U. S. Department of Commerce
Maurice H. Stans
Secretary

National Bureau of Standards
A. V. Astin, Director

# Certificate of Analysis

## STANDARD REFERENCE MATERIALS

## 1143, 1144, 1147, 1148, and 1149

## Blast Furnace and White Iron Standards

| SRM No. | 1143 Blast Furnace Iron 1 | 1144 Blast Furnace Iron 2 | 1147 White Iron (4j) | 1148 White Iron (5L) | 1149 White Iron (6g) |
|---|---|---|---|---|---|
| **Element** | | | **Percent by Weight** | | |
| Carbon | $3.9_1$ | 4.27 | 3.60 | 2.89 | $3.2_8$ |
| Manganese | $0.41_4$ | 1.33 | $0.77_9$ | 0.66 | $1.05_4$ |
| Phosphorus | $.15_8$ | $0.11_1$ | $.16_0$ | .30 | $0.5_6$ |
| Sulfur | .028 | .021 | $.05_9$ | [.11] [b] | $.12_5$ |
| Silicon | 1.68 | $.27_5$ | 1.31 | 1.82 | 1.04 |
| Copper | $0.14_5$ | $.09_0$ | $0.23_1$ | $0.9_7$ | 0.50 |
| Nickel | $.11_5$ | .021 | .070 | $.09_1$ | $.13_8$ |
| Chromium | $.14_2$ | .019 | .093 | .15 | $.36_3$ |
| Vanadium | .008 | — | $.03_2$ | $.03_6$ | $.05_5$ |
| Molybdenum | — | (.007) | (.079) | (.022) | (.038) |
| Titanium | .17 | $.4_2$ | $.04_0$ | $.05_0$ | $.05_9$ |
| Arsenic | — | — | (.020) | — | (.033) |
| Tellurium | (.019) [a] | (.026) | (.018 | (.015) | (.015) |

[a] Values in parentheses are not certified but are provided for additional information on the composition.

[b] This element exhibits excessive segregation and will not be certified.



SIZE AND METALLURGICAL CONDITION: Samples are approximately 1¼ in (3.2 cm) square and ½ 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.

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

Washington, D. C. 20234
July 31, 1969

J. Paul Cali, Acting 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.

Analyses for this provisional 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. Cooperating 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, N. J.

Technical measurements now being performed at NBS for final certification are being 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.