U. S. Department of Commerce
Malcolm Baldrige
Secretary

National Bureau of Standards
Ernest Ambler, Director

National Bureau of Standards

Certificate of Analysis

Standard Reference Material 946

Plutonium Isotopic Standard

This Standard Reference Material (SRM) is certified as an isotopic standard for use in isotopic measurements of plutonium. SRM 946 consists of approximately 250 mg of plutonium in the form of plutonium sulfate tetrahydrate packaged in a glass microbottle.

	^{238}Pu	^{239}Pu	^{240}Pu	^{241}Pu	^{242}Pu
Atom Percent*	0.232 ±0.007	84.464 ±0.015	12.253 ±0.015	2.477 ±0.005	0.574 ±0.003

**As of January 1, 1982, refer to Table 1 for quarterly decay-adjusted values.*

The plutonium isotopic distribution was determined by thermal ionization mass spectrometry at the National Bureau of Standards (NBS) on samples from which the americium and uranium were removed. Because high-purity plutonium isotopes have not been used to prepare known synthetic mixtures, the accuracy is dependent on uranium and plutonium exhibiting similar behavior. The observed mass spectrometer data were corrected for mass discrimination effects using data from the analysis of uranium isotopic SRM's that had been analyzed under similar conditions.

SRM 946 contains uranium and americium isotopes, including growing-in daughters of plutonium that are isobaric with the plutonium isotopes. In addition, there may be radiation damage to the glass bottle and the teflon cap liner resulting in small glass slivers. Therefore, in its use, a chemical separation that provides a purified plutonium fraction is essential to the attainment of high accuracy.

Measurements leading to the certification of this SRM were made in the Inorganic Analytical Research Division by E.L. Garner and L.A. Machlan.

The technical and support aspects involved in the revision of this Certificate were coordinated through the Office of Standard Reference Materials by T.E. Gills.

August 19, 1982
Washington, D.C. 20234
(Revision of Certificate
dated 12-3-71)

George A. Uriano, Chief
Office of Standard Reference Materials

(over)

The decay-adjusted values for the plutonium isotopic composition, in atom percent, are tabulated below in Table 1. The half-life values, in years, used for the decay-adjustment are: ^{238}Pu, 87.74; ^{239}Pu, 24,119; ^{240}Pu, 6,560; ^{241}Pu, 14.34; and ^{242}Pu, 387,000.

Table 1
Decay-Adjusted Plutonium Isotopic Composition
Atom Percent

Date	^{238}Pu	^{239}Pu	^{240}Pu	^{241}Pu	^{242}Pu
January 1, 1982	0.232	84.464	12.253	2.477	0.574
April 1, 1982	.231	84.490	12.257	2.448	.574
July 1, 1982	.231	84.515	12.260	2.419	.575
October 1, 1982	.230	84.540	12.264	2.391	.575
January 1, 1983	.230	84.565	12.267	2.363	.575
April 1, 1983	.230	84.590	12.270	2.335	.575
July 1, 1983	.229	84.614	12.274	2.308	.575
October 1, 1983	.229	84.638	12.277	2.281	.575
January 1, 1984	.229	84.662	12.280	2.253	.576
April 1, 1984	.228	84.685	12.283	2.227	.576
July 1, 1984	.228	84.709	12.286	2.201	.576
October 1, 1984	.227	84.732	12.290	2.175	.576
January 1, 1985	.227	84.755	12.293	2.149	.576
April 1, 1985	.227	84.777	12.296	2.125	.576
July 1, 1985	.226	84.799	12.299	2.100	.577
October 1, 1985	.226	84.821	12.302	2.075	.577
January 1, 1986	.225	84.843	12.305	2.050	.577
April 1, 1986	.225	84.864	12.307	2.026	.577
July 1, 1986	.225	84.885	12.310	2.003	.577
October 1, 1986	.224	84.906	12.313	1.979	.577
95% Confidence Limit:	±0.007	±0.015	±0.015	±0.005	±0.003