

SULPHUR IN STEEL

That sulphur is not harmful as a constituent of low-carbon steel is the contention of Mr. C. R. Hayward in a paper prepared for the next annual meeting of the American Institute of Mining Engineers. Mr. Hayward writes in part:

Sulphur has long been one of the banes of the steel manufacturer and often no effort and expense have been spared in order to reduce it to a small per cent. in the finished product. This condition is due to a general conviction that in many cases where steels have failed in service, sulphur has been the cause. But there has been a growing feeling in recent years that the verdict against sulphur has been unnecessarily severe. In cases of segregation it was present in augmented amounts along with other impurities, but it had not caused the segregation. High sulphur in pig iron is caused by poor furnace conditions and the sulphur is merely one indication of an iron that has not been properly reduced. No amount of subsequent treatment under oxidizing conditions in the openhearth furnace can remedy the defects, although the per cent. of sulphur may be considerably reduced. In other words, the causes of bad steel can frequently be traced back to bad pig iron, and sulphur is merely one indication that the pig iron is bad. The writer recently visited a steel plant where a mass of evidence had been accumulated which substantiated this fact, and the superintendent was emphatic in stating that high sulphur was not harmful provided the steel was not otherwise poor due to insufficient reduction in the blast furnace.

The presence of a moderate amount of sulphur is desirable from the standpoint of the man who machines the steel. The low sulphur material drags and the production of a smooth surface is very difficult. A slight increase in sulphur enables the machinist to produce a smooth surface without difficulty.

Since, therefore, such large quantities of steel are subjected to machining, it becomes highly important that the sulphur controversy should be settled, and if its presence is proved to be harmless the ban on it should be lifted.

Among the recent papers on the effect of sulphur on steel is one by Dr. J. S. Unger, manager of the Central Research Bureau, Carnegie Steel Co. The results of an exhaustive series of tests are given and the conclusion states: "The author does not advocate paying no attention whatever to sulphur content in steel, but believes firmly that a steel containing less than 0.100 per cent. is not necessarily bad, and that it will show little, if any, difference in quality when compared with the same steel of much lower sulphur, other conditions being the same."

Mr. Hayward carried out a series of tests on steels of different sulphur content. The steels finally selected were in the form of $\frac{3}{4}$ -in. round bars. Two bars of each grade were required to furnish sufficient specimens. The analyses below show the percentage content of sulphur, phosphates, etc.:

Mark	Carbon	Total Manganese	Excess Manganese	Phosphorus	Silicon	Sulphur
1	0.18	0.55	0.48	0.007	0.01	0.038
1A	0.18	0.57	0.50	0.009	0.02	0.041
2	0.17	0.67	0.52	0.008	0.01	0.086
2A	0.18	0.70	0.55	0.010	0.03	0.087
3	0.18	0.80	0.54	0.006	0.02	0.152
3A	0.17	0.80	0.55	0.011	0.03	0.148

From the results of tests on these steels, Mr. Hayward concludes:

"The summary of the tensile tests shows that the high-sulphur steel has for each treatment the highest breaking load, while the yield point ranks first for two treatments, second for three and third for two. From this we may conclude that the sulphur does not lower the tensile strength.

"The figures for elongation and reduction of area show that there is little difference in ductility between the low- and medium-sulphur steels, but the ductility of the high-sulphur steel is slightly lower than the other two for most of the treatments.

"The average figures for the shock tests, except for the air- and furnace-cooled specimens, are highest for each treatment in the case of the sulphur steels and lowest for each treatment for the high-sulphur steels. The widest difference appears in the steels which have been quenched and reheated.

"It is difficult to draw definite conclusions from the results because of the newness of the shock test and the difference of opinion among engineers regarding its value. The tensile tests are not unfavorable to steels with moderate amounts of sulphur, while the shock tests show a decided falling off in strength as the sulphur increases. Until the interpretation of the results from the Charpy machine is more fully understood, it is impossible to say to which set of tests the most importance should be attached."

NOVA SCOTIA STEEL.

Boston, September 25.—It is expected that Nova Scotia Steel shares will be introduced on the New York board some time next month. This is the earliest that the listing committee can rule on the subject. The listing notices will contain some interesting items of information. They are expected to show for one thing that the company is earning between 50 and 60 per cent. on its \$7,500,000 common without including any net from the Eastern Car Co. and without any income from its immense ore reserves.

STEEL CO. OF CANADA.

The August statement presented at the monthly meeting of the Steel Co. of Canada held in Toronto last week is said to have reflected the largest production in history and with the orders on hand the outlook was excellent, according to directors.

The question of a dividend on the common stock was not considered. The suggestion that the directors should take the shareholders into their confidence regarding the progress of the company did not meet with favor, and it was decided that there was no satisfactory reason for departing from the ordinary practice of withholding all reference to the affairs of the company until the results were definitely known at the close of the year.

The regular preferred dividend of $1\frac{3}{4}$ per cent. was declared.

The Sullivan Machinery Co. announces that Mr. Burt B. Brewster, for the past two years manager in Alaska, with headquarters at Juneau, has been transferred to Salt Lake City, to become manager at the company's branch office at that point, succeeding Mr. H. E. Moon, resigned. Mr. Walter F. O'Brien, for some time past associated with Mr. Brewster at Juneau, will take his place as local manager for Alaska.