

# Rio Algom Mining LLC

August 28, 2015, 2015

## ADDRESSEE ONLY

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

## CERTIFIED MAIL

Re: **License SUA-1473, Docket No. 40-8905**  
**Semiannual Effluent Report – 1st Half 2015**

Dear Mr. McLaughlin,

In accordance with license condition #19 of the above referenced source material license and the NRC approved *Health Physics and Environmental Programs Manual*, please find attached the 1<sup>st</sup> Half 2015 Semiannual Report for the Ambrosia Lake facility.

During the site reclamation project in 2014, the earth moving activities by Conestoga Rovers and Associates (CRA) flattened the sediment sampling location P-0 to where the drainage wash is no longer there. This location is no longer being sampled.

The environmental High Volume air sample results presented in this semiannual report typically show <1% of the environmental limits for each isotope. For the second quarter samples, the North Fence and KGL North locations were well below the Environmental Concentration limit for Th-230 of  $2.0\text{E-}14 \mu\text{Ci/ml}$  but showed positive results of  $4.5\text{e-}18 \mu\text{Ci/ml}$  (0.02%) and  $2.6 \text{e-}17 \mu\text{Ci/ml}$  (0.13%) of the Th-230 limit respectively. For the second quarter the North Fence sample was at  $2.8 \text{e-}16 \mu\text{Ci/ml}$  or 1.41% of the Th-230 limit.

The quarterly gamma badge for Section 30W VH6 showed an increase with the 1<sup>st</sup> and 2<sup>nd</sup> quarter badge at 28.4 and 52.3 mrem respectively. This badge is in an area where the impacts of reclamation activities would be expected.

With regard to Lower limits of Detection (LLD's) for the soil sediment and vegetation samples we have been able to successfully identify a laboratory which can meet these LLD's for soil and sediment. However, we have been unsuccessful in finding a laboratory that can consistently meet the stringent LLD's for vegetation as prescribed in Regulatory Guide 4.14.

---

P.O. Box 218, Grants, NM USA 87020 - Tel: 505.287.8851 - Fax: 505.285.5550

NMSSD1  
IEH8  
NMSS

Marked as  
original by PM  
JAW

Based on discussions with you and Dr. Evans, we are preparing a license amendment whereby new LLD's may be proposed based on more recent regulatory guidance or the elimination of some or all of the environmental sampling. The final decision will be made based on past year's trend data and whether there is a need for continued sampling for a site being decommissioned.

If you have any questions or need additional information, please do not hesitate to call me at (865) 220-7193.

Regards,

A handwritten signature in black ink, appearing to read "Brad Squibb", written in a cursive style.

Brad Squibb  
Radiation Safety Officer

Attachment

cc: NRC (document control)  
File

---

Environmental Gamma Radiation  
2015

---

1st Quarter		2nd Quarter	
Sample Media: Gamma		Sample Media: Gamma	
Date: 1/1/2015 - 3/31/2015		Date: 4/1/2015 - 6/30/2015	
Location:	Rate (mrem/qtr)	Location:	Rate (mrem/qtr)
Substation	1.5	Substation	5.0
Mill Diversion	6.6	Mill Diversion	4.2
Section 30W VH6	28.4	Section 30W VH6	52.3
North Fence	5.6	North Fence	6.4
Section 17 VH4	5.9	Section 17 VH4	8.8
Section 4 - #1	6.5	Section 4 - #1	8.9
Section 4 - #2	9.9	Section 4 - #2	10.9
Section 4 - #3	8.2	Section 4 - #3	6.4

Notes:  
Values are net after subtraction of control value

Environmental Radon  
2015

1st Quarter  
Sample Media: Track Etch

Location:	Rate pCi/L	Error pCi/L
Substation	0.4	0.0
Mill Diversion	2.0	0.1
Section 30W VH6	2.6	0.2
North Fence	2.3	0.2
Section 17 VH4	0.8	0.1
KGL - North	2.3	0.2
KGL - South	2.3	0.2

