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LETTER REGARDING U S NAVY RESPONSES TO U S EPA REGION III COMMENTS ON DRAFT PHASE II REMEDIAL INVESTIGATION REPORT FOR SITE 1 AND SITE 3 NWS YORKTOWN VA
6/28/2012
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June 28, 2012

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Mr. Moshood Oduwole
Office of Federal Facility Remediation
United States Environmental Protection Agency, Region 3
1650 Arch Street
Philadelphia, PA 19103-2029

Subject: Response to Additional Comments *Draft Phase II Remedial Investigation Report, Sites 1 and 3*
WPNSTA Yorktown, Yorktown, Virginia

Dear Mr. Oduwole,

This letter is in response to USEPA's comments on the subject document provided in your letter dated July 13, 2011 and in the two BTAG letters dated January 26, 2012 and April 4, 2012. Due to the multiple rounds of comments, all July 13, 2011 comments with responses are not specially marked; however, secondary (January 26, 2012) and tertiary comments (April 4, 2012) and responses are labeled as such. Comments are shown in italics, followed by CH2M HILL responses provided on behalf of the Navy.

General Comments

1. *Section 8.1.3, Groundwater Flow, of the RI Report indicates that groundwater at Sites 1 and 3 flows towards Indian Field Creek and its unnamed tributary. The text also indicates that volatile organic compounds (VOCs) "likely discharge to both of these water bodies based on the contaminant distribution discussed in Section 5." However, the RI Report does not present sufficient evidence to support this conceptual site model. According to Section 5.2.2, Volatile Organic Compounds, the principal Sites 1 and 3 groundwater contaminants of potential concern (COPCs) [i.e., trichloroethylene (TCE), 1,2-dichloroethylene (1,2-DCE), and vinyl chloride] were not observed in the surface water, sediment, and sediment porewater samples collected during the investigation. However, cis-I,2-DCE [0.291 micrograms per liter (µg/l)], TCE (0.241 µg/l), and vinyl chloride (0.241 µl/l) were detected at low concentrations in well 3GW29, located on the eastern side of Indian Field Creek, which suggests there may be a component of groundwater flow beneath Indian Field Creek (see Figure 5-9). Furthermore, the RI Report does not present a well-developed evaluation of the surface water/groundwater interaction at the sites. As a result, it is unclear whether shallow groundwater discharges to Indian Field Creek. At Site 1, only one location reported an upward vertical gradient (lGW04/1GW04A), as noted in Table 4-2, Vertical Gradients –Site 1. No vertical gradient data for wells closest to Indian Field Creek appear to have been collected. At Site 3, upward vertical gradients were observed, but no sufficient data close to the surface water bodies were collected (Table 4-3, Vertical Gradients - Site 3.)*

Please revise the RI Report to clarify how it was determined that site groundwater discharges to Indian Field Creek and its unnamed tributary. Given the detections of chlorinated VOCs in groundwater on the opposite site of Indian Field Creek at well 3GW29 as well as the lack of primary COPCs in the sediment pore water samples, the existing data appear to show that groundwater may be flowing underneath the creek. Further investigation of the groundwater/surface water interaction appears warranted to better refine the understanding of contaminant transport pathways. Additionally, please revise the RI Report to clarify how the extent of groundwater contamination on the eastern side of Indian Field Creek will be defined.

Response: Consistent with the text included in Section 2.11 of the RI Report, chlorinated VOCs were detected in Indian Field Creek and its tributaries during LTM completed in these surface water bodies between May 2000 and May 2005. While the monitoring well network is not sufficient to demonstrate upward vertical gradients in the vicinity of these water bodies, the evidence of discharge from previous sampling events demonstrates that discharge is occurring. Additionally, if Indian Field Creek were not a discharge location, one would not expect groundwater flow to be toward the creek (which it is, based on water level surveys), because the York River lies to the north. However, the Navy acknowledges the uncertainty associated with the low concentrations detected in the monitoring well installed on the east side of Felgates Creek. This well was resampled in July 2009 and no concentrations of VOCs were detected; therefore, there is uncertainty with respect to whether the initial result was site-related or due to laboratory contamination. In order to refine the uncertainty related to discharge to the surface water bodies, it is recommended that additional surface water, sediment, and pore water samples will be collected at YS01-SW28; YS01-SW29; YS01-SW/SD30; YS01-SW/SD31; YS01-SW/SD32 (see attached Figure 3-3). Sampling procedures and analytes will be the same as for the most-recent RI samples. Additionally, it is recommended that additional well pairs be installed at Site 1 to evaluate the potential vertical gradient in the vicinity of the surface water bodies (see marked up Figure 5-7). The following pairs are proposed:

- A pair in the location of MIP 17, one screened at the top of the Yorktown-Eastover aquifer and the other at the bottom of the same unit
- A pair located downgradient of 1GW22 by the intermittent feeder stream to the unnamed tributary to Indian Field Creek (shallow well screened at the top of the Yorktown-Eastover and deep well screened at the bottom of the same unit)
- One deep well adjacent to 1GW24 to evaluate the vertical gradient adjacent to Indian Field Creek

The Navy suggests sampling in the February/March 2013 time-frame based on a review of average precipitation. The Navy will set up a reconnaissance visit to help verify locations and identify if seeps are present and requests that BTAG attends. Additionally, the Navy requests that BTAG assist in developing the preferred sampling time to accurately capture a representative picture of groundwater discharge into the unnamed tributary. The field team will conduct a seep survey at the BTAG-approved time in 2013, and if any are found present at that time, they will be sampled. The Navy requests to perform the additional investigation as part of a pre-Feasibility Study analysis. Because it is believed that the COCs at the sites will remain the same and the presence of potential risks has been established, the Navy requests to finalize the RI with the existing data.

2. *There is a concern that a number of VOCs may be present in groundwater at Site 3 at levels which were below detection limits, yet exceed the tapwater RSLs. Several of these VOCs were detected in groundwater at Site 1, and site disposal history suggests that these VOCs may be site-related. Table 11.1 (Comparison of Non-Detected Chemicals to Regional Screening Levels) in Appendix J identifies a number of VOCs where the detection limits significantly exceed the RSLs. For example:*

   - *the maximum detection limits for benzene and carbon tetrachloride are 90 times greater than the RSL.*
   - *the maximum detection limit for tetrachloroethene is over 300 times the tap water RSL.*

   The presence of elevated detection limits for a several VOCs in groundwater at Site 3 may indicated that the risks for this site were significantly underestimated since VOCs with elevated detection limits were not identified as COPCs. Further the uncertainty evaluations presented in Section 6.1.6 and Section 6.3.5 do not adequately address this concern. For example, the general uncertainties associated with the HHRA process in Section 6.1.6 states that the "comparison indicates that there may be additional constituents present at the site at concentrations below the detection limits but slightly above the RSLs. This may result in an under-estimation of risks. However, based on the past site use, it is likely that many of these constituents are not present at the site." These statements are inaccurate, since the detection limits are not "slightly" exceeding the RSLs; rather, the detection limits for several VOCs exceed the RSLs by over two orders of magnitude. Further, the statement that "it is likely that many of these constituents are not present at the site" is without basis since sources of groundwater VOCs were historically disposed of at the site, including solvents, sludge from boiler cleaning operations, grease trap wastes, and Imhoff tank skimmings (containing oil and grease). Finally, Section 6.3.5, Uncertainty Associated with Site 3 HHRA, does not discuss the impacts of elevated detection limits in groundwater on the groundwater risks. Please revise the HHRA uncertainty analysis Sections 6.1.6 and 6.3.5 to include the potential impacts that elevated detection limits may have on the resultant groundwater risks. The uncertainties should identify the chemicals significantly exceeding RSLs and describe the potential cumulative impact of these chemicals on the groundwater risks estimated for the site, and whether the impact would change the overall conclusions for Site 3.

Response: The majority of the samples have detection limits that are below or only slightly above (within an order of magnitude) of the RSLs. There were two groundwater samples collected at Site 3 with elevated detection limits (greater than an order of magnitude above the RSLs) for VOCs. The detection limits for these samples were elevated because the samples needed to be diluted prior to analysis due to the high detections of VC, cis-1,2-DCE, and total 1,2-DCE. It is likely that additional VOCs are present in these samples at concentrations exceeding the RSLs, since the highest concentrations detected at Site 3 were detected in these samples. However, the risk assessment already indicates unacceptable risks associated with VOCs in groundwater at Site 3, therefore, additional VOCs could make the risks higher, but would not change the results of the HHRA. Further discussion will be added to Sections 6.1.6 and 6.3.5 to include the information above.

3. *Semi-volatile organic compounds (SVOCs) were not analyzed for in groundwater during the Phase II investigation. This appears to be a data gap based on potential contaminants of concern associated*

with the sites, and in particular, at Site 3. Although the polynuclear aromatic hydrocarbon (PAH) contaminated soil area depicted in Figure 1-3, Site 3 Group 16 Magazine Landfill, was removed as part of a Remedial Action, this area may have been a source to groundwater contamination. Additionally, soil data collected at Site 3 as part of the Phase II investigation identified several SVOCs in subsurface soil (Table 5-13, Soil Detection and Exceedance Results -Site 3). The concentration of 2-methylnaphthalene detected in sample YS03-S00 1-0609 (11,000 µg/kg) exceeds the Protection of Groundwater Soil Screening Level (SSL) from the November 2010 U.S EPA Regional Screening Level (RSL) Table (750 µg/kg). Additionally, testing for dense non-aqueous phase liquid (DNAPL) during the investigation identified a positive response "likely due to petroleum" at 3GW22 at Site 3 (Section 5.1.2, Site 3). Based on the positive detections of SVOC contamination in soil and likely presence of petroleum in soil, sampling for SVOCs in groundwater appears warranted to determine whether this contamination has leached to groundwater. Please revise the RI Report to address the apparent data gap associated with the lack of SVOC data for groundwater.

Response: All media at Sites 1 and 3 were analyzed for SVOCs during the Round One and Round Two RIs completed at the sites in the 1990s. Only one SVOC (phenanthrene) has ever been detected in groundwater at the sites. This chemical was detected in samples from 3-MW15 (1996) and 3-MW18 (1992) at concentrations of 2J µg/L for both samples. Due to the lack of detection of SVOCs at levels of concern at these two sites, previous reports have recommended no additional analysis of these chemicals. The identification of SVOCs remaining in soil during the MIP study was not anticipated for this site. However, it is not anticipated that the soil contamination is resulting in groundwater contamination at the site because substantial amounts of PAH contamination were already removed from Site 3 as part of the 1999 removal action, and that contamination did not result in groundwater contamination at the site. However, in order to reduce the uncertainty associated with the potential for SVOCs in groundwater, it is proposed that a sample be collected from well 3GW22 and analyzed for SVOCs to confirm that these chemicals are not present at levels of concern prior to completing the PRAP and ROD for these sites. However, due to the low probability of finding these chemicals at levels of concern, it is recommended that the RI be finalized without collecting these data. The data will be collected prior to completion of the design for the remedy at the site. The recommendation will be clearly specified in the RI report.

