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LETTER OF TRANSMITTAL AND U S EPA REGION IV COMMENTS ON DRAFT FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 9 (OU 9) SITE 36 AND SITE 37 NAS CECIL FIELD FL

8/24/1999

U S EPA REGION IV

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4

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Commanding Officer
Attn: Mark Davidson
Mail Code1879
Southern Division
SOUTHNAVFACENGCOM
P.O. Box 190010
North Charleston, South Carolina 29419-9010

Subject: Draft Feasibility Study Report for Site 36 - Control Tower TCE Plume and Site 37 - Hangars 13 and 14 DCE Plume, Naval Air Station Cecil Field, Jacksonville, Florida

Dear Mr. Davidson:

The U.S. Environmental Protection Agency has completed its review of the subject report. Our comments are enclosed. If you have any questions, please contact me at 404/562-8539.

Sincerely,

Deborah A. Vaughn-Wright
Remedial project Manager

Enclosure

cc: Mike Deliz, FDEP
Scott Glass, SOUTHDIV
Mark Speranza, TTNUS
Norm Hatch, CH2M HIll

U.S. Environmental Protection Agency, Region IV, Comments on:

Draft Feasibility Study Report for Site 36 - Control Tower TCE Plume
and
Site 37 - Hangars 13 and 14 DCE Plume,
Naval Air Station Cecil Field, Jacksonville, Florida
dated June 1999[FS]

General Comments

1. With respect to the groundwater alternatives evaluated, it was discouraging to see that no alternative was developed and evaluated which remediated groundwater in under 55 years, even with source remediation. Monitored natural attenuation estimates indicate compliance with Preliminary Remediation Goals (PRGs) at approximately 80 years.

The reduction in years necessary to reach PRG compliance with most of the active remediation technologies does not appear to be substantially significant over natural attenuation alone. Alternative 4 (Pump and Treat) was the only alternative which aggressively addressed the entire plume (PRG attainment 55 years). Alternatives 3A (PRG attainment 70 years) and 3B (PRG attainment 70 years) focused on groundwater hotspot remediation with natural attenuation components, while Alternative 5, which consisted of a passive technology - Permeable Reactive Barriers (PRG attainment 80 years), was designed as a containment technology to prevent the continued migration of the plume. The Feasibility Study (FS) states that Alternative 4 could be modified, to some extent, to reduce the number of years required to achieve PRGs, but would entail a correspondingly increased cost. These increased cost scenarios should be presented. Consideration should be given to adding additional alternatives which actively remediate larger areas rather than concentrating on the groundwater hotspots. Alternatives 3A and 3B can be modified to actively remediate larger areas other than solely concentrating on the groundwater hot-spots. The purpose of these additional alternatives would be to assess impacts of actively remediating larger areas of groundwater contamination on the years necessary for PRG attainment to see if a significant reductions could be made. These points should be addressed in the FS.

2. The FS includes MNA as viable remedial options for Sites 36 and 37. Plumes associated with these sites include chlorinated VOCs. If MNA is to be considered as a viable remedy, breakdown products of the COCs should be considered for development of PRGs, specifically with respect to the chlorinated VOCs. These points should be addressed in the FS.

4. The groundwater alternatives evaluates Air Sparging/Soil Vapor extraction (AS/SVE) and groundwater extraction as separate alternatives. "Dual-Phase Extraction" technology

should be evaluated within the FS. In many instances, utilizing Dual-Phase Extraction technologies appear to speed up cleanup times significantly over groundwater extraction or AS/SVE alone.

Specific Comments

1. **Page 1-31, Section 1.3.3.4.4:** The intermediate aquifer was not discussed. This information should be added. If insufficient data is available, so state.

2. **Section 1.3.4.3, page 1-31** precedes Section 1.3.3.4.4 on that page and appears to be numbered incorrectly.

