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Mr. Dale Smith
US Nuclear Regulatory Commission
Uranium Recovery Field Office
P. O. Box 25325
Denver, CO 80225

Dear Mr. Smith:

United Nuclear hereby submits License Amendment No. 2 to its Reclamation Plan of June 1, 1987. License Amendment No. 2 is submitted in pursuant to License Condition No. 30, to wit, "Licensee shall, as soon as practicable, but in no event later than April 1, 1989, submit to the Uranium Recovery Field Office a proposed Corrective Action Program and cost estimate with supporting rationale" which;

1. Implements the compliance monitoring program described in Paragraph 30A.

2. Proposes to implement a corrective action program for the alluvium "due to exceedance of groundwater protection standards with the objective of returning the concentrations of [identified hazardous constituents] to the concentration limits specified in paragraph 30B."

We are advised by Mr. Konwinski of your staff that the seepage remediation plan contained in approved License Amendment No. 1, dated July 26, 1988, for Zone 1 and Zone 3 of the Upper Gallup Formation is considered sufficient by NRC to constitute the Corrective Action Program for Zone 1 and Zone 3.

Please note that Amendment No. 2 also contains a re-evaluation of the water balance which takes into consideration the additional water which will be produced from the alluvial pumpback system and the requested cost estimate.

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Sincerely,

Juan R. Velasquez
President

Enclosure

cc: William Rowe (2)

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Project 86-060-17
April 1989

Canonie Environmental

Amendment II

Reclamation Plan License No. SUA-1475

Church Rock Site
Gallup, New Mexico

Prepared for:

UNC Mining & Milling
A Division of United Nuclear Corporation
Gallup, New Mexico

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3.2.4 Well Design and System Construction

The technical specifications for extraction and monitoring well design and construction, pumps, and surface conveyance systems are presented in Appendix C. The design is based on the predicted aggregate pumping rate of 17 gpm (801:2 gpm; 802:5 gpm; 803:10 gpm).

3.2.4.1 Extraction Wells

The three extraction wells designated as 801, 802, and 803 will be drilled through alluvium to the top of the Mancos shale. Hence, the extraction wells will fully penetrate the saturated thickness of alluvium. The wells will be drilled using a technique which will not affect the transmissivity of the formation and will not alter the quality of water. The methods which are suitable for drilling in the alluvium are hollow stem auger, air rotary drilling, or casing driving with normal or reverse air circulation. Any combination of these techniques is acceptable and may be implemented depending on the competency and stability of the alluvium.

The use of mud rotary techniques or any other technique which introduces drilling fluid other than formation water into the borehole will not be permitted. Since the transmissivity of the alluvium in the location of the extraction wells is low, removal of drilling mud from the sand pack, breaking and removal of the filter cake from the borehole walls, and satisfactory development of the well may be difficult if not impossible. Using mud dispersing agents such as calcium hypochlorite may, in the presence of low transmissivity, adversely effect the quality of the ground water.

No geophysical logging is planned for extraction wells. The sediments of alluvium consist of silty sands without layering sufficiently distinct to produce meaningful differentiation in geophysical signature. Geophysical logging conducted in the past on alluvium did not prove informative (see geophysical logs, EPA Remedial Investigation 1988).

Development of the wells with compressed air (air lifting) does not appear to be practical because of unfavorable submergence/lift ratio in the wells.

Compressed air may simply push cuttings back into the formation, plugging its porosity.

The wells will be completed with 4 1/2-inch diameter screen with an artificial sand pack. The sand pack envelope should be thick, 2 inch minimum. Therefore, the diameter of the well bore should be no less than 10 inches. A bentonite seal will be placed above the sand pack. The rest of the boring will be filled with concrete. Each well will be supplied with a submersible pump capable of providing sufficient lift to carry the water through the water distribution system to the existing evaporation ponds for discharge.

Upon installation of the pumps, the wells will be tested using a step-drawdown method to establish the well's specific yield ie, pumping rate per foot of drawdown, and the well's efficiency.

For construction details of extraction wells, and water distribution system refer to Appendix C of this amendment.