4. *The RI Report does not include an evaluation of contaminant trends over time. Groundwater data for the sites appears to have been collected since 1986 and long-term groundwater monitoring was initiated in 2000, but there is little discussion of changes in contaminant concentrations or plume configuration over time. Section 2.5, Remedial Investigation Round One (1993), describes elevated concentrations of VOCs in groundwater at well 1GW12. The RI Report states, "The highest concentrations of CVOCs were detected in a groundwater sample from 1GWI2, a Columbia aquifer monitoring well in the southwest portion of the Site 1 study area. Concentrations of TCE and 1,2-DCE were 18,000 µg/L and 1,000 µg/L, respectively, in the sample from this well." During the current investigation at the site, the concentration of TCE has decreased to 56 µg/L, and 1,2-DCE decreased to 4.3 µg/L in well 1GW12. Based on this significant reduction, it is unclear whether the decrease in concentration is the result of horizontal or vertical migration, attenuation/degradation mechanisms, or a combination of both. Please revise the RI Report to include an evaluation of contaminant trends in groundwater, supplemented by figures and/or graphs, to provide a better understanding of the fate and transport characteristics of the groundwater COCs.*

Response: As requested, trend evaluation (including graphs, as appropriate) will be added, as appropriate, to the Fate and Transport section of the Draft Final RI. Based on a review of the data for wells 1GW12, 1GW12A and 1GW12B, it appears that the reduction in concentrations in this area is related to both downward migration and degradation of contaminants. This will be described in the Draft Final report. TCE Trend graphs for the 1GW12 cluster are attached to this RTC letter for your review. The scales are different to show more resolution at the lower concentration levels.

5. *The extent of VOC contamination in groundwater at Site 1 does not appear to be sufficiently defined. Figure 5-4, Site 1 TCE Isoconcentrations Cross Section A-A', shows that there are no permanent Yorktown-Eastover aquifer monitoring wells to the north of wells 1GW12A and 1GW22, which reported some of the highest concentrations of TCE at the site. Additionally, there are no wells bounding the current configuration of the plume to the south of 1GW22. Based on the existing network of wells, the central portion of the plume, immediately downgradient (east) of 1GW22 is also not well defined as the closest downgradient well (1GW04A) is located greater than 300 feet southeast from 1GW22. This also appears to be an area of the site where there are little geological data available to determine the extent of the Yorktown confining unit.*

   Additionally, the vertical extent of contamination at 1GW22 does not appear to be well defined as the monitoring well only extends into a portion of the Yorktown confining unit. It is unclear whether the deeper portion of the Yorktown-Eastover aquifer, beneath the confining unit, is impacted in this portion of the site. Please revise the RI Report to clarify how both the vertical and horizontal extent of VOC contamination at Site 1 will be better defined.

Response: The extent of contamination in the northern portion of Site 1 has been delineated to the extent possible considering limitations associated with waste left in place. Additional wells will be installed to assist in the delineation of the extent of contamination in the downgradient portion of the site, as described in the response to General Comment 1. Additional waste delineation consisting of test pitting to confirm the extent of waste and the cover extent and thickness is planned for this site prior to the Feasibility Study for groundwater. The upgradient well network will be assessed following this evaluation to ensure that sufficient spatial coverage has been achieved.

6. *The extent of VOC contamination in groundwater at Site 3 does not appear to be sufficiently defined. Figure 5-9, VOC Exceedances in Yorktown-Eastover Aquifer Site 3, shows multiple locations at which the VOC plume has not been adequately bounded by wells which do not report exceedances of groundwater screening criteria. For example, there are no permanent monitoring points west of well 3GW28 to define the extent of contamination in the northwestern portion of the site. Additionally, there are no monitoring wells south of 3GW08B screened in the intermediate portion of the Yorktown-Eastover aquifer (i.e., 25-35 feet below ground surface) to define the extent of VOC contamination in this portion of the site. There also appears to be a data gap in monitoring south of 3GW23, at which TCE and vinyl chloride were reported above screening criteria. Please revise the RI Report to clarify how the extent of VOC contamination in groundwater at Site 3 will be better defined.*

Response: The Navy acknowledges that delineation to levels consistent with non-detections has not been completed in the vicinities of 3GW08B (where the TCE concentration was 5 µg/L) and 3GW23 (where TCE was detected at 9.9 µg/L). However, concentrations in these areas are low enough that additional investigation to support the risk assessment or delineation to evaluate the nature and extent for the purpose of the RI is not believed to be necessary. It is agreed that an additional well northwest of 3GW28 will be necessary to adequately characterize the extent of contamination prior to proceeding to a design (see attached revised Figure 5-12). However, because VOCs are already identified as risk drivers and a groundwater FS to address these contaminants is already being recommended, the Navy would prefer to perform this additional delineation prior to the design, rather than prior to the finalization of this RI. The recommendations in the text of the document will be edited accordingly.

7. *Data gaps appear to exist in the groundwater sampling data used for the Human Health Risk Assessment (HHRA) for Site 3. The groundwater samples used in the HHRA were analyzed only for VOCs and metals (total and dissolved), even though several semi-volatile organic compounds (SVOCs) and polynuclear aromatic hydrocarbons (PAHs) have been detected in soil samples from Site 3. Although the contaminated soil was excavated during remediation activities, and there were no exceedances of EPA Regional Screening Levels (RSLs) for SVOCs in post-excavation soil samples, these areas may have served as a source of groundwater contamination prior to removal. The lack of sampling data for SVOCs and P AHs appear to be a significant data gap which could result in the underestimation of risks and hazards associated with groundwater at Site 3. Please revise the RI Report to address this issue. If earlier sampling data which include SVOCs and P AHs are available, they should be included in the assessment. Otherwise, please provide justification for the lack of SVOC and P AH analyses in groundwater samples.*

Response: Please see the response to comment number 3. The results from 1992 and 1996 were not included in the risk assessment because risks were already assessed using these data during both of the previous RI events and no unacceptable risks associated with SVOCs were identified**.** However, consistent with the response to General Comment 3, a sample will be collected from 3GW22 and will be analyzed for SVOCs. Results will be compared against screening levels to ensure no additional action is necessary to address these chemicals.

8. *While most of the exposure factors used in the HHRA were appropriately obtained from applicable guidance documents, several exposure factors are either outdated or used without sufficient justification. Please revise the HHRA to address the following:*

    - *The ingestion rate (IR) of sediment used in the HHRA for the adult trespasser and adolescent trespasser is 50 milligrams per day (mg/day), while the ingestion rate for a construction worker is 240 mg/day. A note at the bottom of Table 4.1.RME, Values Used for Daily Intake Equations, in Appendix K, notes that these values are half the values of the default values for residential and construction soil exposure scenarios. However, the source for the default values for these exposure scenarios has not been provided. Additionally, Exhibit 1-2 of EPA's Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (Soil Screening Guidance, December 2002) indicates that the default ingestion rate of soil for a construction worker is 330 mg/kg, half of which would be 165 mg/day. The use of 240 mg/kg is more conservative than half of the default value, however, documentation of the default values should be provided for the exposure scenarios*

in Table 4.1.RME of Appendix K. Specifically, justify the use of half of the default ingestion rates for these exposure receptors and cite appropriate guidance documents and/or prior interagency agreements as applicable.

- *An exposure frequency (EF) of 125 days was used to evaluate groundwater exposures to future construction workers at Sites 1 and 3 (Table 4.1.RME, Values Used for Daily Intake Equations, in Appendices I and J, respectively), and an EF of 10 days was used to evaluate sediment and surface water exposures to the future construction worker (Table 4.1.RME, Values Used for Daily Intake Equations, in Appendix K). Professional judgment was used to select these values; however, the rationale for their selection has not been provided. Additionally, Risk Assessment Guidance for Superfund (RAGS) Part E, dated July 2004, recommends an EF of 250 days when evaluating a reasonable maximum exposure (RME) industrial scenario. Revise the HHRA to use an EF of 250 days to evaluate groundwater, surface water, and sediment exposures for future construction workers, or revise the HHRA to provide further rationale that forms the basis for selection of 125 days for groundwater exposures, and 10 days for surface water and sediment exposures. Further, a discussion of reasonably anticipated construction activities is recommended for inclusion.*

Response:

Bullet 1 – The following text will be added to Section 6.1.1, subsection titled Estimation of Chemical Intakes for Individual Pathways-

There are no standard default ingestion rates available for sediment. Therefore, one-half of the soil ingestion rates were used as the ingestion rates for sediment. Ingestion of sediment is expected to be much lower than ingestion of soil. As the majority of the sediment is covered with surface water, much of the sediment would wash off the skin during activities involving surface water and sediment contact, and not as much sediment (if any) would be available for transfer from the skin (primarily hands) to the mouth for ingestion. Additionally, since the sediment is wet, not much particulate emission from sediment (if any) would occur, and ingestion of particulate emissions from sediment would be very small.

The source of the soil ingestion rate (for which ½ the value is used as the sediment ingestion rate) will be identified on Table 4.1.RME. Although there is a more recent value and reference for soil ingestion by construction workers, as the value used in the HHRA is more conservative, it will not be changed for this HHRA, but the comment is noted and will be considered for future HHRAs.

Bullet 2- The following text will be added to Section 6.1.1, subsection titled Estimation of Chemical Intakes for Individual Pathways –

Although RAGS Part E (USEPA, 2004) recommends an exposure frequency of 250 days for the industrial worker (or construction worker) exposed to site media under the RME scenario, it is unlikely that a construction worker would be exposed to groundwater in an excavation for longer than 125 days. It is also likely that any groundwater that is present in an excavation would be pumped from the excavation while performing construction activities. Therefore, an exposure frequency of 125 days per year was selected to evaluate construction worker exposure

to ground water. Additionally, it is unlikely that a construction worker would be exposed to surface water and sediment every day they work at the site. Therefore, it was assumed that a construction worker may be exposed to surface water and sediment ten days per year while performing maintenance or construction work within Indian Field Creek and its unnamed tributary.

SPECIFIC COMMENTS

1. *Figure 1-3, Site 3 Group 16 Magazine Landfill: The site boundary for Site 3 is not clearly defined on this figure or any of the other provided figures. Additionally, Figure 1-3 designates individual areas as "Approximate Waste Limits" but it is unclear how these areas were defined (i.e., geophysical survey results, excavated areas during the 1999 Remedial Action, etc.). Please revise the RI Report to clarify how the approximate waste limits presented on Figure 1-3 were determined. Additionally, please revise Figure 1-3 to better define a site boundary for Site 3 (as was done for Site 1 in Figure 1-2, Site 1 Dudley Road Landfill).*

Response: The areas shown on Figure 1-3 are based on the areas excavated during the 1999 Remedial Action. This will be more clearly described in the text and on the figure. Additionally, a study area boundary will be added to the figure that encompasses all previous sample locations associated with the site.

