UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
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ARLINGTON TX 76011-4511

September 7, 2016

Roy Blickwedel
Remedial Project Manager
Global Operations, Environment,
Health & Safety
General Electric Company
640 Freedom Business Center
King of Prussia, PA 19406

SUBJECT: NRC INSPECTION REPORT 040-08907/16-001

Dear Mr. Blickwedel:

This letter refers to the U.S. Nuclear Regulatory Commission (NRC) inspection that was conducted on August 16, 2016, at your former Church Rock Uranium Mill 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 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 "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 or proprietary, 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 at 817-200-1234 or the undersigned at 817-200-1197.

Sincerely,

/RA LEBrookhart Acting for/

Jack E. Whitten, Chief
Fuel Cycle and Decommissioning Branch
Division of Nuclear Materials Safety

Docket: 040-08907
License: SUA-1475

Enclosure:
NRC Inspection Report 040-08907/16-001

Attachment: Supplemental Information

cc w/encl:
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Robert Warren, Chester Engineers, Inc.
Janet Brooks, U.S. Environmental Protection Agency, Region 6
Sara Jacobs, U.S. Environmental Protection Agency, Region 9
Freida White, Navajo Nation Environmental Protection Agency
Steve Jetter, New Mexico Environment Department
Santiago Rodriguez, New Mexico Environment Department
Dr. April Gil, U.S. Department of Energy

U.S. NUCLEAR REGULATORY COMMISSION
Region IV

Docket:	040-08907
License:	SUA-1475
Report:	040-08907/16-001
Licensee:	UNC Mining and Milling Division of United Nuclear Corporation
Facility:	Former Church Rock mill
Location:	McKinley County, New Mexico
Date:	August 16, 2016
Inspector:	Robert Evans, PhD, PE, CHP, Senior Health Physicist Fuel Cycle and Decommissioning Branch Division of Nuclear Materials Safety
Accompanied by:	Richard Kaiser, Health Physicist Fuel Cycle and Decommissioning Branch Division of Nuclear Materials Safety
Approved by:	Jack E. Whitten, Chief Fuel Cycle and Decommissioning Branch Division of Nuclear Materials Safety
Attachment:	Supplemental Inspection Information

Enclosure

EXECUTIVE SUMMARY

United Nuclear Corporation
NRC Inspection Report 040-08907/16-001

This inspection was a routine, announced inspection of decommissioning activities being conducted at the former United Nuclear Corporation mill 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/Operator Training

- The licensee implemented its radiation protection program in accordance with license and regulatory requirements. (Section 2.2)

- The licensee's records indicated that the pre-design studies work, conducted on the tailings impoundment in 2013-2014, was well controlled and documented by the licensee. No radiological action level was exceeded during this work activity, and worker doses were well below regulatory limits. (Section 2.2)

Radioactive Waste Management

- The licensee managed radioactive wastes in accordance with license requirements. (Section 3.2)

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.

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 area 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. In addition to the Zone 3 remedial action, the licensee continues to monitor two other 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.

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 the remainder of the cell cover will be installed over the evaporation pond area.

On March 29, 2013, the U.S. Environmental Protection Agency (EPA) issued a Record of Decision for the nearby Northeast Church Rock mine site. 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. Since the previous inspection, conducted in July 2013 (ADAMS Accession No. ML13210A319), the licensee's staff and other contractors collected samples from the mine site and tailings impoundment to support the development of a remedial design plan. These pre-design study samples were collected and analyzed from November 2013-April 2014.

By letter dated April 9, 2015 (ML16116A344), the EPA requested the NRC's regulatory expertise and technical assistance on the design review team for construction of a repository for mine wastes on the mill tailings impoundment. The NRC responded by letter dated May 17, 2016 (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 an application to the NRC for construction of this mine waste repository on the tailings impoundment.

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 project manager. Other site staff included the assistant project manager, 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. Overall, the licensee had sufficient staff for the limited amount of work being conducted at the site and to maintain compliance with license and regulatory requirements.

Although not required by the license, the RSO continued to conduct monthly site inspections to routinely verify the integrity of the restricted areas. The monthly inspections included visual observation of site fences, evaporation ponds, and weather-related damage. The monthly reports documented adverse conditions when identified as well as corrective actions needed to resolve the adverse conditions. The licensee continued to control the tailings site, 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 with Title 10 of the *Code of Federal Regulations* (CFR) part 20, Section 1101, paragraph (c) (10 CFR 20.1101(c)). The audits were submitted to the NRC. The most recent audit was conducted in December 2015 and was submitted to the NRC by letter dated January 21, 2016 (ML16228A228). The annual audits included license compliance reviews to ensure that the licensee implemented all requirements as specified in the license. Based on the licensee's review, all license and regulatory requirements had been fulfilled in 2015. The inspector reviewed the most recent audit and concluded that the ALARA audit met the requirements of 10 CFR Part 20.

