



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

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Docket No. 40-8380
SUA-1228, Amendment No. 5

DOCKET NO.: 40-8380
APPLICANT: Rocky Mountain Energy - Mono Power-Halliburton Joint Venture
FACILITY: Nine Mile Lake R&D In Situ Uranium Solution Extraction Facility, Natrona County, Wyoming
SUBJECT: EVALUATION OF REQUEST FOR LICENSE AMENDMENT TO AUTHORIZE USE OF CARBONATE LIXIVIANT IN FIELD TEST

Proposed License Amendment

By letter dated March 31, 1980, and supplement dated May 30, 1980, Rocky Mountain Energy Company (RMEC) requested that Source Material License SUA-1228 be amended to authorize the use of a carbonate lixiviant in leaching a proposed new test pattern at the Nine Mile Lake licensed site. A sulfuric acid lixiviant has been used in three previous tests at this site. The proposed test will be conducted in an area designated by the licensee as Test Pattern #4 using a sodium carbonate/bicarbonate lixiviant system with hydrogen peroxide oxidant and an average lixiviant recovery flow of 40 gpm (range 35 to 45 gpm).

Background

The RMEC R&D in situ uranium leaching operation conducted initially at the company's Bear Creek site in 1975 was relocated to the Nine Mile Lake site under license Amendment No. 1 issued in October 1976. A total of three tests has been conducted on this site.

Pattern #1, drilled in November 1976, was a 50-foot radius seven-spot operation using a sulfuric acid-iron sulfate-hydrogen peroxide lixiviant. Severe equipment corrosion problems and irreversible well plugging were experienced and testing was stopped after about two pore volumes of lixiviant were injected. This pattern was restored using a clean water sweep.

Pattern #2, a 50-foot radius five-spot drilled the summer of 1977, was operated using sulfuric acid-hydrogen peroxide leachant introduced at the rate of 10 gpm into each of the four injection wells. Production was maintained at 42 gpm. Scaling and plugging problems were minimal and the overall test was considered successful. This pattern was restored by treating and reinjecting part of the production stream. The treatment system included a lime addition step to neutralize acid and precipitate radionuclides and heavy metals, precipitation of calcium by the addition of soda ash, and removal of the resulting sodium sulfate by reverse osmosis.

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Pattern #3 was drilled in 1978 as a modified seven-spot providing six injection wells each completed into two separate ore zones located one above the other and two recovery wells, one for each ore zone. Although a primary objective was to leach both ore zones simultaneously, a problem was encountered in controlling the lixiviant distribution to the two zones. Due to excessive flow to the upper ore zone, a horizontal excursion occurred in November 1979 which was subsequently brought under control. As of April 1980, injection into both ore zones was discontinued; and currently, each zone is being pumped at 5 gpm. The 10 gpm production stream is being routed through ion exchange and lime neutralization while underflow from the lime clarifier is being discharged to an evaporation pond and the overflow to a treated water reservoir. The licensee plans to continue operation of Pattern #3 following this procedure until a decision is reached regarding the choice of lixiviant for the proposed commercial operation (Docket 40-8721). This decision will be based on the results obtained in the proposed Pattern #4 carbonate lixiviant test. If it is decided to proceed with carbonate leaching in the commercial facility, Pattern #3 will be restored using a groundwater sweep and restoration of a carbonate leached pattern will be demonstrated in Pattern #4. If the decision is to continue with acid leaching, the licensee will install an acid restoration circuit to demonstrate restoration in Pattern #3.

Discussion

Source Material License SUA-1228 authorizes RMEC to conduct R&D in situ uranium solution extraction studies within an approximately 37.2-acre site in the vicinity of Nine Mile Lake using a sulfuric acid lixiviant containing a suitable oxidant. As indicated above, studies using sulfuric acid have been conducted on three test patterns.

