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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 HANFORD PROJECT OFFICE
712 SWIFT BOULEVARD, SUITE 5
RICHLAND, WASHINGTON 99352

August 2, 1995

Donna Wanek
Operable Unit Manager
U.S. Department of Energy
P.O. Box 550 H4-83
Richland, Washington 99352

Re: Review of 200 ZP-1 Phase 2 Interim Remedial Measure Conceptual Design Report

Dear Ms. Wanek:

The U.S. Environmental Protection Agency (EPA) and the Washington State Department of Ecology (Ecology) have completed our review of the 200-ZP-1 Phase 2 Interim Remedial Measure Conceptual Design Report (CDR).

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Since a request for proposal has already been issued for the 200-ZP-1 Interim Remedial Measure, EPA and Ecology are providing these comments to the U.S. Department of Energy (DOE) to supplement the writing of the final design report. No formal response is required on these comments from DOE.

Please note, section 9.0 of the Action Plan to the Hanford Federal Facility Agreement and Consent Order (TPA) classifies the final design report (remedial design document) as a primary document. The customary review time per the TPA for primary documents is 45 days and requires approval of the document by the lead regulatory agency. EPA and Ecology realize that the final design for 200-ZP-1 is on an accelerated path and will work with DOE to respond in a timely manner.

If you have any questions or concerns regarding these comments feel free to contact me at (509) 376-8631.

Sincerely,

Dennis Faulk
Operable Unit Manager

enclosure

cc: Chuck Cline, Ecology
Dib Goswami, Ecology
J. Pollard Freeman, BHI
Administrative Record (200-ZP-1)

GENERAL COMMENTS

Overall, the 200-ZP-1 Phase 2 Interim Remedial Measure Conceptual Design Report (IRM CDR) adequately describes the conceptual approach for design and operation of the pump-and-treat system proposed for installation at the 200-ZP-1 site. There are, however, a few concerns that should be addressed in the detailed design report. These concerns include the following:

- Liquid-phase granular activated carbon (GAC) may be required as a polishing step for treated water from the air stripper (BHI 1995). The elimination of this process step from the 200-ZP-1 pump-and-treat design has not been justified. Although air stripping is highly effective for removing volatile organic contaminants, its performance on the contaminants of concern (carbon tetrachloride, chloroform, and trichloroethyle) is not demonstrated through treatability studies of 200-ZP-1 groundwater. Also, the air-to-water ratios required to achieve the desired levels of effluent concentration varies from 6: to 54:1 depending on the contaminant type and concentration (Love and Eilers 1982; EPA 1991). For example, a 10:1 air-to-water ratio is required to achieve 10 micrograms per liter (μg/L) at an influent concentration of 1,000 μg/L for carbon tetrachloride; on the other hand, a 6:1 air-to-water ratio is required to achieve the same effluent concentration for carbon tetrachloride with an influent concentration of 100 μg/L. It is therefore suggested that either a liquid-phase GAC be included as a polishing step for the treated water to meet regular cleanup levels before injection into the aquifer, or a layout area be established for future installation in the treatment building for liquid-phase GAC polishing.

- According to design criteria for the 200-ZP-1 IRM (BHI 1995), the following items are not considered or clearly addressed in the IRM CDR:

  - Turndown for the air flow rate

  - Water recycle flow rate

  - A storage tank system for off-specification water (that is, treated water that does not meet operational criteria for injection)

- On-site spare air stripper packing and tanks to clean the used packing
- Cost/benefit analysis to evaluate GAC waste disposal options such as off-site regeneration, burial, or on-site regeneration
- Office space

- Although costs and benefits were analyzed for the 2-1/2-foot and 4-foot diameter air strippers, a design analysis was not completed, nor are the pros and cons of increasing the diameter (for example to 5-feet, thus decreasing the liquid loading rate) discussed. Results of the analysis from the model AIRSTRIP (Appendix A) indicate that a decrease in the liquid loading rate would decrease the effluent concentration at the same operating conditions and packing depths. The detailed design report should include a cost/benefit analysis for 5- and 6-foot-diameter air strippers as well as for 2-1/2 and 4-foot-diameter air strippers.

SPECIFIC COMMENTS

Section 4.1.2, pages 4 and 5, bullets 1 through 4

The text indicates that the most economical groundwater treatment system is an upgradable 4-foot-diameter stripper(s) with three 15-foot packing sections at an air-water (A/W) ratio of 6 for a flow of 500 gallons per minute (gpm). However, present-worth tables (Appendix E) do not include present-worth calculations for a 4-foot-diameter air stripper at an A/W ratio of 6 for a flow of 500 gpm. This discrepancy should be addressed.

