UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

February 16, 2000

Mr. Walter Legg
Engineering Field Activity Chesapeake
Washington Navy Yard, Building 212
901 M Street, S.E.
Washington, D.C. 20374-5018

Re: Review of Draft RCRA Facility Investigation for Sites 2, 3, 4, 7, 8, 9, and Paint Branch for the Former Naval Surface Warfare Center

Dear Mr. Legg:

The United States Environmental Protection Agency Region III has reviewed the above report and has the following comments:

GENERAL COMMENTS

1. The RFI report contains many editorial errors. Taken together, these errors significantly impact the readability and clarity of the report. While too many to list individually, editorial errors include referencing the wrong appendix or figure, incomplete tables, referencing the wrong chemicals, and figures that do not delineate all of the sample locations. A thorough QA review of the document should be performed to address this concern.

2. The summary and conclusion section for each site is specific to the human health risk assessment (HHRA). An overall summary and conclusion should be provided as an additional section for each site. This section should contain information summarizing the nature and extent of contamination within each media of concern. A summary should also be provided for the contaminant fate and transport at each site. The final site conclusion should be a discussion incorporating all available information about the site, including the HHRA conclusion.

   Following each summary and conclusion, recommended actions or preliminary remedial action objectives for each site should be discussed.

3. The overall RFI goal was to "characterize environmental conditions at NSWC-White Oak to sufficiently determine whether the facility and surrounding environmental media is protective of the environment." A discussion of whether this goal was met should be added as a site-wide conclusion.

4. For each site, groundwater contamination is presented as a two dimensional parameter without taking into account the depth of contamination. The discussions about groundwater contamination should characterize both the lateral and vertical extent of contamination. To characterize the vertical extent of contamination, the text should further discuss the monitoring well screened interval, the interactions between the overburden and bedrock aquifers, and groundwater flow. The text should be revised to include a complete discussion of groundwater contamination in both the lateral and vertical extent.

5. For several receptors in the human health risk assessment (e.g., trespasser, resident), sediment and soil concentrations are combined and treated as one data set for the risk calculations. It is unclear how soil and sediment can be accurately assessed as one media. Chemicals often behave differently regarding fate and transport in sediments versus soil media due to the differences in oxygen and water availability in these two media. Similarly, the adherence factors are likely to be different for these media for dermal pathway quantification.

   In addition, because chemicals often behave differently regarding fate and transport in sediments versus soil media, it is likely that the concentration data would represent two different populations. The 95 percent upper confidence limit on the mean (UCL) calculations assume that the data are from one population. Therefore, the use of a 95 percent UCL for these two different populations to represent an exposure point concentration (EPC) is inappropriate. Adequate justification for the combination of these two media should be provided, or they should be assessed as separate media.

6. The analytical tests performed on some site data included chromium speciation testing. Because the tests indicated that most of the chromium on the site is trivalent, chromium was assessed in the risk assessment (except for screening) as trivalent. This is not very conservative given the carcinogeneity of hexavalent chromium. Further, the speciation results (including which sites had samples run in the speciation analysis) were not referenced in the report for verification. The speciation results should be provided, including an analysis of which sites had samples run in the speciation analysis. Should the speciation tests be valid, the percentage of hexavalent chromium that is determined to be present at the site should be applied to the EPC and evaluated as hexavalent chromium; the additional chromium should be evaluated as trivalent chromium.

7. The human health risk assessment addresses risks from soils to construction workers and utility workers based on a combination of surface and subsurface soil data. However, Site 2 and Site 3 had many surface soil samples collected than subsurface soil. Given these two sites were formerly used as landfills, it is likely that contamination in the subsurface exceeds contamination in the surface soils. Combining the surface and subsurface soil data and calculating statistics such as the 95 percent UCL, is likely to bias the statistical results toward the lower concentrations in the surface soil. To adequately

ensure that human health is protected for these receptors, the subsurface soil concentrations should be evaluated separately from surface soil samples for these sites.

8. The background screen in the human health risk assessment employs the results of the statistical analysis in the background investigation, which used the Wilcoxon Rank Sum Test at the 80 percent confidence level. An 80 percent confidence level is not appropriate for use at the screening level. The text avers that the 80 percent level of confidence (alpha level of 0.2) is more stringent than the 95 percent level of confidence (alpha level of 0.05). This is incorrect. If, as stated in the text, that the hypotheses are switched, the alpha level would remain the same but the calculation would be performed at the 1-alpha level. The alpha level itself should not change. A more stringent confidence level to reduce the level of uncertainty, such as the 95 percent or 99 percent (alpha level of 0.05 or 0.01) confidence level, should be used in the statistical analysis in the background investigation.

