UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

July 3, 1996

Richard Powell
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Engineering Field Activities West
900 Commodore Drive, Building B102
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RE: Parcel B Feasibility Study Draft Report, Hunters Point Shipyard, San Francisco, California

Dear Mr. Powell:

EPA has reviewed the above referenced document submitted by PRC Environmental Management, Inc on June 4, 1996. The enclosed comments are divided into general comments and specific comments listed by section.

If you have any questions, feel free to call me at (415) 744-2367.

Sincerely,

Anna-Marie Cook

Anna-Marie Cook
Remedial Project Manager

cc: Cyrus Shabahari, DTSC
Richard Hiett, RWQCB
Bill McAvoy, EFAWEST
Mike McClelland, EFAWEST
Jim Sickles, PRC

General Comments:

1. The Ecological Risk Assessment will assess the impact of HPS activities on sediment contamination but does not address the impact of groundwater on aquatic receptors or the effects of mass loading of contaminants from groundwater on the Bay. Following the establishment of HGALs, groundwater should be re-evaluated to determine potential exposure pathways and associated risks posed by contaminants.

2. A table listing out the various groundwater alternatives and the costs associated with various levels of RAOs should be included such as has been developed for soil. Include whether the RAOs are established for human health or aquatic protection.

3. Table D-2 is a very good summary of information contained in the RI, but would benefit from being linked to the RAOs and the information provided on alternatives.

4. The use of the term **removal** and **remedial** have different meanings and requirements under CERCLA. Using the terms interchangeably is incorrect and causes unnecessary confusion to the reader.

5. While it is completely acceptable to have a unified table of all ARARs, it is unsatisfactory to simply state that each alternative will comply with ARARs. Instead, the discussion of the criterion of compliance with ARARs for each alternative should be expanded to explain which ARARs apply to the alternative and how the alternative will comply.

6. There is no mention whatsoever of chemical specific ARARs. If, in fact, there are no chemical specific ARARs, then the FS should contain a short statement to explain that there are no chemical specific ARARs and that cleanup standards will be determined based on risk.

7. The tables for location and action-specific ARARs contain lots of superfluous information, e.g. listings of standards that are <u>not</u> ARARs, as well as speculative listings for treatment units that are very unlikely to be used. While there is no harm in listing things that are not ARARs, it is unnecessary and does not add to the document.

8. There is overlap between the federal RCRA ARARs and the state HWCL ARARs. Because California has an authorized RCRA program, the standard practice in these types of documents has been to cite to California standards and to mention as a parenthetical the federal equivalent. The Navy should follow that practice in this document.

9. The action-specific ARAR table should add RCRA/HWCL

standards for emissions from an air-stripper (40 CFR §§ 1030 - 1034/state equivalent). In addition, the emissions from the air stripper may be subject to the National Ambient Air Quality Standards (40 CFR Part 50) as administered through the State Implementation Plan.

10. Coastal Zone Management Act - cite as Section 307(c) of 16 U.S.C. §§ 1451 et seq. Should also cite to the California Public Resources Code §§ 30,000 et seq. which is the State Coastal Management Plan. The approved coastal zone management program for San Francisco Bay includes the McAteer-Petris Act and the San Francisco Bay Plan and is administered by the San Francisco Bay Conservation and Development Commission. The goals of the Bay Plan are to reduce bay fill and disposal of dredged materials in the Bay and to maintain the water quality and ecological integrity of the Bay. The Navy should coordinate with BCDC to make its consistency determination.

11. The reference to the UST regulations in the ARARs table is inappropriate. The UST cleanup is not being done pursuant to CERCLA and therefore the regulations are not ARARs but are standards that the Navy will use to remove the USTs. This is analogous to the application of OSHA or other standards that apply independently of being ARARs.

