

APPENDIX C

U. S. NUCLEAR REGULATORY COMMISSION
REGION IV

URANIUM RECOVERY FIELD OFFICE

NRC Inspection Report: 40-8084/85-001

License: SUA-1119

Docket: 40-8084

Licensee: Rio Algom Mining Corp.
P.O. Box 610
Moab, UT 84532

Facility: Lisbon Uranium Mill

Inspection At: San Juan County, Utah

Inspection Conducted: May 20-22, 1985

Inspectors:

/s/
Pete J. Garcia, Jr., Project Manager -
Team Leader

6-21-85
Date

/s/
N. M. Shopenn, Project Manager

6-21-85
Date

/s/
D. B. Spitzberg, Radiation Specialist,
Region IV

6-20-85
Date

Approved:

/s/
H. J. Pettengill, Chief
Licensing Branch 2
Uranium Recovery Field Office, Region IV

6-27-85
Date

Inspection Summary

Inspection Conducted on May 20-22 1985 (Report 40-8084/85-001)

Areas Inspected: Routine unannounced inspection of uranium milling operations and radiation safety program including: Management Organization and Controls/ Operations Review; Operator Training and Retraining; Radiation Protection; Radioactive Waste Management;

8507160303 850627
PDR ADOCK 04008084
C PDR

Transportation of Radioactive Materials; Environmental Protection; Maintenance, Surveillance and Testing; and Emergency Preparedness. Independent measurements were made.

The inspection involved a total of 48 inspector hours on site by three NRC inspectors.

Results: Within the nine areas inspected, three violations and one deviation were identified in four areas as follows: (1a) Failure to provide medical certification for respirator users or records of fit testing; (1b) Failure to establish written operating procedures for the maintenance of the supply of respirable air for the supplied air respirators in use; (2) Failure to use proper sampling results to compute exposures; and (3) Failure to maintain DOE records (Form 742) of the annual inventory of U-nat. The inspectors also identified a deviation from practices specified in Regulatory Guide 8.15 with regard to the failure to measure the levels of condensed hydrocarbons in the air supply for supplied air respirators.

DETAILS

1. Persons Contacted

*Mervyn D. Lawton, President/Mine and Mill Manager
 *Robert Pattison, Plant Superintendent
 *Jerry May, Mill Superintendent
 *Larry Perkins, Radiation Safety Officer
 *Tom Reynolds, Environmental Chemist
 5 mill technicians and operators

*Denotes those present at the exit interview.

2. Licensee Action on Previous Inspection Findings

No violations or deviations from acceptable practice were identified during the previous inspections.

3. Management Organization and Controls/Operations Review

The licensee described the organizational structure and specifically the organization of the radiation safety staff. As noted during previous inspections, the Radiation Safety Officer (RSO) reports directly to the President/Mine and Mill Manager. Since the last inspection, the individual holding the position of RSO has changed. The new RSO arrived in September, 1984. The RSO has one health physics technician, one environmental chemist and two technicians

reporting to him. One of the technicians is leaving the company on May 31, 1985, reducing the staff by one. The inspectors determined that the organizational structure and qualifications of personnel with responsibility to direct the radiation safety program was in accordance with guidance provided in Regulatory Guide 8.31.

The changes in personnel are also reflected in the number of employees working within the mill. There were 35 employees employed in the mill at the time of the inspection, a decrease of 9 since the previous year's inspection. Mill personnel were represented by Operating Engineers Local #3.

At the time of the inspection the mill was operating 24 hours per day for 10 days and then shut down for four days. The application for renewal described the rearrangement of the filter system in which a fourth stage was added. The addition reduced by 50 percent the losses of U-nat going to the tailings. The addition of the fourth filter stage occurred in August 1984. Mill throughput was maintained at or below 750 tons of ore and 3,000 pounds of yellowcake per day since the last inspection.