9. The background investigation was conducted for inorganic compounds and for pesticides/PCBs. Pesticides and PCB concentrations are not naturally occurring compounds. Also, the use of pesticides and PCBs at these sites has been documented. Attributing pesticide and PCB concentrations to background is inappropriate for these sites. Furthermore, use of pesticide and PCB "background" data for screening in the human health risk assessment is unacceptable. The background analysis for pesticides and PCBs should be removed from this report.

10. The background investigation report does not appear to provide final chemical-specific background concentrations. It appears from the risk assessment screening and the tables in the background investigation that the 95 percent UCL was used as the chemical-specific background concentration. This is not a very conservative measurement for comparison. An arithmetic average value should be used.

11. Filtered metal samples were included in the human health risk assessment. The groundwater sample data set included a combination of filtered and non-filtered inorganic samples. This is inappropriate per Region III guidance (Draft Guidance on Selecting Analytical Metal Results from Monitoring Well Samples for the Quantitative Assessment of Risk, August 1992). Only unfiltered inorganic samples should be used. The risk assessment should be revised to use only non-filtered inorganic samples.

12. The report contains geologic cross sections for Sites 2, 3, 4, and 9. Since the cross sections provide valuable information about the well depth and geology, they should be provided for every applicable site. The cross section should also be provided in two perpendicular directions for all sites, as provided for Site 4 and Site 9. It is suggested that the figures be updated, where possible.

13. The sample selection rationale is unclear for the miscellaneous parameters analyzed at various sites. Since the miscellaneous parameters are sampled at a low frequency, it should be stated whether the samples are chosen randomly or at specific sample locations.

An explanation detailing the frequency, site selection criteria, and specific parameter criteria should be added to the text.

14. Each site contains a subsection on contaminant fate and transport. The source of contamination, if known or speculated, should be included in the text for the individual sites. Furthermore, limited discussion of contaminant migration between sites is provided. Due to the proximity of certain sites and ability of certain contaminants to migrate easily, this discussion should be provided for each site.

15. The discussions of metal contaminant fate and transport states that metals are more mobile in acidic soils which result from plating-type activities, and metal solutions may be used in some industrial applications. It is unclear if these conditions are present at any sites of concern. This should be clarified in the text.

16. It is unclear how the number of analyzed samples is reported. The amount reported in the text disagrees with the total number of samples listed in the appendices. For instance, the text for Site 9 reports 31 groundwater samples, while Appendix N lists 34 analyzed samples. It is assumed the discrepancy arises because the duplicates are not included in the text. The duplicate samples should be included in the sample count stated throughout the text, because they are used independently in all applicable tables and figures. The report should be modified accordingly.

17. Several figure titles are labeled "critical constituents" in the title. It is unclear what qualifies as a "critical constituent." A definition of "critical constituents" should be provided in the text.

18. Several sites have the same beginning in referring to "Radiation Surveys." Placing this issue at the front of the report for each specific site is not appropriate as it does not provide sufficient reference or caveat. As a public document, availing the reader of information and the rationale for the information provided is incumbent upon the writer.

19. The Corrective Measures Study (CMS) is referenced throughout the report, appendices, and Work Plan. The status and scope of the CMS should be provided.

SITE SPECIFIC COMMENTS

Site 2 - Apple Orchard Landfill

1. Site 2 Summary: The investigation associated with Apple Orchard Landfill in summary does not provide much delineation of the site and as the contamination discovered is low enough that groundwater concerns should be dealt within the OU-1 study.

2. Samples results from monitoring well 2GW102 revealed TCE at 19 μg/L. This monitoring well is a bedrock monitoring well that most likely does not discharge to the

unnamed stream. It is recommended that additional bedrock wells be installed to the south of 2GW102 and the unnamed stream to determine the extent of groundwater contamination.

3. Two NPDES outfalls are identified in the text and Figure 4-1. The source for these outfalls should be stated. Also, any effects these outfalls have on surface water samples should be discussed. The text should be modified to include this information.

4. The text states that surface water from the northern portion of Area 100 is directed through stormwater sewers into the "unnamed stream." A discussion of the effects this flow has on surface water samples should be included. Also, the location of the discharge points should be identified on Figure 4-1.

5. It appears that two soil sample locations are mislabeled in Figure 4-1 or Figure 4-3. Sample 2SS107 in Figure 4-1 is Sample 2SB/SS117 in Figure 4-3. Sample 2SS116 in Figure 4-3 is not labeled in Figure 4-1. This discrepancy should be reconciled.

6. Sample 2SB103 is not identified in Figure 4-4. The sample location should be properly labeled.

7. Reference is provided for Haliburton NUS, 1995 (page 4-3) and Malcolm Pirnie, 1992 (page 4-4) in the text. However, they are not cited in the references for Section 4. The references should be amended.

