NBL Program Office

U.S. Department of Energy

Certificate of Analysis

Certified Reference Material C138 (10mg)
Plutonium (Dry Sulfate) Isotopic Standard

	^{238}Pu	^{239}Pu	^{240}Pu	^{241}Pu	^{242}Pu
Atom Percent: *	0.010 ± 0.001	91.805 ± 0.010	7.925 ± 0.010	0.227 ± 0.001	0.0330 ± 0.0003
Weight Percent: *	0.010	91.772	7.955	0.229	0.0334

* As of October 1, 1987

This Certified Reference Material (CRM) is primarily intended for use as an isotopic standard in the mass spectrometric analysis of plutonium. Each unit of C138 consists of about 0.010 grams of plutonium, in the form of dry plutonium sulfate, contained in a screw-top 30 mL glass bottle.

WARNING: *The container and its contents should be handled under proper radiologically-controlled conditioned at all times. The bottle is inside two layers of sealed plastic bagging, which are then inside a blue cardboard tube. The outside of the blue cardboard tube is considered contamination-free. USERS SHOULD CONSIDER THE INNER CONTENTS OF THE BLUE TUBE TO BE CONTAMINATED WITH LOOSE PLUTONIUM AND HANDLE THE CONTENTS APPROPRIATELY.*

The indicated uncertainties for the isotopic composition of the CRM are 95% confidence intervals for a single determination. This term can be defined as an approximate two-sigma limit, where sigma is the standard deviation of the measurements data obtained from the material.

The contents of this CRM were produced in 2008 by dissolving a 250 mg sample of C138, aliquanting into new bottles, and drying them down in sulfuric acid to form dry plutonium sulfate. Verification measurements utilizing thermal ionization mass spectrometry were performed, along with environmental blanks, to ensure that the material was not contaminated during the re-bottling process.

This CRM was originally issued in 1970 by the National Bureau of Standards (NBS) as Standard Reference Material (SRM) 948. In 1987, the NBS transferred the technical and administrative operations of special nuclear material SRMs to the NBL CRM Program.

The certified isotopic abundance values were determined using solid-sample thermal ionization mass spectrometry. The analyses were corrected for mass discrimination effects relative to uranium isotopic CRMs (issued by NBS as SRMs), since high-purity plutonium separated isotopes were not available for the preparation of synthetic calibration mixtures.

Chemical separation of the plutonium from its uranium and americium daughters prior to use is essential for high accuracy, since these daughters contain isotopes which are isobaric with plutonium isotopes.