2nd Quarter  
Sample Media: Track Etch

Location:	Rate pCi/L	Error pCi/L
Substation	0.8	0.1
Mill Diversion	2.0	0.1
Section 30W VH6	2.4	0.1
North Fence	2.1	0.1
Section 17 VH4	1.2	0.1
KGL - North	1.7	0.1
KGL - South	2.0	0.1

Notes:

High Volume Environmental Air Samples  
2015

1st Quarter					2nd Quarter				
Substation									
Nuclide	Conc. (uCi/ml)	Error (uCi/ml)	LLD (uCi/ml)	% Limit	Nuclide	Conc. (uCi/ml)	Error (uCi/ml)	LLD (uCi/ml)	% Limit
U-nat	0.0E+00	3.9E-16	2.4E-18	< 1.0	U-nat	3.7E-18	9.4E+12	7.6E+10	< 1.0
Th-230	2.4E-18	4.4E-18	7.9E-18	< 1.0	Th-230	6.9E-18	4.8E-18	7.2E-18	< 1.0
Ra-226	3.2E-18	3.7E-18	2.3E-18	< 1.0	Ra-226	3.4E-18	3.3E-18	2.1E-18	< 1.0
Pb-210	6.7E-16	3.5E-17	5.9E-17	< 1.0	Pb-210	6.6E-16	2.8E-17	4.4E-17	< 1.0

1st Quarter					2nd Quarter				
Section 17 VH4									
Nuclide	Conc. (uCi/ml)	Error (uCi/ml)	LLD (uCi/ml)	% Limit	Nuclide	Conc. (uCi/ml)	Error (uCi/ml)	LLD (uCi/ml)	% Limit
U-nat	0.0E+00	3.9E-16	2.5E-18	< 1.0	U-nat	0.0E+00	9.3E+12	9.4E+10	< 1.0
Th-230	1.2E-18	4.0E-18	8.0E-18	< 1.0	Th-230	1.0E-18	5.4E-18	1.0E-17	< 1.0
Ra-226	1.5E-18	2.3E-18	1.8E-18	< 1.0	Ra-226	3.6E-18	3.2E-18	6.9E-18	< 1.0
Pb-210	9.5E-16	3.6E-17	5.4E-17	< 1.0	Pb-210	1.0E-15	3.9E-17	5.6E-17	< 1.0

1st Quarter					2nd Quarter				
Mill Diversion									
Nuclide	Conc. (uCi/ml)	Error (uCi/ml)	LLD (uCi/ml)	% Limit	Nuclide	Conc. (uCi/ml)	Error (uCi/ml)	LLD (uCi/ml)	% Limit
U-nat	3.0E-18	3.9E-16	2.5E-18	< 1.0	U-nat	8.0E-18	8.6E+12	1.0E+11	< 1.0
Th-230	1.4E-17	5.5E-18	8.0E-18	< 1.0	Th-230	3.6E-17	9.3E-18	1.0E-17	< 1.0
Ra-226	-5.8E-19	2.6E-18	7.1E-18	< 1.0	Ra-226	1.7E-17	5.1E-18	2.8E-18	< 1.0
Pb-210	8.8E-16	3.6E-17	5.8E-17	< 1.0	Pb-210	1.1E-15	4.5E-17	6.7E-17	< 1.0

1st Quarter					2nd Quarter				
Section 30 West VH6									
Nuclide	Conc. (uCi/ml)	Error (uCi/ml)	LLD (uCi/ml)	% Limit	Nuclide	Conc. (uCi/ml)	Error (uCi/ml)	LLD (uCi/ml)	% Limit
U-nat	0.0E+00	6.1E-16	1.5E-18	< 1.0	U-nat	1.8E-17	5.4E+11	1.1E+09	< 1.0
Th-230	2.5E-18	2.3E-18	4.0E-18	< 1.0	Th-230	2.7E-17	2.3E-17	3.3E-17	< 1.0
Ra-226	3.3E-18	2.1E-18	1.4E-18	< 1.0	Ra-226	1.9E-17	1.4E-17	3.7E-17	< 1.0
Pb-210	2.1E-16	1.8E-17	3.9E-17	< 1.0	Pb-210	1.4E-15	1.3E-16	3.0E-16	< 1.0

