U.S. Department of Commerce
Elliot L. Richardson,
Secretary

National Bureau of Standards
Ernest Ambler, Acting Director

National Bureau of Standards
Certificate of Analysis
Standard Reference Material 1139a
Cast Steel Standard

SRM No.	1139a Cast Steel 2
Element	Percent by Weight
Carbon	0.79_0
Manganese	.92
Phosphorus	.012
Sulfur	.013
Silicon	.80
Copper	.47
Nickel	.98
Chromium	2.1_8
Vanadium	0.26
Molybdenum	.51

SIZE AND METALLURGICAL CONDITION: Samples are approximately 1 1/4 inches (3.2 cm) square and 1/2 inch (1.3 cm) thick; they were chill-cast by a rapid unidirectional solidification technique.

CERTIFIED PORTION: The certified portion for each sample is that extending upward 5/16 inch (0.8 cm) from the chill-cast or test surface (the largest surface opposite the numbered surface). This portion only was analyzed in the cooperative program for certification.

FINAL CERTIFICATION: The value listed for an element is the best estimate of the "true" value based on the results of the cooperative analytical program. The value listed is not expected to deviate from the "true" value by more than ± 1 in the last significant figure reported; for a subscript figure, the deviation is not expected to be more than ± 5. Based on the results of homogeneity testing, maximum variations within and among samples are estimated less than the accuracy figures given above.

Technical measurements at NBS for certification were coordinated by J. I. Shultz and J. L. Weber, Jr. under the chairmanship of B. F. Scribner, Analytical Chemical Division.

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.

Washington, D.C. 20234
January 20, 1977

J. Paul Cali, Chief
Office of Standard Reference Materials

(over)

PLANNING, PREPARATION, TESTING, ANALYSIS: This cast steel standard is made available as a result of a cooperative program between the Steel Founders' Society of America and the National Bureau of Standards.

The material for the standard was melted and cast at the American Cast Iron Pipe Company, Birmingham, Alabama with use of the NBS chill-cast mold assembly. The preparation and homogeneity testing was similar to that described in NBS Misc. Publ. 260-1, Standard Reference Materials: Preparation of NBS White Cast Iron Spectrochemical Standards, R. E. Michaelis and L. L. Wyman, June 19, 1964.

Homogeneity testing was performed by chemical, optical emission, and x-ray analyses, or combinations thereof, at the National Bureau of Standards, the Research Laboratories of the General Motors Corporation, and the following member foundries of the Steel Founders' Society of America:

General Metals Corporation, California
The Massillon Steel Castings Company, Ohio
Lebanon Steel Foundry, Pennsylvania
The Duriron Company, Inc., Ohio
American Steel Foundries, Inc., Indiana
Esco Corporation, Oregon
Shenango-Penn, Ohio
Minneapolis Electric Steel Castings Company, Minnesota
Ross-Meehan Foundries, Tennessee
Empire Steel Castings, Inc., Pennsylvania

Chemical analyses for certification were made at the National Bureau of Standards and the following member foundries of the American Steel Founders' Society of America:

Minneapolis Electric Steel Castings Company, Minnesota
Esco Corporation, Oregon
Electric Steel Castings, Inc., Texas
Symington Wayne Corporation, New York
American Steel Foundries, Inc., Indiana

CAUTIONS:

1. Determinations made on other than the chill-cast or test surface are not recommended because of the unidirectional solidification structure.
2. This chill-cast standard is designed for calibration in the analysis of samples prepared in the same general manner; samples prepared by other casting techniques or having different metallurgical condition may exhibit a bias in the results.

Additional elements were determined in the cooperative analytical program. Although **NOT CERTIFIED,** the approximate values are given below:

SRM No.	1139a
Element	Percent by Weight
Aluminum	(0.13)
Arsenic	(<.005)
Titanium	(.004)
Iron (by diff)	(93.0)