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AQUIFER RESTORATION DESIGN: TASKS 4 AND 5

12/05/96

USEPA DOE-FEMP
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COMMENTS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

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K-0477

REPLY TO THE ATTENTION OF:

DEC 05 1996

Mr. Johnny W. Reising
United States Department of Energy
Feed Materials Production Center
P.O. Box 398705
Cincinnati, Ohio 45239-8705

SRF-5J

RE: Aquifer Restoration Design: Tasks 4 and 5

Dear Mr. Reising:

The United States Environmental Protection Agency (U.S. EPA) has completed its review of the United States Department of Energy's (U.S. DOE) aquifer restoration preliminary design package for Task 4: injection demonstration and Task 5: south plume optimization.

The design packages provide the functional and design requirements for these modules, as a detailed design package will be submitted at a later date. Overall, the document is deficient in explaining several aspects of the design for tasks 4 and 5

Therefore, U.S. EPA disapproves design package pending incorporation of adequate responses to the attached comments. U.S. DOE must submit a revised document and responses to comments within thirty (30) days receipt of this letter.

Kapoor (J)
PARTIAL ACTION
RESPONSE TO
[illegible]

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Please contact me at (312) 886-0992 if you have any questions regarding this matter.

Sincerely,

James A. Saric
Remedial Project Manager
Federal Facilities Section
SFD Remedial Response Branch #2

Enclosure

cc: Tom Schneider, OEPA-SWDO
Jack Baublitz, U.S. DOE-HDQ
John Bradburne, FERMCO
Charles Little, FERMCO
Terry Hagen, FERMCO
Tom Walsh, FERMCO

TECHNICAL REVIEW COMMENTS ON REMEDIAL DESIGN, PRELIMINARY DESIGN PACKAGE FOR TASK 4: INJECTION DEMONSTRATION AND TASK 5: SOUTH PLUME OPTIMIZATION

GENERAL COMMENTS

Commenting Organization: U.S. EPA Commentor: Saric
Section #: NA Page #: NA Line #: NA
General Comment #: 1
Comment: The document text is not consistent with the drawings included. The text describes systems operations that are contrary to the control scheme shown on the drawings. The document should be revised, and the drawings should be corrected and coordinated with the intended design.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: NA Page #: NA Line #: NA
General Comment #: 2
Comment: The overall design should be coordinated for internal consistency and compatibility of systems described in the text. The entire project should be reviewed for continuity, and if possible, the construction contracts should be modified so that one contractor is responsible for the entire system construction; for example pipe lines should be installed by one contractor, rather than having one pipe line installed in three separate construction contracts, possibly by as many contractors.

SPECIFIC COMMENTS

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.2 Page #: 2-4 Line #: NA
Original Specific Comment #: 1
Comment: The text provides an explanation of the South Plume removal action pipeline system, including the 20-inch force main and a 12-inch discharge line. It is not clear why the force main is larger than the discharge line. If both pipelines are to carry the same flow, there should not be such a difference in pipe size. Typically, the force main is smaller than the gravity line. This discrepancy should be clarified.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.3 Page #: 2-4 Line #: NA
Original Specific Comment #: 2
Comment: See original specific comment #1.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.4.1 Page #: 3-15 Line #: NA
Original Specific Comment #: 3
Comment: The text states that the flow control valves will be remotely operated from the advanced wastewater treatment facility control room. It is not clear how the flow control valves will be operated, because drawing No. SK-N-04364 indicates a local operation, not a remote operation. This discrepancy should be clarified.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.4.1 Page #: 3-16 Line #:NA
Original Specific Comment #: 4
Comment: See original specific comment #3 above.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.4.2 Page #: 3-16 Line #: NA
Original Specific Comment #: 5
Comment: The text states that the injection demonstration will have a 50,000-gallon injection water supply tank. However, the text does not explain why a 50,000-gallon tank is needed. It appears that adequate water will be available as long as the extraction system is working, because the water treatment system is treating water continuously and at a much higher flow rate than needed for injection. The need for a 50,000-gallon tank should be included in the prefinal design criteria document.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.4.2 Page #: 3-16 Line #: NA
Original Specific Comment #: 6
Comment: The text states that each injection well will be capable of influent sampling at the well head. However, the source of injection water is the same for all injection wells. Because the water quality will not change at each injection well, one sampling point near the injection demonstration system supply pump should be adequate. The need for sampling at each of the injection wells should be explained in the response to comments document.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.4.2 Page #: 3-17 Line #: NA
Original Specific Comment #: 7
Comment: The text states that injection wells will have a polyvinyl chloride (PVC) casing to minimize cost and a wire-wrapped stainless-steel screen to provide better resistance. The use of PVC appears to be acceptable; however, it is not clear why this approach is not being used to design extraction wells. If the entire system is designed for the same 15-year life, the use of PVC should be considered for well casings other than injection wells.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.4.2 Page #: 3-17 Line #: NA
Original Specific Comment #: 8
Comment: The text states that each injection well will have two injection tubes, with one tube assembly sized for 100 to 150 gallons per minute (gpm) and the other for 150 to 200 gpm. Because each injection well will be operated at the injection rate of 200 gpm, the response to comments document should explain why two injection tubes are needed.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 5.1 Page #: 5-2 Line #: Figure 5-1
Original Specific Comment #: 9
Comment: The following issues were identified in the diagram of the injection well: (1) the flow control valve should always be located downstream from the flow meter to avoid creating turbulence in the meter section, (2) the air release valve should always be installed at the highest point, (3) a vacuum breaker and air release valve at the injection tubes should be included at the well head to allow water columns to drain when the well is not in use or when power fails, and (4) a sampling port is not required at the injection wells. These issues should be addressed in the response to comment document, and the figure should be revised for the prefinal design package.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 5.2 Page #: 5-4 Line #:NA
Original Specific Comment #: 10
Comment: The text states that a pressure-indicating transmitter will monitor the discharge pressure at each new injection water supply pump. The transmitter will be used solely for indication and will not influence any automatic functions. A simple pressure gauge would be adequate. The purpose of and need for this pressure transmitter is not clear. The need for a pressure-indicating transmitter should be explained in the response to comments document.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 5.2 Page #: 5-4 Line #: NA
Original Specific Comment #: 11
Comment: The text states that each injection well will be controlled by a flow control valve (FCV). It is assumed that the FCV will be used to maintain a preset rate of flow because there is no outside signal coming into it (See Drawing SK-N-04365). In addition, the text states that the valve will also receive a signal from pressure transducer located inside the well casing. This transducer closes the FCV on high or low water levels. This water level pressure transducer is also interlocked with another pressure transducer that closes FCV on negative pressure. However, the following items need to be clarified:

- Figure N.5-1 and Drawing No. SK-N-04365 do not agree with the text.

- The FCV should be located downstream from the flow meter.

- Operating injection wells with only 1 pound per square inch (psi) backpressure may cause the FCV to close prematurely because of flow and pressure fluctuations in the system.

- It is not clear how the pressure of the injection well will be reduced to 1 psi. Elsewhere the text states that injection water supply pumps will operate at 150 pounds per square inch gauge (psig), and no pressure reducing valves are shown.

- It is not clear how the system will react if one of the FCV valves closes in an injection well. The supply pumps have a constant speed of 1,000 gpm, and the maximum injection rate is 200 gpm per well. The text should discuss how this system will react to the pressure increase.

The above issues need to be addressed in the response to comments document and in the prefinal design submittal.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 5.2 Page #: 5-4 Line #: NA
Original Specific Comment #: 12
Comment: The text states that a "low level alarm on the injection water supply tank will secure the injection water supply pumps." The text should clarify how a low level alarm will secure the injection water supply pumps, because such an alarm should shut down these pumps. This issue should be clarified in the response to comment document.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.3.1 Page #: 6-2 Line #: NA
Original Specific Comment #: 13
Comment: The text in this section refers to a 50,000-gallon water supply tank for the injection system demonstration. A 50,000-gallon tank appears to be excessively large for this application. The text should be revised to explain why such a large tank is required. Also see Specific Comment # 5.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.4.1 Page #: 6-3 Line #: NA
Original Specific Comment #: 14
Comment: The text states that the maximum working pressure outside the well head will be kept below 150 psig. This seems to be a very high pressure for the system when the required backpressure at the injection well is only 1 psig.

An explanation for operating at such a high pressure should be included in the response to comments document.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.4.2 Page #: 6-3 Line #: NA
Original Specific Comment #: 15
Comment: The text states that the maximum pressure will not exceed 150 psig in the injection demonstration supply lines. The back pressure at the injection well is only 1 psi, and there are no pressure reducing valves in the system. The response to comments document should explain why it is necessary to operate this system at such a high pressure (maximum 150 psig). See also Specific Comment #14.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.6 Page #: 6-4 Line #: NA
Original Specific Comment #: 16
Comment: The text describes the cleanouts and refers to valves that will have a steel cast iron body with flanged ends attached to ductile iron pipes. If high density polyethylene (HDPE) pipe is used for the force main, the cleanouts can be made from HDPE pipe and fused to the force main (eliminating a mechanical joint required to connect ductile iron to HDPE). The response to comments document should explain why it is necessary to use ductile iron pipe for cleanouts. The response to comments document should also explain how a gate valve on a cleanout can create a sudden surge in the flow in the pipe line.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.7.3 Page #: 6-5 Line #: NA
Original Specific Comment #: 17
Comment: The text refers to electrically actuated ball valves with fully closed limit switches used for flow control. Ball valves are typically used for shut off (that is, on-off) service, and butterfly valves are used for flow control. The response to comments document should explain how a ball valve will be used in flow control based on a 4 to 20 milliamp (mA) direct current (dc) signal, and it should identify the function of the fully closed limit switch.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.7.4 Page #: 6-5 Line #: NA
Original Specific Comment #: 18
Comment: The text describes the injection well flow meter with a flow range of 0 to 500 gpm. This flow range appears to be excessively large. The maximum flow rate to each injection well is 200 gpm. The response to comments document should explain why a flow meter with a 0 to 500 gpm range is used.