### High Volume Environmental Air Samples 2015

1st Quarter					2nd Quarter				
North Fence									
Nuclide	Conc. (uCi/ml)	Error (uCi/ml)	LLD (uCi/ml)	% Limit	Nuclide	Conc. (uCi/ml)	Error (uCi/ml)	LLD (uCi/ml)	% Limit
U-nat	0.0E+00	6.1E-16	1.5E-18	< 1.0	U-nat	9.5E-17	4.7E+11	9.5E+08	< 1.0
Th-230	4.5E-18	3.0E-18	4.3E-18	0.02%	Th-230	2.8E-16	4.7E-17	3.3E-17	1.4%
Ra-226	1.1E-18	1.3E-18	1.4E-18	< 1.0	Ra-226	1.3E-16	2.2E-17	1.7E-17	< 1.0
Pb-210	2.8E-16	1.8E-17	3.4E-17	< 1.0	Pb-210	1.0E-15	1.1E-16	2.7E-16	< 1.0

1st Quarter					2nd Quarter				
KGL - North									
Nuclide	Conc. (uCi/ml)	Error (uCi/ml)	LLD (uCi/ml)	% Limit	Nuclide	Conc. (uCi/ml)	Error (uCi/ml)	LLD (uCi/ml)	% Limit
U-nat	4.6E-18	4.0E-16	2.5E-18	< 1.0	U-nat	7.8E-18	8.2E+12	1.0E+11	< 1.0
Th-230	2.6E-17	6.5E-18	6.4E-18	0.13%	Th-230	3.3E-17	1.1E-17	1.2E-17	< 1.0
Ra-226	3.3E-18	2.0E-18	4.4E-18	< 1.0	Ra-226	3.5E-18	4.1E-18	5.5E-18	< 1.0
Pb-210	6.8E-16	3.5E-17	6.0E-17	< 1.0	Pb-210	9.7E-16	4.3E-17	6.5E-17	< 1.0

1st Quarter					2nd Quarter				
KGL - South									
Nuclide	Conc. (uCi/ml)	Error (uCi/ml)	LLD (uCi/ml)	% Limit	Nuclide	Conc. (uCi/ml)	Error (uCi/ml)	LLD (uCi/ml)	% Limit
U-nat	0.0E+00	3.9E-16	2.5E-18	< 1.0	U-nat	3.7E-18	9.3E+12	9.4E+10	< 1.0
Th-230	2.5E-18	3.4E-18	6.9E-18	< 1.0	Th-230	1.0E-17	1.1E-17	8.7E-18	< 1.0
Ra-226	1.2E-18	1.2E-18	1.4E-18	< 1.0	Ra-226	6.0E-18	3.5E-18	6.9E-18	< 1.0
Pb-210	8.0E-16	3.8E-17	6.7E-17	< 1.0	Pb-210	1.0E-15	3.9E-17	6.0E-17	< 1.0

Vegetation  
2015

1st Quarter

2nd Quarter

Location:		Substation	
Date:		21-Aug-14	
Nuclide	Conc. (uCi/kg)	Error (uCi/kg)	LLD (uCi/kg)
U-nat	No Vegetation Samples 1st Quarter		
Th-230			
Ra-226			
Pb-210			

Location:		Substation	
Date:		21-Oct-14	
Nuclide	Conc. (uCi/kg)	Error (uCi/kg)	LLD (uCi/kg)
U-nat	1.5E-04	8.9E-06	3.4E-05
Th-230	4.8E-04	1.1E-03	1.9E-03
Ra-226	5.0E-04	5.7E-04	1.2E-03
Pb-210	7.9E-03	4.0E-03	1.3E-02

Location:		Mill Diversion	
Date:		21-Aug-14	
Nuclide	Conc. (uCi/kg)	Error (uCi/kg)	LLD (uCi/kg)
U-nat	No Vegetation Samples 1st Quarter		
Th-230			
Ra-226			
Pb-210			

Location:		Mill Diversion	
Date:		21-Oct-14	
Nuclide	Conc. (uCi/kg)	Error (uCi/kg)	LLD (uCi/kg)
U-nat	7.4E-05	4.4E-06	4.1E-05
Th-230	1.3E-03	1.1E-03	1.9E-03
Ra-226	8.6E-04	5.7E-04	6.9E-04
Pb-210	1.8E-03	4.5E-03	1.5E-02