Site 3 - Pistol Range Landfill

1. Site Pistol Range Landfill Summary: Once again the nature and extent of the contamination is probably best handled as part of the OU-1 investigation. However, The slope of this landfill is rather significant, therefore, I have concerns associated with the long term viability of the structure and the possibility for collapse and landsliding into the stream below so some consideration should be made to erosional controls.

2. According to groundwater sample results, the highest levels of cis-1,2-DCE, TCE, and vinyl chloride were detected in monitoring well 3GW102. This monitoring well is located west of West Farm Branch and monitors the bedrock aquifer. These samples results reveal that West Farm Branch is not a discharge point for the bedrock aquifer. Based on these results, it appears the extent of groundwater contamination has not been determined. It is recommended that additional bedrock wells be installed downgradient of 3GW102.

3. The rationale for siting the sample locations is unclear. All of the subsurface soil samples were collected west of West Farm Branch, while surface soil samples were collected on both sides. The reasoning for limiting the collection of subsurface soil samples should be clarified in the text.

4. The text states surface water and sediment samples were collected from either the drainage west or south of Site 3. From site maps, it appears these samples were collected from West Farm Branch. It should be clarified in the text if the samples were collected from this stream or from local drainage. The stream should be properly cited and labeled where applicable throughout Site 3.

Site 4 - Chemical Burn Site

1. The discussions for Site 4 should include the removal action that occurred at the site. The discussions should include the amount of material removed, monitoring wells that were destroyed during the removal action, visual observations, and sample results.

2. The subsurface soil samples collected at Site 4 are referenced throughout the section, but the number of samples collected differs within the text. It appears that subsurface soil samples were collected in November 1998, as well as, March and June 1995. This brings the total count of subsurface soil samples to 36, not 10 as stated under the Scope of Environmental Investigation for Site 4. This discrepancy should be clarified.

3. The Scope of Environmental Investigation for Site 4 states that additional wells were installed between Sites 4 and 3 to delineate the extent of groundwater contamination in the Site 13 area. First, it is assumed that the wells were installed between Site 4 and Site 3, not Site 3, because Site 13-- the Oil Sludge Disposal Area-- is adjacent to Site 4. The text also states that three existing wells were sampled to delineate the contamination migration. However, the locations of these wells is unknown and should be properly identified on the applicable figures.

   In addition, the sample results from these monitoring wells do not appear in the appendix. The results should be accurately cited and discussed. Since Site 13 is not an area of concern for this RFI, the effect of contamination migrating from Site 13 to any adjacent site included in this investigation should be adequately addressed. The text and figures should be adjusted accordingly.

4. The text states the maximum depths of the two disposal areas as 14 feet below ground surface. This statement disagrees with the cross sections provided. The associated depth on the cross sections corresponds to approximately 16 feet below ground surface. Furthermore, the recent removal action at Site 4 revealed the depth of the disposal area much deeper than 16 feet. The proper depth should be cited throughout the text.

5. Reference is provided for Haliburton NUS, 1995 (page 6-2) and Malcolm Pirnie, 1992 (page 6-3) in the text. Reference is also made to the March and June 1995 Design Verification Study. However, these reports are not cited in the references for Section 6. The references should be amended to include all applicable reports.

Site 7 - Ordnance Burn Area

1. The text states no surface water or sediment samples were collected at Site 7 due to the lack of a surface water body. However, the Floral Drive stream is north and east of the Site 7 area delineated on the figures, and this stream does receive drainage from the This stream has historically shown impacts from Site 7. Surface water and sediment samples should be collected from the Floral Drive stream, and the appropriate risk calculations performed for the surface water and sediment pathways.

2. Due to the results reported from the Round 2 groundwater investigation (cited in the Addendum), further investigation is recommended. The monitoring wells located to the north and northeast of the site indicate an average increase in RDX concentrations. This increase should be investigated further. Sample results from this investigation should be incorporated with the OU-1 groundwater investigation presently occurring in this area.

Site 8 - Abandoned Chemical Disposal Pit

1. The soil samples are listed as being analyzed for TCL VOCs, TCL SVOCs, TCL pesticides, and TAL metals plus cyanide. It should be included in this list that the previous subsurface soil samples (March 1995) were also analyzed for explosives. The results should then be included in the applicable tables and figures. The source of this previous investigation should be cited in the text and references.

   The Nature and Extent of Contamination subsection for surface soil, subsurface soil, and groundwater state explosives were not detected. However, explosives were not analyzed, so they could not be detected. The text should be revised to state explosives were not analyzed, or the reference to explosives should be deleted.

2. According to the potentiometric surfaces displayed in Figure 8-1, groundwater flows to the north. The results reported in the Addendum show increased concentrations of iron, manganese, and aluminum in this direction. For this reason, it is recommended additional sampling occur in this area.