The inspectors reviewed the licensee's radiation safety staff audits and the ALARA audits performed since the last inspection. The inspectors noted that monthly audit reports detailing the status of the radiological monitoring and sampling programs had been submitted by the RSO to the Mine and Mill Manager. In addition, formal ALARA audits of the radiation safety program had been performed semiannually and the results submitted to the Mine and Mill Manager. The inspectors determined that the Mine and Mill Manager reviewed the ALARA and monthly audit reports. This action closed an open item from last year's inspection (RA 84-01/1). The inspector's review of the reports indicated that they met the requirements of License Condition No. 11 of the renewed license.

The radiation work permits (RWP) issued since the 1984 inspection were reviewed by the inspectors and were determined to be in order. The inspectors did note that the number of RWPs issued appeared to be small. The inspectors interviewed several operators and maintenance personnel and were able to determine that the need for maintenance and cleanup activities requiring RWPs was very small in the last year. The inspectors determined that radiation safety and mill operating procedures had been reviewed annually and were posted in the applicable areas of operation in accordance with License Condition No. 33 of the current license. The inspectors also determined, however, that standard written operating procedures pursuant to NUREG-0041 for the maintenance of the supply of respirable air for supplied air respirators had not been established. This was identified as a violation of License Condition No. 33.

The inspectors reviewed the condition of the facility and storage areas. Pathways were observed to be clear, scrap was stored properly, and barrels of yellowcake were observed to be stored within the locked storage area. The proper storage of scrap material to assure control of contaminated material within the restricted area closed an open item (RA 84-01/2) from the previous inspection. During the walk through, the inspectors noted that some of the pallets on which yellowcake barrels were stored had partially collapsed. This was mentioned to the management personnel and the bad pallets replaced while the inspectors were on site.

One violation was identified by the NRC inspectors.

4. Operator Training and Retraining

Plant safety meetings were conducted each week. The inspectors determined that all mill personnel attended at least one meeting per month in accordance with License Condition No. 11 and consistent with current NRC staff guidance in Regulatory Guide 8.31.

The inspectors reviewed records of employee training and refresher training conducted by the radiation safety staff during the past year. No new workers had been hired since the last inspection. Therefore, no initial employee training was performed since the last inspection. Refresher training covering radiation safety, ALARA, NRC regulations, respiratory protection and operating procedures had been conducted since the last inspection. All training records were reviewed and the licensee's training program was found to be acceptable.

The NRC inspectors interviewed five mill maintenance and operations personnel during the inspection verifying their attendance at training sessions and safety meetings and their understanding of mill radiation safety procedures.

No violations or deviations were identified by the NRC inspectors.

5. Maintenance, Surveillance and Testing

Access to the mill and restricted area is controlled by an outer perimeter fence and an inner restricted area fence. The inspectors toured the perimeter fence and noted that it was in good repair and appropriately posted.

All mill buildings and associated support buildings were in good repair. The inspectors noted that the secured gate to the

yellowcake storage area located within the restricted area was bent but still secured. The inspectors observed that the gate was straightened and fully functional the same day the condition was observed. All entrances to the mill were posted in accordance with the current license conditions.

No violations or deviations were identified by the NRC inspectors.

6. Radiation Protection

a. Air Sampling

The NRC inspectors reviewed the licensee's program for in-plant air sampling which determined the airborne natural uranium concentrations employees had been exposed to. The routine program consisted of low volume general air samples obtained weekly from 10 locations in the "soluble" uranium areas and monthly from 17 "insoluble" uranium areas. Routine breathing zone samples had been obtained on a monthly frequency for the precipitation and crusher operators and weekly for the day shift dryer operator. In addition, non-routine breathing zone samples had been obtained during work covered by Radiation Work Permits. All air samples had been analyzed fluorometrically. For determination of radon working level, the licensee had obtained low volume air samples quarterly at 18 mill locations, and had analyzed the samples by the modified Kusnetz method.

The NRC inspectors reviewed a number of air sampling results recorded back to the date of the last inspection and noted that the sampling and analysis had been performed at the proper frequencies and that data presentation was consistent. The only areas which occasionally exceeded 25% of MPC were the ore crushing and yellowcake barrelling areas. The inspectors noted that these areas were appropriately posted as "Airborne Radioactivity Areas."

