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DOMINION BUREAU OF STATISTICS - CANADA
Dominion Statistician: R. H. Coats, B.A., F.S.S.(Hon.), F.R.S.C.
Mining, Metallurgical and Chemical Branch
Chief: W. H. Losee, B.Sc.

THE NICKEL-COPPER MINING, SMELTING AND REFINING INDUSTRY IN CANADA, 1930.

In 1930 the nickel companies operating in the Sudbury district, Ontario, mined 2,127,043 tons of nickel-copper ores and produced 166,703 tons of matte as compared with 1,991,910 tons of ore mined and 132,030 tons of matte produced during 1929, according to a statement just issued by the Mining, Metallurgical and Chemical Branch of the Dominion Bureau of Statistics at Ottawa. Production of nickel in 1930, including the metal contained in matte exported, electrolytic nickel, nickel oxides and nickel salts sold, amounted to 103,768,857 pounds valued at $24,455,133 as against 110,275,912 pounds valued at $27,115,461 in the preceding year. This decrease in nickel production reflects the general and exceptionally severe business depression suffered throughout the world during 1930.

Total development work at the Frood mine in 1930 amounted to 50,803 lineal feet or a distance of nearly ten miles. This mine can now furnish 5,000 tons of ore per day; at the Levack mine, which was not in operation during 1930, the new fire-proof head frame and sorting plant have been completed. The first unit of the new International Nickel concentrator, with a capacity of 4,000 tons of ore per day, was started during August and later milled 105,000 tons of ore per month; a second unit of like capacity was practically completed and was expected to be in operation on April 1st, 1931. At Copper Cliff the new smelter was started on July 1st and showed increased efficiency each successive month; a substantial saving in fuel alone justifies the change in smelting practice from blast furnace to reverberatory. The concentrator and smelter handled 1,472,782 tons of ore and produced 106,194 tons of bessemer matte during 1930.

Coniston smelter with a new sintering unit in operation continued to show favourable results. In 1930 this plant smelted 812,345 tons of ore and produced 57,879 tons of bessemer matte. On October 1st the Port Colborne refinery of the International Nickel Company curtailed its output in conformity to a lessened demand for nickel. At this plant the platinum metals contained in Frood and Garson ores are recovered as a by-product from the electrolytic refining of nickel and are shipped in the form of concentrates to the Acton plant in England for refining. During the year a semi-finished material of high nickel content was produced at Port Colborne to

replace the bessemer matte formerly refined in Clydach, Wales. By this means copper is extracted and produced as electrolytic copper in Canada rather than copper sulphate in Wales. A new research laboratory has been completed at Bayonne, New Jersey, by the International Nickel Company, affording facilities for the present extensive research programme in connection with the development of new markets for nickel, nickel alloys and the platinum metals. Nitre cake and sulphuric acid are now being regularly produced at the works of Canadian Industries Limited, recently completed at Copper Cliff. This plant manufactures sulphuric acid from gases purchased from the Copper Cliff smelter.

The new electrolytic copper refinery of the Ontario Refining Company, Ltd., Copper Cliff, was successfully placed in operation in mid-year, later producing 6,000 tons of refined copper per month from blister made at the Granby smelter in British Columbia and the International Nickel Company's plants in Ontario. Gold and silver contained in Frood and Garson ores are recovered at this refinery.

Proven ore reserves of the International Nickel Company as of December 31, 1930, aggregated 206,704,000 tons. Recently proven Frood mine ore below 2,000 feet grades 4.95 per cent copper and 3.53 per cent nickel.

The Falconbridge nickel mines smelter was blown in on February 4, 1930, and treated 71,686 tons of ore of an average grade of 2.47 per cent nickel and 1.05 per cent copper. Owing to smelter production exceeding the refinery capacity in Norway the smelter was shut down from October 31, 1930, to January 1, 1931; during the period of operation 2,630 tons of matte were produced and shipped to the Kristiansand refinery. This matte contained 1,514.75 short tons of nickel; 655.97 short tons of copper and an indeterminate amount of precious metals. The company completed a number of improvements and additions during the year; a second converter was installed and a pan conveyor added to handle slag. Construction in connection with the extension to the blast furnace and converter building was commenced in May.

In British Columbia the B.C. Nickel Mines at the head of Emory Creek, in the Yale mining division continued exploration by electrical and diamond drilling methods of extensive nickel-bearing pyrrhotite deposits which occur in a wide basic dyke intrusive in granite. While a tonnage estimation of economic importance can be obtained only as a result of extensive underground development, the work which has been accomplished is sufficient to indicate extensive bodies of nickel-bearing mineral representing a large reserve of the metal.

During 1930 a deposit of nickel-copper ore located on Rankin inlet, west shore of Hudson Bay, was diamond drilled. The ore is associated with a sill of

pyroxenite and consists of pyrrhotite with minor quantities of chalcopyrite and traces of pyrite; four holes cut commercial ore. It is estimated that the block from the drill holes to surface contains 120,000 tons of possible ore, grading 1.22 per cent copper, 4.62 per cent nickel, and 0.11 ounces per ton of platinum.