3. **Section 1.3.3.4.4, page 1-37** presents a ground-water velocity for Site 36, shallow zone, that apparently relies on one specific capacity measurement (Table 1-1). In Section 1.3.3.4.2, pages 1-29 and 1-30, data from a previous investigation in the vicinity of Site 36 indicates the hydraulic conductivity of the shallow zone is higher, on average, than the one estimate for Site 36 presented in Table 1-1. The hydraulic conductivity estimated from the specific capacity data in Table 1-1 appears anomalously low relative to other Cecil Field data. Therefore, it should probably not be considered as representative of Site 36 data as a whole. Consideration should thus be given to recalculating the Site 36 ground-water velocity using the average of available hydraulic conductivity data from that area.

4. **Page 1-67, Figure 1-14:** This figure indicates chemical concentrations utilizing orange contours. The legend does not define/reference the significance of these contours. The figure legend should be revised to define the significance of the orange contours.

5. **Page 1-86, Section 1.4.1.1.3**. This section states that surface water data for Site 36 is presented in Table 1-8. However, Table 1-8 presents data for Site 37 soils. Surface water data for Site 36 appears to be absent. This data should be included in the report and referenced within the text appropriately.

1. **Page 1-99, Paragraph 2, Section 1.4.1.2.1,**. The fourth line of this paragraph contains an incomplete sentence "This investigation showed that the soil in this area is". This sentence should be completed.

2. **Page 1-112, Section 1.4.1.2.2,** Under the summary header in this section, the report states that one chlorinated compound plume has as a primary component "TCC". This should be changed to "TCE". Additionally, in the same paragraph, the second chlorinated plume as defined by DCE states that the other primary components include "DCE". This should be changed to state "DCA".

3. **Page 1-121, Section 1.4.2.2.1,** This section states that the cumulative potential cancer risk associated with the maximum detected ranges for several potential COCs was 8.2E-06. The receptor category (e.g., future construction worker, resident) for this risk should be included to clarify the risk.

4. **Page 2-5, Table 2-1,** Table 2-1 identifies Federal chemical-specific ARARS. One of the Remedial Action Objectives (RAOs) as specified in Section 2.1.1 (Page 2-1) is to prevent contaminant migration from groundwater to surface water. As such, it would be appropriate to include Federal ambient water quality criteria as an ARAR.

6. **Table 2-2**. It is noted that with respect to Florida's ground-water guidance concentrations, EPA considers those values as "to be considered" criteria, unless they are legally enforceable (per CERCLA Section 121(d)(2)(A)(ii)), in which case they would be relevant and appropriate.

5. **Page 2-11, Section 2.1.4.1** This section states that soil COCs were established based on maximum concentrations of contaminants exceeding the Florida Department of Environmental Protection (FDEP) leachability criteria standards. This section lists three contaminants; ethylbenzene, toluene and xylene as being soil COCs based on comparison to FDEP leachability criteria. These are the three contaminants in Site 37 soils that exceeded the FDEP leachability criteria. As can be seen in Table 1-20, seven contaminants, which include the four BTEX compounds and three semivolatile compounds, exceed the FDEP leachability criteria. It is unclear why the four additional contaminants were not also selected as soil COCs (benzene, 1-methylnaphthalene, 2-methylnaphthalene, and naphthalene). Justification should be provided.

6. **Page 2-11,Section 2.1.4.2** This section lists the COCs which exceeded screening criteria and are to be carried forward for development of PRGs. Several compounds as identified in Tables 1-17, 1-18, and 1-19; specifically ethyl benzene, vinyl chloride, and cis-1,2-dichloroethene exceeded screening criteria including MCLs and Florida groundwater cleanup target levels, but were not identified in this section as requiring a PRG. Additionally, six semivolatiles; 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, 2-methylphenol,, 3-methylphenol, and 4-methylphenol (Table 1-18) also exceeded groundwater screening values for which no PRGs were developed. Clarification is warranted as to their elimination as COCs.