Low volume air sampler calibration had been performed quarterly against a dry test meter standard at four flowrates, resulting in a reported error accuracy of $\pm 1.03\%$. Routine sampling flowrate was 25 lpm. Breathing zone samplers had been calibrated at the same frequency using a bubble tube. Error accuracy was reported as $\pm 5.5\%$. The NRC inspectors reviewed the procedures for performing air sampler calibrations and the records of calibrations and found both to be in order.

b. Exposure Determination

Mill workers had completed daily time cards showing the time spent working in each of 28 locations in and around the facility. These

cards, approved by the foreman, were routed to the time clerk where the hours were manually transcribed into a weekly time card summary for each employee. As weekly or monthly general air sample results became available they were transmitted by telephone to the time clerk who entered this data onto the records and hand calculated the time weighted exposures. Reports of exposures were then provided to the radiation safety office for review. The NRC inspectors questioned the RSO regarding the number of both people and manipulations of data required to derive internal exposures and whether they could lead to errors in the results. The RSO responded by stating that his office reviewed all exposure records and had periodically audited the timekeeper's calculations to validate results.

Internal exposures had been derived by the licensee for weekly yellowcake and quarterly ore dust exposures as required by 10 CFR 20.103. Results were expressed in uCi-hrs/ml and percent MPC. The NRC inspectors reviewed records of internal exposures dating back to the last inspection. The highest weekly exposure to yellowcake, based upon routine general air samples, was noted to be 2.5×10^{-9} uCi-hrs/ml or 62 percent of the maximum permissible exposure. The highest quarterly ore dust exposure was 6×10^{-9} uCi-hrs/ml, or 23 percent of the quarterly limit.

Although the licensee has been required to obtain breathing zone samples on a routine basis for selected process operators, the data from such samples had not been used in the determination of those individuals' exposures. With few exceptions, the general air sample data had been used to determine all routine exposures. Failure to use breathing zone data for computation of exposures for those individuals on whom the samples were obtained was identified as a violation of License Condition No. 11.

The NRC inspectors reviewed the records dating back to the last inspection of exposures incurred during non-routine work covered by radiation work permits. Such exposures had been accounted for separately and had been incorporated into the exposure records derived from general air sample data. One such RWP was processed for work performed on March 18, 1985 involving four individuals engaged in resealing a dryer hearth door. Based on breathing zone samples obtained during the week, the associated exposures of one individual (assuming no credit for respiratory protection) was calculated to be 8.23×10^{-9} uCi-hrs/ml, or 152% of the allowable weekly limit for soluble uranium. This calculated exposure was reported to the NRC, URFO, by letter dated April 17, 1985. Even though the licensee did not conduct an approved respiratory program at the time (see Section 5.c), this individual wore a full face supplied air respirator which afforded him protection during the work. Since the followup bioassay was negative, this individual

did not exceed the intake limit for soluble uranium. During the exit meeting, the NRC inspectors outlined a concern regarding the licensee's handling of this job due to the fact that only the negative bioassay result was available to demonstrate that an overexposure did not take place. It was recommended that in the future, an approved respiratory protection program be conducted and/or more comprehensive evaluations of the hazards be undertaken prior to the work.

c. Respiratory Protection

The NRC inspectors discussed the licensee's use of respiratory protection equipment during routine and non-routine work. The license renewal application committed the licensee to a respiratory protection program which is congruent to Regulatory Guide 8.15, "Acceptable Programs for Respiratory Protection," and allows for the use of protection factors (PF's). From discussions with the RSO it was not clear whether the licensee had initiated an approved program pursuant to 10 CFR 20.103. The April 17, 1985 report of the calculated overexposure stated that "no correction factors were applied." The NRC inspectors reiterated that taking credit for protection factors was a unilateral decision to be made by the licensee whenever the elements of an approved respiratory protection program are adhered to .