2. *Section 2.2, Confirmation Study Round 1 (1986), Page 2-1: The second paragraph indicates that monitoring well 3GW08 was installed as part of the 1986 investigation at the sites, and references Figures 2-1 and 2-2 for the locations of this well and others that were installed during the investigation. However, well 3GW08 could not be located on Figure 2-1 or Figure 2-2. Figure 2-2, Sampling Locations from Previous Investigations at Site 3, identifies wells 3GW08A and 3GW08B, but it is unclear whether these wells represent the location of 3GW08 described in Section 2.2. Please revise the RI Report to identify well 3GW08 on a site figure, or clarify whether wells 3GW08A and 3GW08B, shown on Figure 2-2, represent the location of 3GW08.*

Response: During the May 2000 round of LTM, it was noted that 3GW08 was damaged. Consequently, a replacement well, 3GW08B was installed in 2004. 3GW08A is a deep well installed in the same location in 1996 in support of the Round 2 RI. This will be clarified in the text.

3. *Section 2.2, Confirmation Study Round 1 (1986), Page 2-2: The results of surface water and sediment sampling are described in this section, but the RI Report does not describe how the detected concentrations compare to applicable screening criteria, as was done for the detected concentrations in groundwater. For consistency with the presentation of the groundwater data, please revise the RI Report to include a brief comparison of the detected constituents in surface water and sediment to applicable screening criteria.*

Response: As requested, comparisons to surface water and sediment screening criteria will be added to this previous investigation summary. However, it is recommended that the comparisons used will be the same ones used in the actual Confirmation Study, in order to

maintain consistency with the summaries of other previous investigation studies. The comparison values to be referenced will not be current values.

4. *Section 2.5, Remedial Investigation -Round One (1993), Page 2-3: This section presents a brief summary of the results of the 1993 Remedial Investigation. Multiple media were sampled during this investigation, but the RI Report does not indicate what the samples were analyzed for. In order to determine whether site media have been adequately characterized, please revise the RI Report to specify the analyses that were conducted on the samples collected during the 1993 Remedial Investigation. This comment also applies to Section 2.6, Remedial Investigation - Round Two (1998).*

Response: The comment will be addressed as requested.

5. *Section 2.5, Remedial Investigation -Round One (1993), Page 2-3: This section discusses the results of the 1993 investigation in relation to "base-wide background concentrations." However, a complete reference for these background concentrations has not been provided. Please revise the RI Report to cite the complete reference for the site-wide background concentrations.*

Response: Background samples used for comparison in the Round One RI Report were collected specifically to support that investigation and are included in Section 5 of the 1993 Round One RI Report. This will be clarified in the text of the Draft Final RI.

6. *Section 2.10, Remedial Action (1999), Page 2-7: This section states, "The RA for Site 3 ultimately removed all landfilled waste and resulted in residual soil concentrations at or below residential criteria." It is unclear how it is known that all landfilled waste was removed. Please revise the RI Report to clarify how it was known that all landfilled waste was removed during the RA, and that there are no additional sources remaining outside of the excavated areas.*

Response: The original goal of the removal action at Site 3 was to remove metal debris and PAH-contaminated soil at the site. However, as the removal action was taking place, several other cells of waste (batteries, galley waste, etc.) were encountered. OHM Remediation removed these areas and excavated additional areas to confirm that all waste was removed at the site. This is documented in *Final Report, Remedial Action, Sites 1, 3 and SSA 22, Naval Weapons Station Yorktown, Yorktown Virginia* (OHM, 2001). This will be clarified in the text.

7. *Section 2.11, Long-Term Monitoring (2000), Page 2-7: This section indicates that five rounds of long-term monitoring of groundwater, surface water, and sediment were completed at the sites in May 2000, September/October 2004, February 2005, May 2005, and August 2005. It is unclear why a four-year gap in monitoring occurred between May 2000 and September/October 2004. Please revise the RI Report to clarify why a four-year gap occurred between the first and second rounds of long term monitoring at the sites.*

Response: The gap between the monitoring events was due to funding delays, as documented in *Final Long-term Monitoring Report, Sites 1, 3 and 7, Naval Weapons Station Yorktown, Yorktown Virginia* (CH2M HILL, 2006). This will be noted in the text of the Draft Final RI Report.

8. *Section 3.1, MIP and DPT Investigation, Page 3-2: The text states that, "Soil from several locations*

along the length of the sleeve was placed in the same jar at Site 1 and the initial soil sample collected at Site 3. The second soil sample at Site 3 was collected from only the 15to 16-foot interval." However, the text does not clarify why the second soil sample at Site 3 was collected from only the 15- to 16-foot interval. Please revise Section 3.1 to clarify why the second soil sample at Site 3 was collected from only the 15-to 16-foot interval.

Response: During soil sampling completed prior to DPT groundwater sampling, the field team noted what appeared to be petroleum contamination in the bottom foot of the 12 to 16 ft sample. While a soil sample was not proposed for this location, it was determined that one should be collected. Because contamination was only noted in the bottom foot of this interval, only the bottom foot was sampled. This will be clarified in the text.

9. *Section 3.1.1, Site 1, Page 3-2: The first paragraph notes that some of the membrane interface probe (MIP) locations were moved from the original locations proposed in the work plan "due to terrain or vegetation preventing the MIP rig access to the proposed initial investigation locations." The RI Report does not comment on the implications of these deviations from the work plan. Please revise the RI Report to indicate whether there were any implications due to these deviations from the work plan, and indicate whether original project objectives were achieved even if boring locations were moved. This comment also applies to Section 3.1.2, Site 3, in which it is noted that boring locations were also moved from their originally proposed locations.*

Response: The modifications to the MIP locations at Site 1 are not anticipated to have impacted the completeness of the investigation. However, there are fewer points than anticipated along the eastern side of the landfill. This will be clarified in the text. While boring locations were moved during the Site 3 MIP investigation as well, the overall intent of the investigation was met. Locations at Site 3 were not pre-selected. Rather, an initial start location was selected and additional sample locations were chosen in order to provide a "clean" boundary around locations at which VOCs were detected (as described in Section 3.1.2). While locations were moved due to obstructions and terrain, the intent of the investigation was achieved to the detection level capable of being achieved by the MIP.

10. *Section 3.2.1, Monitoring Well Installation and Development, Page 3-3: This section references Figures 3-1 and 3-2 for the locations of the new monitoring wells installed at Sites 1 and 3. However, neither Figure 3-1, MIP, DPT, and Groundwater Sample Locations Site 1, nor Figure 3-2, MIP, DPT, and Groundwater Sample Locations Site 3, appears to show the new well locations, which are identified as IGW22 through IGW25 at Site 1 and 3GW21 through 3GW29 at Site 3. Please revise Figures 3-1 and 3-2 to show the fourteen new monitoring well locations installed at Site 1 and Site 3.*

Response: Figure 3-1 and 3-2 were revised to include the new wells as requested. Edited figures are attached for your review.

11. *Section 3.2.2, Site 1, Page 3-5: The first bulleted item on Page 3-5 indicates that wells 1GW23, 1GW24, and 1GW25 were installed at Site 1 "to better define the extent of the waste..." Section 5, Nature and Extent of Contamination, does not indicate whether waste material was identified during installation of these wells. Please revise the RI Report to clarify whether any waste materials were identified during installation of wells 1GW23, 1GW24, and 1GW25 or any other borings at the site.*

Response: No waste was encountered when installing 1GW23, 1GW24 and 1GW25, as monitoring wells were intentionally installed outside the expected boundaries of the landfill. The objective has been revised to read, "Three wells (1GW23, 1GW24, and 1GW25) were installed downgradient of the landfill along the eastern and southeastern site boundary to better delineate the nature and extent of contamination and to evaluate groundwater concentrations adjacent to Indian Field Creek."

12. *Section 3.2.2, Site 1, Page 3-5: The second bulleted item on Page 3-5 indicates that well 1GW22 was installed based on the deepest electron capture detector (ECD) response from the MIP results. However, the MIP boring which reported the deepest ECD response is not identified in this section. Additionally, the MIP/DPT Results subsection of Section 5.1.1, Site 1, describes the MIP location with the highest ECD response but not the deepest ECD response. To aid in understanding the rationale for installation of well 1G W22, please revise the RI Report to identify the MIP location at Site 1 that reported the deepest ECD response from the MIP results. This comment also applies to Section 3.2.3, Site 3, at which several wells were installed based on either the highest or deepest ECD responses. The MIP locations which reported these ECD responses should be identified in Section 3.2.3.*

Response: MIP location 1GW22 was installed in the vicinity of MIP location 16 at which both the highest and deepest ECD responses were observed. This will be clarified in the text of the report. Section 3.2.3 will also be updated to clarify which MIP points had the highest and deepest ECD responses at Site 3. Wells 3GW22, 3GW24 and 3GW25 were installed in the vicinity of MIP locations 5, 10 and 4, respectively, to reflect the highest ECD responses at Site 3. Wells 3GW23 and 3GW26 were installed in the vicinity of MIP locations 8 and 2, respectively, consistent with the deepest ECD responses at Site 3.

13. *Section 3.2.6, Site 1, Page 3-6: This section identifies the analyses conducted on the groundwater samples from Site 1. Ethane is mentioned twice in the second to last sentence. Also, this section does not identify all of the analyses conducted on the samples. Table 3-1, Sites 1 and 3 Sample Summary, indicates that groundwater samples from Site 1 were also analyzed for nitrate, nitrite, and sulfide. Please revise the RI Report to resolve these discrepancies, and to ensure consistency between the text and tables.*

Response: The second reference to "ethane" will be replaced with, "ethene." Nitrate, nitrite and sulfide analysis was completed using field test kits. This will be footnoted in Table 3-1.

14. *Section 3.2.6, Site 1, Page 3-6: The Site 3 subsection states, "Monitoring well 3GW07 could not be sampled since the PVC riser was found to be bent/pinched, which prevented sampling equipment from entering the well." The RI Report does not describe any implications of not sampling this well. Additionally, the RI Report does not describe any corrective measures to fix the well or replace it. Please revise the RI report to address these concerns.*

Response: The damage to 3GW07 is not anticipated to have had any notable implications on the characterization of the site. In the past, when this well has been sampled, there have been no exceedances of background concentrations for inorganics and the only organic detected was TCE at a concentration of 3 J µg/L. Consequently, a replacement well was deemed unnecessary

to fulfill the objective of characterizing the contamination at Site 3. This recommendation will be included in the text of the draft final report.

15. *Table 3-1, Sites 1 and 3 Sample Summary: The following discrepancies were noted between Table 3-1 and the text of the document:*

    - *Table 3-1 indicates that the subsurface soil samples at Site 3 (YS03-S001-0209 and YS03-S001-0609) were analyzed for target compound list (TCL) VOCs, SVOCs, target analyte list (TAL) total metals, pesticides, polychlorinated biphenyls (PCBs), and total petroleum hydrocarbons (TPH). Section 3.1.2, Site 3, second paragraph, indicates that the sample collected at a depth of 12-16 feet (i.e., YS03-S001-0209) was analyzed for VOCs only; the sample collected from the 15-19 foot depth interval (Le., YS03-S001-0609) was analyzed for SVOCs, pesticides, PCBs, total inorganics, and TPH. Please revise the RI Report to correct these discrepancies.*
    - *Table 3-1 does not indicate that monitoring wells 1GW12 and 1GW22 were sampled for Dehalococcoides sp., as described in Section 3.2.6, Site 1. The same section, under subheading Site 3, also indicates that wells 3GW19 and 3GW24 were sampled for Dehalococcoides sp., but Table 3-1 does not identify these analyses. Please revise the RI Report to ensure consistency between Table 3-1 and the text of the document.*

Response:

Bullet 1: Section 3.1.2 is correct. YS03-S001-0209 was analyzed for VOCs only and YS03-S001-0609 was analyzed for SVOCs, pesticides, PCBs, total inorganics, and TPH. Table 3-1 will be corrected accordingly. Results for these analyses are included in Tables 5-12 and 5-13 and Appendix A of the RI Report.