12. Appendix A needs to be replaced by the statistical approach used to establish HGALS.

13. The model used to assess a dilution/attenuation factor to the Bay appears too subjective to be useful. Hydraulic conductivity can range by as much as seven orders of magnitude, and it is obvious that the porous media cannot be considered homogeneous. To be conservative, the worst case scenario should be chosen for the concentration of contaminants going out to the Bay. This case would be represented by the storm drain system, where a direct conduit, and often a preferred migration pathway, is presented by the open lines. The dilution/attenuation factor can be discarded for this scenario.

14. There are 6 scenarios for soil and 2 scenarios for groundwater that are discussed in the alternatives. It is difficult to determine which scenario is being evaluated and discussed in the alternatives section as well as the comparative analysis section It would help clear up the confusion if each scenario was completely discussed under a separate heading under the alternative description and evaluated individually according to scenario.

15. The descriptions of the alternatives provided in Sections 4 and 5 are too general and broad. As such, it is not possible to fully evaluate the alternatives, particularly

with respect to the "long term effectiveness", "implementability", and "cost" criteria. The descriptions should include details such as specific construction and operation requirements, impacts caused by existing facility components, waste material handling procedures, and preparatory requirements to implement the alternative. Post remedial monitoring and O & M provisions should also be given greater consideration in the alternatives.

16. The costs provided for the alternatives under the detailed evaluation sections do not appear to include engineering expenses (i.e., design and development costs). The Remedial Action Costing Procedures Manual (US Department of Commerce, National Technical Information Service, October 1987) indicates that engineering expenses account for up to 15 percent of the total direct capital costs.

17. The operation and maintenance (O&M) costs have not been completely computed. Cost table presented in Appendix E only reflect the first year of O&M. However, the necessity for O&M, as well as compliance and performance monitoring, may be required for an indefinite period. Exclusion of a realistic O&M duration underestimates the true cost of the alternative. O&M costs should therefore be computed using present worth analysis for a duration of 30 years.

Specific Comments:

Section 1:

1. **Figure 1-1.** This map needs to be revised to more clearly delineate the boundaries of the parcels. Boundaries of the parcels cannot be identified from this figure.

2. **Page 1-3, section 1.2, 3rd paragraph.** Please provide more explanation regarding the use of "interim storage units". The intent is not clear from the brief description nor is it clear how these "units" would be implemented. Discuss how this differs from a Corrective Action Management Unit.

Section 2:

1. **Section 2.2.6, Page 2-5, 1st paragraph.** Figure 2-5 is a soil distribution map and does not show geologic units as stated in the fourth sentence. Please provide the correct figure reference.

2. **Section 2.2-7, page 2-6, 1st paragraph.** Figure 2-9 does not depict the B-aquifer as stated in this paragraph.

3. **Section 2.2-8, page 2-7, 2nd paragraph, 1st sentence.** The presence of the "thin aquifer, the Bay Mud deposits aquitard, and Artificial Fill" do not provide the reasons

for considering the potential use of the bedrock aquifer as a groundwater source. More appropriate considerations includes water quality, salinity or low yield.

4. **Section 2.3, page 2-12, 2nd paragraph and Table 2-5.** It is not clear whether the analytes listed in this table area complete list of substances for which remedial alternatives are discussed in this FS. If this is intended to be a complete list, explain why VOCs and SVOCs are not considered hazardous substances in groundwater. The list of hazardous substances in groundwater is not complete. Further, EPA recommends that the maximum calculated risk for each site be included in this table with the primary risk drivers noted.

5. **Section 2.3.14, page 2-26, 2nd paragraph.** It is not correct that "there are no previous or currently planned removal actions at IR-50. A removal action for storm drain sediments is currently being implemented. This removal should be mentioned in this section.

Section 3:

1. **Section 3.1.1.1, Page 3-2, paragraph 1.** The assumption, based on age, that any leaching from soil to groundwater has already occurred requires further justification.

2. **Section 3.1.1.1, Page 3-2, paragraph 3.** Additional discussion to explain table 3-1 and the source of the values is needed. Table 3-1 suggest that the lead RAO is greater than 190 but this paragraph indicates 221 ppm. Please clarify. The RAOs in this table should be less than the values indicated (<) not greater than (>).

3. **Table 3-1.** Define TPH-mo in this footnotes to this table.