The licensee had issued half mask respirators to all mill personnel with a potential need. Such respirators were required to be used for all entries into the dryer and packaging enclosures. The licensee had performed a documented program for issuance, cleaning, maintenance and surveys of half mask respirators. Associated records were found to be in order. The licensee also maintained a supply of supplied air respirators for use during non-routine tasks on an as-needed basis. These respirators were supplied by non-dedicated plant air compressors which drew air from outside the mill through an oil bath. The NRC inspectors reviewed the data obtained by the licensee to determine if the supplied air met the approved quality standards specified in NUREG 0041. The licensee had demonstrated that approved standards had been met with respect to O_2 , CO, and CO_2 ; however a determination of the condensed hydrocarbon content of the supplied air had not been made. This was found to be a deviation from accepted industry practice. It was also determined that the licensee had not established written operating procedures pursuant to NUREG 0041 for the maintenance of the supply of respirable air for the supplied air respirators. This was identified as a violation of License Condition No. 33, which requires that written operating procedures be established for all aspects of mill operations.

The NRC inspectors reviewed the records associated with respiratory protection training, fit tests and medical clearance examinations required by the license. Training had been informally conducted in house on several occasions and documentation of such training was found to be adequate. Fit tests had been performed and documented initially for users of half mask respirators. However, documentation was not available at the time of the inspection regarding fit tests for individuals using supplied air respirators. In addition, the process for documenting medical clearance for respirator use had been initiated but not completed by the examining physician as of the date of the inspection. These findings were identified as violations of License Condition No. 11.

d. Bioassay

The licensee had conducted a bioassay program consisting of routine urine samples obtained every 2 weeks for the dryer and precipitation process employees, and monthly for other mill workers. Baseline data was available for all personnel. Non-routine samples had been obtained during work covered by RWP's. Urine samples had been fluorometrically analyzed in house at a minimum detectable activity of 5.4 ug/l. An action level of 15 ug/l for reassay and investigation had been established. Routine cross checks with two outside laboratories had been performed for quality assurance. The NRC inspectors reviewed a representative number of urinalysis results and found the sampling and analysis had been conducted in accordance with license requirements. The highest bioassay results noted were 25 ug/l and 26 ug/l. Actions taken in response to these readings were in accordance with license requirements.

In vivo measurements for mill employees were last performed in 1983. The recently renewed (September, 1984) licensee requires that in vivo measurements be taken every two years. Rio Algom stated that in vivo measurements would be performed in 1985.

e. External Exposure Control

The NRC inspectors reviewed records of personnel external exposures dating back to the previous inspection as determined by vendor supplied TLD's. Approximately 56 employees had been badged. A badge rack was maintained in the change room with a control badge used for background determination and subtraction. The highest annual exposures noted during the period of review were 600 mrem penetrating exposure and 1300 mrem shallow penetrating exposure. Records were maintained on the equivalent of an NRC-5 form.

Monthly beta-gamma surveys had been performed at 55 locations throughout the mill through October 1984. With the issuance of the

license renewal, this program was reduced to 27 locations semiannually. Records of such surveys were found to be in order. All results were below those delineating a "Radiation Area" as defined in 10 CFR 20.202, with the exception of values for the yellowcake storage area. The inspectors noted that the yellowcake storage area was appropriately posted and secured. The inspectors also noted that external radiation survey equipment had been calibrated on a semiannual frequency in accordance with license requirements.

f. Contamination Control

The NRC inspectors reviewed the records of surveys for fixed and removable alpha contamination taken weekly in nine locations. The licensee used a portable air proportional instrument which was calibrated monthly. All levels reviewed in the surveys were less than the contamination limits contained in Table 5.5-4 of the license application, which correspond to the limits specified in Regulatory Guide 8.30.

The NRC inspectors reviewed records of surveys on equipment being released for unrestricted use. Such equipment typically had been identified by shipping or warehouse personnel who had requested the surveys in accordance with procedures. The action level for contamination has been 1000 dpm/100 cm² removable and 5000 dpm/100 cm² total. The licensee's records were found to be complete and in accordance with license requirements.

g. Personnel Contamination Control

Contamination of personnel within the mill has been controlled through the use of protective clothing. The clothing is laundered on site. Showering is required for all yellowcake workers. Showering or monitoring is required for all other workers. The NRC inspectors observed that an alpha scintillation meter was available for workers to use to monitor themselves at the mill exit prior to leaving the primary main building.