3. Reference is provided for Malcolm Pirnie, 1992 (page 8-2), B & R Environmental, 1997a (Figure 8-1), and USEPA, 1997 (page 8-13) in the text. However, these documents are not cited in the references for Section 8. The references should be amended to include all applicable reports.

Site 9 - Industrial Wastewater Disposal Area 300

1. Page 9-1 states no soil samples were collected at Site 9. However, the text in this section, Appendix N, and Table 9-1 indicate the collection of subsurface soil samples. Thirteen subsurface soil samples (including one duplicate) were collected and analyzed during the Design Verification Study in March and April 1995. The Scope of Environmental Investigation and the text, tables, and figures should include these samples.

2. The text indicates that three geophysical studies were conducted at Site 9, including EM, GPR, and azimuthal resistivity studies. Explanation should be provided for selecting the limited areas surveyed in Site 9.

3. Groundwater samples were collected from piezometers at two locations. It should be noted that EPA Region III does not recognize piezometer samples as appropriate data for use in risk assessment. The text should be revised to state how these groundwater samples were used in the RFI.

4. Reference is made to shallow and deep well nests for groundwater sampling. More information on the new and existing well nests should be provided for Site 9, in this section and in the monitoring well installation section. The rationale for situating the deep and shallow nest wells should be provided. From Figure 9-1, the well nests appear reasonable except the planned 9GW102 and 9GW106 well nest. An explanation should be provided for situating this pair farther apart than the other well nests.

5. The sample locations for the surface water and sediment samples should be provided in the Scope of Environmental Investigation. The surface water and sediment samples collected from the intermittent stream east of the site should be discussed in addition to the samples collected from West Farm Branch.

6. The description of Site 9 should be amended to include West Farm Branch and the intermittent stream east of the site. These labels should also be incorporated into the applicable figures.

7. Sections 9.2, 9.3, and 9.4 state the above ground discharges to soil and solvent disposal occurred at Site 9. The field investigation for Site 9 did not include surface soil. Surface soil samples were not collected due to the assumption that disposal occurred in leaching wells and did not include surface discharges. However, the Introduction states above ground discharges did occur at Site 9. Furthermore, subsurface soil samples revealed contaminants that were not present in groundwater. It appears surface and subsurface soils are contaminated through site activities other than disposal through wells. Therefore, surface soil should be characterized through sampling.

8. Reference is made to the B&R Environmental, 1997 (page 9-1), Malcolm Pirnie, 1992 (page 9-3), and the Design Verification Study, 1995 (page 9-4) in the text. However, these documents are not cited in the references for Section 9. The references should be amended to include all applicable reports.

Paint Branch Creek

1. This section does not contain the subsection Site Characteristics. This section should be included so the adequacy of the RFI field investigation can be determined.

2. Reference is made to the USEPA, 1993a (page 10-5) in the text. However, this document is not cited in the references for Section 10. The references should be amended to include all applicable reports.

SPECIFIC COMMENTS

1. Page ES-9, paragraph . This paragraph states that groundwater samples were collected from five existing monitoring wells and one piezometer, but page 8-1 lists five existing monitoring wells and one off site monitoring well. This discrepancy should be corrected in the text.

2. Section 1.4.1, page 1-4, paragraph 1. The last sentence of this paragraph states seven sites were recommended for additional study. Six sites are listed in the ensuing list. Paint Branch is not included. The list should include Paint Branch, if applicable.

3. Section 2.2.3, page 2-2. This section discusses monitoring well installation, but no reference is made to the depth of the monitoring wells. Based on the unknown extent of contamination, a discussion should be added to the text about the depth of well installation.

4. Section 2.2.5 General Groundwater Sampling Procedure, Page 2-3 and 2-4. This section refers to the collection of TAL metal samples and notes that should a value of 10 NTU be exceeded a sample fraction was collected for filtering and analysis. Does this mean that both Total and Filtered were performed or just Filtered Metals?

5. Section 2.5.1, page 2-7 states the Background Investigation did not characterize the deeper aquifer because *"the saprolite underlying the unconsolidated Coastal Plain sediments serves as an aquitard, which limits the vertical migration of contaminants to the bedrock aquifer."* This statement is not supported by historical groundwater samples results or results obtained during the RFI. Groundwater sampling has revealed significant levels of contamination within the bedrock aquifer. This statement should be removed from the text. The document throughout quotes various slug test data from various site investigations provided in the documentation. The hydraulic conductivities quoted do vary across the site and it would appear that the saprolite is neither a confining unit nor an aquitard. As an example, page 9-3 provides data in Section 9.2.2 where saprolite had higher conductivities than the overlying unconsolidated material and the unweathered bedrock beneath the saprolite. Therefore, while the ability of the saprolite to function as an aquitard may vary, it is inappropriate to generalize on this ability across the entire site. This is additionally contradicted by the data presented on Section 4.2.2, page 4-4 paragraph one where hydraulic conductivities are two degrees higher in the saprolite than in the underlying bedrock.