In accordance with License Condition 31, the licensee's staff conducted annual land use surveys. The most recent land use survey report was submitted to the NRC by letter dated March 22, 2016 (ML16085A133). The land use survey report included changes in area ownership, land use, groundwater activity, and well use. In summary, the licensee's annual land use survey report 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 being identified and corrected. The licensee also conducted annual audits and land use surveys in accordance with regulatory and license requirements.

2 Radiation Protection/Operator Training (83822/88010)

2.1 Inspection Scope

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

2.2 Observations and Findings

a. Radiation Protection Program Review

The licensee maintained a radiation protection program that was commensurate with the limited amount of work in progress. The remaining radiologically restricted areas included the evaporation ponds, disposal area, and contaminated equipment storage

yard. During the inspection, the programs in place included worker training and instrument calibrations. The remainder of the radiation protection program was suspended based on the limited work activities in progress at the site.

The inspector reviewed the licensee's radiation protection training program. All site workers had completed annual radiation protection refresher training, which included a written exam. Function-specific training was also provided as required. For example, 17 contracted personnel were trained in Design Field Sampling Activities prior to the collection of core samples from the tailings impoundment in 2013-2014. The inspector concluded that the licensee's training program was in compliance with the contractor's written radiation protection program (Amec Foster Wheeler Environment & Infrastructure, Inc. Radiation Protection Program dated May 1, 2015).

The licensee had radiation protection instrumentation available for use. The licensee continued to maintain instrumentation for measuring exposure rates and detecting surface contamination. All instrumentation were calibrated on an annual basis by the instrument manufacturer in accordance with the requirements provided in established procedures.

b. Tailings Impoundment Sampling to Support the Pre-Design Studies

The licensee's staff and contractors conducted sampling and analysis of the local mine site and tailings impoundment from November 2013 through April 2014. The work included cone penetration testing on the tailings impoundment, borehole drilling on the tailings impoundment, and geotechnical testing of the tailings samples at an onsite laboratory. The licensee maintained detailed radiation protection records for these work activities. The licensee issued Radiation Work Permit (RWP) 2013-01 to support the work activities. In accordance with instructions provided in the RWP, the licensee reactivated portions of their radiation protection program including occupational worker training, dose monitoring, air sampling, bioassay collection, and contamination control. The inspector reviewed these work records and discussed the results of the radiation monitoring program with the RSO. The inspector concluded that the licensee's staff had effectively controlled and documented the work in accordance with License Conditions 18, 20, 21, and 29.

The licensee's records indicate that 23 individuals were monitored during the work. The highest worker dose was about 0.207 rem from both internal and external exposures. Although this dose was well below the 5 rem annual limit provided in 10 CFR 20.1201(a), the RSO concluded that the worker's external dose (0.201 rem) may have been over-estimated by the dosimeter vendor. The licensee's records indicate that all air sample results were less than 10-percent of the most restrictive derived air concentration (thorium-230). Radon sample results were comparable to background levels. Bioassay sample results did not identify any uptakes of uranium. Contamination control efforts were successful because no individual, area, or component was identified with contamination above the respective action levels. The results of perimeter monitoring indicated that the work did not have an impact on members of the public. Finally, the trash that was collected during the work was placed into barrels for eventual disposal in the tailings impoundment.

After completion of the pre-design studies work, the licensee compiled all radiation protection records and closed out the RWP. The licensee had not issued another RWP

since RWP 2013-01 was closed. The licensee intends to activate the radiation protection program as necessary if any future work involves the tailings or similar radioactive materials.

2.3 Conclusions

The licensee implemented its radiation protection program in accordance with license and regulatory requirements. The licensee's records indicated that the pre-design studies work, conducted on the tailings impoundment in 2013-2014, was well controlled and documented by the licensee. No radiological action level was exceeded during this work activity, and worker doses were well below regulatory limits.

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

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 located 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 1.6 gallons per minute from six extraction wells located in Zone 3. The water was being pumped into the north evaporation pond. The licensee was also adding domestic water to the north pond, 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 was insufficient to justify system operation.

The inspector observed the status of the buried jetty, located northwest of the evaporation ponds. The jetty was designed to channel flow in the Pipeline Arroyo away from the south cell area. The buried jetty varied in depth, from approximately 8 to 20 feet deep. During the July 2013 inspection, the surface of the jetty displayed some surface erosion, but a licensee representative stated at the time that the jetty continued to perform its intended function of routing rainwater runoff away from the south cell. During this inspection, the inspector observed that a section of the subsurface jetty had also been damaged by erosion. The site staff indicated that it planned to review the subsurface damage and implement repairs as necessary. In the future, the functionality of the buried jetty will be reconsidered by the licensee and the NRC, if the various government agencies approve the proposed plan to place mine wastes on top of the tailings impoundment.

