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LETTER AND U S EPA REGION III COMMENTS TO DRAFT REMOVAL FEASIBILITY STUDY REPORT SITE 22 BURN PAD NWS YORKTOWN VA
9/27/2010
U S EPA

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

Robert Thomson, P.E., R.E.M.
Office of Federal Facility Remediation

Direct Dial (215) 814-3357
Mail Code: 3HS11

Date: September 27, 2010

Mr. Thomas Kowalski
NAVFAC MIDLANT, Code EV3
9742 Maryland Avenue
Building N-26, Room 3208
Norfolk, VA 23511-3095

Re: Naval Weapons Station–Yorktown NPL site, Yorktown, Va.
Site 22 – Burn Pad
Review of draft *Feasibility Study Report*

Dear Mr. Kowalski:

Enclosed, please find the U.S. Environmental Protection Agency's (EPA's) comments pertaining to the review of the U.S. Navy's (Navy's) June, 2010 draft *Removal Feasibility Study Report* (FS) for Site 22, the Burn Pad, located at the Naval Weapons Station-Yorktown (NWS-Yorktown) NPL site:

GENERAL COMMENTS

1. Three of the four remedial alternatives evaluated in detail for the site include monitored natural attenuation (MNA) as a component of the alternative. The draft FS Report has not, however, presented sufficient evidence to show that MNA is a viable alternative for site groundwater, capable of remediating both chlorinated volatile organic compounds (VOCs) as well as hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) to remedial goals (RGs). Section 4.2.2, Alternative 2 – Monitored Natural Attenuation and Land Use Controls, on Page 4-3, states, "Reducing conditions predominantly present at the site are favorable for biologically mediated degradation of the chlorinated [contaminants of concern] COCs and RDX." The FS Report has not, however, presented sufficient data to show that the reducing conditions are actually degrading site contaminants over time. While the presence of vinyl chloride in site groundwater is one line of evidence to support degradation of trichloroethylene (TCE), EPA's Final Office of Solid Waste and Emergency Response (OSWER) Directive "Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites" (OSWER Directive Number 9200.4-17P) indicates that a three-tiered approach should be used to evaluate the potential efficacy of MNA as a remedial alternative. The three tiers, or lines of evidence, are as follows:

   (1) Historical groundwater data that demonstrate a "clear and meaningful trend" of decreasing contaminant mass and/or concentration over time at appropriate monitoring or sampling points.

(2) Hydrogeologic and geochemical data that can be used to demonstrate indirectly the type(s) of natural attenuation processes active at the site, and the rate at which such processes will reduce contaminant concentrations to required levels. A decrease in parent products (such as TCE) coupled with an increase in daughter products (such as cis-1,2,-dichloroethene and vinyl chloride) could be used to demonstrate biodegradation.

(3) Data from field or microcosm studies which directly demonstrate the occurrence of a particular natural attenuation process at the site and its ability to degrade the contaminants of concern (typically used to demonstrate biological degradation processes only).

The OSWER Directive further states, "Unless EPA or the implementing state agency determines that historical data (Number 1 above) are of sufficient quality and duration to support a decision to use monitored natural attenuation, EPA expects that data characterizing the nature and rates of natural attenuation processes at the site (Number 2 above) should be provided. Where the latter are also inadequate or inconclusive, data from microcosm studies (Number 3 above) may also be necessary." Since limited historical data have been presented to show a clear and meaningful trend of decreasing concentration over time, additional lines of evidence are necessary. Please revise the FS Report to provide supporting documentation and an evaluation of the efficacy of using MNA as a remedial alternative at the site. EPA's *Technical Protocol for Evaluation Natural Attenuation of Chlorinated Solvents in Groundwater* (September 1998) should be consulted for this evaluation. Additional discussions should also focus on degradation processes applicable to RDX as the FS Report currently does not provide sufficient evaluation of the degradation processes applicable to this constituent. RDX metabolites and breakdown products should be identified and quantified.

