

# Rio Algom Mining LLC

March 12, 2010

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**ADDRESSEE ONLY**

Mr. Tom McLaughlin, Project Manager  
U.S. Nuclear Regulatory Commission  
Mail Stop T-8F5  
Washington, DC 20555

Re: **License SUA-1473, Docket No. 40-8905**  
**2009 ALARA Review**

Dear Mr. McLaughlin,

In accordance with license condition #10 of the above referenced source material license and the *Health Physics and Environmental Programs Manual*, please find attached the 2009 ALARA Review for the Ambrosia Lake facility. This summary reviews the actions taken to maintain occupational exposures as low as reasonably achievable.

If you have any questions or need additional information, please do not hesitate to call me at (505) 287-8851 ext 15.

Regards,



Chuck Wentz  
Radiation Safety Officer  
Environmental Department Supervisor

Attachment: As Stated

xc: T. Fletcher  
K. Lovato  
R. Powell  
B. Ray  
J. Meador  
Document Control (NRC)  
file

**ALARA SUMMARY**  
**January - December 2009**

**INTRODUCTION**

The annual ALARA summary for Rio Algom Mining LLC's Ambrosia Lake facility for calendar year 2009 is submitted for NRC's review in accordance with Rio Algom Mining LLC's Source Material License Condition #10. License condition #10 contains Rio Algom Mining LLC's ALARA Policy as well as the NRC approved health physics and environmental effluent monitoring programs required at the facility, as specified within the *Health Physics and Environmental Programs Manual*.

Copies of the ALARA summary were submitted to the facility ALARA audit committee on March 10, 2009. This committee includes Terry Fletcher (President), Chuck Wentz (Radiation Safety Officer), John Meador (Maintenance Foreman), Ron Powell (Reclamation Engineer), Billy Ray (Project Engineer), and Kathy Lovato (Supervisor, Personnel and Administration).

The primary activities at the site during calendar year 2009 were consolidating and transporting evaporation pond sediments associated with the Section 4 lined pond closure, transporting Mill Pond sediments to the Disposal Cell, and finishing the earthen cover and erosion protection on Pond 3. Transporting of sediments from Section 4 was completed during the year; the completion was followed by a reduction in personnel at the end of September 2009. Some Arroyo del Puerto Project activity was conducted by company employees during 2009; there was not a designated project for contractors as in 2008. As a result of the reduced activity, all health physics reporting has been consolidated into one section, which is summarized below.

**HEALTH PHYSICS SAMPLING ACTIVITY**

**A. Bioassay**

The collection of bioassay samples continued during the year in accordance with the policy statement prescribed in the Bioassay Program section of the facility *Health Physics and Environmental Programs Manual*.

As a result of mill demolition, the potential for uranium intake has been reduced. To ensure that the ALARA principle is maintained,

employees associated with the lined pond closure activities and maintenance work continued to submit bioassay samples during 2009.

During the year there were a total of one hundred thirty nine (139) samples collected from Rio Algom employees and contractors. Analytical results indicated that all sample concentrations were below the laboratory's lower detectable limit of five (5) micrograms per liter ( $\mu\text{g/L}$ ) with the exception of one sample that showed a level of  $5.3 \mu\text{g/L}$ . This is below the action level of  $15 \mu\text{g/L}$ , no action was taken. This sample was suspect because it was the exit (termination) sample for an employee being terminated for substance abuse.

All quality assurance spike samples were within the Regulatory Guide 8.22 suggested variance for acceptable spike result.

The reasons for the continued negligible bioassay concentrations are:

1. The site has completed mill demolition of the former yellowcake processing areas. The ion exchange plant was not utilized during 2009.
2. The work activities where potential exposures could occur are performed under radiation work permits to ensure appropriate radiological controls are instituted.
3. Airborne concentrations within the area are continually well below the DAC for soluble natural uranium.

These bioassay results corroborate the airborne yellowcake sampling program sampling results, which show very low airborne concentrations.

#### **B. Personnel Alpha Contamination Checks**

Health physics personnel performed twenty (20) random alpha contamination surveys of employees leaving the restricted area. Three thousand six hundred thirty four (3634) alpha contamination surveys were conducted by employees and contractors leaving the restricted area. The contamination checks were performed at the end of work shift prior to employees leaving the mill facility. All surveys were well below the 1000 disintegrations per minute per 100 square centimeters ( $\text{dpm}/100 \text{ cm}^2$ ) guideline contained within NRC Regulatory Guide 8.30.

C. **Surface Contamination Checks**

There were 767 surface contamination checks performed during the review period. The surface contamination checks were performed at various places throughout the restricted area including lunchrooms, change rooms, and the guard office. All sample results were below the respective action levels.