   Also, it states, *"With a few exceptions, groundwater in proximity to the former NSWC White Oak property is not utilized as a drink water source."* As we are aware of, at least

two drinking water sources, which have likely been impacted by contamination migrating off site.

6. Section 2.5.1.2 Selection of Background Data Set, Page 2-8. This section discusses the exclusion of data based upon elevated turbidity. The document previously discussed elevated turbidity being used for a criteria in taking filtered samples. The data can and should be used along with the turbidity data and total and filtered data. This is critical in the sense that background water quality data needs to used in comparison to site data, especially regarding metals.

7. Section 2.2.7, page 2-4. The text states subsurface soil samples were collected from an interval of 6 inches to 10 feet below ground surface (bgs). However, subsurface soil samples are defined at an interval of 2 feet or greater. The appropriate sections of the report (including tables and figures) should be revised to reflect the appropriate depth of subsurface soil samples. Any soil samples collected at a depth less than 2 feet should be identified as surface soils.

8. Section 2.8.2.1.2, Page 2-46. This section discusses the future onsite resident receptor. It is assumed that exposure to volatiles in groundwater, as assessed in the Region III shower model, is greater than that assessed in a groundwater to indoor air model. Given that the shower exposure is assessed for a short period of time (20 minutes), this is not necessarily accurate. Also, indoor air exposure would occur in a future residential scenario in addition to shower exposure. It is suggested that a comparison be made between the results of the indoor air analysis for the full-time employee be compared to the shower model results for the residential receptor to ensure that the residential receptor is adequately protected by the lack of indoor air assessment.

9. Section 2.8.2.1.2, Page 2-46. This section discusses the future day care child receptor. It is assumed that these day care facilities will prevent children from contacting site sediments. However, it is conceivable that future day care facilities may be placed in the vicinity of a site water body. Further justification for the exclusion of these media should be provided, or they should be included for this receptor.

10. Section 2.8.2.3, Page 2-47. This section discusses the exposure point concentrations (EPCs). It is unclear why the 95 percent UCL calculation equations (normal and lognormal) were not included in the text. The text should include the equations and references for the 95 percent UCL calculations that were performed.

11. Section 2.8.5.2, Page 2-87. This section discusses the uncertainty related to background screening. The text does not address the possibility that the background sample locations may not accurately reflect background and the likelihood that some of the chemicals may be deemed present at "background levels" but may in fact result from past site use. These uncertainties should be included in the discussion.

In addition, it is stated that the 80 percent confidence level used in the background analysis is more conservative than the accepted 95 percent confidence level. This is incorrect and inappropriate given that these results are used in the screening process. The text should be revised accordingly.

12. Table 2.8-7. This table presents the exposure parameters for soil/sediment for the adult recreational user. An exposure frequency (EF) of 16 days is assumed based on professional judgement. This value seems to be biased low. It is likely that a future trespasser would visit the site more frequently. Justification for the selection of this EF should be provided in the text.

13. Table 2.8-10. This table presents the exposure parameters for surface soil for the day care child scenario. The fraction ingested (FI) is assumed to be 0.5 based on professional judgement. However, justification for this value is not provided in the text. It is likely that children at the day care will be there for most of the day, and all of the soil that they ingest will be from the site. An FI of 1.0 should be used for this scenario.

14. Figure 2-1. This figure presents a summary of the human health risk assessment process. The diagram does not demonstrate that for HIs greater than 1.0, toxic endpoint specific total HIs will be calculated. The diagram should be revised to depict the entire process.

15. Figure 2-2. This figure presents the conceptual site model for risk assessment. The figure does not present potential ecological receptors and pathways. A separate ecological conceptual site model should be included.

16. Section 4.1, page 4-1, paragraph 3. The text states samples were collected during the first quarter. The year should be included following first quarter.

17. Section 4.2.1, page 4-3, paragraph 2. This paragraph references Figure 4-X. The text should be modified to identify the correct figure.

18. Section 4.2.2, page 4-3, paragraph 5. It is stated that drought conditions may have influenced water level measurements. Data from previous sampling events at existing monitoring wells should be presented to verify this statement.

19. Section 4.2.2, page 4-3, paragraph 6. This paragraph refers to Site 3 and Figure 3-X. The text should be revised to identify the correct site and figure.

20. Section 4.2.2, page 4-4, paragraph 1. The text states that test results from two monitoring wells were excluded in the geometric mean of the hydraulic conductivity calculation due to poor quality. It is unclear what is considered poor quality. This statement should be discussed further.