Location:		Section 30 West VH6	
Date:		21-Aug-14	
Nuclide	Conc. (uCi/kg)	Error (uCi/kg)	LLD (uCi/kg)
U-nat	No Vegetation Samples 1st Quarter		
Th-230			
Ra-226			
Pb-210			

Location:		Section 30 West VH6	
Date:		21-Oct-14	
Nuclide	Conc. (uCi/kg)	Error (uCi/kg)	LLD (uCi/kg)
U-nat	1.2E-03	6.9E-05	3.4E-05
Th-230	1.6E-03	1.1E-03	1.6E-03
Ra-226	2.4E-03	7.4E-04	7.9E-04
Pb-210	1.2E-02	4.3E-03	1.3E-02

Location:		North Fence	
Date:		21-Aug-14	
Nuclide	Conc. (uCi/kg)	Error (uCi/kg)	LLD (uCi/kg)
U-nat	No Vegetation Samples 1st Quarter		
Th-230			
Ra-226			
Pb-210			

Location:		North Fence	
Date:		21-Oct-14	
Nuclide	Conc. (uCi/kg)	Error (uCi/kg)	LLD (uCi/kg)
U-nat	6.4E-04	3.8E-05	3.4E-05
Th-230	1.8E-03	1.0E-03	1.6E-03
Ra-226	1.0E-03	6.2E-04	1.2E-03
Pb-210	-3.4E-03	4.2E-03	1.3E-02

Vegetation  
2015

1st Quarter

2nd Quarter

Location:		Section 17 VH4	
Date:		21-Aug-12	
Nuclide	Conc. (uCi/kg)	Error (uCi/kg)	LLD (uCi/kg)
U-nat	No Vegetation Samples 1st Quarter		
Th-230			
Ra-226			
Pb-210			

Location:		Section 17 VH4	
Date:		21-Oct-14	
Nuclide	Conc. (uCi/kg)	Error (uCi/kg)	LLD (uCi/kg)
U-nat	4.1E-04	2.4E-05	3.4E-05
Th-230	-2.3E-04	8.9E-04	1.8E-03
Ra-226	1.2E-03	5.7E-04	1.1E-03
Pb-210	-3.8E-03	4.6E-03	1.4E-02

Location:		KGL - North	
Date:		21-Aug-12	
Nuclide	Conc. (uCi/kg)	Error (uCi/kg)	LLD (uCi/kg)
U-nat	No Vegetation Samples 1st Quarter		
Th-230			
Ra-226			
Pb-210			

Location:		KGL - North	
Date:		21-Oct-14	
Nuclide	Conc. (uCi/kg)	Error (uCi/kg)	LLD (uCi/kg)
U-nat	3.9E-04	2.3E-05	4.1E-05
Th-230	8.4E-04	9.8E-04	1.8E-03
Ra-226	3.0E-05	5.3E-04	6.1E-04
Pb-210	9.0E-03	5.0E-03	1.4E-02

Location:		KGL - South	
Date:		21-Aug-12	
Nuclide	Conc. (uCi/kg)	Error (uCi/kg)	LLD (uCi/kg)
U-nat	No Vegetation Samples 1st Quarter		
Th-230			
Ra-226			
Pb-210			

Location:		KGL - South	
Date:		21-Oct-14	
Nuclide	Conc. (uCi/kg)	Error (uCi/kg)	LLD (uCi/kg)
U-nat	4.7E-05	2.8E-06	3.4E-05
Th-230	-2.8E-04	2.2E-03	1.8E-03
Ra-226	7.3E-04	4.7E-04	4.2E-04
Pb-210	1.4E-02	4.2E-03	1.1E-02



Soil  
2015

Location:		Substation	
Date:		3/16/2015	
Nuclide	Conc. (uCi/g)	Error (uCi/g)	LLD (uCi/g)
U-nat	2.2E-06	7.6E-07	3.3E-07
Th-230	1.0E-06	2.8E-07	8.8E-08
Ra-226	1.1E-06	3.9E-07	2.4E-07
Pb-210	2.3E-07	7.1E-08	1.3E-07

