

DEPARTMENT OF COMMERCE

# Bureau of Standards

## Certificate of Analyses

OF

STANDARD SAMPLE No. 100

### MANGANESE RAIL STEEL

ANALYST*	C	Mn		P		S		Si						
	CARBON Direct Combustion	MANGANESE 1. Bismuthate (FeSO <sub>4</sub> -KMnO <sub>4</sub> ) 2. Persulphate Arsenite		PHOSPHORUS 1. Alkali-Molybdate 2. Gravimetric (Weighed as Mg <sub>2</sub> P <sub>2</sub> O <sub>7</sub> after removal of arsenic)		1. SULPHUR Gravimetric (Direct oxidation and final precipitation in reduced solution) 2. SULPHUR Evolution with HCl (1:1) ZnS-Iodine (theoretical sulphur titre <sup>b</sup> )		SILICON Sulphuric acid dehydration	COPPER H <sub>2</sub> S-CuS-CuO	NICKEL Weighed as nickel dimethylglyoxime	CHROMIUM FeSO <sub>4</sub> -KMnO <sub>4</sub> titration	VANADIUM	MOLYBDENUM Colorimetric	
1	0.614	1.38	1.39 <sup>c</sup>	0.022	0.022	0.019	0.020	0.195	0.121	0.151	0.188 <sup>e</sup>	0.012 <sup>e</sup>	0.006	
2	.610		1.39 <sup>d</sup>	.025	.024	.020	.019	.192 <sup>e</sup>	.132 <sup>f</sup>					
3	.625		1.38	.025 <sup>e</sup>		.023 <sup>b</sup>	.023 <sup>i</sup>	.192 <sup>j</sup>	.132 <sup>k</sup>	.15 <sup>l</sup>	.17			
4	.614	1.37		.023	.022		.022 <sup>i</sup>	.184 <sup>j</sup>	.124 <sup>f</sup>					
5	.617	1.39		.023 <sup>e</sup>	.021	.021	.021	.195	.122 <sup>k</sup>	.152	.182 <sup>m</sup>			
6	.618	1.37		.025			.022	.183	.12	.15	.17			
7	.615		1.40	.025	.024	.022	.022	.204	.113 <sup>k</sup>					
8	.623		1.40	.025			.025	.186						
9	.619	1.38	1.39	.024			.022	.185						
10	.612	1.39	1.39	.024	.024	.022	.023 <sup>i</sup>	.186	.129	.150	.192		.005	
11	.625	1.38	1.39 <sup>d</sup>	.023	.023	.022	.023	.200	.123 <sup>k</sup>	.150	.176	.009	.003 <sup>n</sup>	
Averages	.617	1.38	1.39	.024	.023	.021	.022	.191	.124	.151	.180	.011	.005	
General Averages	.617	1.38		.023		.021		.191	.124	.151	.180	.011	.005	

<sup>a</sup> Precipitated at 40°C., washed with 1 per cent KNO<sub>3</sub>, and titrated with alkali standardized against Bureau of Standards standard acid potassium phthalate using the 23:1 ratio.

<sup>b</sup> Value obtained by standardization of titrating solution against sodium oxalate through KMnO<sub>4</sub> and Na<sub>2</sub>S<sub>2</sub>O<sub>8</sub>.

<sup>c</sup> Electrometric titration.

<sup>d</sup> Bismuthate arsenite.

<sup>e</sup> Hydrochloric acid method.

<sup>f</sup> Precipitated with Na<sub>2</sub>S<sub>2</sub>O<sub>8</sub>, CuS-CuO, finished by titration with KCN.

<sup>g</sup> Titration solution standardized by means of Bureau of Standards standard steel.

<sup>h</sup> Precipitated in FeCl<sub>3</sub> solution.

<sup>i</sup> Absorbed in cadmium chloride.

<sup>j</sup> Nitro-sulphuric method.

<sup>k</sup> Finished by electrolysis.

<sup>l</sup> Nickel precipitated with dimethylglyoxime, precipitate dissolved and titrated with KCN.

<sup>m</sup> Barba's method.

<sup>n</sup> Precipitated with H<sub>2</sub>S, Mo reduced in the Jones reductor and titrated with KMnO<sub>4</sub>.

#### \* LIST OF ANALYSTS

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This standard is not recommended for colorimetric carbon determinations, because of uncertainty as to the condition of the carbon.

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*George K. Burgess*

Director.