

# National Bureau of Standards

## Certificate of Analysis

### Standard Reference Material 662

#### AISI 94B17 Steel (Modified)

This standard is in the form of rods 3.2 mm (1/8 in) in diameter and 51 mm (2 in) long for application in microchemical methods of analysis such as electron probe microanalysis, spark source mass spectrometric analysis, and laser probe analysis.<sup>a</sup>

<u>Element</u>	<u>Percent, by weight</u>	<u>Element</u>	<u>Percent, by weight</u>
Carbon	0.16 <sub>3</sub>	Boron	0.0025 <sup>†</sup>
Manganese	1.05	Lead	.0004 <sub>3</sub>
Phosphorus	0.044	Zirconium	.20
Sulfur	.037	Antimony	.012
Silicon	.40	Lanthanum	.0004
Copper	.51	Tungsten	.21
Nickel	.60	Cobalt	.30
Chromium	.30	Titanium	.084
Vanadium	.04 <sub>1</sub>	Arsenic	.09 <sub>2</sub>
Molybdenum	.07 <sub>0</sub>	Tin	.016
Aluminum (total)	.09 <sub>5</sub>		
Niobium	.30		
Tantalum	.21		

<sup>†</sup>Isotopic dilution mass spectrometry – 0.00265;  
Nuclear track – 0.00234

<sup>a</sup>This material also is available in the form of disks, SRM 1262, 31 mm (1 1/4 in) in diameter and 19 mm (3/4 in) thick for use in optical emission and x-ray spectrometric analysis; chips, SRM 362, for use in chemical methods of analysis; and rods, SRM 1096, 6.4 mm (1/4 in) in diameter and 102 mm (4 in) long for the determination of gases in metals by vacuum fusion and neutron activation methods of analysis.

**ANALYTICAL CERTIFICATION:** The value listed for a certified element is the present best estimate of the “true” value based on the results of the analytical program. The value listed is not expected to deviate from the “true” value by more than  $\pm 1$  in the last significant figure reported; for a subscript figure, the deviation is not expected to be more than  $\pm 5$ . Based on the results of homogeneity testing, maximum variations within and among samples are estimated to be less than the uncertainty figures given above.

Details of micro-homogeneity studies of this SRM, as well as other NBS SRM's are described in NBS Misc. Publ. 260-65, Standard Reference Materials: Micro-Homogeneity Studies of NBS Standard Reference Materials, NBS Research Materials, and Other Related Samples, R.B. Marinenko, K.F.J. Heinrich, and F.C. Ruegg, September 1979.

Washington, D.C. 20234  
September 15, 1981  
(Revision of Certificates dated  
10/15/70 & 8/15/72)

George A. Uriano, Chief  
Office of Standard Reference Materials

(over)

**PLANNING, PREPARATION, TESTING, ANALYSIS:** This standard is one of five replacements for the original eight 1100 series iron and steel SRM's. Material from the same melt is available in a variety of forms to serve in checking methods of analysis and in calibrating instrumental techniques.

The material for this standard was vacuum melted and cast at the Carpenter Technology Corporation, Reading, Pennsylvania, under a contract with the National Bureau of Standards. The contract was made possible by a grant from the American Iron and Steel Institute.

The ingots were processed by Carpenter Technology Corporation to provide material of the highest possible homogeneity. Following acceptance of the composition based on NBS analyses, selected portions of the ingot material were extensively tested for homogeneity at NBS by J. R. Baldwin, D. M. Bouchette, S. D. Rasberry, and J. L. Weber, Jr. Only that material meeting a critical evaluation was processed to the final sizes.

Chemical analyses for certification were made on composite samples representative of the accepted lot of material.

Cooperative analyses for certification were performed in the analytical laboratories of Allegheny Ludlum Steel Corporation, Research Center, Brackenridge, Pennsylvania, R. B. Fricioni; Inland Steel Company, East Chicago, Indiana, R. W. Bley and J. E. Joyce; Republic Steel Corporation, Canton, Ohio, R. W. Jones; and The Youngstown Sheet and Tube Company, Youngstown, Ohio, L. E. Chalker.

Analyses were performed in the Analytical Chemistry Division of the National Bureau of Standards by the following: J. R. Baldwin, R. K. Bell, R. W. Burke, D. M. Bouchette, B. S. Carpenter, T. E. Gills, G. J. Lutz, L. A. Machlan, E. J. Maienthal, L. T. McClendon, J. McKay, L. J. Moore, T. J. Murphy, P. J. Paulsen, S. D. Rasberry, B. A. Thompson, J. L. Weber, Jr., and S. A. Wicks.

The overall direction and coordination of the technical measurements at NBS leading to certification were performed under the direction of K. F. J. Heinrich, O. Menis, B. F. Scribner, J. I. Shultz, and J. L. Weber, Jr.

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. E. Michaelis.

ADDITIONAL INFORMATION ON THE COMPOSITION: Analytical certification is made only for the elements indicated. The five replacements, however, contain a graded series for 40 elements and information on the elements not initially certified may be of importance in the use of the material. Although these are not certified, values are presented in the following table for the remaining elements. (Some may be certified at a later date.)

Value from a single method of analysis:

<u>Element</u>	<u>Percent by weight</u>
Bismuth	(0.002)
Silver	(.0010)
Gold	(<.00005)
Calcium	(.0002)
Magnesium	(.0006)
Tellurium	(.0005)
Zinc	(.0005)
Cerium	(.0011)
Neodymium	(.0005)
Praseodymium	(.00012)
Nitrogen	(.0041)
Oxygen	(.0011)
Iron (by difference)	(95.3)

Approximate value from heat analysis:

Selenium	[0.001]
Hafnium	[.006]
Hydrogen	[<.0005]
Germanium	[.002]