Bullet 2: Samples from wells 1GW12, 1GW22, 3GW19 and 3GW24 were analyzed for DHC, as indicated in the text of the RI Report. Data for this analysis is included in Table 5-3, Table 5-7 and in Appendix A. Table 3-1 will be corrected to reflect that this analysis was completed.

16. *Table 3-5, Surface Water and Sediment Tide Levels: This table presents data for background surface water samples, but there is no discussion of these background samples in the text of Section 3, Field Investigation Methods. Additionally, background sample locations do not appear to be shown on any Section 3 figures. Please revise the RI Report to clarify why tide level data for background surface water samples is presented in Table 3-5. If background sample locations are shown elsewhere in the RI Report, a reference to the applicable figure should be provided.*

Response: Background surface water samples were collected in 2007 during the groundwater RI for Sites 4, 8, 21, 22 and SSA 14. Field investigation procedures and sample location information is included in the *Final Remedial Investigation Work Plan for Groundwater at Sites 4, 8, 21, 22, and SSA 14* (CH2MHILL, 2007). This will be noted in the text.

17. *Section 4.5.4, Groundwater Flow, Page 4-6: The Site 1 subsection states, "Groundwater does not appear to discharge to the unnamed tributary." This is inconsistent with information presented in Section 8.2.3, Groundwater Flow, in which it is noted that groundwater at Site 1 "flows to Indian*

Field Creek and its unnamed tributary." Please revise the RI Report to address this discrepancy.

Response: Consistent with Figures 4-9 and 4-10, groundwater flow in the Columbia aquifer at Site 1 is toward Indian Field Creek and its unnamed tributary. Groundwater flow in the Yorktown aquifer at the site is toward Indian Field Creek only. The reference on page 4-6 will be edited to clearly specify that it is describing flow in the Yorktown-Eastover aquifer and the reference in Section 8.2.3 will be edited to clarify that shallow groundwater flow is toward Indian Field Creek and its unnamed tributary.

18. *Section 4.5.4, Groundwater Flow, Page 4-6: This section does not address the potential mounding that appears to be occurring in the western side of the Site 1 at well 1GW20. Figure 4-10, Site 1 Groundwater Elevation Contour Map, appears to show a higher groundwater elevation at this well than in surrounding wells, but the text does not address this inconsistency. Please revise the RI Report to comment on the higher groundwater elevation observed at well 1GW20, and clarify what may be causing the potential mounding in this area, as well as any effects it may have on contaminant migration.*

Response: The well in question is marked as screened within the Yorktown Eastover aquifer and is plotted on the Yorktown Eastover aquifer map, but after additional review of the data, the well is actually screened in the Columbia. There is a substantial change in water levels between this well and the other Columbia wells at the site, but this is due to the ~20 ft difference ground surface elevation between 1GW20 and the other Columbia wells. The well will be included as part of the Columbia aquifer in the Draft Final report and the following footnote added to Figure 4-9: "Well not used - while groundwater elevation is consistent with steep topography toward the tributary, contour interval was not conducive to including this point." This will not have an impact on the risk assessment because the aquifers were combined for the purpose of the risk assessment.

19. *Section 4.5.4, Groundwater Flow, Page 4-6: It is noted that two localized groundwater mounds occur within the eastern portion of the Site 3. The wells at which this groundwater mounding occurs have not been identified in the text. Furthermore, the cause of this mounding is not addressed in the text of the RI Report. For clarity, please revise the RI Report to identify the wells at which mounding appears to occur and clarify what may be causing this mounding, as well as any effects it may have on contaminant migration.*

Response: The groundwater mounding at Site 3 in these areas is consistent with the topography at the site. This will be explained in more detail in Section 4.5.4 of the Draft Final RI Report.

20. *Section 4.5.5, Vertical Gradients, Page 4-6: This section describes the vertical gradients at Sites 1 and 3. It is noted that strong downward vertical gradients were observed at Site 1 between the Columbia and Yorktown-Eastover aquifer. However, according to the data presented in Table 4-2, Vertical Gradients -Site 1, an upward vertical gradient was observed between two Yorktown-Eastover aquifer wells (1GW04 and 1GW04A). This information should also be presented in the text since the Columbia aquifer is absent in some areas of Site 1. The same section also states, "At Site 3 the vertical gradient is mostly upward, but downward at 2 locations where it was measured." According to Table 4-3, Vertical Gradients - Site 3, only one location reported a downward vertical gradient (3GW08A*

and 3GW08B). Please revise the RI Report to discuss the gradients observed between the upper and lower Yorktown-Eastover aquifer at Site 1, and to address the discrepancy noted in the number of locations at Site 3 that reported a downward gradient.

Response: The edits will be made as suggested.

21. *Table 4-3, Vertical Gradients - Site 3: It is unclear why Table 4-3 reports an upward vertical gradient between wells 3GW15 and 3GW15A when the vertical gradient listed at this location is 0.000 ft/ft. Please revise Table 4-3 to clarify how an upward vertical gradient was determined at this location when the data appear to show no vertical gradient.*

Response: The table will be edited to show that there is no vertical gradient between these two wells.

22. *Section 5.1.1, Site 1, Page 5-1: This subsection discusses the MIP/DPT results at Site 1 according to the MIP boring location number (i.e., MIP-14 through MIP-29). Table 5-1, Depth-Discrete Groundwater Detection and Exceedance Results -Site 1, presents the direct push technology (DPT) results by different sample identifications (i.e., station ID and sample ID). In order to coordinate the discussion of the data presented in Section 5.1.1 and the results presented in Table 5-1, it would be helpful if both the text and table identified the MIP location number in addition to the corresponding DPT sample ID. Please revise the RI Report to incorporate this recommendation.*

Response: The report will be edited as suggested. A revised Table 5-1 is attached for your review.

23. *Section 5.1.1, Site 1, Page 5-2: In the fourth paragraph under the Volatile Organic Compounds subsection, the RI Report states, "Although TCE was observed at only one monitoring well within the Columbia aquifer (56 µg/L), it is anticipated that the TCE plume extends at least approximately 140 feet horizontally to the southeast based on the depth discrete sample collected at MIP-16 (no well was installed in this location due to insufficient yield)." Based on review of Figure 5-3, VOC Exceedances in Yorktown-Eastover Aquifer, it appears that a well was installed at MIP-16 (i.e., 1GW-22); however, it is a Yorktown Eastover aquifer well and not a Columbia aquifer well. For clarity, revise the above referenced sentence to state, " ...no Columbia aquifer well was installed in this location due to insufficient yield)."*

Response: The referenced sentence was revised as recommended.

24. *Section 5.1.1, Site 1, Page 5-3: Under the Volatile Organic Compounds subsection, the second paragraph on Page 5-3 discusses the potential for DNAPL at Site 1. TCE was detected at concentrations greater than 11 ,000 ug/L at the site; concentrations greater than this value are generally indicative of the likely presence of TCE as DNAPL. In particular, well 1 GW22 reported a TCE concentration of 18,000 µg/L. The RI Report states, "DNAPL Indigo Blue Dye testing kits were used to identify potential DNAPL in saturated soil at Site 1, but none was detected using these kits (Table 5-4)." However, based on the information presented in Table 5-4, Indigo Blue Test Results, a test was not conducted at well 1 GW22. The RI Report does not explain why an Indigo Blue Dye Test was not conducted at well 1GW22, the well which reported the highest TCE concentration in*

groundwater. Revise the text of the RI Report to acknowledge that an Indigo Blue Dye Test was not conducted at well 1GW22 which reported the greatest TCE concentrations in groundwater, and to clarify why a test was not conducted at this well.

Response: A review of field notes and discussion with field team members indicated that at the time of well installation an Indigo Blue Dye Test was not performed.

25. *Section 5.1.2, Site 3, Page 5-6: Under the General Groundwater Geochemistry subsection, it appears that the pH range cited for groundwater at Site 3 (6.2 to 12.46) does not apply to Site 3. Table 5-6, Groundwater Parameter Results - Site 3, shows a pH range of 6.16 to 12.79. Please revise the RI Report to provide the correct pH range for Site 3 groundwater.*

Response: The referenced pH range was revised as recommended.

26. *Section 5.2.1, Surface Water Quality, Page 5-9: This section indicates that general surface water quality parameters represented in Tables 5-8 and 5-11. Table 5-8, Surface Water Detection and Exceedance Results -Sites 1 and 3, and Table 5-11, Surface Water and Sediment Parameters -Sites 1 and 3, include data for multiple field parameters, including total dissolved solids (TDS), dissolved oxygen (DO), oxidation reduction potential (ORP), pH, salinity, specific conductivity, temperature, and turbidity. However, Section 5.2.1 only discusses the results for TDS and DO. Please revise Section 5.2.1 to include a discussion of the additional surface water quality data that were collected, and clarify how the results relate to the surface water quality at the sites.*

Response: The suggested edits will be made as requested.

27. *Section 5.2.3, Inorganic Compounds, Page 5-9: The first paragraph discusses the results of arsenic in surface water in comparison to the adjusted tapwater RSL, "adjusted by multiplying by 10." This adjustment to the tapwater RSLs for surface water exposures is not described in Section 3.8, Regulatory Standards and Risk Based Screening Values. Based on the screening criteria provided in Table 5-9, Sediment Detection and Exceedance Results, it appears that a similar adjustment was made to the soil RSLs for screening sediment data. Section 3.8 also does not describe this adjustment. Please revise the RI Report, including Section 3.8, to note the adjustments made to the tapwater and soil RSLs for screening surface water and sediment. The rationale for making these adjustments should also be provided.*

Response: The subject adjustments were made to account for the reduced potential exposure to sediment and surface water as compared to soil and groundwater. This will be explained in greater detail in the text.

28. *Table 5-1, Depth-Discreet Groundwater Detection and Exceedance Results - Site 1: Under the Semi-volatile Organic Compounds (SVOC) section, Table 5-1 indicates that there were "No Detections" of these constituents. However, groundwater samples were not analyzed for SVOCs so this information is unnecessary. Revise Table 5-1 to remove the "No Detections" phrase under the SVOC subsection. Also, to increase the utility of this table, it would be helpful if the depths at which the discrete groundwater samples were collected were included in the table. Please revise Table 5-1 to include the depths at which the samples were collected.*

Response: The edits to the table were made as suggested. A revised table has been attached for your review.