2. No laboratory treatability studies or field pilot studies are proposed for Alternative 3, In Situ Chemical Oxidation (ISCO) and Performance Monitoring with Monitored Natural Attenuation and Land Use Controls, or Alternative 4, Enhanced Reductive Dechlorination (ERD) and Performance Monitoring with Monitored Natural Attenuation and Land Use Controls. Although neither of these alternatives is selected as the preferred alternative, all relevant technology and options for a given alternative should be presented so the regulatory agencies and the public can make a decision on the selection of an alternative. Pilot tests would likely better determine the effectiveness of ISCO and ERD, particularly with respect to remediating RDX, and to determine optimal spacing for injection locations and optimal quantities needed for substrate addition. Appendix D, Reagent Evaluation: ISCO and ERD, acknowledges that "case studies exist that show permanganate can also be effective for treating RDX", but information regarding whether or not ISCO has reported success with full-scale implementation is not provided. The section on ERD in Appendix D does not address RDX at all, so it cannot be determined whether RDX could successfully be remediated with this technology. Given the uncertainties associated with these technologies for remediating RDX, it is recommended

that pilot studies be included for Alternatives 3 and 4. The cost comparison of the alternatives should take cost of pilot tests into account.

SPECIFIC COMMENTS

3. **Section 2.2.1, Nature and Extent of Contamination, Pages 2-2 and 2-3:** The Analytical Results subsection states that no VOCs were detected in the four deep monitoring wells screened in the bottom 10 feet of the Yorktown-Eastover aquifer, but the FS Report does not indicate whether or not RDX was detected in the deep monitoring wells. Figure 2-1, Site-Related COCs – Detected in Groundwater, does not show any detected results for the deep wells. For clarity and to support the evaluation of remedial alternatives, please revise the FS Report to indicate whether any site COCs, including RDX, were detected in the deep monitoring wells.

4. **Section 2.2.2, Risk Assessment, Page 2-3:** Heptachlor epoxide and arsenic were identified as constituents of concern (COCs) in the human health risk assessment (HHRA), but these chemicals "were determined to be unrelated to site activities" and "no additional action is required" for these chemicals. Please revise the FS Report to provide a summary on how it was determined that heptachlor epoxide and arsenic are unrelated to site activities and require no further action (i.e., provide data that nullified the HHRA determination).

5. **Section 2.2.2:** The second sentence of the first paragraph should indicate that the pathway not quantitatively evaluated in the risk assessment was vapor intrusion.

6. **Section 2.2.3, Conceptual Site Model, Page 2-4**: The source of groundwater contamination in the northern portion of the site, in the vicinity of wells YS22-GW02 and YS22-GW11, is not defined. In the Sources of Contamination and Migration subsection, it is noted that "the most highly contaminated soils at Site 22 have been previously removed" and "contaminant concentrations in the groundwater…at Site 22 are likely to decrease in the future because no source is present…" Excavation areas and detected concentrations in groundwater are shown on Figure 2-1, Site-Related COCs – Detected in Groundwater; however, wells YS22-GW02 and YS22-GW11, which reported concentrations of TCE, vinyl chloride, and RDX above screening criteria, are located north/northwest and upgradient of the closest excavation area. Based on the limited data and evaluation provided in the FS Report, it is not apparent that the source of the groundwater contamination in the northern portion of the site has been removed. Please revise the FS Report to identify the likely source of groundwater contamination in the northern portion of the site, and indicate whether any soil contamination was identified in this area of the site.

7. **Section 2.2.3, Conceptual Site Model, Page 2-5:** In the discussion of the fate and transport of RDX, the FS Report states, "…available literature indicates that RDX may degrade slowly under reducing conditions through intermediate degradation products." The literature sources referenced in this statement have not been cited in the FS Report.

Please revise the FS Report to provide proper citations for any documents or literature referenced.

8. **Section 2.2.4:** The draft FS concludes that TCE, VC and RDX are considered site-related CoCs because they are "present at the site." However, per Section 2.2.2, arsenic and heptaclor epoxide were also observed in groundwater at the site, but eliminated because they were "determined to be unrelated to site activities." This contradicts the rationale provided in Section 2.2.4 for identifying CoCs. The draft FS should be revised so that the language explaining CoC selection is consistent.