3.2.4.2 Monitoring Wells

The four monitoring wells numbered 804, 805, 806, and 807 will be installed solely to assess the performance of the pumping wells in terms of establishing the hydraulic barrier to the migration of tailings seepage.

These monitoring wells will be drilled in the same manner as extraction wells discussed above. The wells will be completed with 2-inch diameter polyvinyl chloride (PVC) casing and screen, and an artificial sand pack. A bentonite seal will be placed above the sand pack. The remainder of the boring will be backfilled with cuttings except the upper 1 foot which will be completed with a surface seal. A PVC wellhead housing with a locking cap will be placed over the 2-inch casing.

For construction details of monitoring wells please refer to Appendix C of this amendment.

Monitoring wells and extraction wells will be geologically logged while advanced. Drilling, completion, and development will be done under the supervision of a geologist or geological engineer. Well testing will be performed under the direction of a hydrologist.

No geophysical logging is planned for monitor wells. The sediments of alluvium cons st of silty sands without layering sufficiently distinct to produce meaningful differentiation in geophysical signature. Geophysical logging conducted in the past on alluvium did not prove informative (see geophysical logs, EPA Remedial Investigation 1988).

3.2.4.3 Distribution System

The distribution system will convey water from the extraction wells to the existing evaporation pond system. The distribution system will consist of 3/4-inch diameter PVC laterals from each well to a 2-inch diameter high density polyethylene distribution line. The distribution line will connect to the existing seepage collection system discharge lines which feed the evaporation ponds.

Each lateral will be equipped with a flowmeter and valving so that flows from the wells can be determined and the system can be properly regulated. An additional flowmeter will be installed at the discharge end of the distribution line to verify flows and detect potential losses in the system.

The discharge line will be buried below the depth of the frost line and exposed portions of the discharge lateral will be wrapped with insulating heat tape to prevent freezing of the system.

3.2.5 Monitoring Program

A program of regular performance monitoring and evaluation will provide a measure of how well the remedial action meets design expectations. Performance evaluation may indicate that the objectives have been met and the remedy is complete. However, background water quality levels plays a very

important role in setting both the EPA's ARARs and the NRC's ground water protection standards.

The objective of the monitoring program is to provide statistically valid data, which can be used to evaluate the extraction system's performance in meeting regulatory criteria. Water chemistry data will be used 1) to monitor compliance with License Condition 30, Part B criteria at POC wells, 2) to monitor and assess trends in water quality which may develop in response to pumping, 3) to evaluate the effectiveness of cleanup within the target area, 4) to provide an adequate database for development of ACLs (NRC) and waivers to ARARs (EPA), and 5) to supplement the existing database. Water level data will be used to determine the effects of the system on geohydrological conditions including creation and performance of the hydraulic barrier by the system, and to monitor the decreases in saturation which will occur as pre-mining natural conditions are reestablished.

Table 3.6 and Figure 3-11 displays the wells which will be used for monitoring the system's performance. Table 3.7 displays the list of chemical constituents which will be utilized in the monitoring program. This list is inclusive of NRC ground water protection standards and other required constituents contained in License Condition 30, Part A. The wells listed in Table 3.6 are divided into three groups. There are 1) wells currently monitored as required by the NRC in License Condition 30, Parts A and B; 2) wells that monitor the performance of the pumping system, and 3) wells that provide the data needed to complete the hydrogeologic evaluation.

The seven alluvial POC wells as identified by the NRC in License Condition 30, Part B will be used to monitor compliance with the NRC ground water protection standards. In conjunction with the water quality monitoring program, water level measurements will also be taken in all wells identified in Table 3.6 prior to collecting the sample. Water levels will be used to assess the future anticipated dewatering of the alluvium by monitoring the declines in saturated thickness.

Only water levels will be monitored in the system monitoring wells (804, 805, 806, and 807). These water levels, in conjunction with the water

level in 632, will be used to verify the creation of a hydraulic barrier in the vicinity of the extraction wells. As shown on Figure 3-10, these wells are located between the extraction wells, and along the predicted boundary of the capture zone. Figure 3-12 shows that water levels from these wells will be used to define the gradients between the pumping wells, verifying that the water table slopes towards the pumping wells in these areas.

