



# Nuclear Reference Material Program

## U.S. Department of Energy



# Certificate of Analysis

## Certified Reference Material 001A (50g)

### Phosphate Rock Uranium (Natural) Standard

**Description:** Certified Reference Material (CRM) 001A consists of 50 grams of phosphate rock powder in a glass bottle.

**Table 1. Certified Property Values and Uncertainties <sup>(a)</sup>**

	<b>g g<sup>-1</sup></b>		<b>g g<sup>-1</sup></b>
Uranium Mass Fraction •100:	0.0153	U <sub>3</sub> O <sub>8</sub> Mass Fraction •100 <sup>(b)</sup> :	0.0180
Uncertainty:	0.0002	Uncertainty:	0.0002

<sup>(a)</sup> 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 unweighted mean of the measurement data,  $\sigma$  is the standard deviation of the mean, and  $t$  is the Student's t value for the indicated degrees of freedom ( $df = 5$ ) and at the 5 % significance level ( $\alpha = 0.05$ ).

<sup>(b)</sup> Value for oxide was calculated from the measured uranium mass fraction.

**Intended use:** This CRM is primarily intended for quality control analyses of uranium in phosphate rock material.

**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.

**Minimum sample size:** Characterization measurements for certification of CRM 001A were performed on samples of approximately 1 g. Accordingly, the attribute values for this CRM are not guaranteed for samples of less than 1 g.

**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 is traceable to the SI unit of the kilogram.

**Additional information:** This CRM 001A was prepared from pebble phosphate rock donated by the International Minerals and Chemical Corporation (IMC), Phosphoria Mines, Bone Valley Phosphate District, located in Central Florida. The New Brunswick Laboratory (NBL) pulverized, milled, blended, and packaged the raw rock, then selected six (6) units of the final product for characterization and analysis of uranium content. The certified value for uranium mass fraction was determined by spectrophotometry verified with NBL CRM 114 Uranium Oxide (U<sub>3</sub>O<sub>8</sub>) and NBL CRM 1 Phosphate Rock.

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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