29. *Table 5-4, Indigo Blue Test Results: This table indicates that tests were not conducted at well 1GW22, 3GW21, and 3GW27; however, no explanation is provided for why the tests were not conducted at these locations.' It should be noted that Section 3.2.1, Monitoring Well Installation and Development, indicates that tests were conducted at all locations except 3GW21 and 3GW27. Please revise Table 5-4 to include the rationale for not conducting Indigo Blue Tests at 1GW22, 3GW21, and 3GW27. Also, please clarify why depths were not recorded at 3GW26.*

Response: A review of field notes and discussion with field team members indicated that at the time of well installation an Indigo Blue Dye Test was not performed.

30. *Table 5-5, Depth-Discrete Groundwater Detection and Exceedance Results - Site 3: The screening criteria for the groundwater samples are referred to as "CLEAN MCL Groundwater" and "CLEAN RSLs Tapwater Adjusted." It is unclear what is meant by "CLEAN" in these cases. Additionally, the table notes do not document the date of the RSLs used nor do they indicate what adjustments were made to the RSLs. Please revise Table 5-5 to state what is meant by CLEAN MCLs and RSLs, and adequately document the source of the RSLs as well as any adjustments made to the RSLs.*

Response: The reference to "CLEAN" is a reference to a data warehouse screening value choice we use on Navy CLEAN Environmental Restoration projects. Because the values are no different than those that would be used for other sites, all of the references will be removed from the tables. Additionally, the adjustments to the RSLs will be explained and the date of the RSLs used for screening will be footnoted in the table.

31. *Table 5-6, Groundwater Parameters Results - Site 3: The acronym "NR" is used throughout the table without being defined in the table notes. Additionally, the table does not indicate why certain parameters were not measured in some wells, or why there is a blank cell under YS03-GW21. Please revise Table 5-6 to properly define all acronyms and abbreviations used throughout the table. Also, revise Table 5-6 to clarify why field parameters were not measured in some wells, and why there is a blank cell under YS03GW21.*

Response: The "NR" designation stands for "not recorded" and will be added to the acronyms section at the bottom of the table. In the case of YS03-GW19A, where this designation is used most frequently, data were not collected because obstruction in the well allowed for sampling with a check valve, but not use of a submersible pump and flow through cell. This will be better explained. With respect to the blank cell under YS03-GW21, the cell should show a "NR" designation because the turbidity meter malfunctioned during purging of this well.

32. *Table 5-11, Surface Water and Sediment Parameters - Sites 1 and 3: No field parameters are provided for sample location YS03-SW/SD09-0709, but there is no explanation for their exclusion. Please revise the RI Report, including Table 5-11, to clarify why field parameters were not measured at YS03-SW/SD09-0709.*

Response: A review of field notes and discussion with field team members indicated that these parameters were not collected. This will be footnoted in the table.

33. *Table 5-12, Soil Detection Results -Site 1 and Table 5-13, Soil Detection and Exceedance Results - Site 3: Detected constituents in soil were compared to the November 2010 residential and industrial RSLs. It is unclear why they were not also compared to the migration to groundwater SSLs from the RSL table. A comparison of the soil data to the migration to groundwater SSLs or other site-specific SSLs could aid in determining whether soil contamination is acting as a continuous source of groundwater contamination. Please revise the RI Report to compare the soil data to default or site-specific SSLs in order to better determine the potential for soil contaminants to leach to groundwater. Additionally, please revise Tables 5-12 and 5-13 to include the depths at which the soil samples were collected.*

Response: The report will be revised to compare soil data to SSLs. Tables 5-12 and 5-13 were updated to include the depths at which soil samples were collected. Revised tables are attached.

34. *Section 6.1.1, Exposure Assessment, Page 6-4: In the subsection Characterization of Land Use, the HHRA states: "Currently, there are no activities at Sites 1 and 3, although personnel may hunt on the property during deer and turkey hunting seasons." Wildlife present at the site could potentially be exposed to contaminated surface water and sediment in Indian Field Creek and its tributaries, leading to bioaccumulation of constituents of potential concern (COPCs). In order to be conservative, the potential for hunters to be exposed to COPCs via the ingestion of deer and/or turkey from the site should be addressed in the uncertainty section of the HHRA. Please revise the HHRA to address the uncertainties associated with not evaluating this exposure scenario. In addition, this subsection states: "The surface water body near the site supports fishing only as a "catch and release" basis; therefore, it is assumed that fish is not consumed from Indian Field Creek and its tributaries." This assumption may underestimate potential risk to receptors. If the surface water body or its tributaries support fishing, the potential exists for the fish to be consumed. To ensure a conservative approach to protecting human health, please revise the HHRA to evaluate ingestion of fish from Indian Field Creek and its tributaries as a potential exposure pathway for recreational or residential receptors. Alternatively, address the uncertainties associated with not evaluating this exposure scenario in the uncertainties section of the HHRA.*

Response: The potential for hunters to be exposed to COPCs via ingestion of deer and/or turkey from the site will be addressed in the uncertainty section.

The following discussion will be added to Section 6.1.1, Characterization of Land Use-

"Indian Field Creek supports fishing only on a "catch and release" basis (as part of Navy policy).

The constituents detected in the surface water and sediment (primarily metals) at these sites are not constituents that are typically considered to bioaccumulate in fish and crabs to levels of concern for humans who ingest these fish and crab, with the possible exception of mercury (if present as methyl mercury). Mercury was detected in eleven of the fourteen sediment samples

and one of the thirteen surface water samples. Mercury was detected in sediment at a maximum concentration of 0.12 mg/kg. This concentration is not considered to be a concern for bioaccumulation in fish or crab tissue at levels that would pose a risk to human receptors that ingest the fish and crab. In addition, any site-related concentrations in fish and crab downgradient of the sites, where people are more likely to fish and crab and eat the fish and crabs they catch, are anticipated to be lower."

35. *Section 6.1.1, Exposure Assessment, Page 6-6: In the subsection Calculation of Exposure Point Concentrations (EPCs), the HHRA notes that EPCs were calculated for the COPCs using ProUCL software Version 4.00.04. It should be noted for future HHRAs that ProUCL was revised twice in May 2010 to include Versions 4.00.05 and 4.1.00. Several additions (e.g., sample size determination module), enhancements (file module), modifications [e.g., pvalues of for the Willcoxon Rank Sum/Wilcoxon Mann Whitney (WRS/WMW test), and Gehan test] have been made in ProUCL 4.00.05. Some bugs (e.g., correction in adjusted gamma upper confidence limits (UCLs)) have been addressed in version 4.00.05; these changes may have affected the gamma UCL if used in the report. Version 4.1.00 consists of all of the statistical and graphical methods that are available in all previous versions of ProUCL software package, plus some added modules, thus the changes in Version 4.100 should not affect EPC calculations. Unless gamma UCLs were the selected UCL for the HHRA, the newer version of ProUCL would have not affected the EPC calculations. However, for future reference, it is recommended that the most current version of ProUCL be used (http://www.epa.gov/osp/hstl/tsc/software.htm).*

Response: Comment noted. The first version of HHRA was prepared prior to May 2010, and was not updated with the most current version of ProUCL. The most current version of ProUCL (currently 4.1.00) will be used for future HHRAs.

36. *Appendix I, Table 2.1, Occurrence, Distribution and Selection of Chemicals of Potential Concern (Exposure Point: Tapwater): Antimony and beryllium are not included in Table 2.1, even though these constituents are listed in Table 2.3 as having been detected in groundwater at Site 1. Revise Table 2.1 to include antimony and beryllium in the COPC selection process.*

Response: Table 2.1 includes the filtered groundwater samples (for metals) and Table 2.3 includes the unfiltered groundwater samples. Antimony and beryllium were not detected in the filtered groundwater samples, but were detected in the unfiltered groundwater samples. Therefore, they were not included in Table 2.1 (which includes the filtered groundwater samples), but were included in Table 2.3 (which includes the unfiltered groundwater samples).

37. *Appendix I, Table 2.3, Occurrence, Distribution and Selection of Chemicals of Potential Concern (Exposure Point: Water in Excavation Pit): Mercury is not included in Table 2.3, even though it is listed in Table 2.1 as having been detected in groundwater at Site 1. Revise Table 2.3 to include mercury in the COPC selection process.*

Response: Table 2.1 includes the filtered groundwater samples (for metals) and Table 2.3 includes the unfiltered groundwater samples. Mercury was detected in the filtered groundwater samples, and was therefore included in Table 2.1, but was not detected in the unfiltered groundwater samples and was not included in Table 2.3.

38. *Appendix I, Table 5.1, Non-Cancer Toxicity Data – Oral/Dermal, Site 1: Table 5.1 lists the chronic RID for vanadium as 5.0E-03 mg/kg-day, and cites IRIS as the source. However, the IRIS database does not contain an entry for vanadium. The table should cite EPA's November 2010 RSL User's guidance for the use of the modified reference dose (RID) of 5.0E-03 mg/kg-day. Please revise Table 5.1 to provide the appropriate source of the alternate oral RID for vanadium.*

Response: Appendix I, Table 5.1 will be updated to reference EPA's June 2011 RSL table and user's guide in place of IRIS.

39. *Appendix J, Table 2.1, Occurrence, Distribution and Selection of Chemicals of Potential Concern, Site 3 (Exposure Point: Tapwater): Beryllium, chromium, cobalt, and lead are not included in Table 2.1, even though these constituents are listed in Appendix J, Table 2.3 as having been detected in groundwater samples from the Yorktown-Eastover Aquifer at Site 3. Please revise Table 2.1 to include beryllium, chromium, cobalt, and lead in the COPC selection process.*

Response: Table 2.1 includes the filtered groundwater samples (for metals) and Table 2.3 includes the unfiltered groundwater samples. Beryllium, chromium, cobalt, and lead were not detected in the filtered groundwater samples, but were detected in the unfiltered groundwater samples.

40. *Appendix J, Table 2.3, Occurrence, Distribution and Selection of Chemicals of Potential Concern, Site 3 (Exposure Point: Water in Excavation Pit): Cadmium, silver, and thallium are not included in Table 2.3, even though these constituents are listed in Appendix J, Table 2.1 as having been detected in groundwater samples from the Yorktown-Eastover Aquifer at Site 3. Please revise Table 2.3 to include cadmium, silver, and thallium in the COPC selection process.*

Response: Table 2.1 includes the filtered groundwater samples (for metals) and Table 2.3 includes the unfiltered groundwater samples. Cadmium, silver, and thallium were not detected in the unfiltered groundwater samples, but were detected in the filtered groundwater samples.