21. Section 4.3.1, page 4-4, paragraph 5. The first sentence references subsurface soil samples. The text should be modified to read surface soil samples.

22. Section 4.3.3 Nature and Extent of Groundwater Contamination, Page 4-6. This section states that *"The common laboratory contaminant, acetone, was detected in nine samples..."* If your going to qualify the presence of acetone, then it is necessary to present information which supports this contention. Therefore, please either remove the qualification or present sufficient data that supports your position such as QA/QC data blanks, duplicates, or other.

23. Section 4.4.1 Volatile Organics, Page 4-9 states: "have resulted in their disappearance." The section provides little if anything in the way of fate and transport in relation specific site conditions. The reference to disappearance is inappropriate and misleading in that the contamination will vanish eventually. More appropriate information would be aerobic environment present at the site the attenuating process likely to occur. The information provided is rudimentary and while may provide insight to the general public it does not provide information which is of any use to the specific contaminants and conditions present at the site.

24. Section 4.5.5, Page 4-20. This section discusses the conclusions for Site 2. It is stated that SSL screening for the inhalation pathway indicated a potential concern for human health. Given the exceedence of the SSL screen, the inhalation pathway should be assessed for this site. In addition, the screening against these SSLs should be included in the document.

25. Section 5.2.2, page 5-3, paragraph 2. Reference is made to Figure 5-X showing the potentiometric surface of the groundwater. The text should be revised to read Figure 5-1.

26. Section 5.2.2 Hydrogeology Page 5-3 states: "Potomac Group sand facies/saprolite," please provide more definition of this facies and as more data is presented on the variation of hydraulic conductivity it would appear that perhaps a broader approach should be applied to the greatly vary data present for the saprolite and bedrock around the site.

27. Section 5.3.1, page 5-4, paragraph 3. The text reads discusses subsurface soil samples. However, only surface soil samples were collected. The text should be modified to reflect the proper media, surface soil.

28. Section 5.3.3 Nature and Extent of Groundwater Contamination states: that several contaminants were detected in only one sample but fails to specify that sample. In general, I find the approach of to summarizing the contaminant hits an elusive and difficult read, with information left out and little to no interpretation of the findings especially in as relating to the wells which exhibited the most hits or highest concentrations.

29. Figure 5-1. The identification of 13GW104 disagrees with Figure 5-2 where it is labeled 13GW04. The location of SS-111 is further west when compared with Figure 5-3. The

symbols provided in the legend for soil sample locations and groundwater monitoring well locations are used interchangeably and incorrectly in this figure. These discrepancies should be remedied within the appropriate figures.

According to the text, Figure 5-1 contains all groundwater monitoring well locations. However, only the groundwater monitoring well locations north of Dahlgren Road are provided in this figure. The figure should be modified in include all monitoring well pertinent to the Site 3 investigation.

30. Section 6.1, page 6-1, paragraph 3. A list of soil analysis parameters is contained in this paragraph. However, the miscellaneous parameters sampled are omitted from this list. The list should be amended to included the seven miscellaneous parameters.

31. Section 6.1, page 6-1. Paragraph 4. According to the text monitoring wells 4GW11A, 4GW49S, and 4GW51S were found dry during this sampling event. If seasonal variations account for this finding, it should be stated in the text. In addition, these wells should be labeled accordingly on Figure 5-1.

32. Section 6.2, page 6-2, paragraph 2. Reference is made to Figure 6-X showing the overall area of Site 4. The text should be revised to read Figure 6-1.

33. Section 6.2.1, page 6-2, paragraph 5. The text states that the northern disposal area extends 20 feet beyond the Perimeter Road. Figure 6-1 delineates the approximate disposal area outline as completely below Perimeter Road. Furthermore, the recent removal action at Site 4 revealed a more extensive disposal area. The text and figures should be modified accordingly to reflect the appropriate disposal area identified during the removal action.

34. Section 6.2.1, page 6-3, paragraph 3. Reference is made to Figures 4-X and 4-X showing the north-south and east-west cross sections, respectively. The text should be revised to read Figures 6-2 and 6-3.

35. Section 6.2.1 Geology/Soil, Page 6-3, paragraph 4 states: "cross sections are illustrated in Figures 4-X and 4-x, respectively." The text should be revised to show the correct figure.

36. Section 6.2.2, page 6-3, paragraph 5. Reference is made to Figure 6-X showing the potentiometric surface of the groundwater across Site 4. The text should be revised to read Figures 6-1.

37. Section 6.3.2, page 6-6. This paragraph lists the analytes detected in subsurface soil samples. The number of detections reported for SVOCs, pesticides, and metals disagrees with Table 6-2. The correct number of detections should be recorded in the text.