9. **Figure 2-1, Site-Related COCs – Detected in Groundwater:** Figure 2-1 shows that concentrations of TCE, vinyl chloride, and RDX were detected above screening criteria in the northernmost upgradient shallow wells (YS22-GW02 and YS22-GW11). It is not apparent from this figure that the upgradient extent of contamination in groundwater has been defined. If wells from Site 4, located immediately north of the Site 22, are being used to define the upgradient boundary, the Site 4 wells should be identified and detected concentrations in these wells should be included in the Site 22 figures. Please revise the FS Report to discuss the upgradient extent of contamination in groundwater and show that it is adequately bounded. If there are no Site 4 wells screened at appropriate depths and locations to serve as upgradient boundary wells, additional monitoring wells north of Site 22 may be necessary.

10. **Figure 2-1, Site-Related COCs – Detected in Groundwater:** A note on this figure indicates that concentrations shaded in green exceed regional screening levels (RSLs); however, this approach was not consistently applied. For example, TCE concentrations in wells YS22-GW08, YS22-GW05, and YS22-GW02 are shaded green; however, all detected concentrations in these wells are below the TCE RSL of 1.7 ug/l provided on the figure. Please revise Figure 2-1 to address these discrepancies. In addition, provide the source of the TCE RSL of 1.7 micrograms per liter (ug/l) as the published TCE RSL is 2.0 ug/l.

11. **Figure 2-2, Field Parameters and Geochemistry Results:** Dissolved oxygen (DO) measurements were not collected at two of the shallow wells (i.e., YS22-GW10, YS22-GW02). Please revise Figure 2-2 to include a note to explain why DO measurements were not collected at wells YS22-GW10 and YS22-GW02.

12. **Section 2.2:** On page 2-2 state that Trichloroethene (TCE) was detected in samples from 9 of the 12 shallow monitoring wells (maximum concentration of 650 micrograms per liter from YS22-GW-10). Figure 1-4 aquifer potentiometric surface map shows well YS22-GW-10 as the most downgradient well from site 22. There is no data to delineate the TCE plume at the south of site 22.

13. **Section 2.2.2** on page 2-4 states that no contaminants of concern (COC) for ecological receptors were identified for surface water or sediment at Site 22. Similarly, no COCs were identified for food web exposures. Thus, risks to ecological receptors were

considered acceptable. No further action was recommended for ecological receptors at Site 22. It is unclear from this statement if potential future risk from discharging groundwater was addressed as part of the ecological risk assessment (ERA). Figure 2-1 shows that groundwater from wells 04, 10, and 11 have trichlorethene (TCE) concentrations of 69 micrograms/liter (µg/l), 650 µg/l, and 160 µg/l, respectively, in excess of EPA BTAG screening levels for freshwater (21 µg/l) indicating that ecological risk is possible should this groundwater discharge into adjacent creeks. If this migration pathway was not addressed as part of the ERA, it will need to be addressed as part of the FS.

14. **Figure 2-3, Conceptual Site Model (CSM):** This figure shows the approximate extent of TCE and RDX in groundwater exceeding their applicable remedial goals (RGs), but the figure does not show the extent of vinyl chloride (VC) exceeding its remedial goal. Section 3.3.1 explains that the laboratory detection limit of 10 ug/l was higher than the VC RG (2 ug/l). Since vinyl chloride is also a site COC, it should be included on the figure to show extent of VC exceeding the laboratory detection limit. In addition, a note explaining why VC exceeding its RG cannot be depicted should be included on the figure. Please revise Figure 2-3 accordingly.

15. **Section 3.2, Remedial Action Objectives, Page 3-2**: The Remedial Action Objectives (RAOs) for the site are too general. EPA's RI/FS Guidance states that RAOs should be as specific as possible without limiting the range of potential alternatives. RAOs should also specify the following: the contaminant(s) of concern, exposure routes and receptors, and an acceptable contaminant level or range of levels for each exposure route (i.e., RGs). Revise the FS Report to develop more specific RAOs for the site which include the above-noted items. The RAOs should reduce contaminant concentrations in groundwater to site-specific RGs, rather than "to the maximum extent practicable."

