New Brunswick Laboratory
U.S. Department of Energy

Certificate of Analysis
CRM 145-B
High Purity Uranium Assay Solution Standard

Uranium Mass Concentration:	**10.6886 mg U/g solution**
Expanded Uncertainty (α=0.05, k=2):	**0.0029 mg U/g solution**

This Certified Reference Material (CRM) is an assay (elemental concentration) standard for use in uranium determinations. Each unit of the reference material consists of approximately 20 mL of a uranyl nitrate solution in 1 *M* HNO_3, contained in a 30-mL Teflon® FEP screw-top bottle.

NOTE: *The bottle should be handled under proper radiologically-controlled conditions at all times.*

The material was prepared by dissolving samples of New Brunswick Laboratory's CRM 112-A, Uranium Metal Assay Standard, in ultra-high purity nitric acid and distilled, deionized water. Dissolution was performed in a Teflon® PFA jar, and subsequent aliquanting into the Teflon® bottles was accomplished using a peristaltic pump employing Teflon® PTFE and PFA tubing. All plastic ware was cleaned by soaking in nitric acid, followed by refluxing in ultra-high purity nitric acid and triple rinsing with distilled, deionized water to minimize trace metal impurities.

The reference value is based on the mass of uranium metal dissolved and diluted to a known solution mass, combined with the results of titrimetric analysis. The prepared result and measurement result and uncertainties were pooled on an equal-weight basis to determine the reference value and its expanded uncertainty. The value and all uncertainties were calculated in accordance with the ISO guide [1]. Traceability for the value is established through the use and incorporation of uncertainties associated with NIST-traceable mass standards and the certified uranium assay for CRM 112-A.

Users are cautioned that transpiration/evaporation losses through the bottle and pouch walls will result in a significant increase in the uranium concentration. The materials should be stored, in their original unopened packaging, until ready for use. The NBL will perform periodic testing of the material while in storage and update the certified value and uncertainty if necessary.

[1]*Guide to the Expression of Uncertainty in Measurement*, ISBN 92-67-10188-9, 1st Ed., ISO, Geneva, Switzerland, 1993.

March 30, 2008
Argonne, Illinois

Jon Neuhoff, Director
New Brunswick Laboratory

(Editorial revision of Certificate dated April 2007)

Impurity Analysis For Information Only

Two bottles of solution were analysed for trace element content by ICP-OES or ICP-MS. One bottle was a sample of CRM 145-B; the other bottle contained a sample of a 1 M nitric acid solution that was produced at the same time and using the same methods and materials as CRM 145-B with the exception of the addition of uranium.

The values given in the table were all below the detection limit of the instrument and method chosen, and so are reported as "less than" values. Where there are two values shown for an element, the value in parentheses represents the result for the 1 M nitric acid solution. For Al, B, Ca, Fe, K, Li, Na, Ni, Sb, Si, and Zn, the uranium present in the CRM 145-B solution caused interferences that raised the detection limit of the analysis method. ***The values below are given for informational purposes only and do not represent certified values.***

Element	ng/mL	Element	ng/mL	Element	ng/mL
Ag	<0.02	Gd	<0.02	Si	<50 (<1)
Al	<10 (<0.1)	Hg	<0.1	Sm	<0.02
As	<0.05	In	<0.02	Sn	<1
Au	<0.02	K	<5 (<1)	Ta	<0.02
B	<20 (<1)	Li	<100 (<0.02)	Te	<0.02
Ba	<0.02	Mg	<0.5	Th	<0.02
Bi	<0.02	Mn	<0.1	Ti	<0.02
Ca	<10 (<0.1)	Mo	<0.02	V	<0.05
Cd	<0.02	Na	<60 (<0.1)	W	<0.02
Co	<0.05	Nb	<0.02	Zn	<10 (<0.1)
Cr	<0.1	Ni	<1 (<0.02)	Zr	<0.02
Cu	<0.1	Pb	<0.05	U	(<0.1)

Dy	<0.02	Re	<0.02
Eu	<0.02	Rh	<0.02
Fe	<10 (<0.1)	Sb	<1 (<0.02)
Ga	<0.02	Se	<0.1

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