

Rio Algom Mining LLC

July 17, 2020

ATTN: Mr. Thomas Lancaster

United States Nuclear Regulatory Commission
Mail Stop T5-A10
Washington, DC 20555-0001

Re: **License SUA-1473, Docket No. 40-8905**
Editorial and Administrative Amendment to SUA-1473
Proposed Approach for Polonium-210

Dear Mr. Lancaster,

Rio Algom Mining LLC (RAML) has requested that the Nuclear Regulatory Commission (NRC) staff review and amend its present source materials license SUA-1473 for the Ambrosia Lake West Mill to address specific editorial and administrative changes to accurately reflect current site conditions and operations. RAML had previously proposed to add polonium-210 to the license as part of the regular semi-annual groundwater monitoring program, but had not identified a compliance standard against which to compare the results of polonium-210 analysis (see (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20093B939).

RAML's Proposed Approach

In lieu of establishing a separate groundwater standard for polonium-210, RAML proposes to lower its existing lead-210 alternate concentration limit (ACL) to account for potential additional risk due to the presence of the decay products of lead-210 (i.e., bismuth-210¹ and polonium-210) in secular equilibrium with their parent nuclide.

Justification

RAML believes that it is reasonable to assume that polonium-210 ($t_{1/2} = 138$ days) is in secular equilibrium with lead-210 ($t_{1/2} = 22$ years) due to polonium-210's relatively short half-life and the conservative K_d of 1 used for *all* radionuclides in RAML's ACL applications (AVM & AHA 2000, QMC 2001). In effect, lead-210 and its decay products are transported downgradient as one constituent and, after sufficient time has elapsed to allow for ingrowth (ten half-lives of polonium-210, or 3.8 years), lead-210 and polonium-210 are present at equal activity concentrations.

NRC has approved a health risk of 1×10^{-5} associated with exposure to each groundwater constituent for which RAML has obtained ACLs (NRC, 2006)². The "health-risk-based-concentrations" of constituents in groundwater that correspond to 1×10^{-5} excess risk are calculated via the method described in Section 5.2.1.3 of the Technical Evaluation Report (TER) approving RAML's ACLs (NRC 2006).

¹ Bismuth-210 is a short-lived decay product of lead-210 and is always present with polonium-210. References to polonium-210 in this document include bismuth-210.

² This health risk is to an approved exposed hypothetical receptor at an approved point of exposure (NRC 2006).

Based on the assumptions concerning secular equilibrium described above, RAML has calculated a modified ACL for lead-210 that accounts for the risk associated with exposure to polonium-210 (which is transported with lead-210) by summing the cancer risk coefficients for each radionuclides and using the summed risk coefficient as described in Section 5.2.1.3 of the ACL TER (NRC 2006) to calculate a health-risk-based-concentration. Risk coefficients and their summation are provided in Table 1.

Table 1. Risk coefficients for lead-210 and polonium-210.

Constituent	Risk Coefficient ^(a) (Bq ⁻¹)
Lead-210	1.75x10 ⁻⁸
Polonium-210	7.530x10 ⁻⁹ ^(b)
SUMMED	2.50x10⁻⁸

^(a) As reported in Federal Guidance Report No. 13 *Cancer Risk Coefficients for Environmental Exposures to Radionuclides* (EPA, 1999).

^(b) The polonium-210 risk coefficient reported here includes the risk contribution from the presence of bismuth-210.

The summed risk coefficient is 1.43 times greater than the lead-210 risk coefficient alone. Thus, the health-risk-based-concentration and the lead-210 ACLs would need to be lowered by a factor of 1.43 to account for the presence of lead-210's decay product polonium-210. RAML's proposed modified ACLs for lead-210 are provided in

Table 2.

Table 2. Proposed modified ACLs for lead-210.

Aquifer	Approved ACL for Lead-210 (pCi L ⁻¹)	Proposed Modified ACL for Lead-210 ¹ (pCi L ⁻¹)
Alluvium	1274	891
Tres Hermanos B	88	62
Tres Hermanos A	88	62
Dakota Sandstone	88	62

¹ Assumes lead-210 is in secular equilibrium with polonium-210.

RAML proposes to demonstrate compliance for polonium-210 and lead-210 by comparing groundwater monitoring results for lead-210 at its point of compliance wells to the proposed modified ACL value for each aquifer (Table 2), which includes risk from polonium-210 in secular equilibrium with lead-210. RAML would not monitor for or establish an ACL for polonium-210 independent of the proposed modified lead-210 ACL.

If a separate polonium-210 compliance limit is developed, the lead-210 ACLs will revert to the values in SUA-1473 Amendment 61.

RAML understands that NRC is developing Amendment 62 to license SUA-1473 to address editorial and administrative changes. We respectfully request NRC's consideration of the approach described above for monitoring and compliance of polonium-210 using the proposed modified ACLs for lead-210. If you have any questions or need additional information, please do not hesitate to call me at (916) 947-7637.

Sincerely,



Sandra L. Ross, P.G.
Site Manager
Rio Algom Mining, LLC

cc: Document Control

References

- AVM and AHA, 2000. *Corrective Action Program and Alternate Concentration Limits Petition for Upper Most Bedrock Units Ambrosia Lake Uranium Mill Facility Near Grants, New Mexico*. February 15, 2000. [ADAMs Accession No. ML003687843]
- EPA, 1999. *Cancer Risk Coefficients for Environmental Exposure to Radionuclides*. Federal Guidance Report No. 13. EPA 402-R-99-001. Washington, DC: EPA. September 1999.
- NRC, 2006. *Technical Evaluation Report, Alternate Concentration Limits Application, Rio Algom Mining LLC, Ambrosia Lake Uranium Mill Facility, New Mexico*. February 24, 2006 [ADAMs Accession No. ML060380387]
- QMC, 2001. *Application for Alternate Concentration Limits in the Alluvial Materials at The Quivira Mill Facility Ambrosia Lake, New Mexico*. May 31, 2001. [ADAMs Accession No. ML011690068]