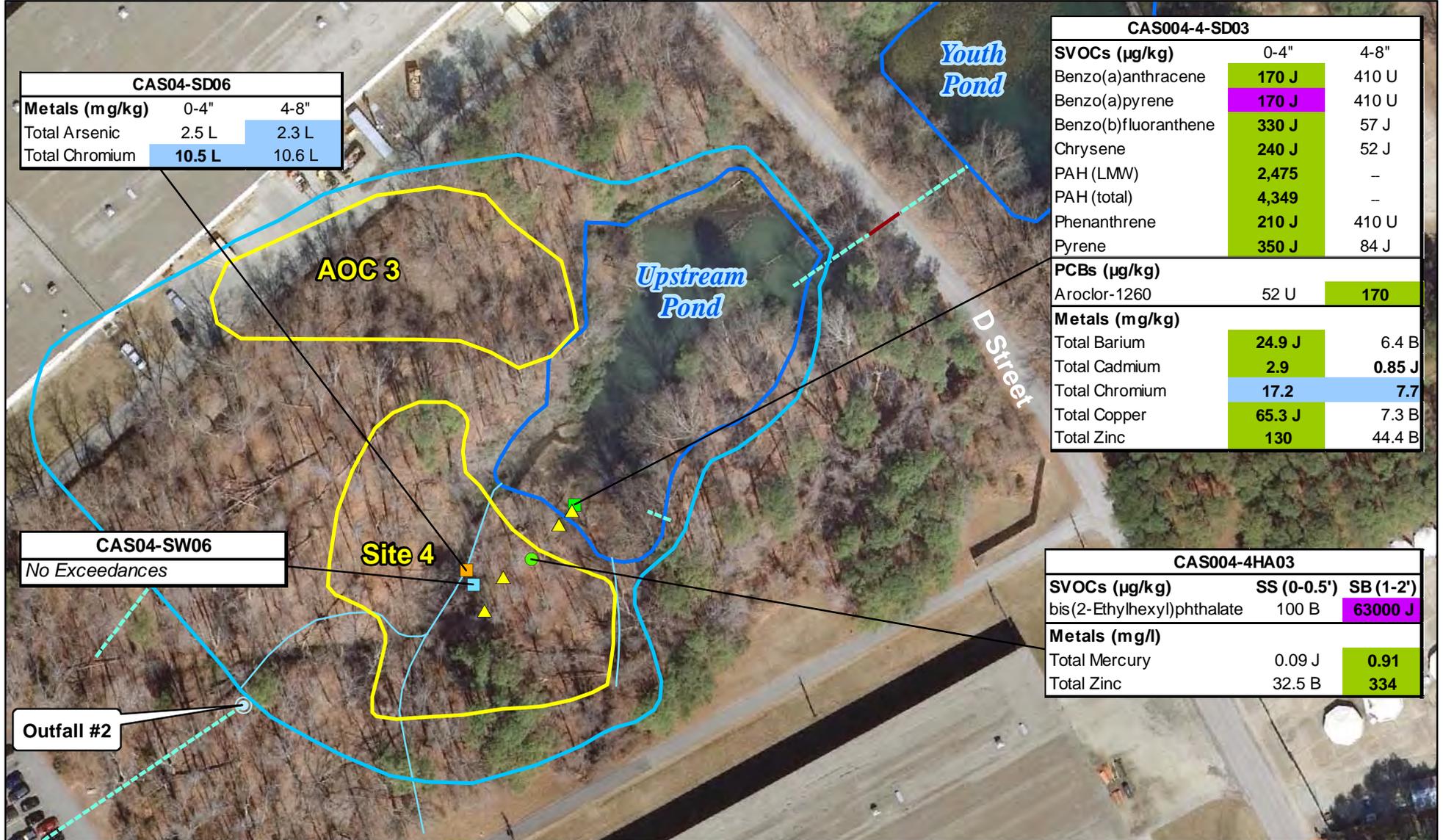
*EPA ESC Comment 8: The water bodies located at Site 4 should be sampled using a sample grid pattern for both water and sediment samples as well. If a water body contains a submerged canister or drum filled with a chemical contaminant, and it has a small opening due to erosion, the concentration of the contaminate will be higher closer to the point of origin and very diluted downstream.*

Response: There is no known or suspected drum in Upstream Pond, and there is no historical evidence of direct disposal of waste into Upstream Pond; therefore, a sample grid pattern for surface water and sediment samples is not necessary to adequately characterize Site 4 and to determine if site-related contaminants pose potential risks to human health and ecological receptors. Site 4 is approximately 4 acres in size and the numbers of samples evaluated in the 2009 SI and to be evaluated as part of this RI were determined with the concurrence of the CAX Partnering Team and adequately cover the site.

## **References**

CH2M HILL. 2011. *Final Site Inspection Site 4, Site 9, and Area of Concern 3, Naval Weapons Station Yorktown Cheatham Annex, Williamsburg, Virginia*. December

U.S. Navy. 2002. *Guidance for Environmental Background Analysis, Volume I: Soil*. Naval Facilities Engineering Command. Washington, D.C.



**Legend**

- ▲ Railroad Tie
- 1999 Sediment Sample Location
- 1999 Soil Sample
- Surface Water Sample Location
- Sediment Sample Location
- Outfall
- Culvert
- Drainage Channels
- - - Storm Water Line
- Proposed Site 4 Study Area
- Site Boundary
- Water Body



Site 4/AOC 3 Results  
Cheatham Annex  
Williamsburg, Virginia