

Developing Radium-226 and Actinium-227 Age-Dating Techniques for Nuclear Forensics to Gain Insight From Concordant and Non-Concordant Radiochronometers

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Supplemental Information

The average ²²⁶Ra concentration of TML measured, 79.8 fg/g ± 1.9 (2.16 x 10⁸ atoms/g) corresponds, within uncertainty, to the secular equilibrium value calculated from our measurements of ²³⁰Th. This average is calculated from three separate measurements of TML reported in **Table 1**. Secular equilibrium predicts a concentration of ²²⁶Ra of 2.1697 x 10⁸ ± 7.8 x 10⁵. The value measured here with an uncertainty of 2.3% is within 1.3% of this secular equilibrium value. This confirms that the calibrations of radium concentrations and compositions in the prepared enriched-²²⁸Ra spike are accurate, and analyses by MC-ICP-MS result in accurate ²²⁶Ra measurements.

Table 1 ²²⁶Ra Concentrations in Table Mountain Latite Relative to ²²⁶Ra Predicted from Secular Equilibrium

Sample	²²⁶ Ra atoms/g	Secular Equilibrium
TML-1	2.142(41) x 10 ⁸	2.1697(78) x 10 ⁸
TML-2	2.144(44) x 10 ⁸	2.1697(78) x 10 ⁸
TML-3	2.125(53) x 10 ⁸	2.1697(78) x 10 ⁸

*uncertainty represents coverage factor of 2 (k=2).

Radium-226 concentrations were also determined for four different ores certified for ²²⁶Ra activity by Natural Resources Canada (CANMET). The ores analyzed were: DH-1a, BL4a, UTS-

1, and UTS-4. Data measured here are compared to CANMET certified values in **Figure 1** below. All measured concentrations agree with certified values.

DH-1a	DH-1a Certified	BL-4a	BL-4a Certified	UTS-1	UTS-1 Certified	UTS-4	UTS-4 Certified
31.62 Bq/g 0.95 2σ	31.5 Bq/g 1.1 2σ	16.02 Bq/g 0.48 2σ	15.5 Bq/g 0.5 2σ	3.86 Bq/g 0.12 2σ	3.67 Bq/g NR	38.4 Bq/g 1.2 2σ	38.6 Bq/g NR

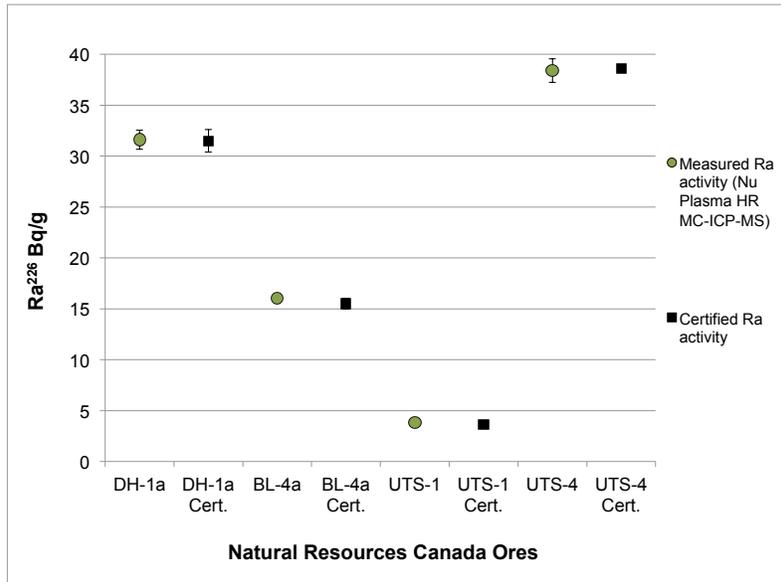


Fig 1. Comparison of ²²⁶Ra activities measured for CANMET ores to certified CANMET values. All measured activities are in agreement with certified values.