



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION IV  
URANIUM RECOVERY FIELD OFFICE  
BOX 25325  
DENVER, COLORADO 80225

DEC 29 1992

URFO:PJG  
Docket No. 40-WM033  
040WM033030E

MEMORANDUM FOR: Docket No. 40-WM033  
FROM: Pete J. Garcia, Jr., Project Manager  
SUBJECT: REQUEST FOR CONCURRENCE IN TERMINATION OF LICENSE FOR JOY  
MINING COMPANY

Introduction

By letter dated January 14, 1991, the Washington State Department of Health (DOH) requested NRC concurrence on the proposed termination of Radioactive Materials License WN-I0220-1 for the Joy Mining Company (JMC) site located approximately 20 miles east of Colville, Washington. The license was issued to authorize the extraction of uranium from bog material under the State of Washington's agreement with the NRC. The concurrence in the termination was requested pursuant to 10 CFR 150.15(a).

Based on the review of the January 14, 1991, submittal, the staff requested additional information from the DOH by letter dated May 20, 1991. The DOH's response to the request for information was submitted on April 22, 1992. The staff review of the request for concurrence is discussed below.

Background

The JMC license was issued in April 1983 to authorize the processing of uranium-bearing bog material from Flodelle Creek. The bog material contained only young post-glacial uranium deposits which have not had time for the significant in-growth of daughter products. Laboratory analyses indicate that the bog materials have attained only a 5 percent in-growth of daughter products. This results in low concentrations of radium relative to uranium.

JMC began construction of the heap leach facility following issuance of the license. Operations then commenced, although the pilot process perfected in the laboratory never did work efficiently on a commercial scale. Operations resulted in the production of only 500 pounds of uranium concentrate before JMC went bankrupt in 1985. The Union Indemnity Insurance Company of New York, which held a \$93,000 site reclamation bond, also went bankrupt before the State could collect on the surety bond. After it became apparent that money

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would not be available for reclamation from JMC or the bonding company, the State made the decision to begin site closure activities. On July 13, 1988, Allied Nuclear, Inc. (ANI) was selected by the State to perform site decommissioning activities.

The processing of the bog material was very simple due to the nature of the material, which was soft and sand-like. No crushing or grinding of the bog material was necessary. Uranium was leached from the bog material in one of four concrete leach pits by the addition of ferric sulfate. Leach pit solutions were then pumped to tanks in the process building for further processing, with the exception that yellowcake drying was not performed onsite. A 10 percent sulfuric acid solution was added to the processed bog material to return the pH of the material to its approximate original value.

A solution retention pond was constructed to allow the storage and evaporation of process solutions during operations. A leak detection system was constructed beneath the synthetically-lined pond. Solutions were transferred to the pond via an above ground 2-inch PVC line.

#### Decommissioning Activities

Only minor contamination was found on mill components because processing activities were conducted for less than 1 year and yellowcake drying was not conducted at the facility. Process tanks within the mill building were transferred to another licensee in Washington. Other mill equipment and the mill building were decontaminated to release limits and either sold or salvaged. All noncontaminated, flammable material was burned. Contaminated wastes were placed in 55 gallon drums and transferred to ANI's Richland, Washington, facility for disposal.

The processed bog material (residue) was returned to the bog in August 1988 along with bog material which had been stockpiled but not processed. This transfer was made following a comparison of the processed and unprocessed materials which indicated no significant differences. A total of 4500 cubic yards of material was moved from the mill area to the bog. Of that total, approximately 1000 cubic yards of the material had been processed. The bog was then recontoured to its natural condition and a flow direction gate constructed to allow water from Flodelle Creek to flow through the bog as it had done before JMC diverted the flow to allow mining activities.