4. **Table 3-3.** The Beryllium RAO indicates that footnote 3 should be consulted, but there is no footnote 3.

5. **Section 3.1.1.2, Page 3-4, paragraph 1.** A potential route for human exposure may be consumption of fish or mussels from the Bay area. If this is not true, add a statement indicating that this is not a concern based on risk assessment calculations.

6. **Section 3.1.1.2, Page 3-5, first paragraph.** It seems prudent that Scenario 1 also account for background concentrations to prevent cleanup of non-contaminated groundwater. Tables 3-3 and 3-4 should reflect this accordingly.

7. **Table 3-7a, Screening of Location-Specific ARARs, and Table 3-7b, Screening of Action-Specific ARARS.** The ARARs listed in these tables have not been broken down in sufficient

detail to determine whether they are applicable, relevant, or appropriate to each site. In order to correctly determine whether a regulation is an ARAR, each component of it must be examined. Citing 40 CFR Part 268 does not provide enough detail. This section should cite 40 CFR Part 268.45, Treatment Standards for Hazardous Debris, and then examine and discuss how each of the "Alternative Treatment Standards for Hazardous Debris" affects the site alternatives, for example. These tables essentially perform a very cursory review the regulations but provide no site specific understanding of what the implications are. These tables also do not include several potential ARARs, including 40 CFR 261 and the requirements of the Bay Area Air Quality Control Board and the Bay Area Regional Water Quality Control Board.

8. **Figure 3-1S.** Soil washing is applicable for soil containing organics and inorganics. This technology should be screened more appropriately based on particle size distribution. There are washing solutions that work on both organics and inorganics.

9. **Section 3.3, general comment.** Provide a table which shows which technologies are applicable for each site.

10. **Section 3.3.2.1.3, 1st paragraph.** Overhead or buried electric lines are hazardous and extremely dangerous and may hamper excavation.

11. **Section 3.3.2.1.3, Page 3-13, 3rd paragraph.** Table 3-9 appears incomplete. It indicates there are no criteria for placing PCBs /Pesticides in the landfill. ARARs will regulate placement and disposal of these types of compounds. Please reevaluate. There are also other contaminants present (see tables 2-4 and 2-5) in the various IR soil (such as TCE) for which no criteria have been included. If this table will be used to screen soil for potential disposal, it must include all constituents of concern. In addition, several of these chemicals are "listed" constituents which prevents soil containing them from being disposed in anything other than a permitted hazardous waste landfill.

12. **Section 3.3.2.1.3, Page 3-14, 1st paragraph.** Please define inert soil. Several sites contain TCE, DCE and TPH-g. These compounds will volatilize if placed in a building and could affect the environment through release of toxic fumes. Interim storage can only occur for up to 90 days based on ARARs. Please discuss how this will affect the implementability of this technology.

13. **Section 3.3.2.1.4, Page 3-21, 4th paragraph.** There are new stabilization technologies that convert the metals to metal sulfides that are non leachable rather than just binding

them in a solid. These technologies often work better than the binding technologies and should be included and discussed.

14. **Section 3.3.2.1.4, Page 3-22, last paragraph.** Treatment of 500 tons of soil per hour seems high. Please verify.

15. **Section 3.3.2.1.4, Page 3-23, last paragraph.** There is an inconsistency between this section which indicates that incineration is not effective for inorganics and Table 3-1S-comment column (p 3 of 3), which indicates that the process is potentially applicable for all contaminated soil types. This also applies to off-site incineration (p 3-25 paragraph 5). A correction or clarification is required.

16. **Section 3.3.2.1.4, Page 3-25, paragraph 3.** There is no mention of retaining on-site incineration for remedial alternative development and screening; however it is retained in Table 3-1S. A correction or clarification is required.

17. **Section 3.3.2.1.5, Page 3-29, 4th paragraph.** Grout injection is cost effective in areas where deep contamination exists. This technology is usually not cost effective for shallow soil. This should be discussed as the reason for eliminating this technology. Currently, no explanation is presented in the text.

