



Nuclear Reference Material Program

U.S. Department of Energy



Certificate of Analysis

Certified Reference Material 104A

Pitchblende Ore – Silica Mixture Uranium Standard

Description: Certified Reference Material (CRM) 104A is 50 grams of a mixture of powdered pitchblende ore and powdered silica in a glass bottle. The certified uranium mass fraction value is reported in Table 1. Supplemental non-certified property values are provided in Table 2.

Table 1. Certified Property Value and Uncertainty^(a)

Uranium Mass Fraction (g g^{-1}) • 100:	0.00989
Uncertainty:	0.00020

^(a) The certified value listed above is expressed in terms of 95 % confidence limits, defined as $\bar{x} \pm \sigma \cdot t$, where $\bar{x}$ is the pooled mean of the measurement data, σ is the pooled standard deviation of the mean, and t is the Student's t value for the indicated degrees of freedom ($df = 12$) and at the 5 % significance level ($\alpha = 0.05$).

Intended use: This CRM was prepared as a quality control reference material for chemical analysis of uranium in ore samples.

Storage: This material should be stored in its original packaging under normal laboratory environmental conditions.

Period of validity: When stored in its original, unopened container, the certification of this material is valid indefinitely. The Nuclear Reference Material Program (NRMP) will notify customers should any degradation be detected.

Instructions for Handling: The material in the unit bottle is radioactive. This radioactive material should be handled only by qualified individuals. To minimize personnel exposure, appropriate facilities and personal protective equipment should be used. Refer to the Safety Data Sheet for further information.

Traceability statement: The certified uranium mass fraction value is traceable to the SI unit kilogram.

Additional information: CRM 104A was prepared by milling and blending NBL CRM 6-A Pitchblende Ore (67.91 % $\pm$ 0.05 % mass fraction U_3O_8) with silica (99.9 % mass fraction SiO_2) to obtain a uniform mixture of desired uranium concentration. Characterization and certification analyses for uranium content were performed on ten (10) units selected from the packaged final product. The analysis methods used for these measurements were spectrophotometry verified with NBL Uranium Oxide (U_3O_8) and Fluorimetry verified with CRM 112A Uranium Metal.

Table 2. Non-Certified Property Value ^(a)

Radium Mass Fraction (g g^{-1}) • 100:	3.40×10^{-9}
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^(a) Calculated value is based on the radium:uranium ratio of 3.44×10^{-7} for CRM 6-A Pitchblende Ore.

In 2016, the New Brunswick Laboratory facility was transitioned to a program office within the Department of Energy and is now operating within the National Nuclear Security Administration (NNSA) as the Nuclear Reference Material Program (NRMP).

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