UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
1600 EAST LAMAR BOULEVARD
ARLINGTON, TEXAS 76011-4511

May 22, 2018

Roy Blickwedel
Remedial Project Manager
GE Global Operations, Environment,
Health & Safety
475 Creamery Way
Exton, PA 19341

SUBJECT: CHURCH ROCK URANIUM MILL - NRC INSPECTION REPORT 040-08907/2018-001

Dear Mr. Blickwedel:

This letter refers to the U.S. Nuclear Regulatory Commission (NRC) inspection conducted from April 30-May 2, 2018, at your former Church Rock Uranium Mill site in McKinley County, New Mexico. This inspection was an examination of activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. Within these areas, the inspection consisted of selected examination of procedures and representative records, observations of activities, and interviews with personnel.

The inspection findings were presented to you and your staff at the conclusion of the onsite inspection. The enclosed report presents the results of this inspection. No violations were identified, and no response to this letter is required.

In accordance with 10 CFR 2.390 of the NRC's "Agency Rules of Practice and Procedure," a copy of this letter, its enclosure, and your response, if you choose to provide one, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

Should you have any questions concerning this inspection, please contact Dr. Robert Evans, Senior Health Physicist, at 817-200-1234, or the undersigned at 817-200-1191.

Sincerely,

/RA by LEBrookhart Acting for/

Ray L. Kellar, PE, Chief
Fuel Cycle and Decommissioning Branch
Division of Nuclear Materials Safety

Docket No. 040-08907
License No. SUA-1475

Enclosure:
NRC Inspection Report 040-08907/2018-001

cc w/encl:
R. Spitz
R. Warren
S. Jacobs
J. Brooks
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U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket:	040-08907
License:	SUA-1475
Report:	040-08907/2018-001
Licensee:	UNC Mining and Milling Division of United Nuclear Corporation
Facility:	Former Church Rock Mill Site
Location:	McKinley County, New Mexico
Date:	April 30-May 2, 2018
Inspector:	Robert Evans, PhD, PE, CHP, Senior Health Physicist Fuel Cycle and Decommissioning Branch Division of Nuclear Materials Safety
Approved by:	Ray Kellar, PE, Chief Fuel Cycle and Decommissioning Branch Division of Nuclear Materials Safety

Enclosure

EXECUTIVE SUMMARY

UNC Mining and Milling, a Division of United Nuclear Corporation
NRC Inspection Report 040-08907/2018-001

This inspection was a routine, announced inspection of decommissioning activities being conducted at the former United Nuclear Corporation mill site in McKinley County, New Mexico. In summary, the licensee was conducting decommissioning activities in accordance with license and regulatory requirements.

Management Organization and Controls

- The licensee maintained adequate staffing to ensure compliance with license and regulatory requirements. The licensee conducted routine site inspections to ensure that adverse conditions were identified and corrected. The licensee also conducted annual audits and land use surveys in accordance with regulatory and license requirements. (Section 1.2)

Radiation Protection

- The licensee implemented its radiation protection program in accordance with license and regulatory requirements. The licensee's records indicate that no worker was assigned an occupational exposure since the last inspection, all workers received required training, and no contamination problems were identified. (Section 2.2)

Radioactive Waste Management

- The licensee managed radioactive wastes in accordance with license requirements. The licensee voluntarily implemented an eradication program to remove deep-rooted plants from the vicinity of the tailings impoundment. The site staff continued to control access to the restricted area using fences, gates, and postings. (Section 3.2.a)

- A contractor core drilled in the area of the jetty, and the work was conducted in accordance with the contractor's work plan. (Section 3.2.b)

Effluent Control and Environmental Protection

- The licensee implemented its groundwater corrective action and monitoring programs in accordance with license requirements. (Section 4.2)

Report Details

Site Status

United Nuclear Corporation's uranium mill operated from 1977-1982. The mill processed ore primarily from two nearby mines. Reclamation of the mill commenced in 1984, and the mill was fully decommissioned by 1992. The mill site was released from the license for unrestricted use in 1995.

An estimated 3.5 million tons of tailings were disposed in the tailings impoundment. The impoundment consists of three areas—north cell, central cell, and south cell. A radon barrier was completed over the tailings material in 1996, with the exception of the south cell where two lined evaporation ponds are located. The ponds are used for evaporation of potentially contaminated groundwater extracted from the Zone 3 remedial action target area. The licensee also continued to monitor potential plumes in the Southwest Alluvium and Zone 1 target areas. In addition to implementation of the groundwater monitoring and corrective action programs, the licensee continued to conduct routine site maintenance and license compliance activities.