38. Section 6.3.3 Nature and Extent of Groundwater Contamination, Page 6-7, Paragraph 2, states: "Sixteen VOCs were detected" and goes on to describe the range in concentration

of five of them. Additionally, the highest concentration is identified as 8,500 μg/l at one point and then later qualified as "J" as an estimate, which is it. The summarizing of the analytical results in this manner provides little in a text setting as presented. It would be better to refer the reader to a graphic representation and interpret the findings. Furthermore, the section goes on to describe in the next paragraph the Inorganic constituents noting "Antimony, beryllium and cadmium were detected in only one sample at maximum concentration of k, 4.7, and 7.3 μg/l, respectively". Please identify what the k refers to.

39. Section 6.4.1, page 6-8, paragraph 2. This section discusses the contaminant fate and transport of VOCs. The potential contaminants of concern listed in the following sections include TCA, TCE, PCE, and VC. The migration of these chemicals is discussed, but the degradation is ignored. A discussion on the degradation pathways is warranted because VC is a degradation by-product of TCA, TCE, and PCE. It is also unclear why a discussion of contaminant fate and transport is not provided for SVOCs, since they are present at Site 4.

40. Figure 6-1. Numerous items are either missing or mislabeled on Figure 6-1. For instance, groundwater monitoring well locations 4GW107 and 4GW100 are omitted. Location 4GW101 is located incorrectly when compared to Figure 6-5. Samples GP-4A-R and GP-4A-C are labeled as RFI soil sample locations, but no reference is made to these samples in the document. The site title also appears incorrectly as Chemical Burn Area. Numerous groundwater monitoring well locations south or Dahlgren Road are omitted from this figure, and they should be included to agree with the text and figure 6-5. The appropriate corrections should be made.

41. Figures 6-2 & 6-3. Both figures display geotechnical information for SB12, however, the information provided is not consistent. The figures should be revised to show identical information for SB12 and all surface elevations.

42. Section 6.6, Page 6-18. This section discusses the conclusions for Site 4. It is stated that SSL screening for the inhalation pathway indicated a potential concern for human health. Given the exceedence of the SSL screen, the inhalation pathway should be assessed for this site. In addition, the screening against these SSLs should be included in the document.

43. Section 7.2.2 Hydrogeology, Page 7-2 states: "Figure 7-X", once again I believe this is an error in the text.

44. Section 7.3.1, page 7-3, paragraph 2. The list of subsurface soil parameters should be revised to include cyanide, explosives, and seven miscellaneous parameters.

45. Section 7.3.1, page 7-3, paragraphs 3 & 5. According to table 7-1, 18 metals were detected in the surface soil sample, contrary to the 21 metals reported in paragraph 3 for the subsurface soil samples. Paragraph 5 then correctly states that 18 metals were detected but excludes arsenic from the list. The text should be modified accordingly.

46. Section 7.3.3 Nature and Extent of Groundwater Contamination, Page 7-5: Once again describes the number of contaminants and concentrations which were detected. In one case it states in the third paragraph that several contaminants "chlorobenzene, toluene, and xylenes were detected in only one sample", the purpose of the Nature and Extent of Groundwater Contamination section is to interpret, analyze and examine the data. The report's inability to define in text which "one sample", shows the lack of data which is really presented.

47. Figure 7-4 shows a depiction of Site 7. It appears from my interpretation of the data that a well would be useful to the south of 7GW41 might be of interest. The analytical data to me suggests that volatile organic contamination is not only possibly present at site 7 but is also migrating from up-gradient to the northwest. This well could be a part of the OU-1 data collection effort.

48. Section 9.2, Site Characteristics, Page 9-2: describes the disposal of 7,200 pounds of these wastewaters over a 256 year period. At these levels correlating 7,200 gallons to approximately 1,000 gallons of fluid over 25 years would indicate the average disposal of 40 gallons a year. Based upon the infrastructure describing the leaching wells it seems questionable in regards to the level of effort of disposal. Please check if these numbers are correct.

49. Section 9.3.1, page 9-4, paragraph 2. This paragraph states the parameters for evaluating the subsurface soil samples. The list should be amended to include TAL metals plus cyanide and the two miscellaneous parameters and omit pesticides/PCBs.

50. Section 9.3.4, page 9-7, paragraph 6. This paragraph reports the results for PCB detections at Site 9, but the information for Aroclor-1260 is incorrect. The text should be amended to state Aroclor-1260 was detected in sample 9SS1010001 at 0.060 J mg/kg, not 0.02 mg/kg in sample 3SD1040001 as reported.

51. Figure 9-1. The list of groundwater sample locations on page 9-1 includes Army wells C-5, C-6, and C-14; water production well 9GWBLDG367; and temporary monitoring well 9TW002. It was not possible to find these sample locations on Figure 9-1, so they should be added to the figure.