EPA REGION III TECHNICAL SUPPORT COMMENTS

1. *Page 1-4 indicates "after removal of the wastes and contaminated soil, the area was re-graded and covered with 4 inches of topsoil (OHM, 2001)." This was part of the 1999 Remedial Action. It is not clear what residual contaminant levels were after the removal and if 4 inches of topsoil was sufficient.*

Response: The cleanup levels established for PAHs were:

Parameters	Cleanup Level (mg/kg)	Max Concentration Remaining
PAHs		
Benzo(a)anthracene	10 mg/kg carcinogenic fraction	**<0.43**
Benzo(a)pyrene		**<0.43**
Benzo(b)fluoranthene		**<0.43**
Benzo(k)fluroanthene		**<0.43**

Chrysene		**<0.43**
Indeno(1,2,3,-cd)pyrene		**<0.43**
Phenanthrene	44 mg/kg all PAH combined	**<1.5**
Benzo(g,h,i)perylene		**<0.42**
Fluoranthene		**<0.42**
Pyrene		**<0.42**

The Site 3 PAH contaminated area was excavated to an average depth of 5 ft bgs and an area 100 ft square. The area was then backfilled, graded, covered with 4 inches of topsoil, and re-vegetated. The amount of backfill used to fill in the excavated area is not known. While historical investigations have not indicated any significant SVOC contamination in groundwater, any remaining PAH contaminated soil will be addressed as part of the groundwater FS to address the potential for future groundwater contamination. As per the ROD, the team agreed that the removal action and site restoration had met the objectives of the ROD.

2. *Page 2-5: Section 2.7 refers to a hot spot delineation in 1997. The text indicates that soil with elevated levels of arsenic were to be removed at Site 1 as well. The text should identify the project remediation goals established for these sites.*

Response: The final remediation goal (FRG) established for arsenic was 63 mg/kg at Site 1, as noted in the *Final Focused Feasibility Study for Sites 1 and 3* (Baker, 1997). At Site 3, the FRG established for total PAHs was 10 mg/kg. This information will be added to Section 2.7.

EPA Secondary Comment (January 26, 2012): The arsenic EcoSSLs for plants, birds and mammals are all below the final soil remediation goal (FRG) of 63 mg/kg at Site 1. The RI needs to provide adequate support demonstrating that this value is protective of ecological receptors. The text needs to document how much of the site has chemical concentrations in excess of EPA EcoSSLs.

Secondary Response: The soil cover should be of sufficient thickness to prevent significant ecological exposures irrespective of the arsenic FRG, which was human-health based. As discussed on the 3 November 2011 call, the Navy will conduct additional studies to confirm that the extent of landfill waste was sufficiently characterized and that the soil cover is adequate in terms of depth and spatial extent.

3. *Page 2-6: Section 2.8 indicates the final remediation goal of 63 mg/kg was for arsenic and human receptors. It is not clear why there was no PRG for ecological receptors.*

Response: These FRG values were based on current/potential exposure scenarios and are protective of human health given the limited nature of potential exposure in the area of Sites 1 and 3. They were also considered to be protective of ecological receptors based on the results of conservative uptake modeling and available literature toxicity information. Based upon the ecological CSM, there are no current significant ecological exposure pathways to site soils.

EPA Secondary Comment (January 26, 2012): The arsenic EcoSSLs for plants, birds and mammals are all below the final soil remediation goal (FRG) of 63 mg/kg at Site 1. The RI needs to provide adequate support demonstrating that this value is protective of ecological receptors. The text needs to document how much of the site has chemical concentrations in excess of EPA EcoSSLs.

Secondary Response: Please see the response above to Comment 2.

4. *Page 2-7: Section 2.10 indicates the RA for Site 3 removed all landfilled waste and resulted in residual soil concentrations at or below residential criteria. Again, it is not clear why a reference to ecological criteria is not presented.*

Response: See response above to Comment 3.

EPA Secondary Comment (January 26, 2012): The arsenic EcoSSLs for plants, birds and mammals are all below the final soil remediation goal (FRG) of 63 mg/kg at Site 1. The RI needs to provide adequate support demonstrating that this value is protective of ecological receptors. The text needs to document how much of the site has chemical concentrations in excess of EPA EcoSSLs.

Secondary Response: The arsenic FRG is not applicable to Site 3.

EPA Tertiary Comment (April 4, 2012): Technical Support Comment 4 recommended that a reference to ecological cleanup criteria should be provided for Site 3 since only residential human health criteria are cited. The RTC states that the arsenic remedial goal is not applicable to Site 3. This comment applies to contaminants other than arsenic, as arsenic was not the only contaminant of concern at Site 3. References to ecological cleanup criteria for other contaminants should be provided.

Tertiary Response: A reference to the February 2008 *Final Technical Memorandum, Documentation of Post-Remedial Action Site Conditions Site 3 – Group 16 Magazines Landfill*, which documents the Site 3 soil FRGs and the rationale for there being no unacceptable post-remedial human health and ecological risks, will be added to the document. Note that arsenic was not an ecological COC in Site 3 soils. Thus, soil at Site 3 is a closed medium and not the subject of the current RI.

5. *Section 3.3 on page 3-7 states that sediment and surface water samples were collected within the channel of the Indian Field Creek and the unnamed tributary that flows between Sites 1 and 3. The section further states that at two of the western-most locations in the unnamed tributary, no surface water or sediment samples were collected because these areas were dry and no water or sediment was present (the substrate was considered soil). The same statement is made in Section 7.2.2 on page 7-6. These sediment samples should have been collected as they are within the migration pathway for the site and likely have flowing water that supports aquatic organisms during certain times of year (late fall to early spring). Because the samples were collected in the summer when the unnamed tributary was dry, this pathway was not assessed. This issue should be addressed.*

Response: The Navy agrees with the comment that an intermittent stream may support ecological organisms. As per response to General Comment 1, there is some uncertainty whether there is base flow leading to the unnamed tributary in this area. The Columbia aquifer

(shallow) flow is towards both the unnamed tributary and the Indian Field Creek. However, it appears that the contamination is migrating downward from the shallow aquifer into the deeper aquifer and then flowing eastward through advection and discharging to Indian Field Creek. Additionally, the majority of contamination is in the deeper Yorktown aquifer where the flow is eastward towards the Indian Field Creek. Additional information will be collected during the future investigations to address this data gap. As per the response to General Comment 1, samples will be collected at locations YS01-SW/SD28 and YS01-SW/SD29 during a time of year to be agreed to by all stakeholders. However, collection of these data prior to finalizing this document is not believed to be necessary. These additional data will be collected prior to completing an FS for groundwater at this site.

> *EPA Secondary Comment (January 26, 2012): Comment #5 stated that because surface water and sediment samples were collected in the summer when most of the unnamed tributary was dry, the pathway from groundwater to surface water was not assessed. The RTC states that surface water and sediment samples will be collected from the most upstream locations (SD28 and SD29) during a time of year agreed to by all stakeholders. BTAG would like to be involved in this process. The RTC further states that collection of these data prior to finalizing this RI is not necessary and the data will be collected prior to completing an FS for this site. Because this information is critical for determining if the migration pathway from groundwater to surface water is complete, it is unclear how the RI can be finalized without this critical piece of information. If this information is not incorporated into the RI, the RTC should clearly state how this information will be incorporated into the administrative record for the site.*

Secondary Response: The proposed sampling to fill the spatial data gaps in the unnamed tributary at Site 1 will be described in detail as part of a SAP. The components of this sampling will be scoped with the partnering team as part of the SAP process, and the draft SAP will be provided to the partnering team for review and comment. Because there are unacceptable human health risks from groundwater exposure at Site 1, some type of groundwater-based remedy will be required for Site 1. Thus, Site 1 groundwater will proceed to an FS for groundwater in any case. Because of seasonal issues related to adequately sampling the unnamed tributary, such sampling would not likely be conducted until late winter or early spring of 2013 (please see the response to General Comment 1). Analysis, data validation, and data evaluation would take several more months. Thus, waiting until these data are available to finalize the RI would significantly delay the FS and any subsequent evaluations. Any additional investigation (e.g., technical memorandum) results will be documented in the administrative record for the site.

6. *Table 3-1 shows that surface water and sediment were collected from these sites in the month of July. At this time of year, it is unlikely that impacts from discharging groundwater can be appropriately assessed, as groundwater seeps would not be flowing, thus much of the unnamed tributary would be dry (as stated in Section 3.3 on page 3-7). This represents a significant data gap. Because of the time of year samples were collected, it is not possible to assess impacts of contaminated groundwater on receiving streams. The sediment pore-water samples may be inadequate to assess this pathway. This pathway should also be assessed by comparing groundwater concentrations to BTAG screening values for freshwater.*

Response: Since ecological receptors do not have direct exposure to groundwater, a comparison of groundwater concentrations to surface water screening values is generally only done as a surrogate for potential ecological exposures (which occur when groundwater discharges to sediment pore water and the water column of a water body, or surfaces as a seep) when data for exposure media (pore water, sediment, and surface water) from the receiving water body are not available. Because surface water, sediment, and pore water data are available, there is much less uncertainty associated with evaluating these media directly (since they reflect direct exposures for ecological receptors) than in evaluating a theoretical exposure scenario using groundwater data, particularly when the available data suggest that the VOC plume has reached the area of the creek. However, the Navy acknowledges the uncertainty associated with the time of year in which the samples were collected, as per the response to General Comment 1. Consequently, the RI will be finalized acknowledging this uncertainty and plans will be made to ensure the conclusion of no ecological risks is still supported following additional data collection in support of the groundwater FS (as per General Comment 1).

> *EPA Secondary Comment (January 26, 2012): Comment #6 stated that because of the time of year samples were collected, it is not possible to assess impacts of contaminated groundwater on receiving streams. The RTC states that the Navy acknowledges the uncertainty associated with the time of year in which the samples were collected. Consequently, the RI will be finalized acknowledging this uncertainty and plans will be made to ensure the conclusion of no ecological risks is still supported following additional data collected in support of the FS. We have no surface water data in the vicinity of seeps to assess the groundwater pathway to surface water. Therefore, it is not acceptable to conclude no ecological risk, and just discuss this in the uncertainty section. The report should instead state that this pathway was not assessed as part of the RI because of the time of year the samples were collected and no conclusion on the ecological risk in receiving waters from discharging groundwater can be made at this time.*

Response: It is acknowledged that there is some uncertainty with regards to the groundwater to surface water pathway due to potential spatial and temporal variability. The RI will acknowledge this and the uncertainty will be addressed as part of follow-up studies (please see the response to Comment 5 and General Comment 1).

7. *Section 3.4 on page 3-8 states that sediment pore-water samples were collected to evaluate potential impacts to and potential exposure pathways from groundwater discharge points to sediment and surface water. Justification should be provided for using this method to evaluate impacts from groundwater. It is unclear from the information provided whether this approach measured impacts from surface water or groundwater. Information should be provided on the local geology to support that this is the interface between surface water and groundwater. Given that samples were collected in late summer, it is not clear that this sample represents groundwater exposure.*

Response: Please see the responses to Specific Comments 5 and 6, and General Comment 1.

> *EPA Secondary Comment (January 26, 2012): Based upon these comments, it is likely that the additional data (human) to be collected in support of the FS (as per General Comment 1) will not be adequate for ecological risk.*

Secondary Response: Additional sampling is proposed to evaluate potential ecological risks from the groundwater to surface water pathway (please see the response to Comments 5 and 6, and General Comment 1).

8. Page 3-7: Section 3.3 refers to Figure 3-5. This figure is not in the hard copy of this report.

Response: The reference to Figure 3-5 should have been to Figure 3-3. The report has been revised.

9. Page 3-11: Section 3.8 indicates that soil samples were not screened against any ecological risk screening values. The text needs to clearly state the reasons for this when the surface water and sediment sample data were screened against USEPA Region 3 Ecological Screening Values.