In addition to the wells required for compliance monitoring (NRC) and for monitoring system performance, six wells were selected to quantify the spatial variation of water quality in the alluvium. These Wells are 639, 642, 644, and 645 located north (upgradient) of the tailings impoundment; and Wells 627 and 624 located to the southwest of the target area. Water quality data from these wells will be used as a statistical benchmark, against which water quality in the vicinity of the system can be compared.

Frequency of Monitoring

Frequency of monitoring for all chemical constituents selected for the performance monitoring program will be quarterly, consistent with License Condition 30, Part A to provide an adequate database for conducting the necessary performance evaluation and establishing ACLs or Waivers. The monitoring program will be reevaluated annually in accordance with NRC and EPA requirements. The annual evaluation will also allow determinations to be made regarding the efficacy of reducing sampling frequency proposed herein. The possibility of reducing the number of monitoring wells will also be considered during the annual evaluation.

3.2.6 System Decommissioning

The objective of the system operation is to clean up ground water standards established by the NRC in License Condition 30, Part B and to the ARARs established by the EPA in the ROD. However, both agencies recognize that modifications may have to be made to these standards. The NRC regulatory mandate recognizes the possibility of not achieving the cleanup standards by providing in Appendix A, 10 CFR 40 of the regulation governing the

disposal of uranium mill tailings the option of establishing ACLs. Further, the EPA also provides an alternative approach of establishing waivers to the ARARs as stated in Appendix A to the ROD (EPA 1988).

This system is designed to be performance based ie, its success will be measured against its ability to meet agency standards. However, the longest the system is anticipated to operate is the end of reclamation activities. The EPA, on page 3 of the ROD established that: "seepage collection in the Southwest Alluvium will be designed to create a hydraulic barrier to further migration of contamination while the source is being remediated." The documented declines in flow rate as described in Section 3.1.2 and illustrated in Figure 3-4 provide technical support demonstrating that the system will not have to be operated beyond the end of reclamation because the depletion of available water will limit the feasibility of pumping the Southwest Alluvium by the mid-1990s. By that time the source, ie, the tailings, will be remediated by installation of a low permeability cover, which will prevent the mobilization of tailings seepage by reducing or eliminating infiltration.

There are, however, other aspects of system operation as determined by actual performance that may allow it to be decommissioned earlier than at the end of reclamation activities. For example, faster than predicted dewatering of the alluvium may occur. Monitoring may determine that compliance with the NRC and EPA standards has been attained. Alternatively, monitoring may determine that it is appropriate to set ACLs and waive ARAR requirements.

Decommissioning - Condition 1

In the event that operation of this system results in meeting the NRC ground water protection standards at the POCs, as set forth in the License, and cleaning up to the EPA ARARs in the identified alluvial target area as set forth in the ROD, the system will be decommissioned.

Decommissioning - Condition 2

Individual wells and/or the system may be decommissioned prior to reclamation of tailings because of the lack of available saturated thickness in the vicinity of the pump-back wells. The saturated thickness is predicted to decline steadily because the primary source of recharge to the alluvium ie, discharge of mine water, ceased in 1986. Water level data collected for performance monitoring will be used to determine when the saturated thickness declines to a level where an individual well or the system can no longer operate. If the water level in the vicinity of a well(s) declines to a point where the well(s) can no longer produce water at rates greater than 1 gpm continuously and this condition of low saturation persists for one month, the well and/or system of wells will be decommissioned.

Decommissioning - Condition 3

The system may also be decommissioned because of its inability to reduce constituent concentrations to the EPA ARAR levels and NRC ground water protection standards. As discussed in Section 2.3, the standards are below background concentrations and are not representative of the actual site conditions. If operation of the system does not result in successful dewatering of the target area or a statistically valid trend towards improvement in water quality cannot be established, the system will be decommissioned and ACLs and Waivers to ARARs will be applied for.