7. **Page 2-12, Section 2.2.1**. This section lists the soil PRGs for the three soil COCs for Site37. As indicated in a previous comment, seven compounds detected in Site 36 soils exceeded FDEP leachability criteria, including the three contaminants listed for Site 37. A comparison of Site 36 (Table 1-20) and Site 37 (Table 1-21) soil data clearly indicates that Site 36 soil data has much higher concentrations. It is unclear why Site 36 does not have any soil COCs. Clarification is warranted.

8. **Page 2-13, Section 2.2.2** The table on this page which identifies site-specific PRGs indicates by the footnote that the PRG values were based on the "Groundwater Cleanup Target Levels groundwater criterion" from the state of Florida as opposed to the site specific risk-based Groundwater Cleanup Target Levels (GWCTL) as indicated in tables 1-17, 1-18,and 1-19. Justification as to why, in cases where the risk-based GWCTL were lower than the FDEP criterion, risk-based GWCTL were not used.

9. **Page 2-13, Section 2.2.2** It appears that the PRG values identified on this page for 1,2-DCA and 1,1-DCE are reversed. This is based on the cited values indicated on Table 1-18 which indicates a FDEP criterion of 3 micrograms per liter (ug/l) for 1,2-DCA and 7 ug/l for 1,1-DCE. The values cited as PRGs on page 2-13 should be verified.

7. **Section 2.4 Estimated Volumes of Contaminated Media,** presents a volume of benzene-contaminated ground water of 104,700,000 ft^3. Based on a review of Figure 1-11, Figure 1-13, Figure 1-15, and Figure 1-17 and considering a maximum potential thickness of the surficial aquifer of approximately 100 feet, an alternate estimate for the volume of contaminated media (soil and ground-water combined) is approximately 69,420,000 ft^3. This alternative estimate assumes contamination extends across a 100-foot thickness of the aquifer, and it does not separate that total volume into aquifer material and ground-water components. If the separation is made considering a total porosity of 0.35, the volume of ground water contaminated by benzene at concentrations above 1 ug/L is probably less than 25,000,000 ft^3. This value is still a huge volume but is considerably less than the volume reported in the FS Report. That FS Report value, and other volumetric estimates in Section 2.4 should be reevaluated to be certain they are reasonable estimates.

8. **In Table 3-1, page 3-3,** the capping technology screening comment needs to indicate capping would reduce infiltration, not filtration.

10. **Page 3-8, Section 3.2.2.1** This section states that institutional controls would effectively prevent unacceptable risks to human and ecological receptors from direct exposure of soils. One of the RAOs for soils is to prevent soil to groundwater contamination. This option does not meet this RAO. Therefore, this option would require additional options to meet this objective. This should be addressed in the FS. Also, how would institutional controls prevent unacceptable risks for ecological receptors?

9. On **page 3-14**, the conclusion is made that soil washing-chemical extraction should be eliminated from further consideration because of significant concerns about its effectiveness. The discussion under the Effectiveness heading on page 3-13 does not make a compelling case that such effectiveness concerns exist. That effectiveness discussion should either be "beefed up" to show the concern about the effectiveness, or the rationale for eliminating the soil washing-chemical extraction technology from further consideration needs to be changed.

11. **Page 3-15, Section 3.2.6.2** Under the subheading "implementability" for the technology On-site Land Farming, a contaminated soil quantity of 2,000 cubic yards is quoted. The basis for estimation of the quantity of contaminated soil should be supported in the report.

12. **Page 3-24, Table 3-2** As seen in this table, vertical barriers were eliminated, yet Permeable Reactive Barriers (PRBs) under the heading of In-Situ Treatment was retained. As proposed in this FS, the PRB is acting as a vertical containment barrier. The vertical barriers considered were extraction wells and collection trenches, and were eliminated

because these technologies would require re-injection. *In situ* Biological treatment technologies considered in this FS such as Oxygen Release Compound (ORC) and Hydrogen Release Compound (HRC) can be utilized in a containment configuration where a biological wall is constructed that treats the plume as it passes through. While this technology was only evaluated for remediation of hot-spots, it should also be evaluated as a containment technology.

