S. Department of Commerce
Malcolm Baldrige
Secretary

National Bureau of Standards
Ernest Ambler, Director

National Bureau of Standards

Certificate of Analysis

Standard Reference Material 1225

Low-Alloy Steel, AISI 4130

(In cooperation with the American Society for Testing and Materials)

This Standard Reference Material is in the form of disks approximately 32 mm (1 1/4 in) in diameter and 19 mm (3/4 in) thick, intended for use in optical emission and x-ray spectrometric methods of analysis.

Element	Certified[1] % by wt.	Estimated Uncertainty[2]
Carbon	0.274	0.002
Manganese	.48	.01
Phosphorus	.007	.001
Sulfur	.014	.001
Silicon	.221	.002
Nickel	.018	.003
Chromium	.91	.01
Vanadium	.004	.001
Molybdenum	.166	.004

[1]The certified value listed for an element is the present best estimate of the "true" value based on the results of the cooperative program for certification.

[2]The estimated uncertainty listed for an element is based on judgment and represents an evaluation of the combined effects of method imprecision, possible systematic errors among methods, and material variability. (No attempt was made to derive exact statistical measures of imprecision because several methods were involved in the determination of most constituents.)

Metallurgical Condition: The structure of the specimens is that resulting from hot working, followed by annealing.

The overall coordination of the technical measurements leading to certification was performed under the direction of J.I. Shultz, Research Associate, ASTM-NBS Research Associate Program.

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 and W.P. Reed.

Washington, D.C. 20234
March 16, 1983

George A. Uriano, Chief
Office of Standard Reference Materials

(over)

PLANNING, PREPARATION, TESTING, ANALYSIS:

The material for this standard was provided by the Bethlehem Steel Corp., Lackawanna, N.Y. Billets were fabricated at the Puget Sound Naval Shipyard, Bremerton, Washington, where they were forged to slabs and portions of questionable homogeneity were cut and discarded. The remaining slab sections were forged and swaged to rods (oversize 32 mm in diameter). The rods were given a sub-critical anneal, and were then centerless ground to the final size of 32 mm in diameter.

Extensive homogeneity testing was performed in the Inorganic Analytical Research Division at NBS by optical emission spectrometry, J.A. Norris; by x-ray fluorescence, P.A. Pella; and carbon/sulfur analysis by B.I. Diamondstone. The material variability was within the methods imprecision.

Cooperative analyses for certification were performed in the following laboratories:

Climax Molybdenum Company of Michigan, Ann Arbor, Michigan, R.C. Binns.

Lukens Steel Company, Coatesville, Pa., J.H. Morris.

National Bureau of Standards, Inorganic Analytical Research Division, B.I. Diamondstone and R.K. Bell, ASTM-NBS Assistant Research Associate.

Pittsburgh Testing Laboratory, Chicago, Illinois, D.D. Troutman.

Pittsburgh Testing Laboratory, Pittsburgh, Pa., W.S. Carlson.