



# National Bureau of Standards

## Certificate

### Standard Reference Material 1876a

#### Chrysotile Asbestos Fibers

This Standard Reference Material (SRM) is intended for use in evaluating the techniques used to count and identify chrysotile asbestos fibers in filter samples by transmission electron microscopy (TEM). It should also be useful in evaluating the preparation of samples as detailed in the Environmental Protection Agency's (EPA) method for the measurement of asbestos in air (1).

SRM 1876a consists of four 3 mm x 3 mm sections of a 0.4- $\mu$ m pore size polycarbonate filter containing chrysotile fibers mixed with an urban dust (SRM 1648, Urban Air Particulate). Copper TEM 200-mesh grids are also included for use in sample preparation.

The fiber loading on the SRM filter is:

$$37 \pm 13 \text{ fibers}/0.01 \text{ mm}^2 \text{ of filter area.}$$

The certified value was determined by using the NBS "verified counting" procedure (2) and represents the best estimate of the true number of fibers per 0.01 mm<sup>2</sup>.

The certified value is a mean count determined from 5 separate counts on areas measuring 0.01 mm<sup>2</sup>. The uncertainty of this 5-count mean is an overall limit of error expressed as the statistical tolerance limits that will include 95% of the population of such 5-count means at a confidence level of 95%. The standard deviation obtained from counts on 21 individual areas 0.01 mm<sup>2</sup> in size is 10.1 fibers.

The measurements were performed in the Gas and Particulate Science Division by J.A. Small, E.B. Steel, P.J. Sheridan, B.B. Thorne, and R.L. Myklebust. Measurements were also performed at NBS by K.B. Shedd from the U.S. Bureau of Mines and A. Zermay from the U.S. Steel Corporation.

Statistical analysis of the certification data was performed by S. D. Leigh of the Statistical Engineering Division.

The overall direction and coordination of the measurements leading to certification were performed under the direction of H.L. Rook, Chief, Gas and Particulate Science Division.

Support for measurement research and standard development was provided by the Quality Assurance Division, Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency.

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

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Stanley D. Rasberry, Chief  
Office of Standard Reference Materials

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### Preparation of Filter Sections

To compare results with the certified value for SRM 1876a the user should prepare three of the four filter sections for measurement, reserving the fourth section as a backup. The preparation of the filter sections should follow the EPA method (1). (The provisional method for electron microscope measurement of airborne asbestos should be used for both preparation and measurement until superceded by newer versions of the method.) The filter sections are pre-coated with carbon, but may be coated with additional carbon if desired. In addition, they may be cleared by use of either the Jaffee wick or the condensation washer (3).

### Counting the Fibers

To use the prepared filter sections, the user should select at least five areas of about  $0.01 \text{ mm}^2$ . Two of these areas should be on each of two filter sections and one area on the remaining filter section. Any additional areas should be evenly distributed among the three filter sections. If the enclosed grids are used, each area will equal one grid opening. If grids having different mesh sizes are used then the appropriate number of grid openings equaling  $0.01 \text{ mm}^2$  must be used. Counting and identifying the chrysotile fibers should follow the protocol in the EPA method. From counts of fibers in these five areas, the user should compute an average count expressed as the number of fibers per  $0.01 \text{ mm}^2$ . The actual size of the grid openings must be determined in each case for this calculation.

### Distribution of Fiber Lengths

A histogram of the distribution of fiber lengths observed at NBS is shown below. Although the size distribution is not certified, it is included for informational purposes in case the standard is used for comparing different analytical methodologies.

### References

- (1) A.V. Samudra, C.F. Harwood, and J.D. Stockman, Electron Microscope Measurement of Airborne Asbestos Concentrations, A Provisional Methodology Manual, EPA Report 600/2-77-178, Environmental Protection Technology Series available from NTIS, Springfield, VA 22161, 1978.
- (2) E.B. Steel, J.A. Small, and P.J. Sheridan, Analytical Errors in Asbestos Analysis by Analytical Electron Microscopy, NBS Special Publication 619, Asbestos Standards: Methods and Materials, pp 162-168, 1982.
- (3) E.J. Chatfield, R.W. Glass, and M.J. Dillion, Preparation of Water Samples for Asbestos Fiber Counting by Electron Microscopy, EPA Report 600/4-78-011, Environmental Monitoring Series available from NTIS, Springfield, VA, 22161, 1978.

SIZE DISTRIBUTION OF CHRYSOTILE FIBERS COUNTED ON SRM FILTER