The most important outlet for nickel is in the production of alloy steel, of which a substantial portion is used in the construction of automobiles. Due to the radical curtailment in the latter industry in America during 1930, sales of nickel to the steel industry were substantially less than in 1929. It is gratifying to note that the use of nickel steel in other fields was less adversely affected in 1930 than in the automobile field; some of the newer uses for nickel steel actually registered increases in 1930. The progress of corrosion-resistant nickel-chromium steels has been very prominent during 1930 and regardless of a general curtailment in the steel industry the production of these corrosion-resistant alloys exceeded that of 1929 by approximately 10 per cent.

Demand for satisfactory white metals for architectural and household use is increasing and is reflected in the continued growth of three types of nickel-bearing white metals, viz., "monel" metal, nickel-silver and nickel-chromium steels (popularly called "stainless" steel).

Metallic nickel contained in matte exported from New Caledonia in 1930 is reported at 5,500 tons; nickel production in countries other than Canada or New Caledonia would probably not exceed 2,000 tons.

The contract price for nickel in the United States during the past five years has remained at 35 cents per pound.

It is interesting to note that the annual report for 1930 of the British South Africa Company gives the proven copper ore reserves of Northern Rhodesia as 449,000,000 tons averaging 4.0 per cent copper distributed as follows:-

	Tons	Per cent copper
Roan Antelope	108,000,000	3.4
N'Kana	100,000,000	3.9
Mufulira	102,000,000	4.4
Chambishi	24,000,000	3.7
N'Changa.....	64,000,000	3.8
R.C.B.C. (Chingola)	30,000,000	6.6
Baluba	21,000,000	3.5
Total	449,000,000	4.0

The tonnage of copper contained in the known ore reserves of the Union Miniere du Haut-Katanga in the Belgian Congo is 5,000,000 as on December 31, 1930.

Capital employed in the nickel-copper mining, smelting and refining industry amounted to $82,436,595 of which $22,793,333 were invested in lands, buildings, plant, machinery and tools at the mines, and $42,090,959 at the smelters and refinery; cost of materials and stocks on hand at the mines, smelters and refinery, $11,537,402, and cash, trading and operating accounts and bills receivable, $6,014,901.

Salaried employees at the mines, smelters and refinery numbered 204 and salaries totalled $736,736. Of the 6,517 wage-earners, 3,440 were employed in and about the mines and 3,077 at the smelters and refinery. Wages for the year totalled $9,987,157. During the month of highest employment the mines had 3,609 men working 8 hours or less per day, 645 men 9 hours per day, 36 men 10 hours per day, and 7 men over 10 hours. The smelters and refinery employed 2,486 men on the 8 hour shift, 673 men 9 hours per day, 269 men 10 hours, and 13 men over 10 hours.

Fuel and electricity consumed by these mining and smelting operations cost $2,382,060 of which $716,369 were expended for electric power, $916,450 for imported bituminous coal, and $649,262 for fuel oil. Power employed consisted of 23 steam engines rated at 5,101 h.p.; 2 oil engines rated at 160 h.p.; and 1,607 electric motors capable of producing 100,494 h.p. There were also 14 boilers rated at 5,700 h.p.

PRINCIPAL STATISTICS OF THE NICKEL-COPPER MINING, SMELTING AND REFINING INDUSTRY IN CANADA, 1929-1930.

	1929	1930
Number of firms	2	2
Number of mines	5	5
Number of smelters	2	3
Number of refineries	1	1
Capital employed ....$	63,533,079	82,436,595
Number of employees - On salary	213	204
On wages	6,047	6,517
Total	6,260	6,721
Salaries and wages - Salaries....$	689,352	738,736
Wages....$	9,427,845	9,987,157
Total....$	10,117,197	10,725,893
Estimated value of matte exported and refinery products produced....$	43,494,911	41,645,744

OUTPUT FROM NICKEL-COPPER MINES AND SMELTERS, 1929 and 1930.

	1929	1930
Ore mined....tons	1,991,910	2,127,043
Ore shipped....tons	1,991,910	2,115,139
Content of ores, etc., shipped -		
Copper....lb.	103,457,449	142,948,534
Nickel....lb.	128,901,304	122,195,531
Ores, concentrates treated at smelters....tons	2,033,457	2,357,154
Matte produced....tons	132,030	166,703
Content of matte -		
Copper....lb.	92,630,143	141,600,753
Nickel....lb.	116,190,232	122,224,692
Matte shipped to Canadian refineries..tons	115,599	137,364
Matte exported to foreign smelters....tons	25,086	34,550

PRODUCTION IN CANADA AND EXPORTS OF NICKEL, 1929 and 1930.

	1929		1930	
	Quantity	Value	Quantity	Value
	pounds	$	pounds	$
PRODUCTION -				
(a)Nickel in matte and speiss exported	28,172,633	5,071,074	41,959,927	7,552,574
Refined and electrolytic nickel produced	70,704,762	18,639,814	57,478,651	15,485,381
Nickel in oxides and salts sold	11,398,517	3,404,573	4,330,279	1,417,178
Total	110,275,912	27,115,461	103,768,857	24,455,133
EXPORTS -				
Nickel, fine	68,408,200	17,544,513	43,122,500	11,262,512
Nickel contained in matte	29,630,700	4,501,389	44,890,400	8,142,794
Nickel in oxide	11,600,900	3,489,782	3,733,000	1,100,018
Total	109,639,800	25,535,684	91,745,900	20,505,324

(a) Nickel in matte and speiss exported valued at 18 cents per pound.