A review of the exit survey records and quarterly spot surveys required by license conditions were found to be adequate.

Two violations and one deviation were identified by the NRC inspectors.

7. Radioactive Waste Management

The inspectors toured the tailings management system several times during the inspection. The lower tailings dam, which provides

flood storage capacity for the entire system, was observed to be in excellent condition with no evidence of any erosion. Freeboard and beach width were well in excess of license requirements. Some minor erosion was noted on the downstream slope of the upper tailings dam. The licensee stated that the erosion would be repaired this summer and the embankment crest sloped toward the pond to reduce the runoff over the downstream slope.

The tailings beaches were observed to be well wetted and no blowing of tails was noted. The inspectors observed the operation of the sprinkler system which the licensee is in the process of expanding. (This closed open item RA 84-01/4.) The inspectors also noted that the licensee had installed flow monitoring instrumentation on the tailings discharge line which activates an alarm in the event of a line failure, as required by License Condition No. 23.

The inspectors noted that the licensee had performed and documented daily and quarterly embankment inspections required by License Condition No. 45. Embankment piezometers had been read on a monthly basis and the readings maintained in graphical form. A review of the readings showed no trends of concern. The 1985 evaluation of embankment performance was being prepared by licensee personnel at the time of the inspection and will be submitted to NRC shortly. The repairs proposed in a special report to the NRC (URFO) regarding rodent burrows in the tailings dam were observed to have been completed at the time of the inspection.

No violations or deviations were identified by the inspectors.

8. Transportation of Radioactive Materials

The inspectors reviewed records of contamination surveys performed on product drums prior to release from the site. The records indicated that yellowcake drums were surveyed at random for removable contamination prior to loading for transport. The records indicated that no surveyed drums were released with contamination levels exceeding 500 dpm/100 cm², which is well below levels specified in Regulatory Guide 8.30. Documentation of such surveys have in the past been inconsistent in terms of type of survey conducted and units of reported results. A new survey form has been approved for use on barrel shipments.

The NRC inspectors reviewed Forms NRC-741 pertaining to yellowcake transfers since the previous inspection. The forms were noted to be in order. Monthly plant operations reports and inventory reports were also reviewed and found to be adequate. The annual inventory report DOE-742 was not submitted in

September 1984 as required by 10 CFR 40.64b. This was identified as a violation of 10 CFR 40.64b.

One violation was noted by the NRC inspectors.

9. Environmental Protection

The NRC inspectors toured the mill property. Six environmental monitoring stations were observed and all were found to be operating and in good repair. Passive radon dosimeters and direct radiation dosimeters were also noted to be at each site.

A review of the semiannual environmental reports submitted pursuant to 10 CFR 40.65 indicated that offsite releases were less than the regulatory limits and all environmental sampling was in accordance with environmental monitoring license conditions and Regulatory Guide 4.14.

The NRC inspectors determined that samples from six gaseous effluent stacks had been obtained at least quarterly and analyzed for U-nat, Ra-226, Th-230 and Pb-210. Stack sampling and analysis had been performed by the licensee using in-house procedures. All stacks, with one exception, had purportedly been sampled under isokinetic conditions using membrane filters. The yellowcake scrubber stack samples had been collected by a wet sampling technique using a two stage nitric acid solution to extract the particulates. Stack sampling results had been previously reviewed by NRC, URFO, following the required submission of semiannual effluent reports. The NRC inspectors questioned the licensee concerning the method used to sample the yellowcake scrubber stack. The method had assumed a 100% sample collection efficiency in the combined extraction stages, but the validity of this assumption had never been demonstrated. The verification of the yellowcake scrubber stack sampling method to ensure that samples are representative will be considered unresolved pending further analysis by the licensee (RA 85-001/1).

Several ground water monitoring wells were observed. These wells are part of the detection monitoring and environmental monitoring program. All the wells viewed were capped and appeared to be in good repair.

The inspectors reviewed the calculations for the efficiency of the yellowcake scrubber system and determined that they were acceptable. The material had been submitted to NRC, URFO, in August

1984. This closed an open item (RA 84-01/3) on the last inspection.

No violations or deviations were identified by the NRC inspectors.

