

40-8905



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV

111 RYAN PLAZA DRIVE SUITE 400
ARLINGTON TEXAS 76011 8064

DOCKET FILE

April 25, 1996

ML16113A386

Quivira Mining Company
ATTN: Bill Ferdinand, Manager
Radiation Safety, Licensing and
Regulatory Compliance
6305 Waterford Building, Suite 325
Oklahoma City, Oklahoma 73118

SUBJECT: NRC INSPECTION REPORT 40-8905/96-01

This refers to the routine, announced inspection conducted by Mr. R. J. Evans of this office on February 26-28, 1996. The purpose of the inspection was to determine whether activities authorized by the license were conducted safely and in accordance with NRC requirements. At the conclusion of the inspection, the findings were discussed with those members of your staff identified in the enclosed report.

Areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observation of activities in progress. The results of this inspection are documented in the enclosed report.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be placed in the NRC Public Document Room.

Should you have any questions concerning this letter or the enclosed report, please contact Mr. Evans at (817) 860-8234 or Ms. Linda Howell at (817) 860-8213.

Sincerely,

Charles L. Cain
for Ross A. Scarano, Director
Division of Nuclear Materials Safety

Docket: 40-8905
License: SUA-1473

Enclosure:
NRC Inspection Report 40-8905/96-01

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ENCLOSURE

U. S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 40-8905/96-01

License: SUA-1473

Licensee: Quivira Mining Company
P.O. Box 218
Grants, New Mexico 87020

Facility Name: Ambrosia Lake Facility

Inspection At: McKinley County, New Mexico

Inspection Conducted: February 26-28, 1996

Inspector: Robert J. Evans, P.E., Health Physicist
Nuclear Materials Inspection and
Fuel Cycle/Decommissioning Branch

Approved:

Charles L. Cain
L. L. Howell, Chief
Nuclear Materials Inspection and
Fuel Cycle/Decommissioning Branch

4/24/96
Date

Inspection Summary

Areas Inspected: This was a routine, announced inspection which included a review of site status, management organization and controls, radiation protection, and radioactive waste management and environmental protection.

Results:

- Some changes had occurred in the licensee's organizational structure involving key positions in the maintenance and mining organizations; however, key positions in the radiation safety and environmental organization were as described in the license (Section 2.1).
- The licensee had implemented a radiation protection program that was generally effective in meeting the requirements of 10 CFR Part 20 and the license conditions. One non-cited violation was identified involving a failure to perform quarterly radon daughter air sampling in a laboratory that was not routinely used by plant personnel (Section 4).
- Environmental and groundwater compliance monitoring programs had been implemented in accordance with license requirements and applicable regulations (Section 5).

Attachments:

- **Persons Contacted and Exit Meeting**
- **Photographs Taken at Quivira Mining Company's Ambrosia Lake Facility**

DETAILS

1 SITE STATUS

Quivira's Ambrosia Lake facility is the nation's largest uranium ore processing facility. The conventional mill ceased operation in January 1985, and the mines and conventional mill have remained in "standby" condition since that time. The licensee has continued to produce yellowcake by extracting uranium from mine water. The licensee's yellowcake dryer has not been used since December 1991; therefore, yellowcake has been shipped offsite for drying.

Two tailings piles remain onsite. Pond 1 contains roughly 30 million tons of mill tailings and covers roughly 260 acres. Pond 2 contains about 3 million tons of tailings and covers 90 acres. Activities completed during 1995 included installation of the radon barrier on Pond 2 and frost protection barriers on both ponds.

Site activities planned for 1996 include final contouring of the ponds, final radon flux testing of the two ponds, and placement of a rock cover on Pond 1. Other activities planned for the near future include completion of the cleanup of windblown material as well as any additional remediation work identified during the soil sampling and verification process. The licensee also planned to complete the construction of a diversion channel in the near future.

2 MANAGEMENT ORGANIZATION AND CONTROLS (88005)

2.1 Management Organization

The organizational structure was reviewed to ensure that the licensee had maintained an organization that was consistent with requirements specified in the license. At the time of the inspection, 29 workers were employed at the site. Site staffing included seven mill operators, five heavy equipment operators, one chemist, two quality control technicians, two mining division workers, five mechanics, three radiation safety workers, and four administrative personnel.