    Since Westfarm Branch and Isherwood Road Stream are referenced in the document, they should be properly labeled on Figure 9-1. The majority of the surface water and sediment samples are not identified on Figure 9-1. The sample locations are assumed to be the blue triangles, but they need to be labeled and added to the legend.

52. Appendix B, Section 3.4. This section discusses the applicable data processing. The proper calculations should either be provided or explained in further detail. This should include the proper adjustments and qualifications used in analyzing the data. The

rationale for conducting azimuthal EM surveys at only 2 locations is unclear. The proper rationale should be provided in the text.

53. Appendix B, Section 4.1. The resistivity results for Site 9 (Bldg. 309) could be interpreted differently. Upon closer evaluation, fractures could remain present beyond the shallow bedrock. The criteria used to define the fractures should be explained in more detail, specifically what difference in zones of low resistivity is characterized as a fracture. Consequently this would apply to all sites tested. For all sites evaluated, the data reported in the text should correspond to the provided figures. Numerous discrepancies arise and should be corrected in the text.

54. Appendix B, Section 5.0. Site 4 and Site 7 constraints prevented extending the resistivity array further. The text should also include a discussion about the possibility of employing other methods. The text states that further investigations are warranted to locate leaching wells. For this reason, a conclusion and recommended actions should be added for further geophysical investigations.

55. Appendix B, Memorandum Report. Several discrepancies arise in the Memorandum Report on Geophysical Surveys for Site 9. A map locating the specific areas tested would help resolve some of the discrepancies. The other main points included deviations or omissions from the Work Plan (in the data acquisition section), omitting site or leaching well numbers and results, omitting information from the figures, providing incorrect figure numbers or directions or citations, and inconsistencies between the text and figures. These items should be investigated further and the appropriate changes made. The uncertainties and specific features encountered should be discussed in the summary. Additionally, further recommended actions should be included in the summary and conclusion.

56. Appendix G, Page ES-2. This page discusses the executive summary of the background investigation. The third bullet suggests that there is no bias in the sample locations for this report. However, the sample locations were selected based on project objectives and were hand chosen. This methodology is inherently biased. Random sample location selection is the recommended method to reduce bias in sample location. Because the sample locations are not unbiased, this statement should be removed from the report.

57. Appendix G, Figure 3-1. This figure depicts the background sample locations. The direction of groundwater flow is not depicted on the figure. The direction of groundwater flow should be provided.

58. Appendix G, Table 3-4, Page 3-17. This table presents the statistical summary of analytical results for background sediment. It is unclear how why the 95 percent UCL was calculated on a data set with only seven samples. The 95 percent UCL calculation is only valid on data sets with ten or more samples. In addition, it is unclear how the selected UCL was chosen when the W-test was not performed to determine the shape of the distribution. This table should be removed.

59. Appendix G, Table 3-7, Page 3-24. This table presents the statistical summary of analytical results for background surface water. It is unclear how why the 95 percent UCL was calculated on a data set with only seven samples. The 95 percent UCL calculation is only valid on data sets with ten or more samples. In addition, it is unclear how the selected UCL was chosen when the W-test was not performed to determine the shape of the distribution. This table should be removed.

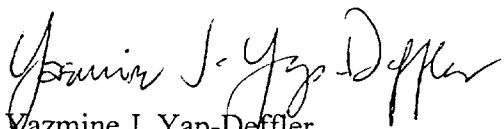
60. Appendix Q provides the Data Validation Memoranda. Several memoranda state TCLP results and analysis, but TCLP is not mentioned in the body of the report. It is also stated that COD analyses were performed on leachate samples. Since this statement is included for soil samples, it is assumed that TCLP is referenced. An explanation and citation to Appendix Q should be added to the text. Information pertaining to TCLP analysis should also be stated in the text.

At least three memoranda mention leachate samples, specifically from waste tanks. No sample numbers or site locations are provided for the leachate samples. It is unclear where and why these samples were collected. Adequate explanation and citation should be incorporated into the report.

48. Please provide site maps and databases including the analytical, drilling and locational data collected during this investigation in an electronic format. The site maps should either be in DXF, or AutoCAD format, databases may be in either MS Access or in a tab de-limited text file. Additionally, all databases and site maps should be supplied to CH2M Hill for inclusion in the work being performed in association with OU-1.

EPA toxicological comments will be forwarded to your office in a few weeks. If you have any questions regarding the above comments, please call me at (215) 814-3369.

Sincerely,



Yazmine J. Yap-Deffler
Remedial Project Manager
Federal Facilities Section

cc: Jeff Thornburg, MDE
Steven Richard, GSA