PDR

40-8768

KERR-McGEE NUCLEAR CORPORATION
KERR-McGEE CENTER • OKLAHOMA CITY, OKLAHOMA 73125

September 11, 1980

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Ronald S. Kaufmann
Uranium Recovery Licensing Branch
Division of Waste Management
US Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Kaufmann:

In accordance with your request in your letter of July 1, 1980, we are enclosing a copy of the application submitted to the State of Wyoming, Department of Environmental Quality and corrected pages to update the NRC application.

Ten (10) sets of revised pages 3-1, 3-2, 3-3, 3-4, and 6-1 are included. Two (2) figures, 3-1 and 3-2 have been revised and are also included. These revised pages should be substituted for the original pages.

Please let me know if you need additional information.

Sincerely,

W. J. Shelley

W. J. Shelley, Director
Regulation and Control

WJS/pls

Attachments - one copy of application submitted to WYDEQ was received. Project Mgr has retained this copy.

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Add'l info

3.0 Project Description and Operation

The in-situ leaching research and development project will include a well field of approximately one acre, a 100 gpm process plant, buried pipelines, and a small evaporation pond.

The well field is expected to include 15 leaching wells and about 11 monitor wells; however, if the pilot performance indicates closer well spacing is needed, additional wells may be drilled. The leaching wells in the initial program will be drilled to a depth of ±525 feet on a conventional five-spot pattern with a spacing of approximately 100 feet between like wells. Monitor wells will be completed in the "Q" sand around the test site and monitor wells will be completed in the aquifers above and below the "Q" sand. The relative locations of the injection, production, and monitor wells are shown in figure 3-1. The well field site is located about 1500 feet south of Kerr-McGee's Bill Smith Mine shaft, in Section 36, T36N, R74W. The recovery plant will be connected to the well field header building by buried pipelines (see Figure 3-2).

All wells will be drilled to the specified depth, cased with PVC, fiberglass, and/or steel casing, and cemented with a sufficient volume of cement to isolate the completion interval from all other aquifers. Typical well completions are illustrated in figure 3-3. Data on well elevations, depths, and completion intervals for the wells drilled for the pump test are included in Table 2-2. Similar data for the other operating and monitor wells will be submitted to NRC after all the wells are drilled. A small header building will be installed near the well field to house the individual well metering and control facilities to protect them from the weather. The individual flow lines will be buried and the well head will be covered with insulated boxes to prevent freezing in the winter months.

The injected fluid will be a sodium carbonate-sodium bicarbonate leach solution with hydrogen peroxide and/or oxygen added. The combined sodium-carbonate/sodium-bicarbonate concentration in the injected solution will be maintained at less than five grams per liter and the hydrogen peroxide concentration will be less than one gram per liter. It is expected that

3.0 (cont'd)
sodium carbonate or sodium hydroxide and carbon dioxide will be used to produce the sodium bicarbonate on site.

The produced fluid will be pumped from the well field through buried pipelines to the uranium recovery facility to be constructed at the existing Bill Smith mine site. At the recovery plant, the uranium will be removed by solid resin ion exchange and the necessary chemicals will be added to the barren fluid to return it to the desired concentration. The fluid will then be reinjected in the leach zone to recover additional uranium. The production and injection rates will be metered and controlled to ensure that the groundwater flow in the area is toward the leach test area. A system bleed of one to five gpm is expected to be sufficient to provide the necessary control.

In the recovery plant which will have a design process rate of 100 gpm, the uranium will be stripped from the ion exchange resin with a strong chloride or acid eluant. The rich eluant will be treated to cause the uranium to precipitate forming a yellowcake slurry which will be transported to a nearby mill for drying and packaging or shipped as a wet product to an uranium processing plant. All yellowcake shipments will be made in compliance with applicable regulations. A block flow schematic for the recovery plant is attached as Figure 34. A small evaporation pond will be constructed near the plant and used to collect and evaporate process waste waters such as excess eluant from the precipitation cycle. The pond will be approximately 100 feet x 100 feet and will be lined with a hypalon or similar liner. A system of perforated pipes will be installed in the sand bed under the liner, and will be monitored to ensure that if any leaks occur, they will be detected. The location of the evaporation pond is shown in Figure 32 and a typical crosssection for the pond is shown in Figure 35.