The senior company official located at the site was the general manager who reported to the vice president. The radiation safety and environmental affairs supervisor, also the radiation safety officer, reported to the general manager and to the corporate radiation safety, licensing, and regulatory compliance manager. Two environmental technicians reported to the radiation safety officer.

The licensee had submitted descriptions of the organization that would be implemented while the site was in standby operational status by letters dated August 30, 1990, and January 31, 1991 (both documents identify the same organizational structure). License Condition 10 incorporates the licensee's submittals by reference. The inspector noted that three positions identified in the above noted documents were currently not staffed, although duties

associated with those positions had been assigned to other individuals in the organization. The affected positions involved the industrial relations, general maintenance, and mines superintendent positions. Licensee representatives noted that the licensee did not plan to staff the vacant positions in the near future. In addition, the mill superintendent position was vacant at the time of the inspection, although the licensee did plan to fill this position. Certain responsibilities associated with the mill superintendent position, such as fire-fighting and emergency response, had been temporarily assigned to appropriate individuals onsite.

Security was provided by contract security personnel who provided round-the-clock coverage. In addition, the restricted area was surrounded with a barbed wire fence that was properly posted. An onsite fire crew was available for response, and the licensee had an approved fire plan which specified actions to be taken in the event of a fire. The licensee has held semi-annual fire drills to ensure the readiness of the onsite fire brigade. Emergency response equipment, such as a fire truck and ambulance, were available and in operational status.

2.2 Management Controls

Site procedures were reviewed for technical accuracy and applicability to the work in process. Overall, the site procedures provided an adequate level of detail, although some minor inconsistencies were identified in a few procedures and were subsequently discussed with licensee representatives. The inspector noted that the licensee had performed the annual review of the procedures as required by License Conditions 14 and 16.

License Condition 21 states that daily inspections of the tailings embankments are to be performed on regularly scheduled work days. Based on interviews of the staff, it appeared that daily inspections were being performed and documented on the licensee's "Daily Tailings Inspection" forms. A review of forms completed over a period of time indicated that the information recorded on the forms was sometimes incomplete. For example, the pipeline "on" and "off" times were incomplete or were not consistently being recorded. Also, the "pond/liner okay" blanks on the form were not being consistently checked off as acceptable or unacceptable following a daily inspection. Because the information recorded on the form was intended to be used to identify and record degraded conditions or problems at the tailings embankments, the inspector brought this to the attention of licensee representatives.

License Condition 24 states that the licensee shall have a contingency plan for responding to unexpected releases of liquids or tailings from the mill facility, tailings impoundment, and lined evaporation ponds. The licensee's tailings contingency plan was reviewed and was noted to provide an adequate level of detail. Although the plan did not specifically mention the lined evaporation ponds, the plan could be used in response to a pond failure.

2.3 Conclusions

In summary, staffing and emergency response capabilities were adequate for activities conducted at the site. However, some changes had been made to the organizational structure affecting positions outside the radiation safety and environmental staff. Discrepancies between descriptions of the organization identified in the license and the current structure were discussed with licensee representatives who confirmed that they would update the license references as appropriate.

Site procedures were adequate for the work in progress, although some minor discrepancies were identified.

3 OPERATIONS REVIEW (88020)

A site tour was performed to ensure that plant operations were being accomplished in accordance with regulations and license conditions, and that the operations were adequate to protect the health and safety of the workers and members of the general public.

3.1 Discussion

Portions of the plant were toured to observe operations in progress, the level of housekeeping, and radiological hazards present. Overall, housekeeping was adequate, although heavy dust accumulation was observed in some areas. Fire fighting equipment was available in the production facilities. Other personnel safety equipment inspected included the eyewash and emergency shower stations. One inoperable building door was observed and reported to the licensee. No significant radiological or safety hazards were identified.

