



# National Institute of Standards & Technology

## Certificate of Analysis

### Standard Reference Material<sup>®</sup> C1137a

#### White Cast Iron

(In Cooperation with ASTM)

This Standard Reference Material (SRM) is in the form of a disk, approximately 32 mm (1 1/4 in) in diameter and 19 mm (3/4 in) thick. SRM C1137a is intended for use in optical emission and x-ray spectrometric methods of analysis. The certified values for 12 elements are listed in Table 1. All values are reported as mass fractions [1].

Table 1. Certified Mass Fractions

Element	(in %)	Element	(in %)
Carbon	2.86 ± 0.02	Molybdenum	0.86 ± 0.01
Cerium	0.016 ± 0.001	Nickel	2.17 ± 0.02
Chromium	0.643 ± 0.003	Phosphorus	0.087 ± 0.002
Copper	0.192 ± 0.002	Silicon	1.15 ± 0.02
Magnesium	0.032 ± 0.002	Sulfur	0.017 ± 0.001
Manganese	0.52 ± 0.01	Vanadium	0.019 ± 0.002

The estimated uncertainty listed for a constituent 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 specimens were chill cast by a rapid unidirectional solidification technique.

**Certified Portion:** The certified portion for each specimen is that extending upward 16 mm (5/8 in) from the chill cast or test surface (the largest surface opposite the numbered surface). Only this portion was analyzed in the cooperative program for certification.

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

The technical and support aspects involved in the original certification and issuance of this SRM were coordinated through the Standard Reference Materials Program by R.E. Michaelis and W.P. Reed.

*This Certificate of Analysis has undergone editorial review by C.M. Beck II of the Standard Reference Materials Program to reflect program and organizational changes at NIST and the Department of Commerce. No attempt was made to reevaluate the certificate values or any other technical data presented on this certificate.*

Gaithersburg, MD 20899  
Certificate Issue Date: September 18, 1996  
(Revision of certificate dated 1-24-84)

Thomas E. Gills, Chief  
Standard Reference Materials Program

## PLANNING, PREPARATION, TESTING, ANALYSIS

The material for this standard was provided and prepared by the American Cast Iron Pipe Company, Birmingham, AL. A water-cooled, copper-plate mold assembly was used in the preparation of the chill-castings.

Extensive homogeneity testing was performed at NIST by optical emission analysis, J.A. Norris; and by x-ray fluorescence analysis, P.A. Pella.

Cooperative analyses for certification, carried out under the auspices of the ASTM-NIST Research Associate Program, were performed in the following laboratories:

R.N. Smith, J.B. Hobby, L.J. Moore, D.R. Denney, R.G. Moffett, and J.E. Pollard; American Cast Iron Pipe Company, Birmingham, AL.

D.A. Flinchbaugh and J.L. Fernandez; Bethlehem Steel Corporation, Homer Research Laboratories, Bethlehem, PA.  
D.H. Craig, J. Pinner, and T. Thompson; Ford Motor Company, Central Laboratory Services, Technical and Transportation Operations, Dearborn, MI.

B.I. Diamondstone, D.E. Brown, T.A. Rush, T.C. Rains, NIST, Inorganic Analytical Research Division and R.K. Bell, ASTM-NIST Research Associate Program.

**CAUTION:** Determinations made on other than the chill-cast or test surface are not recommended because of the unidirectional solidification structure. This chill-cast SRM 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.

Elements other than those certified are present in this material. The mass fractions indicated in Table 2 are *not certified*, but are given as additional information on the composition.

Table 2. Non-Certified Mass Fractions

Element	(in %)
Titanium	0.04
Aluminum	0.007

## REFERENCE

- [1] Taylor, B.N., "Guide for the Use of the International System of Units (SI)," NIST Special Publication 811, 1995 Ed., (April 1995).