The restoration of the groundwater in the mining zone after completion of the chemical mining phase will in itself be a R&D effort to determine the most effective way to accomplish the restoration. Restoration technology

3.0 (cont'd)

is currently in the development stage and one or more combinations of existing methods will be tried to reduce the concentration of any contaminants remaining in the groundwater to acceptable levels.

The primary restoration technique will be to use groundwater sweeping of the pilot leach area by selectively withdrawing water from the existing production and injection wells. Natural groundwater from the surroundings will flow into the leached zone sweeping any contaminants to the wells for withdrawal from the formation. Water withdrawn from the ore zone will be processed through the IX unit to recover any contained uranium then pumped to the existing facilities for treatment and discharge. The distance from the Bill Smith facility is authorized by NPDES Permit No. 0022411, a copy of which is attached as Appendix C. In addition to the use of the groundwater sweep technique described, it is planned to evaluate reverse osmosis and/or other techniques which produce a water suitable for reinjection into the aquifer to accelerate cleanup. The concentrated contaminants from a commercial project reverse osmosis of similar system would be disposed of by deep well injection or solar evaporation ponds.

The goal of the restoration program will be to return the average concentrations of the specified parameters to baseline or near baseline conditions, however, if this cannot be achieved in a reasonable time using the best practical technology, a secondary target value for that parameter shall be the value determined by the quality of use for which the water was suitable prior to the test. If neither of the above goals can be achieved in a reasonable time, the restoration program will continue until the water produced from the leach area is acceptable for the quality of use (as established by the Wyoming Department of Environmental Quality) for which it was acceptable prior to mining. Currently, the highest use category is Wyoming drinking water and the criteria for this use for the specified parameters is listed in Table 3-1. Other uses for which Wyoming is currenlty establishing criteria are livestock, irrigation and industrial uses.

Baseline water quality data taken to date are included in Tables 3-2 (Leach Zone Wells), Table 3-3 (Leach Zone Monitor Well), and Table 3-4 (Upper

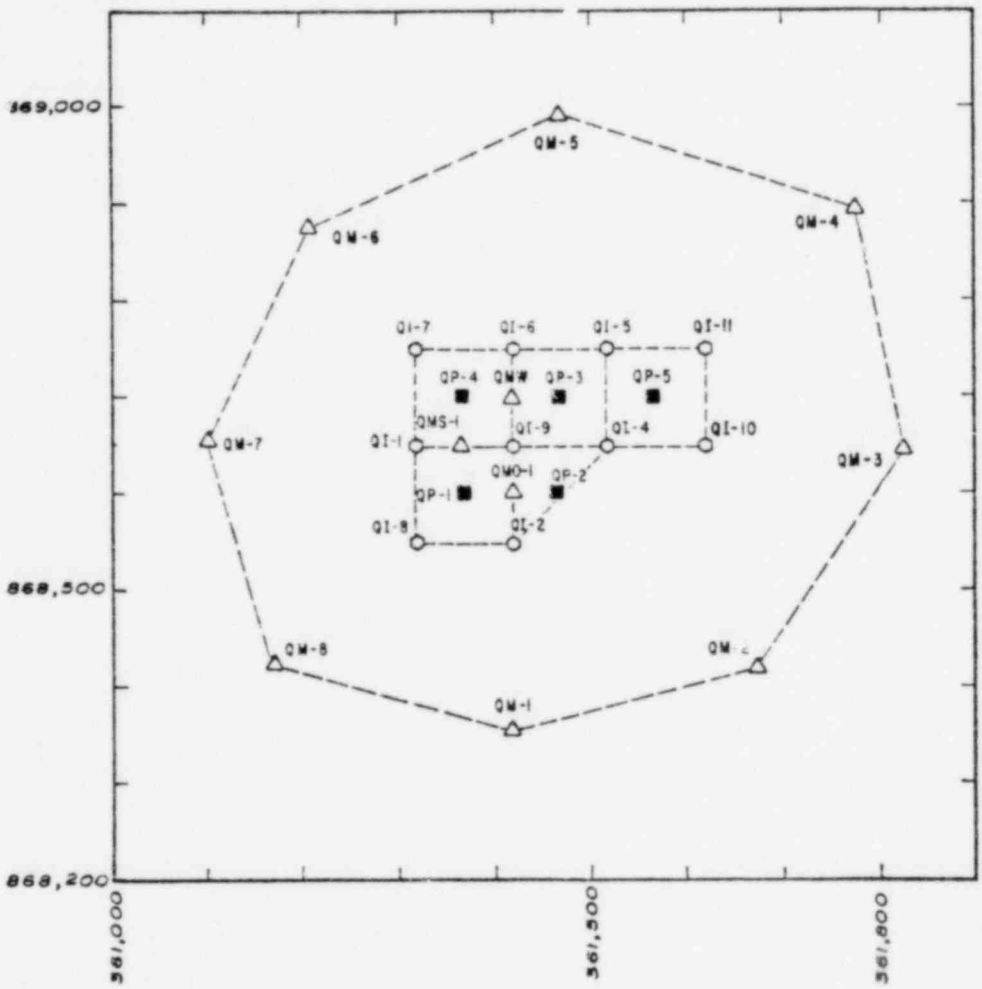
3.0 (cont'd)