The inspector did identify one issue that may warrant further review by appropriate management staff involving controls established over areas where eating, drinking, and smoking is permitted. Although the written instructions regarding this issue were provided in site procedures, the inspector noted that in the ion exchange plant, a water cooler was located outside the control room. The control room is the only area in the plant where eating, drinking, or smoking is permitted by procedure. This observation was discussed with licensee management.

3.2 Conclusions

Plant conditions appeared appropriate for the work in progress, and no significant leaks or degraded equipment were observed. No significant health or safety hazard was identified, although one observation involving control of eating, drinking, and smoking areas was discussed with licensee representatives.

4 RADIATION PROTECTION (83822)

The purpose of this portion of the inspection effort was to determine if the licensee's radiation protection program was in compliance with requirements established in the license and 10 CFR Part 20. Areas inspected included personnel exposure (external and internal), bioassay surveys, equipment releases, monthly ALARA records, instrument calibrations, and radiation protection training records.

4.1 Discussion

The licensee's personnel monitoring program included use of thermoluminescent dosimeters to monitor for external exposures and calculations used to determine internal exposure. During the 1995 calendar year, the highest total effective dose equivalent received by an individual was 571 millirems.

Exposures to radon daughters were calculated using a time-weighted average format. During 1995, the highest annual radon daughter exposure for an individual was 0.5 working level months, or approximately 12.5 percent of the annual allowable occupational exposure limit. Internal exposures to uranium were determined by analyzing air samples for gross alpha activity and calculating average air concentrations for a particular area. An employee's internal dose was then calculated based on the individual's time in any given area of the facility. The calculated maximum exposure to uranium received by an employee during 1995 was 7.4 derived-air-concentration-hours, or less than one percent of the annual limit of intake.

Bioassays are required by License Condition 10. During 1995, 53 urine samples were obtained. During the year, one sample result indicated a concentration of 62 micrograms per liter of uranium, a value above an action level of 35 micrograms per liter identified in the licensee's bioassay procedures. Actions taken by the licensee in response to the elevated level were appropriate for the circumstances. A followup sample indicated that the uranium content in the urine had dropped to below the lowest action level of 15 micrograms per liter. The licensee speculated that this individual apparently disturbed some yellowcake material causing it to become airborne. The individual's internal exposure was calculated to be less than one percent of the annual limit of uptake for natural uranium.

During the inspection, the licensee's equipment release and personnel contamination records for 1995 were reviewed. A review of survey records indicated that no component had been inappropriately released for unrestricted use. Also, almost 700 self-checks and over 200 random contamination checks were performed on individuals leaving the restricted area. Records indicated that no individual left the restricted area while exceeding the licensee's contamination limit.

Routine and non-routine radiological sampling is required by License Condition 10 which incorporates, by reference, the licensee's "Health Physics and Environmental Programs" manual (manual). As specified in the manual,

airborne sampling is required for uranium ore dust and yellowcake, as well as radon daughters. Survey records indicated that the licensee had performed the required sampling at the designated frequencies with one exception as described below.

The manual specifies that non-routine radon daughter sampling will be performed in the "Met Lab," as well as other locations throughout the facility, on a quarterly basis. Records indicated that the licensee apparently had not performed radon daughter sampling in the Met Lab for approximately 7 years. However, the inspector noted that the area was not normally used by plant personnel and that other surveys had been performed in this area. This failure constitutes a violation of minor significance and is being treated as a non-cited violation consistent with Section IV of the NRC Enforcement Policy.

Although the root cause for the violation was not clearly identified, a contributing factor involved the development of the plant implementing procedures. The requirement to perform radon daughter sampling in the Met Lab had been inadvertently left out of the applicable implementing procedure. In response to the discussion of this finding, licensee representatives confirmed that they would perform radon daughter sampling in the Met Lab during subsequent routine site sampling evolutions.

Surface contamination checks and gamma surveys are also required by License Condition 10. A review of the licensee's records revealed that these radiological checks were performed as required during 1995 and that no significant contamination or radiation levels were identified.