Response:

Site 1: Soil samples collected as part of this RI in support of the MIP results were collected from depths greater than 24 inches and are, therefore, not appropriate for use to assess ecological risks. It is acknowledged that the extent of waste and the soil cover have not been clearly defined at Site 1. This will be completed as part of future evaluations and if it appears that the soil cover may not address risk associated with soils, additional samples may be collected to address this data gap.

Site 3: Based upon the ecological CSM, there are no current significant ecological exposure pathways to site soils at Site 3. In addition, the soil samples collected as part of this RI were subsurface and below the depths (generally 0 to 24 inches) to which ecological receptors are typically exposed. Therefore, it is not believed that additional evaluation is necessary to address ecological risks for Site 1 soils.

> *EPA Secondary Comment (January 26, 2012): The Navy refers to "…future evaluations…" to address not clearly defining the extent of waste and the soil cover at Site 1. The text needs to specifically describe these future evaluations so that the reviewers are assured they are adequate. In addition, the text needs to describe how clarifying the extent of waste and the soil cover at Site 1 will be used to augment the ecological risk assessment.*
>
> *For Site 3, there are a number of uncertainties (e.g., accuracy of the CSM, document that backfill material was clean, and invertebrates can utilize soil exceeding 24 inches bgs) which need to be adequately addressed.*

Secondary Response: For Site 1, please see the response to Comment 2. These studies [which will include intrusive investigations (e.g., test pitting)] were discussed on the 3 November 2011 call and will be documented in a SAP prior to their conduct. If the extent of the waste has been adequately characterized and sufficient cover material is present over the entire area where waste is present, then potential pathways to ecological receptors from direct exposures are incomplete.

Site 3 wastes have been removed and soils have been closed with no further action required. Please reference the remedy as noted in the Record of Decision (#001000), Post-Remedial Action Site Conditions Technical Memorandum (#002200), and Explanation of Significant Differences (#002351).

10. *Page 7-1: Section 7.1 indicates "Terrestrial habitats were not evaluated as part of this ERA based upon the RAs that have occurred at these sites, which have eliminated complete and significant terrestrial exposure pathways." Supporting information and documentation should be provided, focusing on the cleanup values and descriptions of the final actions.*

Response: A summary of the remedial actions that have occurred at the sites is contained in Section 2 of the RI report. A reference to Section 2 will be added to Section 7.1.

EPA Secondary Comment: It is not clear if the decision to not include terrestrial habitats in the evaluation of risk in the ERA was appropriate and defensible. Information needs to be included in this report to address this uncertainty.

Secondary Response: Please see the response to Comment 9.

11. *Generally, this document refers to a number of previous documents (e.g., RAs and RODs) that were dated in the 1990s. Given the timeframes, it is not clear if protection of ecological receptors was adequately considered.*

Response: The focus of this RI is on groundwater, surface water, and sediment since these media were not addressed in the RODs for these sites, which addressed soils and surface debris. It is beyond the scope of this RI to re-evaluate the past remedial actions and RODs for these sites, which is an activity more appropriately done as part of a 5-year review. However, additional evaluation of the soil cover at Site 1 is planned, as per response to specific comment 9.

EPA Secondary Comment (January 26, 2012): BTAG recommends that the Five Year Review for the soil ROD/ERA include a re-evaluation of the risk to ecological receptors. This may necessitate additional sampling and evaluation to minimize shortcomings in these previous documents.

Secondary Response: Since additional data will be collected at Site 1 in 2013, a reevaluation of potential risks to ecological receptors is premature until these data are available. For Site 3, please see the response to Comment 9.

12. *Section 7.2.2 on page 7-6 states that groundwater data collected as part of this RI were not directly evaluated as part of the ecological risk assessment (ERA) but were considered qualitatively. BTAG does not support this approach, particularly given the time of year that surface water and pore-water samples were collected. Given the proximity of contaminated groundwater to the suspected discharge point in the creek, groundwater should be evaluated quantitatively by comparing groundwater concentrations to freshwater BT AG screening values.*

Response: Please see response to specific comment 6.

13. *Section 7.2.3 on page 7-8 states that direct ingestion of drinking water is only considered when the salinity is below 15 part per thousand (ppt) , the approximate toxic threshold for wildlife receptors. The section further states that while the salinity in the unnamed tributary is below this threshold, the presence of standing water or flowing water is typically transitory, thus exposure via direct ingestion of drinking water was not included in this ERA. BTAG does not agree with this approach. If surface water samples were collected from this unnamed tributary, they should be evaluated as a drinking water source in the ERA. Because sampling occurred in the summer when the tributary was dry, it is not possible to adequately characterize this exposure pathway. This represents a data gap that will need to be addressed.*

Response: The measured salinity in the unnamed tributary was 13 ppt, which is just below the 15 ppt drinking water threshold. This, in concert with the transitory nature of the water in the unnamed tributary, indicates that the surface water in the unnamed tributary is unlikely to be used as a regular source of drinking water for ecological receptors. Further, this potential exposure pathway rarely contributes significantly to the total dietary dose for upper trophic level receptors. At this time, this exposure pathway is not considered a data gap. However, additional evaluation may be considered if surface water to be collected in the unnamed tributary in the future has measured salinity more consistent with drinking water.

EPA Secondary Comment (January 26, 2012): Comment #13 stated that because the salinity is less than 15 ppt in the unnamed tributary, it should be evaluated as a drinking water source in the ERA. The RTC states that the measured salinity in the unnamed tributary was 13 ppt, which is just below the 15 ppt drinking water threshold, and because of the transitory nature of the tributary, the surface water in the unnamed tributary is unlikely to be used as a regular source of drinking water for ecological receptors. It is BTAG's position that when the salinity is less than 15 ppt, the water should be evaluated as a drinking water source in the ERA. In addition, the salinity was measured during the driest part of the year when salinity would be at its highest further supporting the need to evaluate the surface water as a drinking water source in the ERA.

Secondary Response: As stated in the original response, the decision to include or exclude surface water from the unnamed tributary as a source of drinking water for upper trophic level receptors will be based upon salinity measurements taken during the supplemental sampling.

14. *Page 7-10: There is a reference to Table 7-4. However, this table is not contained in the hard copy of this report.*

Response: Table 7-4 is included in the Tables 7_ERA spreadsheet.

15. *Page 7-12: Section 7.3.2 states "In cases where adequate spatial sampling coverage exists, mean concentrations are also appropriate for evaluating potential risks to populations of lower tropic level receptors because the members of the population are expected to be found throughout an area." This statement could be interpreted to be contradictory to the premise that maximum contaminant concentrations must be considered for lower trophic level receptors due to these receptors limited mobility.*

Response: The ERA states no such premise so there is no contradiction. Maximum chemical concentrations are included in the screening tables for each medium evaluated.

> *EPA Secondary Comment (January 26, 2012): The Navy has not clearly or sufficiently shown that spatial coverage of sampling at the sites has been adequate. Because of this, it is not sufficient to only use mean contaminant concentrations to characterize ecological risk to lower trophic level organisms. Maximum contaminant concentrations need to be used to assess risk to these receptors. Both maximum and mean contaminant concentrations can be used to show a potential range of risk to ecological receptors.*

Secondary Response: The sampling for these sites was scoped by the partnering team and included input from BTAG. Except for the samples in the unnamed tributary that were not collected, which the Navy acknowledges an uncertainty that will be further investigated as part of the future sampling, all samples scoped as part of the site work plan were used in the ERA. Maximum, arithmetic mean, 95% UCL of the arithmetic mean, and geometric mean concentrations were all included in the ERA evaluation.

16. *Section 7.3.2 on page 7-12 states that since upper trophic level receptors are highly mobile, they would be expected to effectively average their exposure over time as they forage within the area defining their home range. Therefore, for a baseline ERA, average prey concentrations across the site were used to provide a more representative estimate of potential exposure. This assumes that the area over which the average prey concentration is calculated is not larger than the home range of the receptor being evaluated. This issue should be discussed to ensure risk is not underestimated.*

Response: The assessment endpoints evaluated in the ERA for upper trophic level receptors were based upon receptor populations, not individual organisms. Thus, even for receptors with relatively small home ranges, average exposure concentrations are applicable to an evaluation of receptor populations. Note that the 95% UCL of the mean was used for decision-making in the BERA (Step 3a), which is a conservative estimate of a mean concentration. This issue is already discussed in the uncertainty section of the ERA.

17. *Section 7.4.1 on page 7-14 states that because the salinity of Indian Field Creek and its unnamed tributary exceeded 10 ppt, marine screening values were used when available and freshwater values were used when marine values were not available. Because the water is brackish, the lower of the marine and freshwater screening values should be used.*

Response: By definition, brackish surface water has a salinity of between 1 and 10 ppt. Since the measured salinity in all unnamed tributary and creek sample exceeded this value, the surface water is considered marine and marine surface water screening values are the appropriate values for use in the ERA. Freshwater values were only considered when no marine value was available.

> *EPA Secondary Comment (January 26, 2012): Comment #17 stated that because the water in the unnamed tributary and Indian Field Creek is brackish (between freshwater and marine), the lower of the marine and freshwater screening values should be used to assess ecological risk from surface water. The RTC states that because the salinity exceeds 10 ppt, the surface water is considered marine*

and marine surface water screening values are more appropriate. BTAG does not support this position. Because the salinity falls between freshwater and marine (ocean salinity), the lower of the freshwater and marine screening levels is appropriate and should be used.

Secondary Response: The salinity thresholds used were based upon USEPA guidance (1996; Ecotox Thresholds) which states: "Freshwater AWQC are applicable in waters with salinity less than or equal to 1 part per thousand (ppt), 95 percent or more of the time. Saltwater AWQC are to be used in waters with salinity greater than or equal to 10 ppt, 95 percent or more of the time. For waters with salinity between 1 and 10 ppt, the more stringent of the freshwater or saltwater AWQC is used, unless site-specific information on species inhabiting the water body indicates a different preference." The NOAA Squirts (2008) uses an identical definition.

18. *Section 7.4.1 on page 7-14 states that the screening values used in the ERA are summarized in Table 7-10. However, no tables are provided in Section 7 and it is not possible to evaluate the results of the ERA. Tables for Section 7 should be provided for BTAG to review to ensure appropriate values were selected.*

Response: Table 7-10 is included in the Tables 7_ERA spreadsheet.

19. *Pages 7-13 through 7-15: There are a number of other tables (e.g., 7-6 through 7-13) that are not included in the hard copy of this report.*

Response: These tables can be found as worksheets in the Tables 7_ERA spreadsheet.

20. *Page 7-16: Section 7.5.1 states "HQs exceeding one indicate the potential for unacceptable risk ... HQs less than or equal to one indicate that unacceptable risk are unlikely." This statement needs to change to "HQs equal to or exceeding one indicate the potential for unacceptable risk ... HQs less than one indicate that unacceptable risk are unlikely." This applies elsewhere in the document as well.*

Response: The text will be revised as indicated in the comment.

