

Rio Algom Mining LLC

**Rio Algom
ALARA Summary
January – December 2012**

**Prepared by: Brad Squibb, RSO
Date: March 2014**

Table of Contents

Introduction	3
I. Health Physics Sampling Summary	3
A. Bioassay.....	3
B. Personnel Alpha Contamination Checks.....	3
C. Surface Contamination Checks	3
D. Radon Daughter Sampling	3
E. Uranium Dust.....	3
F. Gamma Surveys	3
II. Respiratory Protection Program	4
III. Exposure Summary	4
A. Total Effective Dose Equivalent	4
B. Deep Dose Equivalent (Gamma Exposure)	4
C. Radon Daughter Exposures.....	4
D. Yellowcake and Uranium Ore Dust.....	5
E. Dose to Members of the Public	5
IV. Miscellaneous ALARA Activities	6
A. Health, Safety, Environment and Community Management System.....	6
B. Daily and Weekly Inspections	6
C. Safety and Training Activities.....	6
D. Performance of Emission Control Equipment	6
E. Operational Procedures & Emergency Response Actions.....	6
Appendix A	7

Introduction

The annual ALARA summary for Rio Algom Mining LLC's (RAML) Ambrosia Lake facility (ALF) for calendar year 2012 is submitted for NRC's review in accordance with Rio Algom Mining LLC's Source Material License Condition #10. License Condition #10 contains RAML's ALARA Policy as specified within the Health Physics and Environmental Programs Manual (HPEM).

The primary activities at the site during calendar year 2012 were development of plans and schedules for 2013 reclamation projects, review and updates of health physics and environmental SOPs, implementation of the monitoring well replacement project, and continuation of the environmental & groundwater monitoring programs.

I. Health Physics Sampling Summary

A. Bioassay

Bioassay samples were collected quarterly in accordance with the HPEM Bioassay Program section. During the year there were a total of twenty-four (24) routine samples collected and all of them were below the laboratory's lower detectable limit of five (5) micrograms per liter ($\mu\text{g}/\text{L}$). All quality assurance spike samples were within the Regulatory Guide 8.22 suggested variance for acceptable spike results.

B. Personnel Alpha Contamination Checks

Random quarterly personnel alpha contamination surveys were conducted on March 20th, June 7th, August 29th, and November 13th. All readings were within the action limits.

C. Surface Contamination Checks

There were 468 surface contamination checks performed during 2012. They were performed at various places throughout the restricted area including lunchrooms, change rooms, a guard office, and the IX building. All sample results were below the action levels stated in the NRC Regulatory Guide 8.30.

D. Radon Daughter Sampling

Personnel were not monitored for radon during 2012. Area radon monitoring was conducted in buildings such as the office, change rooms, shop areas, etc. The highest values for the area quarterly samples averaged below the working level (wl) limit.

a) Mill IX Plant

The IX Plant area was monitored quarterly and the highest reading during this period was .11 wl. This concentration is 1/3rd the DAC limit of .33 wl.

E. Uranium Dust

There were twenty-four (24) uranium dust samples taken quarterly in the office, two mechanic shops, IX Plants 1 and 2, and the Chem Lab. The highest concentration sampled was below the acceptable limit referenced in NRC Regulatory Guide 8.30.

F. 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.

II. Respiratory Protection Program

The current Respiratory Protection Program is in place and proper training and testing has been done in case the necessary action is needed. In 2012 there was not an occasion to implement this procedure. Air sampling data continues to indicate that airborne concentrations are well below the DAC for soluble natural uranium.

III. 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. Dosimetry Badges were used throughout 2012 and were monitored quarterly. There were no remarkable exposures to report.

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).

TABLE 1
2012 Total Effective Dose Equivalent (TEDE)

Exposure (REM)	0 - .005	.006 - .010	.011 - .050	>.050
No. of Employees	6	1	1	0

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 2012 employee gamma dose exposures.

TABLE 2
2012 Deep Dose Exposures

Exposure (REM)	0 - .005	.006 - .010	.011 - .050	>.050
No. of Employees	6	1	1	0

C. Radon Daughter Exposures

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

Based on occupancy factors, all employee radon daughter exposures during 2012 were below the annual allowable occupational exposure limit of 4 wlm.

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 3 summarizes the 2012 employee internal exposures to soluble uranium.

Appendix A, Chart 4 contains a chart depicting the maximum annual exposures to uranium for the time period covering 1995 to 2012. Due to no activity occurring in 2012 associated with uranium/yellowcake activity or radiation work permits, no employee exposures were incurred.

TABLE 3
2012 Soluble Uranium (Yellowcake) Exposures

Exposure (DAC-Hr)	<0.1	0.1 – 1.0	1.01 – 2.0	>2.0
No. of Employees	8	0	0	0

E. Dose to Members of the Public

In addition to the occupational exposures discussed above, RAML prepares an annual evaluation for radiation doses to members of the public. These are prepared as per requirements of 10 CFR 20.1301-1302 and 40 CFR 190.10.

RAML submits semi-annual Effluent Monitoring Reports to the NRC. These reports are generally submitted in February and August of each year; exact dates of the submittals are dependent on the dates results are received from the laboratories. RAML would like to incorporate these reports by reference.

Dose to members of the public are prepared for the nearest resident, a typical delivery driver, and the occasional visitor that might spend some time near the boundary of the site property, such as a hunter or rancher. The 2012 results for dose to member of the public are submitted below.

TABLE 4
2012 Dose to Member of the Public

Individual	Direct Gamma (mrem)	Radon (mrem)	Air Particulate (mrem)	Total TEDE (mrem)
Nearest Resident	4	51	0	54
Delivery Person	0	2	0	2
Occasional Visitor	0	3	0	3

The table shows that the potential dose calculations for members of the public for 2012 were well below the 10 CFR 20.1301 dose limit of 100 mrem/yr.

IV. Miscellaneous ALARA Activities

A. Health, Safety, Environment and Community Management System

Implementation of the corporate wide Health, Safety, Environment and Community Management system (HSEC) continued throughout 2012. 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.

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

B. Daily and Weekly Inspections

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 RSO were 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 RAML's "Radiation Safety Training Program".

All employees receiving physicals were administered a pulmonary function evaluation during 2012. 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, fire extinguisher use, and the importance of practicing good personal hygiene.

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 updated, as necessary, to better conform to the corporate HSEC management guidelines. In addition, all procedures utilized within the radiation safety program were reviewed and updated, as necessary.

Appendix A