The monthly and annual ALARA reports for 1995 were reviewed. The monthly reports provided an adequate level of detail as did the annual ALARA report, submitted to the NRC on January 26, 1996.

License Condition 15 references requirements for radiation work permits. During a previous NRC inspection (documented in NRC Inspection Report 40-8905/95-01), a concern was identified with the level of detail provided in the radiation work permits. At that time, the inspector determined that the licensee was not providing adequate information about the scope of the work being performed from a radiation protection perspective. Work permits issued during the current inspection interval were reviewed to determine whether any improvement in this area had occurred. Radiation work permits used during this inspection interval were a consolidation of a work order, maintenance corrective order, and radiation safety survey form. Collectively, these documents appeared to provide an adequate level of information about the scope of work to be performed and the corresponding radiological restrictions. Several radiation work permit packages issued late in 1995 were reviewed. Overall, the implementation of the radiation work permit program appeared adequate during this inspection period.

A representative sample of records systems related to the radiation safety program were reviewed. Training records indicated that required training had

been performed during 1995, including radiological hazards and respiratory protection training. Records relating to instrument calibration and safety meetings were also consistent with license and procedure requirements.

4.2 Conclusions

Radiological controls were noted to have been properly implemented, and no equipment had been inappropriately released. Radiation work permits were adequate for the associated work. The licensee's record systems for activities relating to the radiation safety program were consistent with license requirements.

The licensee had implemented a radiation protection program that met the requirements established in 10 CFR Part 20 and the license, with one exception. A non-cited violation was identified involving the licensee's failure to perform radon daughter air sampling in a laboratory identified for non-routine sampling in the license. However, the laboratory was not normally used by plant personnel.

5 **RADIOACTIVE WASTE MANAGEMENT (88035) AND ENVIRONMENTAL PROTECTION (88045)**

An inspection of the radiological environmental monitoring, groundwater corrective action, and radioactive waste management programs was performed to ensure that the programs were effectively implemented by the licensee. Also, the licensee's soil sampling and verification program was briefly reviewed during the inspection.

5.1 Environmental Protection

The licensee's environmental monitoring program consisted of continuous air, radon gas, vegetation, water, sediment, and soil sampling, as well as ambient gamma exposure rate measurements. As part of the inspection, the licensee's 1995 environmental monitoring data were reviewed. (Data for the second half of 1995 had not been submitted to the NRC at the time of the inspection and were considered to be "draft" information.)

Particulate air sampling was performed at five environmental monitoring stations using continuous high volume air samplers. The air sample filters were changed weekly, and samples were composited and analyzed on a quarterly basis. The samples were analyzed for natural uranium, radium-226, thorium-230, and lead-210. The air sample results indicated that the radium and uranium concentrations were less than 1 percent of the effluent concentration limits specified in Appendix B of 10 CFR Part 20. Thorium concentrations varied up to 44 percent of the applicable limit, and lead concentrations varied up to 9 percent. The highest value measured for thorium-230 was at the Mill Diversion station which is located onsite.

Radon gas sampling was performed at the five sample stations. Radon gas was measured using the continuous track-etch method. The sample canisters were

changed out quarterly and analyzed for radon-222. The measured values ranged from 0.7 picocuries per liter at the background station to 8.4 picocuries per liter at the North Fence. All analysis results were above the value specified in Appendix B of 10 CFR Part 20, including the background location. However, the results were comparable with each other and with previous sample results.

Vegetation samples were required to be taken three times per year and were obtained near the five sample stations. The samples were analyzed for natural uranium, thorium-230, radium-226, lead-210, and polonium-210. (Sampling for polonium was not required by the license.) The highest value measured was for radium-226 (0.0018 microcuries per kilogram) in October 1995 at the Mill Diversion sample station. No obvious trends were identified, and no specific limit has been established for vegetation samples by the NRC.

Soil and sediment sampling were required on an annual basis. Soil samples were taken at the five sample stations, and sediment samples were taken at four creek locations. The samples were analyzed for natural uranium, radium-226, thorium-230, and lead-210. The highest concentration measured was 10 picocuries per gram of thorium-230 at two locations, including the Mill Diversion station. The highest concentration measured for radium-226 was 5.1 picocuries per gram at the station designated as Section 30W-Vent Hole 6.

