U. S. DEPARTMENT OF COMMERCE

National Bureau of Standards

Certificate of Analyses

OF

STANDARD SAMPLE 5i

CAST IRON

ANALYST*	C		Mn		P		S			Si	COPPER H_2S CuS-CuO	NICKEL Weighed as nickel dimethylglyoxime	CHROMIUM $FeSO_4$-$KMnO_4$ titration	VANADIUM	MOLYBDENUM Colorimetric	TITANIUM Colorimetric	ARSENIC	
	Total	Graphitic	Bismuthate ($FeSO_4$-$KMnO_4$)	Persulfate-Arsenite	Gravimetric (weighed as $Mg_2P_2O_7$ after removal of arsenic)	Alkali-Molybdate [a]	Gravimetric (direct oxidation and final precipitation in reduced solution)	Evolution with HCl (sp gr 1.18) [b] ZnS-Iodine (theoretical sulfur titre) [c]	Combustion	Sulfuric acid dehydration								
1	2. 52	2. 06	0. 693	0. 698	0. 243	[d] 0. 241	0. 101	0. 101		[e] 2. 45	0. 99	0. 017	[f] 0. 021	[g] 0. 012	0. 004	0. 045	[h] 0. 022	
2	2. 56	2. 04		. 695		. 247	. 104	[i]. 101	[j] 0. 104	2. 45	1. 01	. 011	. 020	[g]. 018	. 005	. 044	[k]. 028	
3	2. 49	2. 07		. 702		[d]. 238				[l] 2. 43	[m] 1. 01	[n]. 015	. 018					
4	2. 49	2. 02		. 69		. 242		. 105	. 105	[e] 2. 42	1. 00	. 019	. 02			. 044		
5	2. 53	2. 02	. 695	. 700	. 238	. 245	. 102	[i,o]. 100		[l] 2. 46	[m] 1. 00	[p]. 016	. 021			. 046	[k]. 023	
6	2. 52	2. 01	. 691		. 239	. 239	. 099	. 099	[q]. 099	[e] 2. 44	[r] 1. 02	. 017	[f]. 019		. 005	. 044		
7	2. 54	2. 03		. 702	. 239	. 241	. 099	. 100		[e] 2. 43	1. 01	. 018	[s]. 019			. 043	[k]. 025	
8	2. 49	2. 07		. 692	. 237	. 238	. 100	[i,o]. 095		[t,e] 2. 42	[u]. 99	. 018	. 020			. 044	[k]. 029	
Averages	2. 52	2. 04	0. 693	0. 697	0. 239	0. 241	0. 101	0. 100	0. 103	2. 44	1. 00	0. 016	0. 020	0. 015	0. 005	0. 044	0. 025	
General averages	2. 52	2. 04	0. 696		0. 241		0. 101			2. 44	1. 00	0. 016	0. 020	0. 015	0. 005	0. 044	0. 025	

[a] Precipitated at 40° C, washed with a 1-percent solution of KNO_3 and titrated with alkali standardized by the use of acid potassium phthalate and the ratio 23NaOH:1P.

[b] Sample annealed by covering with a layer of graphite, and heating for 20 minutes at 685° C.

[c] Value obtained by standardizing the titrating solution by means of sodium oxalate through $KMnO_4$ and $Na_2S_2O_3$ and use of the ratio 2I:1S.

[d] Molybdenum-blue photometric method. See J. Research NBS **26**, 405 (1941) RP1386.

[e] Double dehydration with intervening filtration.

[f] Persulfate oxidation and potentiometric titration with ferrous ammonium sulfate.

[g] Nitric acid oxidation and potentiometric titration with ferrous ammonium sulfate.

[h] Distillation-molybdenum-blue photometric method. See J. Research NBS **24**, 7 (1940) RP1267.

[i] Solution in diluted HCl (1+1).

[j] Gases absorbed in NaOH-H_2O_2 solution, and excess NaOH titrated with H_2SO_4.

[k] Distilled as $AsCl_3$, weighed as As_2S_3.

[l] Perchloric acid dehydration.

[m] $Na_2S_2O_3$ precipitation, finished by electrolysis.

[n] Dimethylglyoxime colorimetric method.

[o] Absorbed in ammoniacal cadmium chloride solution.

[p] Glyoxime—KCN titration method.

[q] Burned in oxygen at 2,600° F, sulfur dioxide absorbed in acidified starch-iodine solution, the iodine being liberated from iodide by titration during the combustion with KIO_3 solution standardized with a standard iron.

[r] Finished by electrolysis.

[s] Diphenylcarbazide colorimetric method.

[t] Sulfuric-nitric acid dehydration.

[u] KI-$Na_2S_2O_3$ titration.

*LIST OF ANALYSTS

1. Ferrous Laboratory, National Bureau of Standards, John L. Hague in charge. Analysis by J. I. Shultz, R. A. Watson, and Florence Yenchius.
2. R. E. Deas, Catherine Smith, Mathilde Ramsey, and E. Phelps, American Cast Iron Pipe Co., Birmingham, Ala.
3. W. B. Sobers, Chain Belt Co., Milwaukee, Wis.
4. L. T. Morgan, Republic Steel Corp., Open Hearth Works, Youngstown, Ohio.
5. J. B. Armstrong, Bethlehem Steel Co., Sparrows Point Plant, Sparrows Point, Md.
6. Jones and Laughlin Steel Corp.; H. E. Slocum, director of chemical laboratories. Analysis by Pittsburgh Works, J. D. Ritz, chief chemist.
7. Jones and Laughlin Steel Corp.; H. E. Slocum, director of chemical laboratories. Analysis by Aliquippa Works, D. J. Hallisey, chief chemist.
8. C. McKimmon, W. A. Bass, and J. W. Lovin, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

The cast iron for the preparation of this standard was furnished by the American Cast Iron Pipe Co.

WASHINGTON, D. C., February 10, 1947.

E. U. CONDON, *Director*.

U. S. GOVERNMENT PRINTING OFFICE 732280