18. **Section 3.3.2.2.3, Page 3-34, 3rd paragraph.** Its not clear why SB walls were retained over the DSM technique. Please explain.

19. **Section 3.3.2.2.4, Page 3-41, 2nd paragraph.** Here and elsewhere the depth of the extraction wells are discussed. This depth appears to be based on the depth of the aquifer. A discussion on the vertical extent of groundwater contamination must be included in section 2 since the contamination may not necessarily occur across the entire depth. If this is the case other technologies such as trenches may be easier to implement.

20. **Section 3.3.2.2.4, Page 3-41, last paragraph.** A comparison of the groundwater contamination with the POTW criteria should be included in this report. Before this technology is retained, it should be discussed with the POTW to determine if the water is acceptable. In some cases, POTWs will not accept additional discharges due to operating capacities, permit provisions, etc.

21. **Section 3.3.2.2.5, Page 3-43, paragraph 1.** This air sparging discussion suggests that applying high air injection flow rates will provide more uniform gas channeling distribution in heterogeneous soils. When

applying high air injection pressures there is potential for contaminants to migrate outward from the injection well without changing from the liquid to vapor phase. In this case, contaminants may move a significant distance from their original location, potentially spreading contamination to clean areas. Containment should be discussed as an option to reduce this effect. In the same paragraph, uncaptured VOCs emanating from the ground surface may be considered a threat to human health. While this may be minimal, it should be discussed.

22. **Section 3.3.2.2.6, Page 3-45.** UV/Oxidation should be discussed as a remedial groundwater technology. This technology is being used successfully at many contaminated groundwater sites and can be implemented cost effectively.

Section 4:

1. **Section 4.1.2, Page 4-3, Off-Site Disposal.** Given the quantities of soil to be excavated and transported off-site for disposal, it is unrealistic to assume the material will be loaded directly into trucks. The alternative should therefore include provisions for the stockpiling of the material and stockpile management. Furthermore, the shallow depth of groundwater will require excavation below the water table or in the capillary fringe zone. As a result, soil dewatering may be required to remove the free liquids prior to off-site transportation which may result in the need for stockpiling the material and wastewater handling. The stockpile pad should be constructed to accommodate the anticipated volume of material and be lined with an impermeable membrane suitable to prevent the release of contaminants. This comment is applicable to all alternatives that have an excavation component.

2. **Section 4.1.2, Page 4-3, Off-Site Disposal.** It appears that disposal options for this alternative (and others that follow) did not account for the possibility of listed wastes. A discussion of waste listing and codes is not discussed anywhere in this report. Its possible that some of the soil contaminants (such as TCE) may be listed and require treatment or disposal as hazardous wastes independent of the TTLC, STLC or TCLP concentrations. This should be discussed for all alternatives and sites. This discussion should be included under the ARARs criteria.

3. **Section 4.1.2, Pages 4-3 and 4-4, Evaluation.** Excavation dewatering will burden this alternative with substantial wastewater storage and treatment requirements. These factors should be included in the alternative's implementability and cost considerations. This section implies that no long term monitoring is necessary. There should be a requirement to perform some post-remediation

monitoring to insure the remedy is protective of the environment.

4. **Section 4.1.3, Page 4-4.** This alternative should include long-term performance monitoring of the groundwater due to the continued presence of contamination. In addition, compliance monitoring will likely be required for the SVE system process gas emissions.

5. **Section 4.1.3, Page 4-5, Soil Vapor Extraction.** The alternative should discuss process gas treatment options (carbon adsorption, incineration, etc.); treatment of the SVE process gas may significantly impact the implementability evaluation if such requirements are deemed necessary by the regional air quality board. Air sparging technology should be combined with the SVE system to address VOC constituents below the water table. Since SVE is not capable of treating saturated soil, air sparging wells will be necessary for this alternative to fully satisfy the RAOs.

6. **Section 4.1.3, Page 4-5, On-Site Placement.** The text incorrectly references Table 3-19 for the proposed site-specific screening criteria; it is assumed the correct reference is Table 3-9.