21. *Page 7-17: Section 7.5.1, under Surface Sediment, refers to maximum and mean concentrations being compared with screening values in Table 7-15." In neither case does the text indicate which ecological receptors are associated with each concentration. This needs to be clarified. This also applies to surface water in this same section.*

Response: The surface water and sediment screenings are intended to evaluate lower trophic level ecological receptor exposures, as reflected in the assessment endpoints (see Table 7-4). The applicable receptors groups are aquatic plants, benthic invertebrates, fish, amphibians, and reptiles. For pore water, benthic invertebrates are the applicable receptor group. A statement to this effect will be added to Section 7.5.1.

22. *Page 7-18, Section 7.5.3, under Surface Sediment and Sediment Pore Water, indicates that site concentrations were either similar to background or were consistent with background. The text needs to document which site concentrations exceeded background concentrations. This comment also applies to Section 7.6 on page 7-22, the last bullet.*

Response: The comparison to background is contained in Table 7-20 for sediment (there are no available background pore water data). The maximum ratio of site sediment concentrations to background concentrations exceeded one for aluminum, beryllium, and carbon disulfide but the mean ratios were all less than one. This will be added to the text.

23. *Section 7.5.4 on page 7-19 states that chemicals are not migrating to adjacent aquatic habitats via groundwater at levels that present unacceptable risk to ecological receptors, and no further action is recommended for ecological receptors at these two sites. As stated earlier, it is unclear that appropriate sampling was conducted to characterize this migration pathway. Data shows that concentrations of trichloroethene in groundwater are greater than freshwater BTAG screening values (e.g., 18,000 micrograms per liter [µg/L] vs. 21 µg/L). The proximity of the well to the unnamed tributary of Indian Field Creek suggests that this pathway is complete. Because concentrations in groundwater are greater than BT AG screening values, BTAG does not agree with the conclusion of no further action for ecological receptors. An "action" may be needed to prevent the discharge of contaminated groundwater to surface water at concentrations that pose unacceptable risk to ecological receptors at the groundwater/ surface water interface and downgradient receiving waters. This exposure pathway to ecological receptors will either need to be addressed as part of the Feasibility Study or additional studies should be conducted to further evaluate the risk associated with this potential pathway.*

Response: The existing data indicate that the relatively high concentrations for some VOCs in some groundwater samples are not being reflected in the media to which ecological receptors are exposed (pore water, surface water, and sediment). Thus, a groundwater-related action to directly protect ecological receptors is not believed to be warranted. An action for groundwater will occur at both of these sites to address potential human health concerns. However, additional samples are proposed to support the FS for groundwater, consistent with the response to General Comment 1. If the additional samples indicate a potential ecological concern, the need for an action will be considered.

EPA Secondary Comment (January 26, 2012): A portion of the response indicates the high concentrations in some groundwater samples are not being reflected in pore water, surface water, and sediment. The sediment samples were of the surface (e.g., 1-4 inches) and there is no data on the contamination of the deeper sediments. Therefore, the potential impact to deeper dwelling benthos and higher concentrations of contaminants that could be carried into the surface sediment are data gaps which need to be adequately addressed.

Secondary Response: Pore water samples were collected down to 12 inches below the sediment surface which will provide an adequate depth interval estimate of potential impacts.

EPA Tertiary Comment (April 4, 2012): Technical Support Comment 23 stated that sampling was not adequate to characterize the pathway from groundwater to surface water, and that this issue will either need to be addressed as part of a Feasibility Study or additional studies will need to be conducted to further evaluate this pathway. The original RTC states that the existing data indicate that the relatively high concentrations for some volatile organic compounds in some groundwater samples are not being reflected in the media to which ecological receptors are exposed (pore water, surface water, and sediment). EPA comments on this RTC stated that

because no sediment was collected at depth (greater than 4 inches deep), a potential impact to deeper dwelling benthos from high concentrations of contaminants is a data gap that needs to be addressed. The RTC states that pore water samples were collected from down to 12 inches below the sediment surface, which will provide an adequate depth interval estimate of potential impacts. While pore water may provide an estimate of exposure to sediment at depth, it will not provide an estimate of exposure to upwelling groundwater as the time of year the samples were collected (summer) prevented a full assessment of this pathway since the stream was dry. Pore-water should be collected in areas of discharging groundwater to more fully assess exposure to deeper dwelling benthos.

Tertiary Response: As discussed in the response to General Comment 1, additional surface water, surface sediment, and pore water samples will be collected. The timing of sample collection will be coordinated with EPA/BTAG in an effort to collect these samples when groundwater may be discharging to the unnamed tributary.

24. *Given the presence of chlorinated solvents in groundwater at the sites, there is need to discuss in the RI the potential presence of 1,4-dioxane in groundwater and if it has been ruled out.*

Response: 1,4-dioxane was not included in the analytical suite as part of this sampling event as there was no toxicity value available for it at the time the sampling occurred. However, a human health toxicity value has since been developed for 1,4-dioxane. This constituent is used as a stabilizer for 1,1,1-TCA. However, there were no detections of 1,1,1-TCA during any sampling event and very low concentrations (<15 µg/L) of its breakdown products (1,1-DCE and 1,1-DCA). Consequently, it is not anticipated that 1,4-dioxane would be present at levels of concern at Sites 1 or 3. However, future post-RI sampling efforts at Sites 1 and 3 will include 1,4-dioxane sampling for wells 1GW22, 1GW24, the new deep well to be installed by 1GW24, the two new wells downgradient of 1GW22, the new wells co-located with MIP 173GW20, 3GW24, 3GW27 and 3GW28 to confirm that this chemical is not a potential concern at the sites. This proposed sampling will be included in the recommendations section of the report. However, it is anticipated that the FS for Site 3 groundwater can proceed without completion of this sampling due to the low likelihood of encountering this contaminant. The sampling will be completed prior to initiation of the design for Site 3.

25. *Section 1.1: While it is true that a soil investigation was not planned as part of the Phase II RI, membrane interface probe results indicated potential impacts to unsaturated soil at Site 3; therefore, soil samples were, in fact, collected during this study to determine if a groundwater source remained (per page 6-1). It is suggested that this information is clearly stated in this section in order to provide an understanding that the soil-to-groundwater pathway was during the RI.*

Response: Section 1.1 will be revised to note the soil investigation that was performed to determine if a source to groundwater remained.

26. *Page 6-5: According to the sixth paragraph, the vapor intrusion (VI) pathway was not assessed at Site 1; rather, as a landfill with waste in place, LUCs will be implemented to restrict construction activities. Note, however, the rule-of-thumb for this scenario is that the potential for VI exists at any*

structure (current or future) within 100 feet of the groundwater plume (when VOCs exceed of MCLs). This point should be incorporated into the LUCs implemented for Site 1.

Response: The land filling activities were extensive at Site 1 and it is anticipated that the LUCs would not allow for construction of structures to be built within 100 ft of the groundwater plume. Additionally, no structures currently exist within 100 ft of the groundwater plume at Site 1.

27. *It appears that the MIP results presented in this reports do not clearly delineated the vertical and horizontal extent of the CVOCs at site 1. Based on the data only the MIP #16 from 9' to 13' shows concentration of 11,000 µ/L of TCE, while the others MIP shows no detection of CVOCs. The MIP results do not correlate with the data from the newly installed wells which shows higher concentrations increasing with depth, particularly monitoring well 1 GW22 screened from 27 to 37 feet with a concentration of 18,000 ppb of TCE.*

Response: The MIP results are separate from the direct push groundwater results to which this comment refers. MIP data do not provide actual concentrations, but rather show response on an electron capture device. With respect to the level of delineation provided by the MIP, please see response to General Comments 5 and 6. With respect to the increasing concentrations with depth at MIP location 16, the highest MIP response was actually detected at the 27 to 37 foot interval, consistent with the well results (See Appendix A), but a DPT sample could not be collected at that interval due to low yield. This will be clarified in the text.

28. *On page 5-3 the report states that DNAPL Indigo Blue Dye testing kits were used to identify potential DNAPL in saturated soil at Site 1, but none was detected in using these kits. However table 5-4 shows that the test was used in wells 1GW23, IGW24 and 1 GW25 which seem to be located very far from the source, but the test was not performed in well 1 GW22 which contain the higher level of contamination. The negative results of the DNAPL Indigo Blue Dye test at site 1 are not an indication of whether or not DNAPL are present at the site.*

Response: Please see response to Specific Comment 29.

29. *The extent of the Yorktown-Eastover confining unit was not determined during this phase of the investigation. The highest levels of concentration were found underneath the Yorktown Eastover confining unit (predominantly fine-grained material). On Figure 5-4 Monitoring wells cluster 1GW04 shows that the Yorktown-Eastover confining unit is not present at this location. There are no monitoring wells to the east of 1GW22 showing the edge of the Yorktown-Eastover confining unit where the Columbia aquifer and the Yorktown-Eastover aquifer may be interconnected, this is particularly important due to the potential for the presence of DNAPL and the fate and transport of contaminants.*

Response: Based on the conductivity response on the MIP, the confining unit is present at MIP point 18 and is estimated to be truncated between MIP 18 and the 1GW04 cluster. The extent of the confining unit will be better described in the text of the Draft Final Report. Additionally a well pair is proposed at the location of MIP17, as shown in revised Figure 5-7 (see response to General Comment 1).

30. *The water head data for clusters monitoring wells 1 GW12 and 1 GW04 indicates that the groundwater move downward in both locations. Based on the highest concentration on well 1GW22 (18,000 µg/L of TCE), the low level found in deep well 1GW04A, no detection of contamination in shallow monitoring well 1GW04 and the detection of TCE above the MCLs at monitoring well 1GW24 may indicate that the contaminant is moving deeper in the Yorktown-Eastover aquifer.*

Response: The vertical extent of contamination at Site 1 was delineated using both monitoring wells and the MIP instrumentation. MIP logs are included in Appendix A of the RI. While it appears that there is contamination present in the confining unit (where present) as evidenced by the high concentrations detected in 1GW12B (which is screened in the confining unit) and by some of the MIP results (MIP 16, in particular). Data do not suggest considerable migration into the Yorktown aquifer. This is likely due to discharge of contaminants to the surface water bodies adjacent to the site. However, additional well pairs are proposed to confirm this, as described in the response to General Comment 1.

31. *Additional investigation is recommended to determine the vertical and lateral extent of contamination at Site 1.*

Response: While the Navy agrees that additional investigation will be necessary prior to completing the FS for Site 1 groundwater and prior to designing a remedy for Site 3, the Navy believes that the existing characterization is adequate to support finalization of the RI.

If you have any questions or concerns regarding this response, you may contact me at (757) 671-6235 or Bill Friedmann at (757) 671-6223. Upon acceptance of this response letter, the Navy will submit a Draft Final Remedial Investigation Report and USEPA will have 30 days to review and concur with proposed changes.

Sincerely,

CH2M HILL

Rebekah Klyukin

Rebekah Klyukin
Project Manager

cc: Mr. Jim Gravette/NAVFAC
Mr. Wade Smith/VDEQ
Mr. William Friedmann/CH2M HILL
Mr. Adam Forshey/CH2M HILL