Location:		Mill Diversion	
Date:		3/16/2015	
Nuclide	Conc. (uCi/g)	Error (uCi/g)	LLD (uCi/g)
U-nat	9.7E-07	4.8E-07	3.2E-07
Th-230	1.0E-05	1.8E-06	9.3E-08
Ra-226	1.4E-06	4.4E-07	2.4E-07
Pb-210	1.1E-06	1.0E-07	1.2E-07

Location:		Section 30 West VH6	
Date:		3/16/2015	
Nuclide	Conc. (uCi/g)	Error (uCi/g)	LLD (uCi/g)
U-nat	5.0E-06	1.2E-06	3.2E-07
Th-230	4.1E-06	8.0E-07	8.0E-08
Ra-226	4.3E-06	8.7E-07	3.6E-07
Pb-210	1.1E-06	1.1E-07	1.5E-07

Location:		North Fence	
Date:		3/16/2015	
Nuclide	Conc. (uCi/g)	Error (uCi/g)	LLD (uCi/g)
U-nat	9.1E-07	5.2E-07	3.0E-07
Th-230	9.5E-07	2.9E-07	1.2E-07
Ra-226	9.4E-07	4.9E-07	4.3E-07
Pb-210	2.3E-07	7.3E-08	1.3E-07

Location:		Section 17 VH4	
Date:		3/16/2015	
Nuclide	Conc. (uCi/g)	Error (uCi/g)	LLD (uCi/g)
U-nat	1.5E-06	5.8E-07	3.1E-07
Th-230	1.0E-06	2.8E-07	9.8E-08
Ra-226	3.9E-07	2.7E-07	3.4E-07
Pb-210	4.3E-06	8.7E-07	3.6E-07

Location:		KGL - North	
Date:		3/16/2015	
Nuclide	Conc. (uCi/g)	Error (uCi/g)	LLD (uCi/g)
U-nat	1.6E-06	6.1E-07	2.7E-07
Th-230	7.4E-07	2.1E-07	4.7E-08
Ra-226	7.9E-07	3.9E-07	3.3E-07
Pb-210	2.6E-07	7.1E-08	1.2E-07

Location:		KGL - South	
Date:		3/16/2015	
Nuclide	Conc. (uCi/g)	Error (uCi/g)	LLD (uCi/g)
U-nat	3.0E-06	9.1E-07	2.6E-07
Th-230	3.4E-06	7.0E-07	6.6E-08
Ra-226	2.4E-06	5.4E-07	2.0E-07
Pb-210	1.2E-06	1.1E-07	1.2E-07

Sediment  
2015

Location: P-0			
Date: 3/16/2015			
Nuclide	Conc. (uCi/g)	Error (uCi/g)	LLD (uCi/g)
U-nat	Removed during reclamation activities		
Th-230			
Ra-226			
Pb-210			

Location: P-1			
Date: 3/16/2015			
Nuclide	Conc. (uCi/g)	Error (uCi/g)	LLD (uCi/g)
U-nat	2.8E-06	8.2E-07	2.2E-07
Th-230	1.5E-05	2.7E-06	6.6E-08
Ra-226	2.4E-06	5.5E-07	1.9E-07
Pb-210	1.3E-06	1.1E-07	1.2E-07

Location: P-2			
Date: 3/16/2015			
Nuclide	Conc. (uCi/g)	Error (uCi/g)	LLD (uCi/g)
U-nat	1.0E-05	2.1E-06	3.7E-07
Th-230	1.9E-05	3.7E-06	1.2E-07
Ra-226	1.2E-05	1.4E-06	3.3E-07
Pb-210	4.4E-06	1.8E-07	1.5E-07

Location: P-3			
Date: 3/16/2015			
Nuclide	Conc. (uCi/g)	Error (uCi/g)	LLD (uCi/g)
U-nat	1.0E-06	5.2E-07	4.8E-07
Th-230	5.7E-07	1.9E-07	6.7E-08
Ra-226	8.0E-07	3.7E-07	3.2E-07
Pb-210	3.2E-07	7.9E-08	1.3E-07