Gamma radiation levels were continuously monitored at the five sample station locations using thermoluminescent dosimeters (TLD). Environmental TLD's were exchanged on a quarterly basis. Reported results for the background location was 137 millirems for 1995. The nearest residence location, the "Substation" sample station, was reported as 129 millirems (gross) for the calendar year. The Mill Diversion station was reported as 312 millirems, or 182 millirems above background.

Four of the licensee's five environmental monitoring sample stations were visited by the inspector. All stations appeared to be in service with all monitoring devices in operable condition.

5.2 Groundwater Corrective Action Program

A compliance monitoring program is required to be implemented by License Conditions 10 and 34. Also, the licensee is required by License Conditions 19 and 34.D to submit semi-annual reports and an annual program review to the NRC.

The semi-annual effluent reports for 1995 were reviewed. All groundwater samples required by the license were obtained and were sampled at the specified time intervals. Surface water samples could not be obtained because the sample locations were dry. In addition, the 1994 annual groundwater monitoring report, submitted to the NRC on July 31, 1995, was briefly reviewed. The report was noted to provide an adequate level of detail.

5.3 Radwaste Management

License Conditions 30 and 36 specify that damaged yellowcake drums and byproduct waste material from the Rio Algom Mining Corporation Smith Ranch in-situ leach facility may be disposed of at the Quivera facility. In addition, License Condition 31 authorizes the licensee to process alternate feed material (raffinate and calcium fluoride sludge) from the Sequoyah Fuels Corporation. Although some damaged yellowcake drums and material from the Smith Ranch facility had been received on site, it was being held in storage and had not yet been transferred to the disposal basin. Likewise, no alternate feed material from Sequoyah Fuels Corporation had been processed.

5.4 Soil Sampling and Verification Program

The status of the licensee's programs for radon-222 flux measurement of the tailings pile and soil sampling for radium-226 was briefly reviewed. Written procedures existed for performing both soil and radon flux sampling. Overall, the radon flux sampling procedure met the intent of the U.S. Environmental Protection Agency's Part 61, Appendix B, Method 115, "Monitoring for Radon-222 Emissions." Included in the licensee's program was an appropriate method for performing quality control and quality assurance checks of the flux measurements. The inspector noted that although the soil sampling procedure provided an adequate level of detail, it did not specify any quality assurance or quality control requirements.

At the time of the inspection, both tailings piles had been tested, although some of the data were determined to be invalid because the ambient temperature was too low during the flux testing. As a result, the licensee planned to resample the piles as necessary at a future date. The licensee had performed a characterization survey and was remediating windblown material.

5.5 Conclusions

A review of the licensee's environmental and groundwater compliance monitoring programs indicated that the licensee was in compliance with license requirements. A review of the 1995 environmental monitoring data indicated that the site had not released significant amounts of radioactive material into the environs of the site during the year.

ATTACHMENT 1

1 PERSONS CONTACTED

1.1 Licensee Personnel

*T. Fletcher, General Manager

*P. Luthiger, Supervisor, Radiation Safety and Environmental Affairs

*The personnel listed above attended the exit meeting.

2 EXIT INTERVIEW

An exit meeting was conducted on February 28, 1996. During this meeting, the inspector reviewed the scope and findings of the inspection with the participants.

The licensee stated that details provided to the inspector regarding the site's current and future production capabilities were considered company proprietary information. Therefore, at the licensee's request, the facility's current and proposed future uranium production levels were not included in the Site Status section of this NRC Inspection Report.

ATTACHMENT 2

*Net 040-850.
Li 50A-147.
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Photograph 1 - Quivira Mining Company's Ambrosia Lake Facility.



Photograph 2 - Site Logo on Conventional Mill Building.



Photograph 3 - IX Plant Building, Currently in Use.



Photograph 4 - The Met Lab.



Photograph 5 - Sample Station 30W - VH6.



Photograph 6 - NRC Inspector performing survey instrument calibration check.