SS
RECORD FILE

DEPARTMENT OF COMMERCE

Bureau of Standards

Certificate of Analyses

OF

STANDARD SAMPLE No. 33

NICKEL STEEL

CASTING FURNISHED BY CARPENTER STEEL CO., READING, PA.

ANALYST.	CARBON.		SILICON.		PHOSPHORUS.			SULPHUR.			MANGANESE.			NICKEL.	COBALT.	CHROMIUM.	COPPER.	TUNGSTEN.	MOLYBDENUM.
	DIRECT COMBUSTION.	SOLUTION AND COMBUSTION.	DROWN METHOD.	OTHER METHODS.	ALKALI-MOLYBDATE.	MOLYBDATE REDUCTION.	WEIGHING PHOSPHO-MOLYBDATE.	OXIDATION.	EVOLUTION (CdS-Iodine).	OTHER METHODS.	FORD (Weighing as $Mn_2P_2O_7$).	BISMUTHATE.	OTHER METHODS.						
1	.272			.113	.024			.039				.560		3.32		.12	.15	.16	
2	.275			.115		.027		.039				.553		3.30		.11	.15	.15	.004
3	.280			.107		.027		.040				.560		3.35	.03		.14	.16	
4	.290			.112		.027		.035				.537		3.35			.16	.15	
5	.266	.271	.103	.107		.023		.034		.035[1]		.535	.535	3.33			.15	.13	
6			.100		.031				.028		.57								
7		.298		.105			.027		.030				.530	3.31			.13		
8		.280	.101		.026		.027	.040			.55			3.36			.16	.15	
9	.290			.119	.025			.037	.026				.570	3.30					
10	.271	.270	.110	.122	.026				.027				.557	3.35			.14	.145	
AV.	.278*	.280	.104	.113	.026	.026	.027	.038	.028	.035	.56	.55	.55	3.33	.03	.12	.15	.15	.004
GEN. AV.	.278		.110		.026						.551			3.33	.03	.12	.15	.15	.004

[1] Meineke's method.

*In view of the results of certain chemists, especially those of the Midvale Steel Co., supported by tests made at the Bureau of Standards, it seems not improbable that even the highest results reported for carbon in this steel are slightly below the truth. The matter is under investigation.

INDEX TO ANALYSTS

1. J. R. Cain, Bureau of Standards.
2. L. F. Witmer, Bureau of Standards.
3. Wm. H. Keen, Washington Steel and Ordnance Co., Washington, D. C.
4. H. L. Frevert, Midvale Steel Co., Philadelphia, Pa.
5. E. A. Loos, Carpenter Steel Co., Reading, Pa.
6. J. Lloyd Uhler, Union Steel Casting Co., Pittsburgh, Pa.
7. J. L. Harvey, Carnegie Steel Co., Homestead, Pa.
8. W. D. Brown, Carnegie Steel Co., Duquesne, Pa.
9. C. M. Johnson, The Crucible Steel Co. of America, Park Works, Pittsburgh, Pa.
10. George M. Berry, Halcomb Steel Co., Syracuse, N. Y.

S. W. STRATTON,
Director.

Washington, D. C.

11—6327

June 20, 1912.

The methods used for determining special and certain other constituents are indicated below, in so far as they are not shown by the table. In most cases the values given in the table are the means of two or more determinations. This is particularly true of those made at the Bureau of Standards. The numbers designating analysts correspond to those in the "Index to Analysts."

1. NICKEL.

1 and 2. Dimethylglyoxime method as given in Bureau of Standards Circular No. 14. 3. Ether extraction and electrolysis, after removal of copper, with correction applied for cobalt. 4. Dimethylglyoxime after ether extraction. 5, 7, and 8. Cyanide titration after ether extraction. 9. See Johnson, "Analysis of Special Steels, etc.," 1909, pp. 104-115, the copper being first separated by H_2S. 10. Like 9, except that the silver nitrate solution was standardized electrolytically.

2. MANGANESE.

5. Cain's method for the second value (J. Ind. Eng. Chem., **3**, 630, 1911). Precipitation of Cr by $CdCO_3$ from the sulphuric acid solution of the steel and treatment of the filtrate by the bismuthate method. 7. Persulphate color method. 9 and 10. See Johnson, "Analysis of Special Steels, etc.," 1909, pp. 180–182.

3. CHROMIUM, COPPER, TUNGSTEN.

Copper was determined at the Bureau of Standards by the methods given in Bureau of Standards Circular No. 14; tungsten as described in Blair, "Chemical Analysis of Iron," 7th ed., p. 203; chromium by the ether method as given on p. 196 of Blair (l. c.), the final determination being made colorimetrically, also by MgO precipitation from H_2SO_4 solution of the steel, fusion with Na_2CO_3 and KNO_3 and color comparison, and finally by Cain's method (Bur. Stand. Tech. Paper No. 6; J. Ind. Eng. Chem., **4**, 17, 1912). To give in sufficient detail the methods used by other analysts would require more space than the importance of the determinations seems to warrant.