   The proposed screening criterion for mercury exceeds the RCRA waste criterion of 0.2 mg/L listed under 40 CFR 261.24. Therefore, soil material may potentially be considered a RCRA waste, and would require appropriate disposal measures if placed in the IR-1/21 landfill. Please revise.

7. **Section 4.1.3, Page 4-6, Evaluation.** As stated in comment 5, this process option would not effectively treat VOC contaminated soil in the saturated zone unless it is combined with an air sparging system.

   A post-remedial performance monitoring program will be required due to residual contaminants (VOCs in the IR-10 and IR-25 areas as well as disposed material in the IR-1/21 landfill). Such a program will monitor the adequacy of the SVE system as well as ensure the remedy remains protective of the environment. This program may significantly increase costs associated with this alternative.

8. **Section 4.1.4, Page 4-7, Soil Vapor Extraction.** See comments 4 and 5 regarding the need for process-gas treatment and air sparging technology.

9. **Section 4.1.4, Page 4-9, Evaluation.** This alternative requires a post-remedial sampling and performance monitoring program due to residual contaminants (VOCs in the IR-10 and IR-25 areas as well as the encapsulated waste material). Such a program will monitor the adequacy of the SVE system

as well as ensure the remedy remains protective of the environment. This program may significantly increase costs associated with this alternative.

10. **Section 4.1.5, Page 4-10, Soil Vapor Extraction.** See comments 4 and 5 regarding the need for process-gas treatment and air sparging technology.

11. **Section 4.1.5, Page 4-11, On-Site Placement.** The text incorrectly references Table 3-10 for the proposed site-specific screening criteria; it is assumed the correct reference is Table 3-9.

12. **Section 4.2, Page 4-17.** The negative effects of heterogeneous soil (cobbles, boulders) on implementability and cost for monitoring and extraction wells are not discussed (as it was for sheet piling and interceptor trenching in previous sections). These cobbles and boulders would likely have a similar effect on drilling activities. A discussion should be added to address the effects of the heterogeneous soil conditions on extraction and monitoring well cost and implementability .

13. **Section 4.2.2, Page 4-19, 1st paragraph.** Since the extent of DNAPL contamination has not been clearly determined, excavation costs could increase to an unreasonable level.

14. **Section 4.2.3, Page 4-25.** For both ion exchange and carbon adsorption, a discussion of the effect of potential "clogging" due to removal of non-target compounds is necessary. This is supported by the known high ambient concentrations of inorganics/metals associated with bedrock and site soils containing fill.

Section 5:

1. **Section 5.1.2, Page 5-6, Excavation.** As previously indicated, the shallow depth of groundwater will require excavation below the water table or in the capillary fringe zone. As a result, soil dewatering may be required to remove the free liquids prior to off-site transportation, which will require stockpile management of the material and wastewater handling. The stockpile pad should be constructed to accommodate the anticipated volume of material and be lined with an impermeable membrane suitable to prevent the release of contaminants and allow for the collection of the liquids. Wastewater treatment and/or disposal will likewise be required, affecting the cost of this alternative.

2. **Section 5.1.2.3, Page 5-9, Adequacy and Reliability of Controls.** Long term post-remedial monitoring would be required in the event that contaminated soil remains on-site

under RAO scenario 1. This monitoring requirement would likely include groundwater monitoring to determine the impact to the aquifer and contaminant migration from the residual contaminated soil. Operation and maintenance costs would therefore be required for this alternative.

3. **Section 5.1.3.3, Page 5-21, Adequacy and Reliability of Controls.** Carbon Adsorption is an ineffective treatment for vinyl chloride, which was identified in Section 5.1.3.2 as a potential emission compound. Therefore, alternative treatment technologies, such as incineration, may be required to satisfy discharge requirements. This requirement may substantially increase the alternative's cost and administrative (implementability) factors. This comment is applicable to all alternatives that include an SVE component

4. **Section 5.1.3.7, Page 5-28, Cost.** Monitoring and O&M cost components should be included for this evaluation for all costs incurred beyond one year. Such costs may be substantial when considering operation of the SVE systems, carbon regeneration (or other treatment processes as necessary), and compliance and performance monitoring. This comment is applicable to all alternatives that include an SVE component.