The inspector observed deep-rooted plants, tamarisks in particular, in the vicinity of the evaporation ponds. The evaporation ponds are located above tailings material in the south cell. This area of the cell has an interim cover. Although remote, the roots of these plants may negatively impact the functionality of the tailings impoundment. The

licensee's onsite staff agreed to review the impacts of deep-rooted plants on the tailings impoundment and to implement a removal program, after consultation with the State of New Mexico.

The NRC inspector conducted radiological surveys during the site tour. The inspector measured ambient gamma exposure rates using a Ludlum Model 19 microRoentgen survey meter (NRC No. 015518, calibration due date of 07/13/17, calibrated to radium 226). 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, 150 microRoentgen per hour, was observed at the edge of the evaporation ponds. This would be expected since the radon barrier cap had not been completed on this portion of the disposal impoundment, and the evaporation ponds may contain residual quantities of radioactive material. During the tour, the inspector noted that the licensee continued to provide access control to the tailings site with posted signs, locked gates, and fences.

3.3 Conclusions

The licensee managed radioactive wastes in accordance with license requirements. The jetty had been impacted by surface and subsurface erosion in certain places, and the licensee's onsite staff planned to investigate and repair the erosion as necessary.

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 details of 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. At the time of the inspection, the licensee was not conducting extraction operations in Zone 1 or the Southwest Alluvium. In addition, the licensee continued to sample 30 wells in all three areas on a quarterly basis. Four wells (GW-2, GW-3, 504-B, and NBL-1) could not be sampled because the wells were dry, inaccessible, or have insufficient fluid for sampling. The licensee also installed and sampled 13 supplemental wells specifically for plume monitoring, and the licensee sampled 21 additional wells for water levels only.

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. The inspector questioned

whether the 13 supplemental wells should be captured under the requirements of License Condition 30.C. The licensee's staff considered the supplemental wells to be outside of the scope of the license requirements, but the inspector noted that the wells were installed to supplement sampling within Zone 3. The onsite staff agreed to investigate whether the 13 supplemental wells should be sampled as specified in License Condition 30.A. This finding was not safety significant because the licensee voluntarily reported the sample results from the supplemental wells to the NRC in semi-annual reports.

The licensee continued to present 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 29, 2016 (ML16062A218). 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 February 4, 2016 (ML16040A168, ML16040A169, ML16040A171, and ML16040A172).

The inspector reviewed the most recent annual report for the groundwater corrective action program. The data indicated that several wells continue 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. The licensee's current corrective action includes extraction of contaminated groundwater and evaporation of the groundwater in one of two evaporation ponds.

The licensee submitted a license amendment request to the NRC by letter dated October 22, 2015 (ML15313A044). The licensee requested NRC approval to revise License Condition 30 based on current information about the results of the groundwater monitoring and corrective action programs. The licensee also requested a change to two dates specified in License Condition 35, for placement of the final radon barrier and erosion protection, based on site status and projected plans for placement of mine wastes on the tailings impoundment. At the conclusion of the onsite inspection, the NRC had not approved these proposed changes to License Conditions 30 and 35.

4.3 Conclusions

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

6 Exit Meeting Summary

The inspector presented the inspection results to the licensee's representatives at the conclusion of the onsite inspection on August 16, 2016. During the inspection, the licensee did not identify any information reviewed by the inspector as proprietary that was included in the report.

SUPPLEMENTAL INSPECTION INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

R. Spitz, Project Manager
A. Garoutte, Assistant Project Manager
M. Chischilly, Radiation Safety Officer

INSPECTION PROCEDURES (IPs) USED

IP 88005	Management Organization and Controls
IP 83822	Radiation Protection
IP 88010	Operator Training/Retraining
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 USED

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

Should you have any questions concerning this inspection, please contact Dr. Robert Evans at 817-200-1234 or the undersigned at 817-200-1197.

Sincerely,

/RA LEBrookhart Acting for/

Jack E. Whitten, Chief
Fuel Cycle and Decommissioning Branch
Division of Nuclear Materials Safety

Docket: 040-08907
License: SUA-1475

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Freida White, Navajo Nation Environmental Protection Agency
Steve Jetter, New Mexico Environment Department
Santiago Rodriguez, New Mexico Environment Department
Dr. April Gil, U.S. Department of Energy

ADAMS ACCESSION NUMBER: ML16243A438

■ SUNSI Review By: RJE	ADAMS: ■ Yes ☐ No	☐ Sensitive ■ Non-Sensitive	☐ Non-Publicly Available ■ Publicly Available	Keyword
OFFICE	DNMS/FCDB		C:FCDB	
NAME	REvans		JWhitten	
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DATE	09/7/16		09/7/16	

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Letter to Roy Blickwedel from Jack Whitten dated September 7, 2016

SUBJECT: NRC INSPECTION REPORT 040-08907/16-001

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