The leach pits were decommissioned by removing bog material residue and then cleaning the pits. The pits were then inspected for evidence of contamination and surveyed. Areas of contamination which were identified in Leach Pit No.1 were removed using a scabbling tool and the surface resurveyed. The DOH performed a final survey of the leach pits following the completion of decontamination activities by ANI. After the survey revealed that all contamination above release limits had been removed, the pits were filled with clean soil to natural contours.

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The solution transfer line was disassembled, placed in drums, and transferred to the ANI facility. Radiation surveys were conducted along the length of the line (about 100 feet). The surveys showed areas of slight contamination. The contaminated soil was removed and transferred to the ANI site.

Waste materials which were drummed and shipped to the ANI facility in Richland, Washington, are currently in storage. The DOH recently amended the Washington State Administrative Code to allow the disposal of small quantities of 11e.(2) byproduct material at the Hanford commercial low-level radioactive waste disposal site.

The April 22, 1992, submittal provides the action levels which were used for release of items for unrestricted use. These levels are as follows:

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|----|----------------------|------------------------|
| 1. | Removable beta-gamma | < 1000 dpm/100 sq. cm. |
| 2. | Fixed beta-gamma     | < 5000 dpm/100 sq. cm. |
| 3. | Removable alpha      | < 200 dpm/100 sq. cm.  |

All items released for unrestricted use were surveyed prior to release and the results documented.

Soil samples were collected following the completion of decommissioning activities to assure that all areas had been cleaned to less than 5 pCi/g of Ra-226 above background. The solution pond, the mill area, and the road between the mill and the bog were gridded into 30-foot square sections. Five soil samples were collected in each section and composited. A total of 180 composite samples were collected and screened for Ra-226 content using a germanium detector. Five samples which exhibited the highest peak counts were sent to a laboratory for analysis using wet chemistry methods. All results were less than 5 pCi/g Ra-226.

Quality assurance procedures followed during the soil sample analysis program included counting of reference samples, duplicates, and blanks, and daily reliability checks of all counting systems. A comparison of results obtained using the germanium detector and wet chemistry, which was provided in the April 22 submittal, showed a very good correlation. Finally, calibrations of survey instruments were performed using standards traceable to the National Institute of Standards and Testing.

#### Staff Review

The DOH provided data to show that the processed bog material was essentially the same as the surrounding natural bog material. The data were obtained from samples of residue material and unprocessed bog material. The results indicated that concentrations of natural uranium, Ra-226, and iron were very similar for the residue and the bog material. Concentrations of uranium ranged from 90-210 pCi/g for the residue and from 150-330 pCi/g for the bog material. Concentrations of Ra-226 ranged from 5.4 to 8.8 pCi/g for the residue and from 6.4 to 9.1 pCi/g for the natural material. Iron values



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ranged from 1035 to 1400 ug/g for the residue and from 591 to 1568 ug/g for the unprocessed material. Uranium and Ra-226 concentrations in the residue material were less than or equal to corresponding concentrations in the natural material. Iron concentrations in the residue showed a 7.5 percent increase over concentrations in the unprocessed ore. It should be noted that the calculated increase in the iron concentration is heavily biased by a single very low result for an ore sample. Finally, pH values for the two materials were essentially the same.

Criterion 6 of Appendix A to 10 CFR 40 states that the design requirements for stabilization specified in Criterion 6 apply to any portion of a disposal site unless the portion contains concentrations of Ra-226 which do not exceed the background level by more than 5 pCi/g. The data discussed above clearly show that Ra-226 concentrations in the residue are no greater than those in the surrounding natural bog material. Therefore, the design requirements of Criterion 6 do not apply to the return of the residue to the bog.

Criterion 5 states that surface impoundments used to manage uranium byproduct materials, except for existing portions, must have a liner that will prevent the migration of wastes out of the impoundment. The introduction to 10 CFR 40, Appendix A, defines a surface impoundment as an area designed to hold wastes containing free liquids. The transfer area does not classify as a surface impoundment because it is clearly not intended to hold wastes containing free liquids. Rather, the transfer area simply results from the return of the residue to its original location and status. Further, placement of a liner beneath the residue while the rest of the bog remains unlined would have no effect on the environment.

