It should be noted as of particular significance, the general lowering of the average grade of the ore produced, and further, that the production of the last three months of the period under review, that is, October, November and December, had an average gross value of only $12.50 per ton, which made a working deficit to the company of $2.64 per ton for the ore produced during these months, notwithstanding the profits derived from the three-quarters interest in the smelter.

Such were the statistics furnished by the company's records for the first fourteen months of its existence. From these it was quite apparent that no profit could be earned unless the conditions under which operations were carried on were modified.

The Conditions.—At this time the mine was worked through a three-compartment incline shaft, sunk near the easterly end of the property on the variable dips of the vein, to a depth of 940 feet. In this shaft, at approximately 100 feet distant from each other, stations were cut and level drives run easterly and westerly in the vein. Along these drives stopes were opened and worked upwards in the ore bodies. The exhausted stopes were timbered by the square set system. The ore was stoped by drilling with machines run by compressed air, and by blasting with dynamite. The ore when blasted was shovelled into chutes, down which it gravitated to the levels, the larger pieces being sledged into sizes not exceeding 10 inches in diameter. From these chutes it was drawn off into steel push-cars having a holding capacity of from 18 to 22 cubic feet (about one ton of broken ore). These cars were pushed by the trammers to the shaft stations, and their contents dumped into the storage pockets cut under the stations. The storage pockets had a holding capacity of from 700 to 900 cubic feet, that is to say, 40 or 50 tons of ore each. From these pockets the ore was loaded into the hoisting skips and lifted to the surface by a double drum, direct acting hoisting engine, cylinders 20 x 42 inches. These skips dumped automatically at the surface, running in counter balance, the empty skip being lowered as the loaded one is hoisted.

On being dumped at the surface, the ore gravitated into a receiving car which was pushed along to the various distributing stations over the sorting floor, where it was dumped before the squads of ore sorters, whose duty it was to pick out the second class ore from the shipping ore and shovel the two classes into separate bins.

From these bins the ore was trammed in the receiving bins at the head of the tramway, and the second-class ore was trammed to the second-class ore dump. From the receiving bins the ore was loaded into four-ton cars and run over a surface gravity tramway, 700 feet in length, with a fall of 250 feet, to the lower or loading terminal, where it dumped through a chute into the railway cars.

As each of the railway cars were loaded, it was moved by men and an empty one substituted, until a train of from ten to twenty 30-ton cars was made up. When, as often happened, there were no empty cars, all the men at the various stages in the passage of the ore from the stopes to railway cars, were thrown idle because there were no intermediate storages of sufficient capacity to hold the ore accumulating in the interval.

Under these conditions, and with the facilities and equipment briefly described above, the average output (250 tons per day) for the fourteen months under review, was hoisted from the mine, sorted and loaded on the railway cars

The details of the cost per ton of hoisting, sorting and tramming to and loading on the railway cars is given in the following table:—

TABLE I.

Hoisting—					
Fuel	8 tons	@ $6.00 =	$48.00	or $0.192	per ton.
Engineers	3	@ 4.00 =	12.00	or 0.048	"
Firemen	2	@ 3.00 =	6.00	or 0.024	"
Skiptenders	4	@ 3.50 =	14.00	or 0.056	"
Interest, depreciation & renewals			1.50	or 0.006	"
Oils and waste			.50	or 0.002	"
					$0.328 per ton.
Sorting—					
Foremen	2	@ $3.00 =	$6.00	or $0.024	per ton.
Topmen	4	@ 2.50 =	10.00	or 0.040	"
Waste trammers	4	@ 2.50 =	10.00	or 0.040	"
Ore "	12	@ 2.50 =	30.00	or 0.120	"
Sorters	32	@ 2.50 =	80.00	or 0.320	"
Interest, depreciation, renewals and tools			1.50	or 0.006	"
					$0.550 per ton.
Tramming to Railway—					
Brakemen	1	@ $4.00 =	$4.00	or $0.016	per ton.
Carmen	5	@ 2.50 =	12.50	or 0.050	"
Carmen at railway	3	@ 2.50 =	7.50	or 0.030	"
Interest, depreciation, renewals and tools			2.00	or 0.008	"
					$0.104 per ton.
Total cost					$0.982 "

After the mechanical handling of the ore produced as above described, the next item of cost attaching was 75 cts. per ton for railway freight between the mine and the smelter. This was the contract price made with the railway some three years before for all the ore to be produced by the mine for the term of five years.

On arrival at the smelter yards, the ore was dumped from the (bottom-dumping) railway cars into the receiving bins. From these it was loaded into push-cars and trammed to the roast yard and dumped over the roast heaps being built there, into which it was fed by shovelling—six men being required for this work. The crushed ore was elevated and put through the sampling mill. When sampled, the ore was again elevated to the "high line" bins. From these it was loaded into push-cars and trammed to the roast yard, and there on trestles over the roast heaps being built.

Table II following gives an itemized statement of the cost of the different handlings of the ore as above described, between the mine and the roast heaps, including the railway freight.

TABLE II.

Railway Freight—				
Under contract				$0.750
Unloading and Crushing—				
2 Dumpmen	@ $2.40 =	$4.80	or $0.019	
6 Trammers to crushers	@ 2.50 =	15.00	or 0.060	
2 Crusher feeders	@ 2.50 =	5.00	or 0.020	
Repairs and renewals			0.050	
				$0.149
Sampling—				
1 Foreman	@ $5.00 =	$5.00	or $0.020	
1 Sampler	@ 3.50 =	3.50	or 0.014	
1 Topman	@ 3.00 =	3.00	or 0.012	
1 Binman	@ 3.00 =	3.00	or 0.012	
Interest, depreciation and renewals			0.100	
Power			0.125	
				0.283
Tramming to Roast Yard—				
6 Trammers to roast	@ $3.00 =	$18.00	or $0.072	
Depreciation and renewals			0.010	
				0.082
Total cost				$1.264

TABLE III.

Giving Summary of the Per Tonnage Costs attaching to the Ore for Hoisting; Sorting; Tramming to Railway; Loading on Cars; Railway Freight to Smelter; Unloading and Crushing at Smelter; Sampling and Elevating at High Line; Tramming to Roast Heaps.

250 tons possible.

Hoisting	Table	I.	$0.328
Sorting	"	I.	0.550
Tramming to railway	"	I.	0.104
Railway freight to smelter, contract	"	II.	0.750
Unloading and crushing at smelter	"	II.	0.149
Sampling and elevating to high line bins	"	II.	0.283
Tramming to roast heaps	"	II.	0.082
Total			$2.246

The costs of stoping, timbering and development work will not be considered here, although they were also indirectly and unfavourably affected to a considerable extent as to cost.

Extraneous Conditions.—While my investigation of the economical factors affecting the operation of the Le Roi was proceeding, that is