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 1641b

Mercury in Water – µg/mL

This Standard Reference Material is intended for use in the primary calibration of instruments and techniques used for the determination of mercury in natural waters. It is designed for the preparation of calibration solutions and for use as a "spike" sample in a "method-of-additions" type analytical procedure.

Mercury concentration	1.52 ± 0.04 µg/mL

The estimated uncertainty, 0.04 µg/mL, includes the effects of the observed random variability and an upper bound estimate of possible systematic errors. The random variability expressed as two standard deviations of the certified value is ± 0.02 µg/mL and reflects both internal and between-method variabilities for the NBS atomic absorption and neutron activation measurements. The upper bound estimate of possible systematic errors is ± 0.02 µg/mL.

Stability: The long-term stability of trace mercury solutions has been a constant problem. At or below the µg/mL level, mineral acid stabilization is not sufficient. However, the addition of trace gold to a nitric acid solution of mercury was found to stabilize the concentration of mercury in the two previous issues of this Mercury in Water SRM. Although the mercury concentration of SRM 1641b has not changed significantly in eight months, the stability will continue to be monitored. However, SRM 1641b should *not* be used after ONE YEAR FROM date of purchase.

Precautions: Traces of mercury vapor are present in most laboratory situations. Therefore, contamination of reagents, equipment, and common laboratory materials may cause a severe problem. Apparatus for analysis at this level must be scrupulously cleaned immediately before use, and only the purest-grade reagents, with respect to mercury, should be used.

SRM 1641b was prepared by J.R. Moody. Atomic absorption analyses were performed by T.C. Rains and T.A. Butler; and neutron activation analyses by R. Zeisler, Inorganic Analytical Research Division.

The overall direction and coordination of technical measurements leading to certification were performed under the chairmanship of E.L. Garner, Inorganic Analytical Research Division. The statistical evaluation was done by R.C. Paule.

The technical and support aspects involved in the preparation, certification, and issuance of this Standard Reference Material were coordinated through the Office of Standard Reference Materials by R. Alvarez.

Analytical: Two independent techniques were used in the certification of this Standard Reference Material: atomic absorption spectrometry and instrumental neutron activation analysis.

Use: This SRM consists of six ampoules, each containing approximately 20 mL of solution. Dilutions may be made by the addition of accurately measured aliquots, withdrawn from an ampoule, to known volumes of pure or natural water (spiking mode) using conventional techniques. Blank determinations should be made of the water and other reagents used.

The reliability of the dilution process will depend on the care exercised and the reliability of the calibration of the volumetric apparatus, which should have an uncertainty no greater than one percent. The volumetric apparatus should be scrupulosuly cleaned. Diluted solutions should be used without delay, as their stability cannot be guaranteed. SRM 1642b, which is certified for mercury at the ng/mL level, should be used to validate methodology for these concentrations. The long-term retention of unused portions of this Standard Reference Material in opened ampoules is not recommended.

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George A. Uriano, Chief
Office of Standard Reference Materials