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Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.7.5 Page #: 6-5 Line #: NA
Original Specific Comment #: 19
Comment: The text states that injection demonstration well pressure transmitters can indicate the discharge pressure for each injection demonstration well. It is not clear why pressure monitoring is needed at the injection well. The text in Section 6.1.3 states that this pressure will be about 1 psi. If a low pressure interlock is required to close a valve, a pressure switch would operate more efficiently. The response to comments should provide justification for use of transmitters. See also the other comments pertaining to injection well flow control.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.7.6 Page #: 6-6 Line #: NA
Original Specific Comment #: 20
Comment: The text refers to an electrically activated ball valve as a injection demonstration well flow control valve. The use of ball valves is not advised for flow control. A butterfly-type valve is normally used for flow control. The response to comments should explain why ball valves are used for flow control.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.7.7 Page #: 6-6 Line #: NA
Original Specific Comment #: 21
Comment: The text refers to a pressure indicating transmitter on each discharge from the injection demonstration pumps with local and remote indication. Drawing No. SK-N-04365 does not indicate remote indication. In addition, the need for a remote pressure indication at each injection supply pump is not clear. The text also states that high and low pressure interlocks will be provided to shut off the pumps. High pressure shutdown can occur quite often (see Comment #11), and a pressure switch with low and high pressure presets can be used to shut down the pumps. The anticipated pressure range should be provided in the response to comments document and in the prefinal design package.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.7.8 Page #: 6-6 Line #: NA
Original Specific Comment #: 22
Comment: The text states that a low- and high-level interlock will be provided to close the flow control valve. Seasonal groundwater level fluctuation will also have an effect on the system, and it may cause low- or high-level shutdowns. The need for the high-low interlock from the injection well level transmitter is not understood. The need for the high-low interlock should be justified in the response to comments document and in the prefinal design package.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.7.9 Page #: 6-6 Line #: NA
Original Specific Comment #: 23
Comment: The text in this section provides information on the injection demonstration water supply tank level control valve; however, the text does not explain what will happen to the treated water flow when the injection demonstration water supply tank is full and the level control system closes the level control valve. It is not clear whether this valve can shut down the entire extraction and treatment system, and no bypass is shown to allow the treatment system to operate. This issue should be addressed in the response to comments document.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.7.10 Page #: 6-6 and 6-7 Line #: NA
Original Specific Comment #: 24
Comment: See original specific comment #23.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.7.11 Page #: 6-7 Line #: NA
Original Specific Comment #: 25
Comment: The text describes the advanced wastewater treatment facility expansion and the aeration tank level control valve as a pneumatically actuated ball valve. All other valves are electric. If possible, the system should use electric valves for compatibility. In addition, ball valves are not normally used for flow control. The response to comments document should explain the reason for using a pneumatically activated ball valve.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: Appendix B.9 Page #: B-7 Line #: NA
Original Specific Comment #: 26
Comment: The text refers to the isolating valves as manually operated butterfly valves. However, ball valves provide better shut off, and butterfly valves are better for flow control. The use of butterfly valves for shut off service should be explained in the response to comments document.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: Appendix D Page #: Drawing SK-N-04363 Line #: NA
Original Specific Comment #: 27
Comment: Drawing No. SK-N-04364 shows local indication and operation in the SPO valve house, which contradicts information provided in Section 3.4.1, page 3-15, and in Section 6.7.2, page 6-14. DOE should clarify this discrepancy in the response to comments document and the prefinal design package.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: Appendix D Page #: Drawing No. SK-N-04365 Line #: NA
Original Specific Comment #: 28
Comment: Flow control valves are normally installed downstream from the flow meters. Ball valves are normally used for shutoff (isolation), and butterfly valves are used for flow control. However, drawing No. SK-N-04365 shows electrically actuated flow control ball valves upstream from the flow meter, and butterfly valves are shown as shut off valves. These valves should be located upstream of the flow meters so that the meter section can be isolated for service and removed if necessary. The air release valve should also be located at the highest point in the system. A combination air release/vacuum release valve should be used at the well head. (See Specific Comment #9.) This drawing should be revised and resubmitted with the prefinal submittal.