On March 29, 2013, the U.S. Environmental Protection Agency (EPA) issued a Record of Decision for the nearby Northeast Church Rock mine site (ADAMS Accession No. ML13095A352). The EPA's selected remedy was to remove approximately 1 million cubic yards of waste material from the mine site and dispose of the material at the NRC-regulated tailings impoundment. Between November 2013-April 2014, EPA contractors collected samples from the mine site and tailings impoundment to support the development of a remedial design plan.

In addition, the EPA's contractors collected core samples from the jetty area in November 2016. The jetty is located adjacent to the tailings impoundment within the controlled area. The jetty was designed to channel flow in the adjacent Pipeline Arroyo away from the impoundment. As described in Section 3.2 of this inspection report, EPA contractors were onsite a second time during the inspection to collect additional core samples from the jetty area.

By letter dated April 9, 2015 (ADAMS Accession No. ML16116A344), the EPA requested the NRC's regulatory expertise and technical assistance for construction of a repository for mine wastes on the mill tailings impoundment. The NRC responded by letter dated May 17, 2016 (ADAMS Accession No. ML16035A472), reminding EPA that the construction of this repository would require an amendment to License SUA-1475. At the time of the onsite inspection, the licensee had not submitted this amendment request to the NRC. The amendment request is expected to be submitted to the NRC prior to the end of calendar year 2018.

License Condition 25 provides the financial assurance requirements. By letter dated March 30, 2017 (ADAMS Accession No. ML17110A370), the licensee transmitted its annual surety update to the NRC. However, by letter dated August 24, 2017 (ADAMS Accession No. ML17229B453), the NRC requested the licensee to resubmit the update as a re-baselining estimate as described in NUREG-1620, Revision 1, Standard Review Plan for the Review of a Reclamation Plan for Mill Tailings Sites Under Title II of the Uranium Mill Tailings Radiation Control Act, to ensure compliance with the requirements of 10 CFR Part 40, Appendix A, Criterions 9 and 10. After further discussions with the licensee, the NRC agreed to suspend its request for a re-baselining estimate until after the license amendment request to add mine wastes to the tailings impoundment has been submitted to the NRC (ADAMS Accession No. ML17249A321).

1 Management Organization and Control (88005)

1.1 Inspection Scope

The inspector reviewed the licensee's oversight and control of licensed activities.

1.2 Observations and Findings

The licensee's onsite staff consisted of six contractors. The highest ranking official was the site project manager. This individual reported to the licensee's remedial project manager, who was located offsite. Other site staff included the assistant manager/environmental technician, radiation safety officer (RSO), two field technicians, and project administrator. These contractors conducted site maintenance activities, operated the groundwater extraction wells, and collected groundwater samples. As discussed in Section 3.2 of this inspection report, additional contractors were onsite during the inspection to conduct core drilling within the jetty area. Overall, the licensee had sufficient staff for the limited amount of work in progress and to maintain compliance with license and regulatory requirements.

Although not required by the license, the RSO conducted monthly site inspections to routinely verify the integrity of the radiologically restricted areas. The monthly inspections included visual observation of site fences, evaporation ponds, and weather-related damage. The RSO documented adverse conditions when identified as well as corrective actions needed to resolve the adverse conditions. The onsite staff also voluntarily conducted daily inspections of the evaporation ponds. The licensee continued to control the tailings impoundment, as referenced in License Condition 11, with signs, gates, and fences.

The licensee's staff conducted annual As Low As Reasonably Achievable (ALARA) audits in accordance 10 CFR 20.1101(c). The audits were submitted to the NRC. The most recent audits were submitted to the NRC by letters dated January 31, 2017, and January 28, 2018 (ADAMS Accession Nos. ML17032A356 and ML18032A104, respectively). The annual audits included license compliance reviews. Based on the licensee's review, all license and regulatory requirements had been fulfilled in 2016-2017. The inspector concluded that the ALARA audits met the requirements of 10 CFR 20.1101(c).

In accordance with License Condition 31, the licensee's staff conducted annual land use surveys. The two most recent land use survey reports were submitted to the NRC by letters dated March 31, 2017, and March 27, 2018 (ADAMS Accession Nos. ML17095A556 and ML18088A198, respectively). The land use surveys included changes in ownership, land use, groundwater activity, and well use. In summary, the licensee's annual land use surveys met the requirement of the license.

