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from January to September and one blast furnace and the sintering plant for the balance of the year. During 1931 this smelter treated 427,717 tons of copper-nickel ore and produced 23,163 tons of bessemer matte. There was a considerable reduction in the operations at the Port Colborne, Ontario, nickel refinery and during the latter months of the year only two of the nine electrolytic nickel circuits were working; the copper converters were closed down in August and the cupolas in November preparatory to transferring the Orford separation process to the new plant at Copper Cliff. Production of nickel at this plant, excluding sulphide for the Clydach refinery in Wales, totalled 31,877,840 pounds as compared with 61,704,271 pounds in 1930; there were also produced 28,688 tons of blister copper as compared with 59,503 tons in the previous year. Export sales of nickel from the Port Colborne refinery to the United States were off 33 per cent and to other countries, 21 per cent from the figures of 1930; sales of nickel by the Mond Nickel Company Ltd. from Clydach decreased 16 per cent from the previous year. Copper sales, inclusive of copper in sulphate produced in Wales, decreased from 109,743,747 pounds to 96,919,677 pounds or 12 per cent.

The Ontario Refining Company Ltd., an associate company of the International Nickel Company operated their refinery at Copper Cliff at approximately fifty per cent capacity. This plant electrolytically treated blister copper produced by the Granby Consolidated Mining and Smelting Company at Anyox, British Columbia; blister copper produced by the International Nickel Company and blister copper made by the Hudson Bay Mining and Smelting Company at Flin Flon, Manitoba, from ores mined at the Sherritt Gordon mine. The plant also treats precious metal bearing slags, concentrates, bullion, etc. Copper products consist of wire bars, ingot bars, small ingots, V. C. cakes, cathodes, slabs and billets. Selenium was recovered in 1931, for the first time in Canada, at this refinery.

At Deloro, Ontario, the Deloro Smelting and Refining Company operated their metallurgical plants throughout the year and produced silver bullion, white arsenic, cobalt oxide, cobalt metal, nickel oxide, mixed oxides, and a silver-lead-bismuth bullion; this last named product is exported.

In Manitoba the Hudson Bay Mining and Smelting Company operated the Flin Flon copper smelter continuously in 1931. There were no breakdowns and several improvements were made which greatly increased the efficiency of the plant. There was smelted new charge to the reverberatory furnace during the year 175,437 tons of ore and concentrates assaying gold, 0.433 oz.; silver, 4.30 oz.; copper, 10.04 per cent. Blister shipped contained 73,000 ounces of gold, 709,149 ounces of silver and 31,232,114 pounds of copper. In addition, 32,659 tons of custom ore and concentrates were smelted on toll. The cyanide annex which recovers gold, silver and accessory copper from the tailings discharged from the flotation section of the mill treating the heavy sulphide ore, treated 432,539 tons and recovered in the form of zinc dust precipitate 8,261 ounces gold, 76,355 ounces silver, and 39,601 pounds of copper. The electrolytic zinc plant operated steadily and efficiently during the year. This department treated 63,828 tons of zinc concentrates from which was produced 35,056,199 pounds of 99.9865 per cent pure zinc. Stocks of zinc plant residues totalled 35,171 tons; these assayed gold, .201 oz.; silver, 4.37 oz.; zinc, 23.1 per cent, and copper, 2.13 per cent. Cadmium precipitate stored amounted to 2,166 tons and averaged 50.9 per cent zinc, 2.49 per cent cadmium, and 7.78 per cent copper. It is intended to treat the cadmium precipitate during 1932.

The greatest advance in 1931 in the Trail smelting plants of Consolidated Mining and Smelting Company in British Columbia was undoubtedly in the lead smelting plant. This was attained through the operation of the slag fuming department and the changes made possible in the blast furnace practice. The



furnace speed in 1929 was 270 tons of charge against 336 tons in 1931 for the standard furnaces and 504 tons for the new large furnace. The fuming plant has produced and can continue to produce 23 per cent more zinc and 4 per cent more lead from the same ore than was formerly possible, or in other words, has added 23 per cent to the Sullivan zinc ore reserves and 4 per cent to the reserves of Sullivan lead ores. The lead production was 138,772 tons as against 151,370 tons in 1930. The zinc plant maintained production costs at the 1930 level notwithstanding a ten per cent drop in production; new low record costs were attained in both the lead and silver refineries. These costs were 4 per cent below those of 1930, the previous low record year. Operations in the cadmium plant were intermittent, production amounting to 161 tons; untreated cadmium residues were stocked awaiting a more favourable market. The copper smelter was inactive throughout the year.

During 1931 the Granby Consolidated Mining, Smelting and Power Company continuously operated the Anyox smelter in the Nass River mining division of British Columbia. Production was subjected to necessary curtailment to meet adverse copper market conditions. In 1931 the company produced 35,235,910 pounds of copper from 1,577,700 tons of ore mined at the Hidden Creek and Bonanza mines. Remarkably creditable results have been achieved by the management and staff and the per pound production cost of copper was persistently lowered during the period under review.

The industry consumed during the twelve months ending December 31, 1931, 89,898 short tons of Canadian bituminous coal valued at \$449,927; 191,684 short tons of imported bituminous coal worth \$1,009,717; 176,356 tons of coke for furnace charges valued at \$1,565,927; 132,133 tons of coal for furnace charges worth \$1,108,923; 9,329,424 gallons of fuel oil at \$485,434; 196,645,979 k.w.h. of electricity valued at \$3,945,879, also considerable quantities of gasoline, wood, etc.; power employed included 29 steam engines rated at 16,512 h.p.; 11 gas and oil engines at 348 h.p.; 21 hydraulic turbines at 65,160 h.p.; 4,479 electric motors rated at 237,877 h.p., and 2,181 boilers of 119,716 h.p. capacity.

PRINCIPAL STATISTICS OF THE NON-FERROUS METALLURGICAL INDUSTRIES IN CANADA, 1930 and 1931.

	1930	1931
Number of companies .....	10	11
Number of plants .....	13	14
Capital employed .....\$	163,092,471	175,669,195
Number of salaried employees .....	788	878
Salaries .....\$	2,009,895	2,131,079
Number of wage-earners .....	7,838	6,982
Wages .....\$	11,786,229	11,114,248
Cost of fuel and electricity .....\$	6,552,569	6,013,398
Estimated cost of ores, concentrates, etc., treated .....\$	45,310,472	48,336,301
Value of smelter products .....\$	100,946,136	98,565,755
Value added by smelting .....\$	55,635,664	50,229,454

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