16. **Section 3.2** on page 3-2 states that the remedial action objectives (RAO) for the protection of human health and the environment for groundwater are to reduce contaminant concentrations in groundwater to the maximum extent practicable and maintain land use controls until contaminant concentrations in groundwater allow for unlimited use and unrestricted exposure at Site 22. An additional RAO should be to prevent the migration of contaminated groundwater to adjacent surface water bodies to prevent exposure and potential risk to ecological receptors. The development of preliminary remedial goals discussed in Section 3.3.1 will also need to address this issue to protect ecological receptors in adjacent surface water bodies. As discussed above, an additional RAO is warranted since TCE concentrations in three groundwater wells exceed EPA BTAG screening levels for freshwater.

17. **Section 3.3, Applicable or Relevant and Appropriate Requirements (ARARs), Pages 3-2 and 3-3:** This section includes a discussion of ARARs but it does not mention whether there is any guidance or other recommended federal, state, or local criteria that should be identified as "to be considered" (TBC) criteria in the development of remedial action alternatives. TBCs are not generally enforceable but are advisory. An example of a TBC would be use of EPA RSLs or Health Advisories for specific chemicals in

determining action or cleanup levels. Please revise the FS Report to identify and include a discussion of potential TBCs.

18. **Section 3.3.1, Development of Risk-Based Preliminary Remedial Goals, Page 3-4:** The second paragraph under the Human Health Remedial Goals subsection notes that "the same exposure assumptions used in the HHRA to estimate intake via ingestion, dermal contact, and inhalation from groundwater were used for the risk-based cleanup goal calculations" for RDX. Please revise the FS Report to document the exposure assumptions used so that the PRG calculations for RDX can be verified, and to assure that the most up-to-date and adequately protective exposure parameters were used.

19. **Section 3.3.1, Development of Risk-Based Preliminary Remedial Goals, Page 3-4:** Under the Extent of Site-Related COCs Exceeding RGs subsection, the statement "Couldn't we at least show where VC exceeded 10?" should be removed from the FS Report since it appears to be an artifact of the internal review. Please revise the FS Report accordingly.

20. **Section 3.3.1:** Contrary to the first sentence, risk-based PRGs were not developed for TCE and VC in groundwater because MCLs are available. (Refer to the second paragraph in this section.) The first paragraph should be modified to reflect this.

    Regarding the paragraph describing the extent of site-related CoCs exceeding RGs, the following points should be noted:

    - The analytical detection limit for VC should be low enough to ensure the remediation goal (2 ug/L) is met. A detection limit of 10 ug/L is not sufficient.

    - Because of high detection limits for VC, the draft FS assumes that the VC isoconcentration contours are similar to TCE. However, VC is much lighter than TCE and, presumably, has the potential to move faster than TCE in groundwater.

21. **Section 4.2.2, Alternative 2 – Monitored Natural Attenuation and Land Use Controls, Page 4-3:** The third full paragraph on this page describes calculating first-order decay rates, and the estimated time frame to achieve remedial goals under Alternative 2. No supporting documentation of these calculations has been provided. The FS Report has not provided the 1997 or 2006 data nor has it described exactly which decay rates were used to calculate the estimated time frame to achieve remedial goals (i.e., the site-specific decay rates or theoretical rates). Additionally, the estimated time frame for achieving RGs of 34 years is for TCE only. The FS Report does not appear to have calculated an estimated time frame to achieve RGs for vinyl chloride or RDX. As the time frame to achieve RGs is a factor in selecting a remedial alternative, it is imperative that all COCs be considered when estimating a time frame for cleanup. Please revise the FS Report to calculate decay rates and time frame estimates for all COCs, including RDX and vinyl chloride, and provide supporting documentation for all calculations. This comment also applies to clean up estimates for Alternatives 3 and 4.

