

REGULATORY FILE CY

40-8200

DON L. WARNER

P. O. BOX 781

ROLLA, MISSOURI 65401

April 2, 1974



Mr. Richard B. Chitwood, Chief
Technical Support Branch
Directorate of Licensing
U. S. Atomic Energy Commission
Washington, D. C. 20545

Dear Mr. Chitwood:

As you requested in your letter of March 15, 1974, I have reviewed the application of Cleveland-Cliffs Iron Company for a license to conduct pilot studies of in-situ leaching of uranium in the Powder River Basin of Wyoming.

In the applicant's letter of February 7, to Mr. L. C. Rouse, it is stated that the proposed project will be carried out within an area approximately 200 x 200 feet. The letter further indicates that only a limited volume of leaching agent will be injected, but the exact amount is not specified. It is estimated that the largest volume will be injected during the continuous multi-well test, and the maximum volume to be injected during that particular test was calculated as 103,000 gallons.

Since the project is to be carried out in a fresh-water bearing sandstone of the Wasatch Formation, any injected chemical or dissolved radioactive elements that are not recovered will become groundwater pollutants. The applicant estimates that perhaps one percent of the total volume of injected solution might not initially be recovered. The amount of injected chemicals that are recovered depends on a number of hydrogeological variables, but most importantly on the natural flow rate in the aquifer and the length of time of pumping. If only one pore volume of 103,000 gallons is injected and the same amount pumped, I would estimate the unrecovered amount at much greater than one percent.

In any case, the applicant proposes to flush the test area with high-quality water after the test to attempt to remove any remaining solvent or dissolved radioactive elements. Also, as the applicant correctly points out, chemical reaction will tend to remove additional amounts of any remaining solvents. Other factors tending to reduce the concentration of pollutants are hydrodynamic dispersion and possibly ion exchange.

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In conclusion, because of the limited extent of the proposed program and the protective measures to be used, it does not appear that extensive groundwater pollution could occur.

The following suggestions and comments are offered concerning the proposed program:

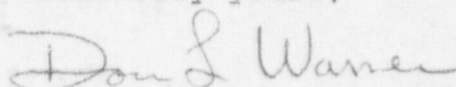
1. The applicant should be requested to maintain an extremely accurate material balance of injected and recovered chemicals. This would do more than anything else to define the extent of any contamination that might occur during the test.
2. It would be preferable to discharge the clarified water pumped during the clean-up phase at the surface, rather than reinject it. The clean-up pumping would be more effective without concurrent injection. Pumping could then continue until the water is of background quality. There should be no objection to discharging the treated water at the surface if it is deionized by ion exchange or chemically treated as described.
3. Perhaps I do not fully understand the applicant's proposed operation of the barrier-monitor system, but it appears to state that, if contamination is detected in a barrier-monitor well, the test field (injection and pumping wells) will be shut down and the barrier-monitor well pumped at a high rate. This procedure would tend to draw more of the injected chemicals from the test area toward the barrier-monitor well. I would suggest that injection should stop, but the production should continue while the monitor well is pumped until the barrier-monitor well no longer produces any contaminated water. At this time, it would be reasonable to assume that contamination had been removed from the area of influence of the barrier-monitor well and that any remaining contaminants would be moving back toward the test area.

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4. It is not definitely stated, but it is implied that sampling of the barrier-monitor wells would be discontinued after testing was completed. If any significant amount of injected chemicals were not recovered, it might be desirable to continue to test the barrier-monitor wells in an attempt to determine the rate and direction of movement of the contaminants.
5. The above comments all apply to the system the way that the applicant proposes to operate it. I do not know why it is proposed to inject into the peripheral wells and produce through the central well. It may be that, from an operating point of view, it is preferable to inject smaller amounts into the peripheral wells to minimize injection pressures. However, I believe that the potential for escape of injected chemicals would be less if the central well were the injection well and the marginal wells the producers. In a large system of many wells it does not matter, since there will be an equal number of producing and injection wells, but it probably will matter in this case.

Thank you for the opportunity to be of assistance to the Directorate of Licensing.

Sincerely yours,



Don L. Warner
Consulting Geological
Engineer

DLW:def

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FROM:
Don L. Warner
Rolla, MO

DATE OF DOCUMENT:

April 2, 1974

DATE RECEIVED

April 8, 1974 *

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REPORT:

OTHER:

TO:

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ORIG.:

CC:

OTHER:

Richard B. Chitwood

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ACTION NECESSARY

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CONCURRENCE

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DATE ANSWERED:

NO ACTION NECESSARY

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COMMENT

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Ltr. comments on the application of
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