D. **Radon Daughter Sampling**

During 2009, the annual radon daughter exposure for all employees was 0.0 working level months (wlm). The annual allowable occupational exposure limit is 4 wlm. It should also be noted that the radon concentrations measured are inclusive of background concentrations. As a result of mill demolition, the ion exchange plant was the only facility remaining on the quarterly sampling program for radon daughters.

1. Mill IX Plant

The average radon daughter concentration during 2009 was 0.02 wl. The 2008 radon concentration averaged 0.0 wl. The 2009 average area concentration represents 6 % of the DAC limit of 0.33 wl. Employee occupancy times within the ion exchange plant are typically less than 10 hours per week.

E. **Yellowcake Samples**

As an integral component of the health physics monitoring program outlined within License Condition #10, air sampling is performed to assess potential employee exposure to airborne yellowcake. With demolition of key process areas completed in February 2004, potential exposure was greatly reduced. As a result, sampling frequency was also reduced to quarterly.

There were 123 air samples taken during 2009 for airborne yellowcake activity. The samples, which were obtained at random times, indicated an annual average concentration for 2009 less than 1% of the DAC for soluble natural uranium.

F. **Uranium Ore Dust**

During the review period, there were no routine uranium ore dust samples taken as the crushing circuit was demolished in late 2003.

## G. **Gamma Surveys**

There were two semiannual gamma surveys conducted during the year as suggested by Regulatory Guide 8.30 and all areas surveyed were properly posted in accordance with 10 CFR 20.1902 and License Condition 28.

## **RESPIRATORY PROTECTION PROGRAM**

The facility *Respiratory Protection Program* was reviewed to evaluate the effectiveness of the program in limiting exposures to individuals. This review included evaluating air sampling data, use of engineering controls, bioassay results, and employee acceptance of using the equipment.

All employees received refresher training on the respiratory protection program. Spirometry testing by a physician indicated that all employees requiring physicals have been deemed physically fit to use respiratory protection equipment. During 2009, respirators were not required on any task performed by Rio Algom employees.

Air sampling data continues to indicate that airborne concentrations are well below the DAC for soluble natural uranium. This is attributable to demolishing the mill and following established procedures.

## **EXPOSURE SUMMARY**

All licensees are required to ensure compliance with the occupational dose limits specified within 10 CFR 20.1201(a). This regulation establishes an annual limit based on internal exposures as well as external exposures. Annual exposure to employees is determined by calculating exposures to radon daughters, soluble airborne yellowcake dust, and gamma radiation. Each component of the annual exposure is discussed in more detail in subsections A through D below.

### A. **Total Effective Dose Equivalent**

The total effective dose equivalent (TEDE) exposure results for all employees are presented in Table 1 below. The TEDE is the sum of the deep dose equivalent (external exposures) and the committed effective dose equivalent (internal exposures, CEDE). The CEDE was calculated in a more conservative procedure for 2009, resulting in somewhat higher CEDE values than those calculated in 2008. All CEDE values were well below the 1Rem limit required to calculate ODE (organ dose equivalent).

The highest TEDE exposure for a Rio Algom employee or contractor for 2009 was 0.426 Rem (0.204 Rem in 2008). This exposure represents 8.5 % of the annual allowable occupational dose limit specified within 10 CFR 20.1201(a). Review of the results indicates that the TEDE is comprised primarily of the committed effective dose equivalent component.

Appendix A, Chart 1 contains the maximum annual TEDE exposures for employees for the time period covering 1990 to 2009. The chart demonstrates that occupational exposures are being maintained ALARA.

TABLE 1  
2009 TOTAL EFFECTIVE DOSE EQUIVALENT (TEDE)

Exposure (REM)	0 -.005	.006 -.010	.011 -.050	> 0.050
No. of Employees	19	5	2	7

10 CFR 20.1502 requires exposure monitoring of any individual likely to receive a dose in excess of 10% of the occupational dose limits prescribed in 10 CFR 20.1201. Based on the annual exposures determined for facility personnel, individual exposure monitoring of visitors will not be necessary.

**B. Deep Dose Equivalent (Gamma Exposure)**

Gamma exposures are determined by the results of personnel dosimetry worn by all employees and analyzed in accordance with National Voluntary Laboratory Accreditation Program (NVLAP) procedures and specifications by an accredited outside contract laboratory. Table 2 summarizes the 2009 employee gamma dose exposures. The highest annual gamma exposure incurred by an employee was 0.012 Rem, which represents 0.2 % of the annual allowable occupational dose limit, if there is no CEDE.

Appendix A, Chart 2 contains the maximum annual deep dose equivalent exposures for the time period covering 1990 to 2009. The chart demonstrates that occupational external radiation exposures are being maintained ALARA.

