



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-8064**

November 15, 2001

Rick Cables, Regional Forester
U.S. Forest Service
P.O. Box 25127
Lakewood, Colorado 80225-0127

**SUBJECT: MINING RESEARCH CORPORATION TERMINATED LICENSE SITES
(AEC LICENSE R-00143)**

Dear Mr. Cables:

The Nuclear Regulatory Commission (NRC) conducted reviews of previously terminated licenses to determine if adequate documentation exists to demonstrate that the sites were properly decommissioned. One of the docket files reviewed was the license issued by the U.S. Atomic Energy Commission (AEC), the NRC's predecessor, to Mining Research Corporation (MRC) of Boulder, Colorado. Our review of this docket file determined that site decommissioning records were incomplete, including information which described the final radiological status of MRC's former locations of use. As a result, we determined that onsite visits were necessary to determine if any radioactive material was still present at these sites.

MRC had three AEC licenses that were active between 1952-1957. MRC conducted operations in two general locations, Dove Creek, Colorado, and Edgemont, South Dakota. The NRC has determined that MRC did not process uranium ore in Colorado. The licensee tested its processing equipment in Colorado using non-radioactive material before moving its operations to South Dakota. However, the docket file records indicate that MRC conducted strip mining, below-surface mining, and in-situ leaching operations at two South Dakota locations, the Lion-McKnight claims and the Virginia C claim. Both locations are situated in the Black Hills National Forest.

On July 10, 2001, an NRC inspector toured the Lion-McKnight and Virginia C claims. The inspector was accompanied by two representatives from the U.S. Forest Service (USFS). The inspector collected soil samples to determine if these two sites contained previously licensed radioactive material and whether the sites required remediation under current NRC regulatory requirements. In summary, residual radioactive material, remnants of past uranium milling operations, was identified at the former Lion-McKnight claims. The Virginia C claim, based on limited sampling, appears to be free of processed material and former milling wastes. Details of our site visits are included in the enclosed Site Status Report.

As discussed in our telephonic exit briefing with members of your staff on October 30, 2001, the NRC does not exercise jurisdiction over this material. In particular, sampling results from the Lion-McKnight claims indicate that the uranium concentrations are less than the minimum concentration of 0.05 percent by weight that defines source material in our regulations. Also, the material would not be regulated by the NRC as tailings, because the milling waste was

created prior to promulgation of the Uranium Mill Tailings Radiation Control Act of 1977. Finally, sampling at the Virginia C claim indicated that only naturally-occurring radioactive material was present. The NRC does not regulate naturally occurring radioactive material.

Please note that as discussed in our October 30, 2001, phone call, NRC's limited review of the material at the Lion-McKnight claims indicates that it could potentially be a health and safety hazard to members of the public, under conservative occupancy scenarios. As NRC does not exercise jurisdiction over this material, we are providing this information for your consideration as the property custodian.

If you have any questions concerning this letter, please contact D. Blair Spitzberg, Ph.D., Chief, Fuel Cycle & Decommissioning Branch, at (817) 860-8191 or Mr. Robert J. Evans, Health Physicist, at (817) 860-8234.

Sincerely,

/LHowell for/

Dwight D. Chamberlain, Director
Division of Nuclear Materials Safety

Docket No.: 999-90004
License No.: AEC R-00143 (Expired)

Enclosure: Site Status Report

cc w/enclosure:
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FCDB File

MIS System

RIV Nuclear Materials File - 5th Floor

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ENCLOSURE

Site Status Report

Final ORNL Score: 16

Docket No. 999-90004

License Nos. C-02621, R-00143, P-03399 (all expired)

Licensee Name: Mining Research Corporation

Site Names: Lion-McKnight and Virginia C Claims
Edgemont Mining District
Fall River County, South Dakota

Site Addresses: 1320 Pearl Street (office address)
Boulder, Colorado

P.O. Box 356 (local mailing address)
Edgemont, South Dakota

Regional Contact: Robert Evans, PE, CHP, Health Physicist
Fuel Cycle & Decommissioning Branch
Division of Nuclear Materials Safety
Region IV

Background Information:

By letter dated September 2, 1952, Mining Research Corporation (MRC) applied for a U.S. Atomic Energy Commission (AEC) license to possess a small quantity of uranium oxide for use as an analytical reagent. MRC needed the material to calibrate a fluorimeter. AEC License C-02621 was issued to MRC on September 4, 1952, with an expiration date of September 1, 1953. This license allowed MRC to possess 1 pound of refined source material as an analytical reagent only. This license expired without being renewed.

By letter dated May 5, 1953, MRC submitted a second application to the AEC for a source material license. The company wanted to process 175 tons of ore that was possessed under Livingston Uranium Company's AEC Source Material License P-01322. The AEC issued Source Material License R-00143 to MRC on May 7, 1953, to process raw source material on mining claims located in South Dakota. Records indicate that MRC conducted uranium production operations from about August 1953 until September 1954. License R-00143 expired on June 1, 1955.

MRC submitted a third license application to the AEC during October 1956 for shipment of source material from local mines to the AEC's Edgemont district ore buying station. The AEC issued Source Material License P-03399 to MRC on November 5, 1956, which allowed the company to transfer and deliver possession of and title to raw source material. This license did not allow MRC to process source material. This license expired on November 1, 1957.

Docket file records indicate that MRC conducted strip mining, below-surface mining, and in-situ leach operations at multiple locations using semi-portable equipment under AEC

License R-00143. The records indicate that uranium processing operations were reputed to have occurred at two locations, the Lion-McKnight claims and the Virginia C claim. The Lion-McKnight and Virginia C claims are currently located in the Black Hills National Forest, land controlled by the U.S. Forest Service (USFS).