Criterion 5 also states that hazardous constituents entering the ground water from a licensed site must not exceed the background level or the drinking water standard, if such a standard has been established for a particular parameter and the background value is less than the standard. The only parameters which exist in greater concentrations in the residue than in the natural bog material are iron and sulfate. Neither parameter is designated as a hazardous constituent in Criterion 13, which contains a listing of hazardous constituents. Concentrations of hazardous constituents entering the environment from the residue will not exceed background levels in the bog because (1) the levels of hazardous constituents in the residue were not increased as a result of processing, (2) the physical characteristics of the residue do not differ from the ore since crushing and grinding processes were not required, and (3) the pH adjustment of the residue should help minimize any difference in the mobility of hazardous constituents which may have resulted from processing by reestablishing the chemical equilibrium which originally existed. Criterion 5 requirements will therefore be met by the return of the residue to the bog, to the extent that the requirements apply.

The staff review of the soil sampling results indicates that concentrations of Ra-226 in the soils at the processing site following decommissioning activities were less than 5 pCi/g, thus eliminating the need for further

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remediation. In addition, the decontamination criteria used for release of equipment or structures for unrestricted use indicates that adequate decontamination was achieved. Finally, all contaminated materials were transferred to a site authorized to receive them.

#### Land Transfer Requirements

The property which contains the bog area is owned by the Washington Department of Natural Resources. The DOH requested that the land transfer requirement of Criterion 11 of Appendix A to 10 CFR 40 and Section 83 of the Atomic Energy Act, as amended, be waived. The waiver was requested because the DOH believes the remedial action was in keeping with the intent of Appendix A to 10 CFR 40, and the current status of the site does not constitute a health or safety hazard to the public or the environment. The DOH states that the land will remain in the possession of the Department of Natural Resources, which plans to revert the land back to its previous uses of light grazing and recreation.

Criterion 11 of Appendix A states that title to byproduct material and land which is used for its disposal must be transferred to the Federal government or the State in which the land is located, at the State's option. The site would then be under the general license contained in 10 CFR 40.28 for custody and long-term care by the designated State or Federal agency. Criterion 11 also states that, in some rare cases where no ongoing site surveillance will be required, surface land ownership transfer requirements may be waived. Section 83(b)(2) of the Atomic Energy Act, as amended, further states that the title shall be transferred unless the Commission determines that transfer of title to the land and byproduct material is not necessary or desirable to protect the public health, safety, or welfare, or to minimize or eliminate danger to life or property.

The staff concludes that the return of the residue material to the bog will not result in incremental impacts to the public health and safety or the environment over those resulting from the natural bog material. The staff therefore concludes that the transfer of title to the land and byproduct material is not necessary to protect the public health, safety, or welfare, or to minimize or eliminate danger to life or property. Further, no ongoing site surveillance will be necessary. Finally, the site will remain in the possession of the State of Washington, thus assuring control of future use of the site.

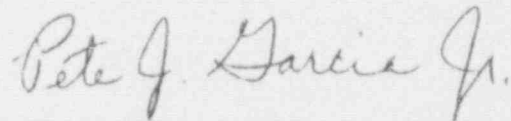
#### Conclusion

The staff review of the remedial actions taken to decommission the JMC site indicates that the actions were appropriate, in that the disposal criteria of Criterion 6 of Appendix A to 10 CFR 40 do not apply to the residue material and the ground-water requirements of Criterion 5 are met, to the extent applicable.

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The staff therefore recommends that the NRC concur in termination of the JMC license. Further, the staff recommends that the license transfer requirement of Criterion 11 be waived.

A handwritten signature in cursive script, reading "Pete J. Garcia Jr.", written in dark ink.

Pete J. Garcia, Jr.  
Project Manager

Case Closed: 040WM033030E

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