1.3 Conclusions

The licensee maintained adequate staffing to ensure compliance with license and regulatory requirements. The licensee conducted routine site inspections to ensure that adverse conditions were identified and corrected. The licensee also conducted annual audits and land use surveys in accordance with regulatory and license requirements.

2 Radiation Protection (83822)

2.1 Inspection Scope

The inspector reviewed the licensee's radiation protection and training programs to verify compliance with 10 CFR Part 20 and license requirements.

2.2 Observations and Findings

The licensee maintained a radiation protection program that was commensurate with the limited amount of work in progress. The existing radiologically restricted areas included the evaporation ponds, waste disposal area, and contaminated equipment storage yard. During the inspection, the radiation protection programs in place included worker training and instrument calibrations. Equipment release surveys and personnel contamination surveys were conducted as needed to support the concept of ALARA. The remainder of the radiation protection program continued to be suspended based on the limited work activities in progress at the site.

License Condition 21 provides the requirements for radiation work permits. The last radiation work permit was issued in 2013 to support core drilling on the tailings impoundment. Since 2013, no work was conducted that required a radiation work permit. In addition, no worker was assigned an occupational exposure in 2016-2017. The EPA contractors provided their own dosimetry for the drilling work that was conducted in 2016 and 2018.

The inspector reviewed the licensee's radiation protection training program. All site workers had completed annual refresher training, which included a written exam. The RSO also maintained records of new employee training for the contractors who conducted core drilling work.

License Condition 11 specifies the requirements for release of equipment or packages from the restricted areas. The RSO maintained the equipment release records. The surveyed equipment included vehicles, tools, and other components being removed from the restricted area. The RSO required workers who worked in the restricted areas to survey themselves before leaving the areas. The NRC inspectors determined the licensee was adequately complying with License Condition 11.

The licensee had radiation protection instrumentation available for use. The licensee continued to maintain instrumentation for measuring exposure rates and detecting surface contamination. The instrumentation was calibrated annually by the instrument manufacturer in accordance with the frequencies provided in site procedures.

License Condition 20 specifies that written procedures shall be established. The licensee established procedures for radiation safety and environmental monitoring. The site procedures were supplemented by the contractors' Radiation Protection Program Manual dated May 2015. The RSO reviewed the procedures annually, and the last review was conducted in January 2018. In summary, the licensee established procedures as required by the license.

The inspector also reviewed the licensee's radiation protection program for the contractors conducting core drilling work during the inspection period. The RSO

determined that a radiation work permit was not necessary, because the workers were not expected to encounter radioactive tailings material. However, for ALARA reasons, the RSO implemented the radiation safety training, personnel survey, and material/equipment release survey programs.

2.3 Conclusions

The licensee implemented its radiation protection program in accordance with license and regulatory requirements. The licensee's records indicate that no worker was assigned an occupational exposure since the last inspection, all workers received required training, and no contamination problems were identified.

3 Radioactive Waste Management (88035)

3.1 Inspection Scope

The inspector interviewed licensee representatives, toured the site, and reviewed applicable records to determine if the licensee had established and maintained an effective program for managing radioactive wastes.

3.2 Observations and Findings

a. Site Tours

The 110-acre tailings impoundment consisted of the north, central, and south cells. The cells appeared to be in good condition with little observable erosion. Two evaporation ponds were constructed in 1988-1989 in the south cell. Each evaporation pond covered 5 acres and was designed to hold up to 10 million gallons of fluid. At the time of the inspection, the licensee was extracting approximately 1.23 gallons per minute from six extraction wells located in Zone 3. The extracted water was pumped into the evaporation ponds. The licensee was also adding domestic water to the ponds, to maintain a minimum pond depth of 0.5 feet, as recommended in the design documents for the evaporation ponds. The licensee's onsite staff stated that the enhanced evaporation system, referenced in License Condition 32, had not been used since about 2000. The extraction flow rate was insufficient to justify the use of the enhanced evaporation system.

Final reclamation of the evaporation ponds has been deferred until the groundwater corrective action program is complete. At that time, any remaining mill debris and radioactive trash will be placed into the evaporation ponds, and a final cover will be installed over the evaporation pond area.

During the previous inspection, conducted in August 2016 (ADAMS Accession No. ML16243A438), the inspector observed deep-rooted plants in the vicinity of the evaporation ponds and other onsite areas. The roots of these plants could negatively impact the functionality of the tailings impoundment cover. Since the last inspection, the licensee's onsite staff implemented a multi-year eradication program that followed the recommendations of the State of New Mexico. At the time of the inspection, the eradication program appeared to be working; although, the program needed more time to determine if it was truly effective in eradicating deep-rooted plants.