5. **Section 5.1.4.3, Page 5-34, Adequacy and Reliability of Controls.** RCRA Subtitle D merely requires the landfill cover to have a lower permeability than the base (liner) of the landfill so as to prevent the "bathtub" effect. This requirement, by itself, will not prevent the infiltration of precipitation into the landfill and subsequent leaching of hazardous substances from the soil. Specific performance standards should be established to ensure adequate protectiveness is attained.

6. **Section 5.1.5.5, Page 5-50, Protection of the Community.** Air emission standards will be applied to the operation of the thermal desorption equipment and solidification/stabilization process (since the potential exists to emit caustic matter from the fly ash, lime or other cement additives, as well as emissions from the waste material itself). This section should specify all emission standards from the regional air quality board (BAAMQD) that must be met in order to operate these systems.

7. **Section 5.1.5.6, Page 5-55, Administrative Feasibility.** Specify the administrative requirements associated with the off-site treatment of the thermal desorption residuals (condensed wastewater and oil).

   Air permitting would likely be required for the thermal desorption equipment as well as for the

solidification/stabilization process. This section should specify the potentially applicable administrative requirements from the BAAMQD that must be met in order to operate these systems.

8. **Section 5.1.5.7, Page 5-56, Cost.** Monitoring and O&M cost components should be included in this evaluation for all costs incurred beyond one year. These costs include long-term compliance and performance monitoring associated with the stabilized/solidified material.

9. **Section 5.2.2, Page 5-61.** The description of the alternative indicates that DNAPLs will be transported to an off-site disposal facility. However, Section 5.2.2.4 (on page 5-68) states that the DNAPLs extracted from the groundwater will be incinerated. It is assumed that the wastewater will be shipped for off-site treatment, but it is not clear what this treatment process this will include. Incineration is unlikely due to the excessive cost associated with incinerating liquids. Further information should be included under the alternative's description regarding the specific treatment options for this waste material. All evaluation criteria for this alternative should be revised as appropriate to reflect these changes.

10. **Section 5.2.2, Page 5-64, Extraction.** The eight proposed 36-inch extraction wells are excessively large for the total pumping rate of 10 gpm. Provide appropriate technical justification for the selection of these wells.

    Discuss modeling data and pump-test data (if performed) to support the proposed well spacing of 100-feet.

    Greater consideration should be given to the groundwater pretreatment options. For instance, carbon adsorption is not an applicable treatment technology for vinyl chloride. Alternative treatment technologies should be included to attain the specified pre-treatment discharge limits for all anticipated compounds.

11. **Section 5.2.2, page 5-65, Groundwater Monitoring.** The chemical parameters for groundwater monitoring should be included in this document and not deferred to the remedial design. Sufficient information currently exists to indicate the chemicals of concern. Moreover, analytical data requirement will be a substantial factor in the O&M costs.

12. **Section 5.2.2.7, Page 5-73.** Provide the basis for the O&M costs. This basis should also include groundwater monitoring requirements, and should be extended beyond year one (refer to General Comments).

13. **Section 5.2.3, Page 5-74, DNAPL Source Removal.** Describe

the specific treatment process for the extracted DNAPLs and include any appropriate computation and modeling data to support the selection of the well sizes, capture zones, extraction rates, etc.

14. **Section 5.2.3, Page 5-76, Gradient Control with Groundwater Extraction.** Modeling should be performed and included in this FS to determine the extent of impact a slurry wall containment system will have upgradient of the wall and on storm water management systems. These results may significantly alter the feasibility/implementability of a containment alternative.

15. **Section 5.2.3.7, Page 5-86.** Provide the basis for the O&M costs. This basis should also include groundwater monitoring requirements, and should be extended to the anticipated 30 year duration (refer to General Comments).