22. **Section 4.2.2, Alternative 2 – Monitored Natural Attenuation and Land Use Controls, Page 4-3:** The last paragraph on this page discusses the proposed monitoring associated with Alternative 2. The FS is not proposing to monitor groundwater in the deep wells onsite nor is it proposing to monitor surface water concentrations. Although no VOCs were detected in the deep wells during the previous investigation as noted on Page 2-2, it is recommended that at least a subset of the deep wells be included in the monitoring program, possibly on a reduced sampling schedule, to verify that contamination is not migrating vertically and beyond its current configuration. Additionally, it is recommended that surface water samples be collected at the leading edge of the plume to verify that groundwater is not discharging to surface water at potentially unacceptable levels. Further, no degradation products of RDX have been proposed for analysis. Therefore, it is unclear how the degradation of RDX will be monitored. Please revise the FS Report to incorporate sampling of deep wells and surface water into the monitoring plan, or provide adequate justification for not including this sampling. Additionally, please propose to monitor RDX degradation products in an effort to better monitor its degradation, or provide justification for not doing so. This comment also applies to Alternatives 3 and 4 since periodic monitoring has also been proposed for these alternatives.

23. **Section 4.2.2:** Page 4-3, Iron and manganese are identified as "...sensitive metals." The reasons iron and manganese are sensitive metals need to be provided.

24. **Section 4.2.2:** Alternative 2 MNA states that reducing conditions predominantly present at the site are favorable for biological remediation of the chlorinated COCs and RDX, however, the draft FS fails to present a technical course of action that allows converging lines of evidence to be used to scientifically document the occurrence of natural attenuation and to quantify the rate it which it is occurring. As mentioned above, the EPA OSWER Directive 9200.4-17 (1997) identify 3 lines of evidence that can be used to estimate natural attenuation of chlorinated hydrocarbons , including:

    a) Historical groundwater and/or soil chemistry data demonstrate a clear and meaningful trend of decreasing contaminant mass and/or concentration over time at appropriate monitoring or sampling points. (in the case of groundwater plume , decreasing concentration should not be solely the result of plume migration).
    b) Hydrogeologic and geochemical data that can be used to demonstrate indirectly the type(s) of natural attenuation process active at the site, and the rate at which those processes will reduce contaminant concentration s to require levels. For example , characterization data may be used to quantify the rates of contaminants sorption, dilution or volatilization or to demonstrate and quantify the rates of biological degradation processes occurring at the site.
    c) Data from field or microcosm studies (conducted in or with actual contaminated site media) which directly demonstrate the occurrence of a particular natural attenuation process at the site and its ability to degrade the contaminants of concern.

    Unless EPA or the implementing state agency determines that historical data (paragraph (a) above) are of sufficient quality and duration to support a decision to use MNA , EPA

expects that data characterizing the nature and rates of natural attenuation processes at the site (paragraph (b) above) should be provided. Where the latter are also inadequate or inconclusive, data from microcosm studies (paragraph (c) above) may also be necessary.

25. **Section 4.2.3, Alternative 3 – In Situ Chemical Oxidation and Performance Monitoring with Monitored Natural Attenuation and Land Use Controls, Page 4-5:** A pre-design investigation to refine the extent of contamination in groundwater has been proposed as part of Alternative 3. This investigation would include collecting groundwater samples at 64 locations along four transects. The proposed sample locations have not been shown on a site figure. To aid in an understanding of the proposed investigation, please include a figure that shows the proposed boring locations and transects in relation to the existing contamination.

26. **Section 4.2.3:** Alternative 3 ISCO states that prior to design of the ISCO alternative, a pre design investigation is recommended to refine the lateral and vertical extent of site related groundwater COCs in the vicinity of the target treatment areas. Please note that this pre-design investigation must be performed irrespective of the remedy selected.