and Lower Aquifer Monitor Wells). As noted on the tables, the analyses of some of the samples indicate the wells were not fully cleaned up when the samples were taken. Therefore, additional samples will be taken after further cleanup operations. Analyses of new samples from the existing wells and baseline data from the wells to be drilled will be submitted to NRC prior to beginning leaching operations. These data will be used to determine the groundwater restoration targets to be used for the pilot program. Only representative baseline data will be used for this determination.

At the termination of the operation, all structures such as tanks, buildings, and foundations will be removed and all remaining disturbed areas will be reclaimed in accordance with the regulations of Wyoming Department of Environmental Quality. All wells will be plugged with cement and/or other approved material and the casing will be cutoff two feet below the surface. Any solids remaining in the evaporation pond will be removed and disposed of in a licensed mill tailings pond or as otherwise approved by the NRC. The evaporation pond site will be leveled and contoured to blend with the natural terrain, covered with topsoil, and revegetated. If it is decided to expand the pilot operation into a commercial scale operation, the reclamation would be deferred and completed as per the approved plan for the commercial scale operation.

Other permits required to implement the program are a mining permit from Wyoming DEQ Land Quality Division, well permits from the State Engineer and pond construction permits from the State Engineer and the Wyoming DEQ Water Quality Division. The only permits that have not been applied for are for the evaporation pond. Other facilities that frequently require special permits are available at the Bill Smith mine facility; therefore, these additional permits are not required.

