Ferro-manganese.—Before the war (December, 1913) the 80-per-cent. alloy sold at about $50 per long ton in the Eastern States. Its present price (October, 1918) is $250 for the 70-per-cent. alloy, with a charge of $3.50 per unit from that basis; thus the 80-per-cent. alloy would bring $285 per ton, which is nearly six times its price before the war. Before the war a spiegel (low-grade ferro-manganese) containing 20 per cent. of manganese was worth $25 a ton; at present a 16-per-cent. spiegel is worth $75 a ton, and a 20-per-cent. spiegel would be worth about $90 a ton.

The price of ferro-manganese in British Columbia must be about $20 a ton higher than the above figures, so that if 80-per-cent. ferro-manganese could be made at $150 a ton there would be a very good profit at present prices. On the other hand, the business would be impossible if prices were to return to their original level, unless in the meantime very important economies could be effected in the cost of supplies and other operating expenses.

Ferro-silicon.—Before the war (December, 1913) the price of 50-per-cent. ferro-silicon was $73 a ton, the 10-per-cent. alloy was $21, the 11-per-cent. alloy was $22, and the 12-per-cent. alloy $23. At the present (October, 1918) 50-per-cent. ferro-silicon is quoted at $160 per ton, the 9-per-cent. alloy is $55, the 10-per-cent. alloy is $57, and the 11-per-cent. alloy is $60 a ton. If the 50-per-cent. alloy can be made in British Columbia at anything like the estimated cost of $70 per ton, its manufacture should afford a good profit at present prices, and with reasonable economies should remain profitable even when prices have fallen considerably.

It will be remembered, of course, that the present market for these alloys in British Columbia is very limited, being less than a ton of each alloy daily. One reason for making ferro-alloys will be to supply them to the steel-making department of the plant, which otherwise would have to buy these alloys at excessive prices, and as the steel industry develops the outside market for the alloys will increase.

The design and cost of the plant and furnaces for making ferro-alloys have been considered in other parts of this report.

STEEL-MAKING.

In order to be able to make pig-iron on as large a scale as possible, and also with a view to combining more profitable industries with that of iron-smelting, it is desirable to introduce into the electric-smelting plant furnaces and other appliances for making steel. The general scheme suggested is that about 25 tons of foundry iron should be produced daily for sale to iron-foundries, and a further 25 or 30 tons of white pig-iron should be made for conversion into steel in the same plant or elsewhere. The steel would probably be made in small open-hearth furnaces heated by oil, or in electric furnaces of the Heroult type. Together with 30 tons of pig-iron, about 60 tons of steel scrap could be used if desirable, thus yielding about 85 tons of steel daily. This could be used in part for making steel castings, and the remainder could be rolled into rods and bars of small section in a small rolling-mill. The manufacture and the use of steel are too well known to require any discussion in this report, and it would be impossible for me to treat the subject adequately in the space and time at my disposal. A rough estimate of the cost of a steel plant has been given in Appendix IX., and I may add the following estimate, made by Lyon and Keeney in 1915, for the cost of electric steel-making in the Western States (Trans. Amer. Electrochem. Soc., 1915, XXVIII., page 158):—

Cost of Production of One Long Ton of Steel in the Electric Furnace in the Western States.

1.1 tons of scrap at $15 per ton	$16 50
Slag materials	1 00
Ferro-alloys	1 00
800 kilowatt-hours at 0.20 cents	1 60
Labour	2 50
Maintenance and repairs	2 40
20 lb. of electrodes at 5 cents	1 00
Amortization and depreciation at 5 per cent. each	1 50
Interest at 6 per cent.	90
General	1 00
Royalty	50
Total	$29 90