13. **Page 3-33, Section 3.5.4.1** Under the "effectiveness" subheading for In-Situ Aerobic/Anaerobic Biological Treatment, it should be noted that other potentially harmful degradation (daughter) products may be produced, particularly with respect to anaerobic degradation. If this process option is implemented, degradation (daughter) products of this process should be considered COCs at the site and should have PRGs developed for them.

10. **Table 3-2**, page 3-27 rejects subsurface discharge as an option for discharge of treated ground water because of the shallow depth to ground water at the site. This is a valid rationale if the only option for such discharge of treated water was to the surficial aquifer. However, there is a potential for discharge to deeper aquifers that would not be adversely affected by the depth to the water table. Therefore, some additional or more universal reason for rejecting the technology should be presented here.

11. **Table 3-2** presents enhanced ex-situ oxidation of extracted ground water as a physical treatment process, when it should be included as a chemical treatment option.

12. With regard to the option of effectiveness for natural attenuation in ground water (**reference Section 3.5.2.3)**, the text should make some statement regarding the understanding (or lack thereof) of processes that collectively represent the natural attenuation potential for Site 36 and Site 37. The text, as written, really doesn't say anything about the effectiveness of the natural attenuation processes.

13. **Page 4-6, Section 4.2** This section states that no remediation of soil is required for Site 36. As seen in Table 1-20, Site 36 had concentrations of four VOCs and 3 semivolatile contaminants which exceeded FDEP leachability criteria. Additionally, three of these contaminants, benzene, ethyl benzene and xylene also exceeded Site 36 groundwater screening criteria (Table 1-17). Clarification as to why these contaminants are not considered soil COCs should be provided.

14. Recommend including a statement about specifying numbers of samples and frequencies of sampling for costing purposes only in Section 4.2.2.1, since the details of monitoring in Alternative 2 might be subject to revision or modification during the design or implementation phases of the remedial action.

14. **Page 4-12, Section 4.2.2.2** Under the subsection "Short-term Effectiveness" the report states that the institutional controls alternative for soil at Site 37 would be achieved. This does not appear to be correct. One of the RAOs is to prevent contaminant

migration from soil to groundwater. This alternative does not restrict soil contamination to groundwater. In fact the groundwater, already contaminated with soil COCs above screening criteria, would remain to act as a potential continuing source of contamination. Additionally, the FS acknowledges in the "Compliance with ARARs and TBCs" subsection that this alternative does not meet chemical-specific ARARs. The ability of institutional controls to be the sole component of an alternative to address soil contamination is not supported by the FS. This point should be addressed in the FS.

15. **Page 4-17, Section 4.2.3.1** This section states that 16 vapor extraction wells are to be used as part of Soil Alternative 3. The text indicates that the effective area of influence of the extraction wells is 700 ft^2. The effective area of influence value should be substantiated in the report. Additionally, nowhere in the FS is there a figure/map which delineates the area of soil which requires remediation. This should be included in this section so that an evaluation as to the adequacy of the estimated 16 vapor extraction wells can be made.

15. **Section 4.2.3.1** specifies that an SVE system would be operated for a two-year period. Some basis for this assumption needs to be provided or referenced here, particularly since the statement is very definitive.

16. Similar to the above comment on Alternative 2, specific details of the SVE system (reference **page 4-127**) should either probably be identified as estimates provided for costing purposes or those details should be qualified because of some level of uncertainty regarding the actual system requirements.

17. **At the bottom of page 4-19**, the text references Alternative 2 when it should reference Alternative 3.

18. Similar to the comment on Alternative 2, specific details of the monitoring component of the natural attenuation alternative on **page 4-31** should either probably be identified as estimated values provided for costing purposes or the details should be qualified because of some level of uncertainty regarding the actual monitoring requirements.

