

UNITED STATES DEPARTMENT OF COMMERCE

National Bureau of Standards

Certificate of Analyses

Standard Sample 122 B

Cast Iron

(Car-Wheel)

ANALYST	C		Mn		P		S		Si	Cu	Ni	Cr	V	Mo	Ti	
	Total	Graphitic	Bismuthate (FeSO ₄ -KMnO ₄)	Persulfate-Arsenite	Gravimetric (weighed as Mg ₃ P ₂ O ₇ after removal of arsenic)	Alkali-Molybdate ^a	Gravimetric (direct oxidation and precipitation after reduction of iron)	Combustion	Evolution with HCl (sp. gr. 1.18) ^b ZnS-Iodine (theoretical sulfur titre) ^c	Sulfuric acid dehydration	H ₂ S-CuS-CuO	Weighed as nickel dimethylglyoxime	FeSO ₄ -KMnO ₄ titration	Colorimetric	Colorimetric	
1	3.13	2.44	0.555	0.552	0.289	0.290	0.115	0.115	0.109	0.645	0.045	0.023	0.035	0.012	0.003	0.012
	3.13	2.44	0.567			0.286			0.109	0.644	0.046	0.024	0.031	0.009		0.01
2	3.15	2.42	0.558	0.559	0.300	0.305			0.114	0.656		0.028	0.030			
4	3.16	2.41	0.564	0.562	0.289	0.292	0.115		0.111	0.637	0.049	0.027	0.036	0.014		0.010
5	3.12	2.37		0.559	0.282	0.285	0.117		0.115	0.634	0.051	0.024	0.034	0.012		0.008
6	3.16	2.40	0.569	0.565	0.290		0.120		0.116	0.638	0.043	0.019	0.031	0.015		0.010
Averages	3.14	2.41	0.563	0.559	0.290	0.292	0.117	0.115	0.112	0.642	0.047	0.024	0.033	0.012	0.003	0.010
General average	3.14	2.41	0.561		0.291		0.116			0.642	0.047	0.024	0.033	0.012		0.010

^a Precipitated at 40° C, washed with a 1-percent solution of KNO₃ and titrated with alkali standardized by the use of acid potassium phthalate and the ratio 23 NaOH:1P.
^b Sample annealed by covering with graphite and heating for 20 minutes at 685° C.
^c Value obtained by standardizing the titrating solution by means of sodium oxalate through KMnO₄ and Na₂S₂O₈, and use of the ratio 2:1:18.
^d Potentiometric titration.
^e Molybdenum-blue photometric method. See J. Research NBS 26, 405 (1941) RP1386.
^f 1-g sample burned in oxygen at 1,400° C, and sulfur dioxide absorbed in starch-iodine solution. The iodine was liberated from iodide by titration, during the com-

bustion, with standard KIO₃ solution based on 93 percent of the theoretical factor.
^g Double dehydration with intervening titration.
^h Chromium separated from the bulk of the iron in a 10-g sample by hydrolytic precipitation with NaHCO₃. Persulfate oxidation and potentiometric titration with ferrous ammonium sulfate.
ⁱ Vanadium separated as in (h). Nitric acid oxidation and potentiometric titration with ferrous ammonium sulfate.
^j Cupferron separation after solution of sample in diluted HCl (1:2). Vanadium separated by treatment with NaOH.
^k Arsenite titration.

^l Titrating solution standardized by use of a standard steel or iron.
^m Absorbed in ammoniacal cadmium chloride.
ⁿ Finished by electrolysis.
^o Dimethylglyoxime photometric method.
^p Coprecipitated with ammonium phosphomolybdate, H₂O₂ reduction, KMnO₄ titration.
^q As in (j) except vanadium separated by Na₂CO₃.
^r Nitric-sulfuric acid dehydration.
^s Perchloric acid dehydration.
^t KI-Na₂S₂O₈ titration.
^u Dimethylglyoxime precipitation, KCN titration.
^v Cupferron-KMnO₄ titration method.
^w FeSO₄-(NH₄)₂S₂O₈-KMnO₄ titration.

List of Analysts

1. Ferrous Laboratory, National Bureau of Standards, John L. Hague in charge. Analysis by J. I. Schultz, J. R. Baldwin and C. Litsey.
2. J. A. Sample, Weirton Steel Co., Weirton, W. Va.
3. R. W. Ryker and R. E. McKenzie, American Car & Foundry Co., St. Louis, Mo.
4. J. B. Armstrong, Bethlehem Steel Co., Sparrows Point, Md.
5. S. S. Heide and Wm. A. Bass, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
6. Wm. M. Barr, Union Pacific Railroad Co., Omaha, Nebr.

The iron for the preparation of this standard was furnished by the Association of Manufacturers of Chilled Car Wheels.

WASHINGTON, D. C., January 20, 1950.

E. U. CONDON, Director.