RMEC now proposes to study the use of a sodium carbonate/bicarbonate lixiviant in a new 50-foot radius five-spot designated as Pattern #4 located on the same site approximately equidistant between Patterns #2 and #3. The proposed change in lixiviant will require several minor modifications to the process flow sheet none of which can be expected to produce any significant change in potential environmental impact.

Due to the changes in the lixiviant chemistry and required changes in the recovery process, the licensee proposes to modify the sampling program to be used in monitoring operation of the proposed new test pattern. The licensee also proposes to modify well completion techniques to reflect the experience gained in previous tests and to utilize materials most suitable for use with carbonate leach solutions.

The staff concurs with the licensee's observation that carbonate/bicarbonate leaching at near neutral pH may be environmentally more desirable than the sulfuric acid leach process in that smaller quantities of heavy metals should be mobilized resulting in smaller quantities of solid wastes to be disposed of. In addition, previous operations by the industry have indicated that the water quality of ore bodies mined using carbonate/bicarbonate lixiviants can be readily restored to premining conditions.

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Based upon review of the licensee's submittals, the staff concludes that issuance of an amendment authorizing the proposed operations will not result in undue risk to the public health and safety and will not produce any increase in adverse environmental impact over that produced with sulfuric acid lixiviant. Because issuance of this amendment is not deemed a major federal action significantly affecting the quality of the environment, pursuant to 10 CFR Part 51.5(d)(4), no environmental impact statement, negative declaration, or environmental appraisal need be prepared.

Approval of the requested amendment is recommended subject to the indicated revision and addition of the following license conditions:

8. Authorized Place of Use:

Nine Mile Lake Area, Natrona County, Wyoming. For use in connection with research and development uranium solution mining and recovery operations in accordance with statements, representations, and conditions contained in the licensee's application dated March 19, 1976, and submitted in April 1976; Part II of supplement dated June 1976 and submitted by letter dated July 2, 1976, the application dated February 1980 submitted with letter dated March 31, 1980, and application supplement dated May 30, 1980.

Notwithstanding the above, the following conditions shall override any conflicting statements contained in the licensee's applications and supplements:

11. During normal operations, monitor wells shall be sampled every two(2) weeks and analyzed for pH, chloride, bicarbonate, uranium, vanadium, and conductivity with static water levels measured before each sample is taken. Every four weeks, these samples shall also be analyzed for radium-226, thorium-230, arsenic, and selenium. On a quarterly basis, the full suite of thirty-two water quality parameters tabulated on page 11 of the amendment request submitted on March 31, 1980, shall be determined on samples from each of the five monitor wells for Test Pattern #4.
12. Pre-injection groundwater quality baseline in the Pattern #4 production zone shall be established following the procedure described in the February 1980 amendment request submitted March 31, 1980. Baseline values shall also be established for each of the four monitor wells outside the leach zone as well as the shallow monitor well committed by the licensee to be installed in the alluvium overlying the Lewis Shale following

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the same procedure except that for the five monitor wells, only those seven parameters used for excursion detection need be determined.

- 13. The upper control limits for detecting excursions shall be determined for each of the five monitoring wells by taking the average for each parameter (\bar{X}), adding two standard deviations (S) then adding 10% of this total. The lower control limits will be determined by subtracting two standard deviations from the average of each parameter then subtracting 10% of the remainder or:

$$UCL = 1.1(\bar{X} + 2S)$$

$$LCL = 0.9(\bar{X} - 2S)$$

- 14. Grab samples of yellowcake, yellowcake decant, yellowcake filtrate, reverse osmosis brine, and reverse osmosis product listed in table headed "Requested Sampling Summary" in the February 1980 Amendment Request shall be analyzed for radon-226 on at least a monthly basis.
- 15. The goal for restoring the groundwater quality in Pattern #4 will be the return of all parameters to pre-injection background levels. Criteria for groundwater restoration will be determined in accordance with Wyoming State requirements.

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Approved:

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