16. **Page 4-35, Section 4.3.3.1** This section states that it was assumed that 1,250 direct push technology borings and 15 lbs. of ORC/HRC would be required for this alternative. The basis for the numbers of borings be should be supported. Additionally, supporting documentation from "Regenesis Bioremediation Products" to justify the 15 lbs. per location should be provided.

17. **Page 4-35, Section 4.3.3.1** A component of Groundwater Alternative 3A is natural attenuation. As indicated in Appendix B of the FS, with source remediation, the time frames are between 10 to 20 years post source remediation for Site 36, and between 40 to 60 years post source remediation for Site 37 to achieve PRGs. With the exception of the Site 36 plume under a source remediation scenario, the other natural attenuation scenarios do not support natural attenuation within a "reasonable" time frame, given the time frame

to achieve PRGs. Therefore, a natural attenuation component should be justified over a more aggressive technology.

19. **Page 4-37, Figure 4-5:** Explain what are the pros/cons of the three groundwater collection options.

20. **On page 4-42**, the wording in the second paragraph under the heading Reduction of Toxicity, Mobility, or Volume through Treatment needs revision. The first sentence of this paragraph should read "...vinyl chloride formation which is more toxic than _____ ." (Fill in the blank with the parent compound(s) for vinyl chloride).

18. **Page 4-43, Section 4.3.3.2** Under the subheading "Short-term Effectiveness" the report states that groundwater PRGs would be attained within an estimated "25 years" for Site 36 and "70 years" for Site 37. These estimates are based on reducing the source hotspots to 1 milligram per liter (mg/l) or less. The use of a natural attenuation remedy has to achieve stated objectives and goals within a "reasonable time frame" as compared to more active remedial options. In an effort to reduce the required time for achieving PRGs, sensitivity analysis should be run to both determine the affects that treating the source area to levels well below 1 mg/l currently modeled, and the effect that treating down gradient portions of the plumes with ORC/HRC would have on time required to achieve PRGs.

19. **Page 4-44, Section 4.3.4.1**. This section states that this alternative consists of a component which requires two AS/VE systems. These systems are presumably designed to reduce hot-spot groundwater concentrations. As seen in Figure 4-6, three hot-spot locations are identified. Clarification as to how the two AS/VE system would remediate the three hot-spot locations is required.

20. **Page 4-44, Section 4.3.4.1**. This section indicates that 20 air sparging well clusters and 40 vapor extraction wells are required as part of this alternative. No figures are provided which depicts air sparging and vapor extraction well locations in relation to hot spot areas. This would be necessary to document adequate coverage of the areas to be remediated (e.g. hot spot areas). Figures should be provided which show proposed AS/VE air sparging and extraction well locations so that an evaluation can be made as to the adequacy of the system components.

21. **Figure 4-7** proposes to install 19 monitoring wells but only sample 15 new wells. The discrepancy may be related to the fact that previous report figures that are correlative to Figure 4-7 but that apply to other ground-water alternatives (e.g. Figure 4-5) have a component of ground-water monitoring that includes a separate monitoring schedule for four of the nineteen wells that would be installed. That four-well monitoring schedule is excluded from the Figure 4-7 proposal. Regardless of the reason for the problem, some correction to Figure 4-7 is needed.

22. The **Section 4.3.4.1** discussion of the "hot spot" air sparging/vapor extraction alternative for ground water provides very specific design conditions that are not supported by any modeling analysis or calculations in the FS Report. This situation is acceptable if there is qualifying language placed in the document that indicates something to the effect that for costing purposes, preliminary evaluations of the alternative indicate the system design would likely be similar to the design specifications presented in Section 4.3.4.1. Alternatively, the report could provide in an appendix a complete documentation of calculations or modeling leading to the specified design.

