U. S. Department of Commerce
Malcolm Baldrige
Secretary
National Bureau of Standards
Ernest Ambler, Director

National Bureau of Standards

Certificate of Analysis

Standard Reference Material 891

High-Alloy White Cast Iron

(Ni-Hard, Type I)

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

This material is in the form of small granules prepared by water atomization and is intended for use in chemical and instrumental methods of analysis.

Constituent	Certified Value,[1] Percent by Weight	Estimated Uncertainty[2]
Carbon	2.71	0.02
Manganese	0.55	.02
Phosphorus	.038	.002
Sulfur	.029	.002
Silicon	.56	.02
Copper	.150	.005
Nickel	4.48	.05
Chromium	2.23	.02
Vanadium	0.039	.001
Molybdenum	.27	.01
Cobalt	.19	.02

[1]The certified value listed for a constituent 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 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.)

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.

April 1, 1982
Washington, D.C. 20234

George A. Uriano, Chief
Office of Standard Reference Materials

(over)

PLANNING, PREPARATION, TESTING, ANALYSIS:

The material for this SRM, in the form of small castings, was furnished to NBS gratis, courtesy of J. Hammetter, Rexnord, Inc., Milwaukee, Wisconsin. Under contract with NBS, the castings were remelted and water atomized to fine size granules at the Hoeganaes Corporation, Riverton, New Jersey. Following a sieve fraction/composition study at NBS, the entire lot was sieved and those particles sized between 0.057 mm and 0.250 mm sieve openings (250 and 60 mesh) were accepted for use as SRM 891.

Homogeneity testing was performed at NBS by E.R. Deardorff and B.I. Diamondstone, Inorganic Analytical Research Division, and by R.K. Bell, ASTM Assistant Research Associate. The material was determined to be of exceptionally high homogeneity, with the material variability being well within the imprecision of the analytical methods.

Cooperative analyses for certification were performed in the following laboratories:

American Cast Iron Pipe Company, Birmingham, Alabama, R.N. Smith, L.J. Moore, and D.R. Denney.

Foster Wheeler Development Corporation, Research Center, Livingston, New Jersey, M. Fornoff.

Johnson Brass and Machine Foundry, Saukville, Wisconsin, D.C. Marshall.

National Bureau of Standards, Inorganic Analytical Research Division, Washington, D.C., E.R. Deardorff, B.I. Diamondstone, M.S. Epstein, S. Hanamura, W.R. Kelly, R.M. Lindstrom, G.J. Lutz, P.J. Paulsen, and R.K. Bell, ASTM-NBS Research Associate Program.

U.S. Bureau of Mines, Albany Research Center, Albany, Oregon, A.J. Mackie, D. Bollman, and R. Farrell.

Elements other than those certified may be present in this material as indicated below. These are *not certified,* but are given as additional information on the composition.

Element	Percent by Weight
Al	(0.008)
As	(.004)
B	(.0010)
Ga	(.002)
Sb	(.0007)
W	(.0080)
Zr	(<.001)
O	(.121)
N	(.012)
H	(.0017)
Fe	(88.5)
Sn	(<.01)
Ti	(.01)

SRM's 890, 891, and 892
High-Alloy White Cast Irons
(Water-Atomized Granules)

The following table provides information on the entire series of High-Alloy White Cast Iron Standard Reference Materials as they are certified. Those values listed in parentheses are provided for information only and are not certified.

Element	890 (HC-250+V)	891 (Ni-Hard, Type I)	892 (Ni-Hard, Type IV)
C	2.91	2.71	3.33
Mn	0.62	0.55	0.76
P	.025	.038	.054
S	.015	.029	.015
Si	.67	.56	1.83
Cu	.055	.150	0.270
Ni	.397	4.48	5.53
Cr	32.4	2.23	10.18
V	0.45	0.039	0.041
Mo	.018	.27	.20
Al	(<.01)	(.008)	(.009)
As	(.008)	(.004)	(.006)
B	(.0018)	(.0010)	(.0020)
Co	(.03)	.19	.31
Ga	(.004)	(.002)	(.003)
Sb	(.0008)	(.0007)	(.0012)
Sn	- - -	(<.01)	(.02)
Ti	- - -	(.01)	(.02)
W	(.0016)	(.0080)	(.048)
Zr	(<.001)	(<.001)	(<.001)
O	(.273)	(.121)	(.089)
N	(.089)	(.012)	(.019)
H	(.0009)	(.0017)	(.0012)
Fe	(61.8)	(88.5)	(77.4)