TABLE 2  
2009 DEEP DOSE EXPOSURES

Exposure (REM)	0 -.005	.006 -.010	.011 -.050	> 0.050
No. of Employees	22	6	5	0

**C. Radon Daughter Exposures**

Air samples are obtained in accordance with the facility sampling program outlined within the NRC approved *Health Physics and Environmental Programs Manual*. Occupancy times are then factored into these values in order to obtain an employee's internal exposure to radon daughters for that time period.

All employee radon daughter exposures during 2009 were 0.0 wlm. The annual allowable occupational exposure limit is 4 wlm. These exposures are the result of reduced production within the ion exchange plant and demolition of the mill. The annual radon daughter exposure results are presented below in Table 3.

TABLE 3  
2009 RADON DAUGHTER EXPOSURES

Exposure (wlm)	< 0.1	0.1-0.5	0.6 – 1.0	> 1.0
No. of Employees and Contractors	33	0	0	0

Appendix A, Chart 3 contains a chart depicting the maximum annual radon daughter exposures for the time period covering 1990 to 2009. The chart demonstrates that occupational exposures to radon are being maintained ALARA.

**D. Yellowcake and Uranium Ore Dust**

Internal exposures to soluble uranium are determined by analyzing the yellowcake samples for gross alpha activity to obtain an average air concentration for the area. Air samples are obtained in accordance with the facility sampling program as well as from

radiation work permits which may require personnel sampling. Occupancy times are then factored into these values in order to obtain an employee's internal exposure for that time period or task.

Table 4 summarizes the 2009 employee internal exposures to soluble uranium. Due to no activity occurring in 2009 associated with uranium/yellowcake activity, no employee exposures were incurred.

Appendix A, Chart 4 contains a chart depicting the maximum annual exposures to uranium for the time period covering 1990 to 2009. The chart demonstrates that occupational exposures to uranium are being maintained ALARA.

TABLE 4  
2009 SOLUBLE URANIUM (YELLOWCAKE) EXPOSURES

Exposure (DAC-Hr)	< 0.1	0.1-1.0	1.01-2.0	> 2.0
No. of Employees	33	0	0	0

#### MISCELLANEOUS ALARA ACTIVITIES

##### A. **Health, Safety, Environment and Community Management System Implementation**

Implementation of the corporate wide Health, Safety, Environment and Community Management system (HSEC) continued throughout 2009. The management system provides a framework for personal, site, and corporate HSEC responsibilities and leadership and ensures the continued improvement of HSEC programs and performance.

Integration of the ALARA principle into the site HSEC management system has provided an additional mechanism to monitor progress toward continued improvement in HSEC activities.

Key improvements involved increased employee awareness, incorporating the concept of performing job safety analyses, and expanding the task observation program so that potential exposure concerns are identified and addressed prior to initiation of work.



**B. Daily and Weekly Inspections**

During the year, daily inspections did not result in any mill corrective orders being issued. Mill corrective orders (MCO) are normally issued when an area requires clean up and that item involves radiological conditions that are below the recommended regulatory guide limits. Mill corrective orders are issued when the job does not require a radiation work permit (RWP).

No RWPs were issued during 2009. Job safety analyses were typically performed prior to initiation of work to identify potential hazards expected to be encountered with appropriate mitigation controls implemented.

Weekly inspections of pertinent mill areas by the radiation safety officer are performed to observe and ensure that general radiological control practices are being used. The weekly inspections did not identify any unusual conditions or situations that required corrective action.

**C. Safety and Training Activities**

The annual eight (8) hour refresher course was completed for all employees and included the topics as outlined in Rio Algom Mining LLC's "Radiation Safety Training Program". All employees also completed a first aid training session during 2009.

All employees receiving physicals were administered a pulmonary function evaluation during 2009. Results from these spirometry tests indicated that all current employees are medically qualified to wear respiratory protection equipment.

Safety meetings, conducted throughout the year, reviewed various topics pertaining to radiation safety including the HSEC management system, contamination control, personnel dosimetry, personnel survey procedures, bioassay procedures, and the importance of practicing good personal hygiene and housekeeping while working in the mill area to ensure exposures remain ALARA.

**D. Performance of Emission Control Equipment**

The facility emission control equipment was demolished in late 2003.

E. **Operational Procedures & Emergency Response Actions**

During the year, all Standard Operating Procedures (SOP) and Emergency Response Procedures were reviewed and are being updated, if necessary, to better conform to the corporate HSEC management guidelines. In addition, all procedures utilized within the radiation safety program were reviewed and are being updated, as necessary.

APPENDIX A