23. **Section 4.3.4** presents specifics of the ground-water extraction and treatment alternative that need to be supported by a more detailed explanation or analysis. The discussion in the second paragraph under the heading **Component 1:Extraction** in Section 4.3.5.1 indicates that some level of effort went into the specified system design. That work should be fully documented. Specific concerns are as follows:
A. The specified placement of extraction wells needs either an explanation or detailed discussions of the modeling used to select locations
B. The pumping rates for individual wells need to be justified
C. The rationale for proposed well depths needs to be presented in detail

21. **Page 4-47, Section 4.3.4.1** This section indicates that the vapor extraction well would have an effective area of influence of 1,250 square feet (ft^2). This figure was reportedly based on pilot scale tests at other NAS Cecil Field sites. Under the Soil Alternative 3 (Page 4-17), estimates for effective area of influence vapor extraction wells was stated to be 700 ft^2. The difference in the two estimates for effective areas of influence for vapor extraction wells should be clarified.

22. **Page 4-53, Figure 4-9** This figure, which depicts the locations of the extraction wells, should include estimated capture zones of these wells based on the combined flow of 50 gallons per minute (gpm) for the system.

23. **Page 4-55, Section 4.3.5.1** This section states that the pumping rate of the extraction system (50 gpm) was designed to capture the three plumes, factoring a reasonable balance between size/cost of the system and the duration of the cleanup. This factoring evaluation should be presented so that the reviewer can also evaluate the reduction of cleanup time with the escalation of costs for creating a larger extraction system.

24. Ground-water monitoring proposals illustrated in Figure 4-8 need to be consistent with the written description of monitoring under the heading **Component 5: Monitoring** on **page 4-57.**

24. **Page 4-59, Section 4.3.5.2** The subheading "Short-term Effectiveness" for Groundwater Alternative 4 indicates that the groundwater hotspots could be remediated in 9 years. Therefore, between 9 years and 55 years, when PRGs are estimated to be attained, this alternative would be treating relatively low concentrations of water. As seen in the cost estimates for the groundwater alternatives, this alternative has the highest annual O&M costs associated with it. In an effort to reduce costs, and potentially speed

up PRG attainment, a subalternative of 4 could be considered which relies on groundwater extraction to treat the relatively high concentrations of groundwater contamination, and utilize a less aggressive technology to treat portions of the plume exhibiting lower concentrations such as ORC/HRC as a reactive barrier. Utilizing enhanced bioremediation in portions of the plume exhibiting lower concentrations may reduce the years necessary to attain PRGs, and reduce costs since O&M costs associated with enhanced bioremediation technologies appear to be significantly less than operating a groundwater pump and treat system.

25. **Page 4-60, Section 4.3.6.1** This section provides detail on Groundwater Alternative 5 Permeable Reactive Barriers. As proposed, a PRB is to be placed down gradient of the leading edge of the plume. By placing the PRB down gradient of the plume, a PRB length of 1,000 feet is necessary to intercept the advancing plume. The cost associated with this technology is high, with estimates for this technology as presented of over two times greater than the other technologies. Consideration should be given to moving the PRB to within the plume boundary, intercepting areas expected to contain the highest concentrations, with potentially natural attenuation addressing the lower concentrations. Doing so may reduce the size of the PRB needed, and potentially reduce costs which would make this technology more comparable to the other alternatives. This is highly dependent on access within the flight line, and an ability to demonstrate that natural attenuation would be successful at reducing the contaminants bypassing the PRB.

25. As presented on Figure 4-11, the permeable reactive barrier remedial alternative is unacceptable because the proposed location allows for expansion of the existing contaminant plume (as far as it has been characterized) into areas of uncontaminated ground water. Alternative designs would either be to place the reactive barrier at the downgradient margin of the identified plume, or place the reactive barrier somewhere upgradient of that point. The latter alternative would have to be accompanied by an analysis of how plume concentrations downgradient of the barrier would naturally attenuate after the contaminant "source" upgradient of the barrier was effectively removed.