27. **Section 5, Detailed Evaluation of Alternatives, Pages 5-1 through 5-10:** The FS Report has not included a detailed discussion of the individual alternatives with respect to the first seven of nine evaluation criteria. Only a summary table has been presented (Table 5-2, Detailed Evaluation of Remedial Alternatives). EPA's RI/FS Guidance states, "The analysis of individual alternatives with respect to the specified criteria should be presented in the FS report as a narrative discussion accompanied by a summary table....This discussion should focus on how, and to what extent, the various factors within each of the criteria are addressed. The uncertainties associated with specific alternatives should be included when changes in assumptions or unknown conditions could affect the analysis." Please revise the FS Report to present a narrative discussion of the alternatives against the evaluation criteria in consideration of the factors described in the RI/FS Guidance.

28. **Section 5.2:** Page 5-5, Eight sustainability metrics for NAVFAC are bulleted and include ecological impacts. According to Table 5-1, ecological impacts are only associated with short-term effectiveness. It is uncertain why ecological impacts are not included under long-term effectiveness and permanence. Protection of ecological receptors is equivalent to environmental protectiveness and is a threshold criterion and cannot only be considered over just the short term. This apparent deficiency must be addressed.

29. **Section 6** on page 6-1 states that the cost versus benefit (such as length of time, sustainability) comparison indicates that although Alternative 2 takes longer to reach RAOs, it is more cost effective and more sustainable than the other alternatives presented. Therefore, Alternative 2 is the preferred alternative for remediation of groundwater contamination at Site 22. EPA BTAG agrees with the selection of this alternative provided the short-term risk to ecological receptors from discharging groundwater in excess of BTAG screening levels is addressed.

30. **Appendix A, ARARs:** The site is located adjacent to the Eastern Branch of Felgates Creek and its unnamed tributary, yet Appendix A has not identified ARARs specific to wetlands and floodplains. Please revise the FS Report to clarify whether ARARs for wetlands or floodplains would apply to the site, and identify specific ARARs.

31. **Appendix C, Preliminary Cost Estimates, Alternative 2: MNA and LUCs:** The following comments were generated with respect to Alternative 2's cost estimate:
    - For Operation and Maintenance Costs (Years 1 through 4), 14 annual land use control inspections are estimated. It appears that only four annual inspections would be needed for Years 1 through 4. Please address this discrepancy and revise the cost estimate as appropriate.
    - For Operation and Maintenance Costs (Years 5 through 34), 14 annual land use control inspections are estimated. It appears that several additional annual inspections would be needed since Years 5 through 34 spans 30 years. Please address this discrepancy and revise the cost estimate as appropriate.

    Please note that Alternatives 3 and 4 also include the incorrect number of annual land use control inspections and should be corrected as well.

32. **Appendix C, Preliminary Cost Estimates, Alternative 3: ISCO and Performance Monitoring with MNA and LUCs:** The following comments were generated with respect to Alternative 3's cost estimate:
    - Item Number 8 under "Key Assumptions" indicates that monitoring will be conducted until RAOs are achieved (34 years). According to Section 4.2.3, RAOs for Alternative 3 should be achieved within 25 years, not 34. Please address this discrepancy and revise the cost estimate as appropriate.
    - Item Number 9 under "Key Assumptions" states that "sensitive inorganic constituents" would be analyzed, but the specific constituents to be analyzed have not been defined. Please define the sensitive inorganic constituents that will be analyzed.
    - Item Number 14 under "Key Assumptions" references bench-scale studies for information pertaining to the permanganate oxidant demand, but it is unclear to which specific bench-scale studies this comment refers. Please provide further information on the bench-scale studies.

This concludes EPA's review of the Navy's June, 2010 draft *FS* for Site 22, located at the NWS-Yorktown NPL site. If you have any questions, please feel free to call me at (215) 814-3357,

Sincerely,

Robert Thomson, P.E., R.E.M.
Federal Facility Remediation (3HS11)

Cc: Wade Smith (VaDEQ, Richmond)
Dawn Ioven (USEPA, 3HS41)
Herminio Concepcion (USPEA, 3HS41)
Bruce Pluta (USEPA, 3HS41)