The inspector observed the status of the jetty area. The purpose of the jetty is to redirect flow within the adjacent arroyo away from the impoundment. During the previous inspection, the inspector noted that the jetty had experienced both surface and subsurface erosion. The inspector noted that the licensee had not repaired the damage, and the area was partially isolated for safety reasons. If the NRC agrees to the proposed license amendment to place mine wastes on top of the tailings impoundment, the jetty is expected to be redesigned, excavated, and reconstructed. In the meantime, the licensee's representatives concluded that the jetty continued to perform its intended function of diverting water in the arroyo away from the tailings impoundment.

The NRC inspector conducted radiological surveys during the site tour. The inspector measured ambient gamma exposure rates using a Ludlum Model 2401-S microRoentgen survey meter (NRC No. 079971, calibration due date of April 2, 2019, calibrated to cesium-137). With a background of 10-20 microRoentgen per hour, most areas of the tailings impoundment and surrounding areas were measured at background levels. The highest measurement, 275 microRoentgen per hour, was observed at the edge of the south evaporation pond. This elevated measurement was expected since the evaporation ponds contain residual quantities of radioactive material. During site tours, the inspector noted that the licensee continued to provide access control to the tailings site and evaporation ponds with posted signs, locked gates, and fences.

b. Core Drilling in Jetty Area

The EPA's contractor collected core samples from the jetty area in November 2016 to support the development of a remedial action plan. During development of the action plan, EPA determined that additional information was needed from the jetty area to support the final development of the action plan. For example, EPA wanted to determine if the soil in the jetty area could be reused in the construction of the future mine waste repository. The EPA's contractor conducted additional core sampling during the week of April 30-May 5, 2018. The work included collection of subsurface core samples, field testing of the soils, radiological scanning of the soils, and collection of samples for offsite analysis.

The contractor collected eight core samples, varying in depth from 40-95 feet, depending on location and subsurface conditions. The core samples were visually inspected and field tested. The field tests included visual classifications and standard penetration tests. Sample were also collected for offsite analysis. The offsite analyses will include water content, particle size, and permeability. Immediately after removal from the ground, the core samples were scanned for radioactivity. The EPA wanted to determine if the subsurface soils met the radiological limits for reuse in the construction of the repository. Soil with radium-226 concentrations less than 6 picocuries per gram may be eligible for reuse. Soil samples were also collected for offsite laboratory analysis of radioactivity content. As required by the State of New Mexico, upon completion of boreholes, the holes were backfilled with the stockpiled cuttings. If groundwater was encountered, the contractors were required to backfill the hole with grout followed by stockpiled cuttings.

The NRC inspector compared the work in progress to the instructions provided in the contractor's "Work Plan for Additional Soil Characterization at Proposed Jetty Improvements," Revision 1, dated March 30, 2018. The inspector noted that the contractors conducted the work in accordance with instructions provided in the work plan.

As noted in Section 2.2 of this inspection report, the RSO implemented additional radiological protections of the workers conducting core drilling operations for ALARA reasons. These protections included site training, personnel scans, and equipment scans. Based on preliminary results, the drilling work was not creating contamination problems. The NRC will review the licensee's final sample and scan results during a future inspection.

3.3 Conclusions

The licensee managed radioactive wastes in accordance with license requirements. The licensee voluntarily implemented an eradication program to remove deep-rooted plants from the vicinity of the tailings impoundment. The site staff continued to control access to the restricted area using fences, gates, and postings. A contractor core drilled in the area of the jetty, and the work was conducted in accordance with the contractor's work plan.

4 Effluent Control and Environmental Protection (88045)

4.1 Inspection Scope

The inspector reviewed the licensee's effluent and environmental protection programs to ensure compliance with license and regulatory requirements.

4.2 Observations and Findings

License Condition 30 provides the requirements for the groundwater compliance monitoring and corrective action programs. At the time of the inspection, the program consisted of groundwater extraction, monitor well sampling, and groundwater elevation measurements. There were three remedial action target areas—Zone 3, Zone 1, and Southwest Alluvium.

In Zone 3, the licensee continued to operate six pumps to extract potentially contaminated groundwater from the subsurface area. The pumping system continues to decline in performance due to declining saturated thicknesses, as previously predicted by the licensee. At the time of the inspection, the licensee was not conducting extraction operations in Zone 1 or the Southwest Alluvium. In Zone 1, the licensee discontinued extraction operations in 1999. Extraction operations in the Southwest Alluvium were suspended in 2001.