26. **Page 4-68, Section 4.3.6.2** Under the subheading "Long-term Effectiveness and Performance" there is no discussion concerning potential biofouling of the system, or the need to replace the reactive media over time. This technology would be required to be in place over a considerable time period (80 years estimated for PRG attainment). It is not clear whether estimated costs associated with regeneration or replacement of the PRB was factored in to the total costs.

27. **Page 5-1, Section 5.1.1** This section states that Soil Alternative 2 (Institutional Controls) would be protective of human health and the environment. This alternative leaves contaminated soil in place above FDEP teachability criteria and above established soil PRGs. As a result, this soil is currently or has the potential to act as a continuing

source of groundwater contamination. Therefore, this alternative does not appear to be protective of the environment. This point should be addressed in the FS.

28. **Page 5-2, Section 5.1.3** This section states that Soil Alternative 2 (Institutional Controls) would be long-term effective and permanent. It states that monitoring would be effective for the detection of migration of soil contamination to the groundwater. Soil COCs have already been detected in groundwater, and it is likely that this soil contamination is acting as a continuing source. Therefore this alternative would not be long-term effective. This point should be addressed in the FS.

29. **Page 5-6, Table 5-1** This table should be modified based on concerns raised with respect to Soil Alternative 2 (Institutional Controls) to be protective of the environment.

26. **Page 5-8, Table 5-1** If soils are excavated to residential levels and replaced with clean fill, why would institutional controls be needed?

27. **Table 1 in Appendix B** presents a value of the organic carbon content that does not appear to be a site-specific value determined in the Remedial Investigation. The value appears to be reasonable, but the source of the value needs to be referenced in the table.

28. The field data points used as calibration targets in the Bioscreen modeling need to be identified (on the hand-drawn figures, **Attachment A to Appendix B**).

30. **Appendix C.2 Page 1**. This alternative has as a component, institutional controls. Because institutional controls would be a component of this remedy, 5 year reviews would be required because the contaminated soil would have been remediated to PRGs based on leachability and industrial standards, not residential. Therefore, it appears that the cost estimate does not take into consideration costs for 5 year reviews as needed. These costs should be incorporated into the cost estimate.

31. **Appendix C.3, Page 1**. Line item 5.4 (Import Clean Fill Material) only includes material costs. No labor or equipment costs are associated with this line item. Clean fill may have to be excavated and transported to the site. Clarification should be provided as to why no labor, or equipment costs are associated with this line item.

32. **Appendix C.3, Page 1**. Line item 6.2 (Transport and Dispose of Soil) appears to include costs for transportation of the soils, soil treatment utilizing low temperature thermal desorption, and final disposal costs. The cost item should be broken into the above components so that an accurate evaluation and comparison to other technologies can be made.

33. **Appendix C.3, Page 1**. This alternative has as a component, institutional controls. Because institutional controls would be a component of this remedy, 5 year reviews would be required because the contaminated soil would have been remediated to PRGs

based on teachability an industrial standards, not residential. Therefore, it appears that the cost estimate does not take into consideration costs for 5 year reviews as needed. These costs should be incorporated into the cost estimate.

34. **Appendix C.6, Page 1**. Line item 7.9 includes four 2,000 pound granular activated carbon (GAC) canisters. It is not clear if the listed cost for these GAC canisters also includes disposal or regeneration costs. Clarification should be provided.

29. **On page ES-5**, the FS Report lists PRGs for soil remediation. The tabulation at the top of page ES-6 indicates that of the three chemicals with soil remedial goals listed on page ES-5, only toluene is a ground-water contaminant of concern. If this was correct then only toluene would need to be included as a soil chemical of concern. If toluene is not the only ground-water contaminant of concern, the tabulation at the top of page ES-6 needs revision. Additional discussion in the FS Report (Section 2.1.4.2, for example) would need to be adjusted to account for concerns about ground-water contamination by the other VOCs.