16. **Section 5.2.4, Page 5-88, Containment Through Gradient Control.** Provide modeling data and assumptions for the anticipated extraction rates and capture zone.

17. **Section 5.2.4, Page 5-89, On-Site Groundwater Treatment, Carbon Adsorption System.** As previously stated, carbon adsorption is not an effective treatment for vinyl chloride. Greater consideration should be given to selecting an appropriate treatment for this constituent.

18. **Section 5.2.4, Page 5-93, Discharge of Treated Groundwater to San Francisco Bay or A Constructed Wetland.** Details regarding the constructed wetland are few in this section, yet marine wetland construction poses a substantial amount of design and hydraulic consideration. A full and meaningful evaluation of this alternative is not possible with the level of detail provided in this section. The FS should provide more details on this alternative and its technical basis.

    The proposed location of this wetland does not fit the Reuse Plan. This is critical, because once constructed, it is unlikely that destruction of the wetland would be allowed. Any proposed wetland must be in an area of the site designated for reuse as a wetland. Reevaluate the location of the wetland.

19. **Section 5.2.3.7, Page 5-96.** Wetland construction costs do not appear in the cost estimates and would be expected to be high. This cost should be provided to evaluate and compare the cost of this alternative to others. In addition, provide the basis for the O&M costs. This basis should also include groundwater monitoring requirements, and should be extended to the anticipated 30 year duration (refer to General Comments).

20. **Section 5.3.1.2, Page 5-103.** Alternative 2 (and possibly others) may not meet LDR ARARs for TCE. Although a detailed comparison of all LDRs was not performed during this review, it appears that some of the sites contain compounds that exceed LDRs and would require treatment prior to disposal. A comparison of LDRs to the contaminant concentrations should be performed.

21. **Section 5.3.1.6, Page 5-108, Administrative Feasibility.** Alternative 6 may also require an air emissions evaluation and risk assessment prior to operation. This would increase the difficulty of this alternative and must be included in the text.

22. **Section 5.3.2.3, Page 5-111, last paragraph.** It is not clear that GW-2 would remove more contamination than the other alternatives. GW-2 would remove groundwater at 3 sites. GW - 4 and 5, although are not designed for contaminant removal, may end up removing more mass since site wide groundwater is removed for gradient control. GW-5, according to the description, could pump 2 to 4 times the volume of GW-2 and actually remove more mass. This should be evaluated and this section revised as necessary.

23. **Section 5.3.2.3, Page 5-112, 3rd paragraph.** It is not clear under which scenario this comparison is being made. Under scenario 1, controls used to ensure protection are groundwater monitoring since no removal or containment is being provided for groundwater exceeding criteria. The reliability of groundwater monitoring is less than a containment wall. Therefore the reliability of GW-2 is less than that of the other alternatives. Please clarify.

    It appears that these alternatives are not being compared for the same scenario. The text says GW-4 has the second highest level of reliability, however, GW-2 will not meet the RAOs of scenario 1 (see p.4-17). Therefore it would appear that GW-4 has the highest reliability for this scenario.

24. **Section 5.3.2.4, Page 5-113, 3rd paragraph.** See comment 23.

25. **Section 5.3.2.4, Page 5-114, 1st paragraph.** This discussion should include an evaluation to define the alternative which has the potential to remove the greatest mass (see comment 22).

26. **Section 5.3.2.5, Page 5-116, 2nd paragraph.** GW-5 has the greatest risk to workers as a result of the full time operation of the groundwater treatment plant. This operation will expose workers to chemicals. This should be discussed.

27. **Section 5.3.2.7, Page 5-120.** There is much information in

this section concerning how the alternatives compare. It would be beneficial to summarize this in a table with the alternatives ranked numerically. This would allow the reader to determine at a glance which alternatives appear to best meet all the criteria.

Appendix D

1. **Section 1.0, Page D-1, 2nd bullet.** Agency concurrence is required before the action level of 10^{-4} can be accepted.

Appendix E

1. Costs for thermal desorption and stabilization are high. These costs should be reconfirmed.