IN SITU R&D PROJECT WELL PATTERN
"Q" SAND DEPOSIT
SECTION 36-T36N, R74W
CONVERSE COUNTY, WYOMING



LEGEND

- △ MONITOR WELL
- ■ PRODUCTION WELL
- ○ INJECTION WELL

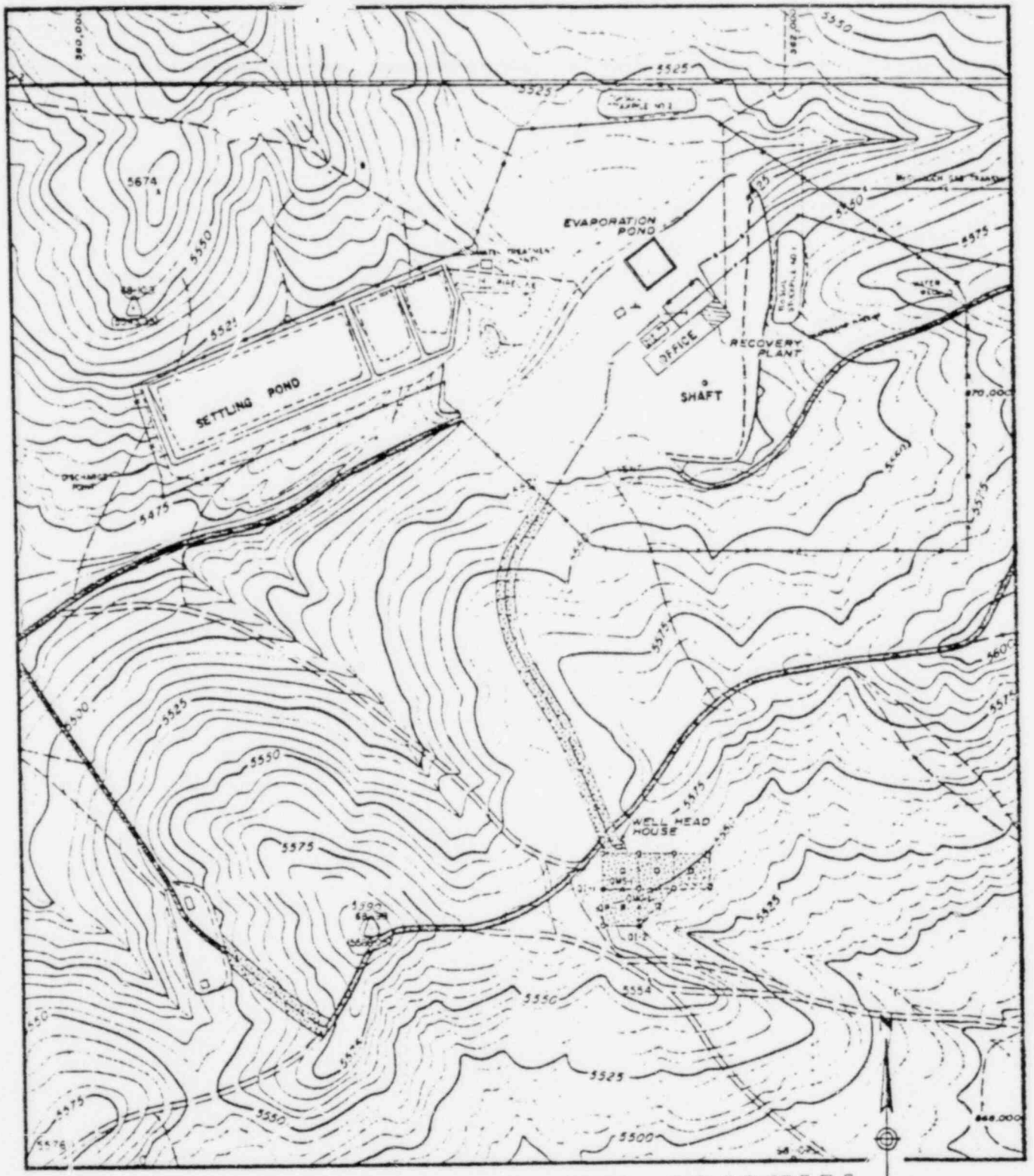
SCALE 1" = 200'

FEB 1980
REV. JULY 1980

FIGURE 3-1

KERR-McGEE NUCLEAR CORPORATION

LOCATION OF Q-SAND PILOT WELL FIELD AND RECOVERY PLANT
SOUTH POWDER RIVER BASIN
SECTION 36 - T.36N., R.74W.
CONVERSE COUNTY, WYOMING



LEGEND

- △ MONITOR WELL
- □ PRODUCTION WELL
- ○ INJECTION WELL
- ○ EXPLORATION HOLE
- ——— PIPE LINE
- DISTURBED AREA
- EXISTING ROADS TO BE USED FOR ACCESS

SCALE IN FEET
200 0 300 600

By C SUTTER Feb 11, 1980
REVISED AUG 8, 1980

FIGURE 3-2

6.0 Monitoring Program and Mitigating Measures

6.1 Groundwater Monitoring

Monitor wells will be completed in the leach zone aquifer ("Q" sand) encircling the injection recovery field as indicated in Figure 3-1. Monitor wells will also be completed in the overlying and underlying aquifers. All monitor wells will be sampled twice per month and analyzed for carbonate, bicarbonate, chloride, and uranium. If indications of leach solution appear in any of the monitor wells, the production and injection rates will be adjusted as needed to move solutions back to the leach area. If any two excursion parameters exceed the upper control limits (UCL) and are confirmed by analyses of two verification samples taken within 48 hours and 96 hours after results of the first analyses are received, corrective action will be initiated and the NRC will be notified. The sample frequency for the affected well(s) will be increased to once per week until the excursion parameter values are below the UCL values. The UCLs for the monitor wells will be established based on the baseline water quality data for the individual monitor wells. The UCLs for carbonate and bicarbonate shall be the highest representative baseline value for that parameter plus 20 mg/l. UCLs for chloride shall be the highest representative baseline value for that well plus 10 mg/l. The UCL for uranium shall be 2 mg/l.

To date, four wells have been completed in the "Q" sand in the project area and one well each has been completed in the overlying and underlying aquifers. Each of these wells have been sampled twice and the samples were analyzed for all major elements of concern. However, the analyses of some of the samples indicate the wells were not fully cleaned up when the samples were taken. Therefore, additional samples will be taken from all of the wells after further cleanup operations.

Analyses of the new samples from the existing wells, baseline data from the wells to be drilled and the monitor well UCL values will be submitted to NRC prior to beginning leaching operations.

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