

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

National Bureau of Standards
Joseph A. Ambler, Acting Director

National Bureau of Standards

Certificate of Analysis

STANDARD REFERENCE MATERIALS

Blast Furnace Iron Standards (Chill Cast White) 1143a and 1144a

SRM No.	1143a Blast Furnace Iron 1a	1144a Blast Furnace Iron 2a
Element	Percent by Weight	
Carbon	4.08	4.32
Manganese	0.29 ₆	1.23
Phosphorus	.16 ₄	0.08 ₄
Sulfur	.067	.083
Silicon	1.60	.18 ₂
Copper	0.13 ₈	.09 ₁
Nickel	.11 ₆	.06 ₃
Chromium	.16 ₃	.029
Vandium	.018	.02 ₅
Molybdenum	(.004) ^a	(.007)
Titanium	.08 ₇	.32
Arsenic	(.003)	(.004)
Tellurium	.01 ₆	.02 ₂
Aluminum	(.008)	(<.005)

^aValues in parentheses are not certified but are provided for additional information on the composition.

SIZE AND METALLURGICAL CONDITION: Samples are approximately 1 1/4 in (3.2 cm) square and 1/2 in (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 in (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 to be less than the accuracy figures given above.

Washington, D.C. 20234
December 1, 1976

J. Paul Cali, Chief
Office of Standard Reference Materials

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PLANNING, PREPARATION, TESTING, ANALYSIS: These standards are made available as a result of the cooperative program among the National Bureau of Standards, the American Cast Iron Pipe Company, the Ductile Iron Society, and the General Motors Corporation.

The material for the standards 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 plan was similar to that described in NBS Misc. Publ. 260-1, Standard Reference Materials: Preparation of NBS White Cast Iron Spectrochemical Standards, Robert E. Michaelis and LeRoy L. Wyman, June 19, 1964.

Homogeneity testing was performed at the Research Laboratories, General Motors Corporation, Warren, Michigan, by A. C. Ottolini under the direction of M. D. Cooper.

Cooperative analyses for certification were performed by members of the Ductile Iron Society under the direction and coordination of W. R. Kennedy, American Cast Iron Pipe Company, Birmingham, Alabama. Co-operating in the program were R. E. Deas and R. N. Smith, American Cast Iron Pipe Company, Birmingham, Alabama; F. R. Bryan, Ford Motor Company, Detroit, Michigan; C. M. Davis and C. H. Albright, International Nickel Company, Inc., Suffern, N. Y.; and C. P. Gaskill, U.S. Pipe and Foundry Company, Burlington, New Jersey.

Analyses for final certification at the National Bureau of Standards were performed in the laboratories of the Analytical Chemistry Division by D. A. Becker, B. B. Bendigo, D. M. Bouchette, E. L. Garner, T. D. Gills, W. D. Kinard, P. D. LaFleur, E. June Maienthal, J. S. McKay, Jr., T. J. Murphy, S. D. Rasberry, W. R. Shields, and J. L. Weber, Jr.

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

The technical and support aspects involved in the preparation, certification, and issuance of these Standard Reference Materials were coordinated through the Office of Standard Reference Materials by R. E. Michaelis.

CAUTIONS:

1. Determinations made on other than the chill-cast or test surface are not recommended because of the unidirectional solidification structure.
2. These chill-cast standards are designed for calibration in the analysis of samples prepared in the same manner; samples prepared by other casting techniques or having other than a white structure may result in considerable bias.
3. Because the samples exhibit a change with respect to the columnar structure, both among standards and from bottom to top of the certified portion of the samples, the surface preparation for x-ray spectroscopic analysis may be critical. (A metallographic polishing technique is recommended.)
4. Because of the poor heat conductivity of the white irons, difference in volatility rates for certain elements in emission spectroscopic analysis may occur depending on the location of the burn and the source parameters. Sample and standard should be handled in the same way with respect to location of the burn.