Section 4.1.2, page 5, second paragraph

The text states, "The total packing height can be accomplished using one single tower or by using multiple towers in series." The IRM CDR, however, does not, but should include a design analysis of the performance of multiple towers in series to achieve the designed reduction in contaminant concentration. Also, use of multiple towers in series instead of in parallel should be justified. If a series configuration is used, a lower A/W ratio could be used for each successive tower. Contaminant levels in the influent to each successive towers will likely be lower than contaminant levels in influent to the first tower, thus requiring a lower A/W ratio to achieve a given level of removal (Clark and others 1984).

Section 4.3.1, page 13, 5th paragraph

This paragraph lists predetermined off-normal conditions for equipment shut-downs. The list should also include the off-normal condition, "high concentrations of carbon tetrachloride, trichloroethylene, or chloroform in the treated effluent before injection into the aquifer."

Section 5.3.1, Table 4, sheet 2 of 2, pages 31 and 32

The purpose of using 5 horsepower (HP) sump pumps should be explained. In the project cost estimate table (Appendix C), two, 1/3-HP sump pumps are proposed. This inconsistency should be corrected.

Section 8.1.4, page 39, last paragraph

This paragraph states, "Air stripper modeling shows that if the inlet temperature drops below 54°F, the liquid effluent will no longer meet the maximum contaminant level for carbon tetrachloride." Modeling results should be included to support this statement for the recommended 4-foot diameter air stripper (single tower, A/W = 5, water flow rate = 200, 300, and 500 gpm).

Appendix B, pages B-32 through B-34

For the air stripper removal efficiencies for contaminants of concern (COCs) for water temperatures of 45°F, 50°F, and 55°F, with varying numbers of trays, the depth (height) of the tray is not specified. A consistent definition should be used for packing height in the air stripper. It is not clear whether the tray refers to the packing height. Also, the diameter of the air stripper used in the modeling run is not identified, but should be.

Appendix C, pages C-3 and C-4

The following items are not included in the project cost estimate table:

- V-04, GAC unit (drawing 0200W-DD-F0001, page D-5)
- V-02 and V-03, GAC units (drawing 0200W-DD-F0001, page D-5)
- C-01, chiller, GAC units (drawing 0200W-DD-F0001, page D-5)
- H-01, heater, GAC units (drawing 0200W-DD-F0001, page D-5)
- Mobilization

Appendix D, Drawing 0200W-DD-F0001, page D-5

- The treated water recycle arrangement should be shown from the effluent filter system to the influent surge tank if the effluent levels of COCs do not meet regulatory levels for injection into the aquifer. The influent surge tank should be sized accordingly.
- The gaseous effluent loadings for COCs are entered as zero in the process flow diagram data table at set points 10, 11, 13, and 14. This is not correct. The effluent loadings for COCs should be calculated based on regulatory cleanup levels and reported as less than the estimated values.

Appendix D, Drawing 0200W-DD-M0017, page D-6

- The GAC unit for the vent on the influent surge tank is not shown on the drawing but should be.
- The treated water recycle arrangement should be shown on the drawing if the effluent levels for COCs do not meet regulatory levels for injection into the aquifer.

Appendix D, Drawing 0200W-DD-C0007, page D-7

The location of the injection well manifold building should be justified in the text.

REFERENCES

BHI 1994. Engineering Evaluation/Conceptual Plan for the 200-ZP-1 Operable Unit Interim Remedial Measure. BHI-00110, Rev. 00. Bechtel Hanford, Inc. Richland, Washington.

BHI 1995. Design Criteria for the 200-ZP-1 Interim Remedial Measure. BHI-00159, Rev. 0B. Bechtel Hanford, Inc. Richland, Washington.

Clark, R.M., R.G. Eilers, and J.A. Goodrich 1984. VOCs in Drinking Water: Cost of Removal. Journal of Environmental Engineering. Volume 110, No. 6. December.

EPA 1991. Engineering Bulletin: Air Stripping of Aqueous Solutions. EPA/540/2-91/022. U.S. Environmental Protection Agency. October.

Love, O.T. Jr., and R.G. Eilers 1982. Treatment of Drinking Water Containing Trichloroethylene and Related Industrial Solvents. Journal of the American Water Works Association. pp. 413-425. August.