9. Emergency Preparedness

A review of emergency procedures was made by the inspectors. The fire suppression equipment within the mill was inspected and the insurance underwriter's inspection report was reviewed. Fire fighting equipment for the mill consisted of 115 portable fire extinguishers and 9 hose stations. The hose stations are fed from a 300,000 gallon pond through a pumphouse equipped with both diesel and electrical powered pumps, with a secondary 200,000 gallon water supply from separate storage tanks also available. A 750 KW, 460V emergency diesel generator is available for emergency power. An ambulance is on site and 5 personnel are qualified emergency medical technicians. Training drills were held during the year.

No violations or deviations were noted by the NRC inspectors.

11. Independent Measurements

The NRC inspectors performed exposure rate surveys throughout the mill. All areas were less than 1 mR/hr. The highest reading was 11 mR/hr at the surface of barrels loaded with yellowcake prior to April 1985. Barrels dated after April 1985 produced readings of 9.5 mR/hr at the surface.

The packaging facility was not in operation during the inspection, therefore, air samples were not collected.

No violations or deviations were identified by the NRC inspectors.

12. Exit Interview

The NRC inspectors met with the licensee representatives at the conclusion of the inspection on May 22, 1985. The inspectors summarized the purpose, scope and findings of the inspection.

Three violations were identified as follows:

- A. License Condition No. 11 requires that the licensed material be used in accordance with statements, representations, and conditions contained in Sections 5.1.1, 5.1.3, 5.1.4, 5.2, 5.3, 5.4, 5.5.1,

5.5.2, 5.5.3, 5.5.4, 5.5.5, 5.5.9 and 6.5.1; and Appendices 5.5.2, 5.5.3.3, 5.5.5 of the licensee's renewal application dated December, 1982 as modified by supplement submitted by letter dated May 30, 1984 and supplements dated August and September, 1984.

1. Appendix 5.5.3.3 Sections V and VI require, in part, that employees who are required to use respiratory protection be fitted for a respirator using a series of qualitative fit tests (described on Page A.5.5.3.3-11) and receive annual medical certification of their ability to use a respirator.

Contrary to this requirement, on March 18, 1985, four individuals required to use respiratory protection during non-routine maintenance activities had not received medical certification of their ability to use a respirator, and the three individuals from the group assigned to use air supplied full face respirators did not have records of fit testing available for these respirators.

2. Section 5.5.3 "Exposure Calculations" requires, in part, that if the employee wears a breathing zone samplers on a given day, the breathing zone sample concentration be used instead of measurement from general air sampling for determining exposures.

Contrary to this requirement, since the license was renewed in September 1984, the licensee had used measurements from general air samples in exposure calculations for employees who had worn breathing zone samplers during routine work.

- B. License Condition No. 33 requires, in part, that standard written operating procedures be established for all activities involving radioactive materials.

Contrary to this requirement, as of the date of the inspection, the licensee had not established written operating procedures pursuant to NUREG-0041, Section 9.8, for the maintenance of the supply of respirable air for the supplied air respirators in use.

- C. 10 CFR 40.64(b) requires, in part, that each licensee who is authorized to possess at any one time and location more than 1000 kilograms of uranium submit an annual inventory to the Department of Energy within 30 days after September 30.

Contrary to this requirement, the licensee had not submitted the annual inventory for 1984.

In addition, one deviation was identified as follows:

Section 5.5.3.3 of the licensee's renewal application dated December, 1982 states, in part, that the respiratory protection program has been developed in conjunction with Regulatory Guide 8.15 (Acceptable Programs for Respiratory Protection). Among the elements specified for an acceptable respiratory protection program, Item C.8.A of Regulatory Guide 8.15 states, in part, that respirable air for supplied air respirators is to be of approved quality (reference NUREG-0041 Section 5.2.4.1, which lists specifications for acceptable levels of condensed hydrocarbons in the air supply).

Contrary to this standard, as of the date of the inspection, the licensee had not measured the levels of condensed hydrocarbons found in the mill's air-line supplied air respirator system to verify that the air quality met specifications.