In addition to extraction operations, the licensee continued to sample 39 wells, primarily on a quarterly basis. An additional eight wells could not be sampled because the wells were dry, inaccessible, or have insufficient fluid for sampling. The licensee measured water levels in 23 additional wells. In the future, the licensee may install new monitoring wells north of the property, on Navajo Nation reservation property, pending completion of the permitting process.

By letter dated October 22, 2015, the licensee requested amendment of License Condition 30 (ADAMS Accession No. ML15313A044). The licensee requested changes to the sampling and corrective action programs based on current information about the effectiveness of the programs. The licensee submitted supplemental information to the

NRC by letters dated December 8, 2016, and February 13, 2017 (ADAMS Accession No. ML16356A323 and ML17061A217, respectively). At the time of the onsite inspection, these license amendment requests were still under NRC review.

The inspector discussed the requirements of License Condition 30.C with site staff. This license condition states, in part, that additional wells must be installed in Zone 3 and the Southwest Alluvium to determine the extent of ground water contamination. Once these wells have been installed, they will be sampled in accordance with the groundwater monitoring program specified in License Condition 30.A. This requirement was added to the license by Amendment 32 dated March 8, 2001 (ADAMS Accession No. ML011060130). The inspector noted that 18 wells had been installed at the site since 2001; although, some of the wells cannot be sampled for various reasons.

The inspector questioned licensee representatives to understand which wells had been installed to comply with License Condition 30.C requirements, in part, to ensure that the wells were being sampled in accordance with License Condition 30.A requirements. The licensee's representative stated that the wells installed to comply with License Condition 30.C requirements will be formally presented to the NRC in an updated amendment request, to supplement the October 22, 2015, letter. The licensee's representative planned to submit the updated amendment request to the NRC in the next few weeks.

The licensee continued to provide the groundwater sampling results to the NRC in semiannual groundwater monitoring reports, as required by License Conditions 12 and 30.C. The most recent semiannual report was submitted to the NRC by letter dated February 26, 2018 (ADAMS Accession No. ML18060A208). In addition, the licensee continued to submit annual groundwater corrective action program reviews to the NRC in accordance with License Condition 30.C. The most recent annual report was submitted to the NRC on January 31, 2018 (ADAMS Accession No. ML18036A066).

The inspector reviewed the most recent semi-annual groundwater monitoring report. The report included the results of samples collected from license-required and supplemental wells. The inspector also reviewed the most recent annual report for the groundwater corrective action program. The data indicated that several wells continued to exceed various groundwater protection standards. In response, the licensee continued to implement the groundwater monitoring and corrective action programs in accordance with License Condition 30 requirements.

4.3 Conclusions

The licensee implemented its groundwater corrective action and monitoring programs in accordance with license requirements.

5 Exit Meeting Summary

The inspector presented the inspection results to the licensee's representatives at the conclusion of the onsite inspection on May 2, 2018. During the inspection, the licensee did not identify any information reviewed by the inspector as proprietary that was included in the report.

SUPPLEMENTAL INFORMATION

Partial List of Persons Contacted

Licensee

R. Blickwedel, Remedial Project Manager (via telephone)
M. Chischilly, Radiation Safety Officer
A. Garoutte, Assistant Project Manager
R. Spitz, Project Manager

U.S. Environmental Protection Agency

J. Brooks, Remedial Project Manager
J. Cumbers, Geotechnical Engineer, Stantec
N. Patel, Environmental Consultant, AVM Environmental Services
V. Patel, Project Engineer, AVM Environmental Services

Inspection Procedures Used

IP 83822	Radiation Protection
IP 88005	Management Organization and Controls
IP 88035	Radioactive Waste Management
IP 88045	Effluent Control and Environmental Protection

Items Opened, Closed, and Discussed

Opened

None

Closed

None

Discussed

None

List of Acronyms

ALARA	As Low As Reasonably Achievable
ADAMS	Agencywide Documents Access and Management System
CFR	Code of Federal Regulations
EPA	U.S. Environmental Protection Agency
IP	Inspection Procedure
NRC	U.S. Nuclear Regulatory Commission
RSO	radiation safety officer

UNITED NUCLEAR CORPORATION, NRC INSPECTION REPORT 040-08907/2018-001
DATED MAY 22, 2018

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