

# National Bureau of Standards

## Certificate of Analysis

### Standard Reference Material 1618

#### Vanadium and Nickel in Residual Fuel Oil

This Standard Reference Material (SRM) is intended for use as an analytical standard for the determination of vanadium and nickel in fuel oils or materials of similar matrices. SRM 1618 consists of 100 mL of a commercial "No 6" residual fuel oil as defined by the American Society for Testing and Materials (ASTM). The certified vanadium and nickel values were determined using isotope dilution mass spectrometry (IDMS), a single method of analysis for which the sources of errors and biases have been carefully evaluated.

The certified values are given below and are based on at least 200-mg samples of the fuel oil, the minimum quantity that should be used for analysis.

Element	Content, $\mu\text{g/g}^1$
Vanadium	$423.1 \pm 3.4$
Nickel	$75.2 \pm 0.4$

<sup>1</sup>The uncertainties consist of a term equal to two times the standard deviation of the certified average plus an allowance for possible unknown biases. The latter allowance is conservatively set equal to twice the standard deviation of the average. Thus, each of the reported uncertainties is equal to four times the standard deviation of the certified average.

Notice: The certification of SRM 1618 is valid for 3 years from date of purchase.

Analyses for certification were performed by J.D. Fassett and H.M. Kingston of the Inorganic Analytical Research Division, NBS Center for Analytical Chemistry.

The statistical analysis of the certification data was performed by R.C. Paule of the NBS National Measurement Laboratory.

The overall direction and coordination of the analytical measurements leading to certification were performed in the Inorganic Analytical Research Division, J.R. DeVoe, Chief.

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 T.E. Gills.

Gaithersburg, MD 20899  
November 1, 1984

Stanley D. Rasberry, Chief  
Office of Standard Reference Materials

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### Preparation, Testing and Analysis

The base material for this SRM was supplied by Alpha Resources, Inc., Xenia, Ohio. The material was homogenized and bottled into 100 mL units (~1000 units).

Thirteen bottles were randomly selected and analyzed in duplicate using x-ray fluorescence. The bottles were heated to 40 °C, to reduce the viscosity, and poured directly into Somar cups. Duplicate pours of each bottle were made. Each sample was measured twice with the order of measurement being random. A statistical analysis of the data showed no evidence of variability between the bottles.

### Use

SRM 1618 has a high viscosity at room temperatures (23 °C). The oil may be heated to 40 °C, without loss of V or Ni, before sampling.

Long term stability >3 years of this SRM has not been rigorously established. NBS will continue to monitor this material and any substantive change in its certification will be reported to the purchasers.