Lion and McKnight Claims Site Visit

On July 10, 2001, an NRC inspector visited the Lion-McKnight site with two representatives from the USFS. The site consisted of three distinct areas of mining, including one large open pit mine, several smaller excavations, an in-situ leach operations test site, and several piles of dirt containing radioactive and non-radioactive material. Also, the Lion-McKnight site contained approximately 100 abandoned wells.

The first area (located at Latitude 43° 21' 30" North, Longitude 103° 44' 45" West) was reputed to be a large open pit mine with a pile of uranium ore situated adjacent to the mine. This area had been remediated by the USFS during 1996. The ore was disposed of in the bottom of the mine pit and covered with mine overburden and other soil. The general area of the former ore stockpile and sidewalls of the former mine were also regraded and reseeded. After the completion of the onsite inspection, the USFS provided the NRC inspector with copies of the 1996 reclamation contract.

The inspector measured the general area radiation exposure rates using a Ludlum Model 19 survey meter (NRC No. 015540, calibration due date of November 29, 2001) calibrated to radium-226. The exposure rate at the former ore stockpile measured 60 microRoentgens per hour ($\mu\text{R/hr}$) with a background of 15 $\mu\text{R/hr}$. The inspector noted that the general area exposure rates around the various mine sites were elevated above background levels most likely because of the presence of naturally occurring radioactive materials. No tailings material, remnants of past milling operations, or ore was clearly visible at this specific location; therefore, no soil samples were collected at this site.

The second mining area (Latitude 43° 21' 15" North, Longitude 103° 44' 49" West) was located about 400 yards west-southwest of the main mine pit. This mine site appeared to be an abandoned in-situ leach test facility. The area consisted of a pile of mined material, a concrete structure resembling a settling basin, and an in-situ leach test site. About 100 feet northeast of the concrete structure was a series of evenly spaced wells. This site contained about 40 wells with metal pipes protruding from the ground. Remnants of an abandoned wooden tank were located near the test site. The inspector speculated that this tank could have contained the chemicals or fluids that were being injected into the ground. The concrete structure appeared to have been used as a settling basin for the fluids and uranium material that was removed from the ground.

The inspector measured an exposure rate of 380 $\mu\text{R/hr}$ on contact with soil in the concrete structure. One soil sample was collected from the material in the structure and analyzed for uranium and radium-226. The sample was analyzed by the NRC's Region III laboratory. The sample contained 147 picocuries per gram (pCi/g) \pm 2 percent of radium-226, 3.74 pCi/g \pm 7 percent of uranium-228, and 7.65 pCi/g \pm 9 percent of total uranium. Based on the ratio of radium to uranium, the material appears to be tailings material from past uranium ore processing operations.

Located near the concrete structure was a pile of dirt containing radioactive material. The material measured up to 800 $\mu\text{R/hr}$ on contact. One soil sample was collected from this location. The sample contained 323 pCi/g \pm 3 percent of radium-226, 3.27 pCi/g \pm 9 percent of uranium-228, and 6.69 pCi/g \pm 9 percent of total uranium. Based on the ratio of radium to uranium, the material appears to be tailings material.

The third mining area consisted of miscellaneous excavations located generally north of the open pit mine. Several piles of mine overburden material of varying sizes were observed. None of the piles resembled tailings material. The maximum exposure rate was 200 $\mu\text{R/hr}$ per hour, and that material appeared to be naturally occurring radioactive material. No soil samples were collected from this area.

Virginia C Claim Site Visit

The Virginia C site (Latitude 43° 24' 29" North, Longitude 103° 51' 16" West) consisted of a series of open pit mines and associated overburden material. The USFS representatives believed that the area had been partially remediated in the recent past, although no record of the reclamation could be found. There was no evidence of in-situ leach operations having been conducted at this site, although docket file records indicate that in-situ leach operations had been conducted in the past. The inspector did not observe any wells during this limited site tour. The inspector noted that the highest exposure rate, 500 $\mu\text{R/hr}$, was measured on contact with rocks containing naturally occurring radioactive material.

Located near the entrance of the mine was a small pile of material that visually resembled tailings material. The material measured 180 $\mu\text{R/hr}$ on contact. One soil sample was collected from this location. The sample contained 149 pCi/g \pm 5 percent of radium-226, 110 pCi/g \pm 4 percent of uranium-228, and 225 pCi/g \pm 4 percent of total uranium. Based on the ratio of radium to uranium and the total quantity of uranium present in the sample, the material appears to be naturally occurring radioactive material.

In summary, the NRC recommends closure of this terminated site file. The NRC does not exercise jurisdiction over the material present at the Lion-McKnight claims and does not have jurisdiction over the naturally occurring radioactive material at the Virginia C claim.

Photographs taken at Mining Research Corporation Sites



Reclaimed Lion-McKnight mining pit.



Reclaimed Lion-McKnight mining pit (same pit as above).



Location of former ore stockpile previously situated adjacent to Lion-McKnight mining pit; the area was reclaimed and reseeded in 1996.



Location of former Lion-McKnight in-situ leach facility test field.



Former settling basin located near Lion-McKnight in-situ leach facility test field.



Soil sampling of material located near Lion-McKnight in-situ test field.



Radiological survey being conducted in the Virginia C mine pit.



Soil sampling of material located adjacent to Virginia C mine pit.