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THE NON-FERROUS SMELTING AND REFINING INDUSTRY IN CANADA, 1932.

A bulletin issued by the Mining, Metallurgical and Chemical Branch of the Dominion Bureau of Statistics at Ottawa contains considerable information relating to the smelting and refining of domestic and imported ores in Canada during 1932 together with a summary of world statistical data.

QUEBEC - The Shawinigan reduction and fabricating plants of the Aluminum Company of Canada, Ltd., were in continuous operation throughout 1932. At the former plant aluminium pig was produced from alumina imported from the United States; aluminium ingot, aluminium wire and other fabricated aluminium products were produced in the latter plant. At Arvida the slag ore plant of the same company was not operated in 1932; aluminium pig was manufactured from imported alumina in the reduction works- this plant operated throughout the year.

Noranda Mines Limited treated 918,567 tons of ore, concentrate and refinery slag and produced 63,422,518 pounds of anodes, the average analysis of which was 99.36 per cent copper, 10.76 ounces gold, and 19.54 ounces silver per ton.

Ore Treated and Smelter Production, 1927 - 1932.

Year	Tons of ore, concentrate and refinery slag smelted	Pounds of fine copper produced	Gold produced ounces	Silver produced ounces
1927	10,740	552,345	767	2,644
1928	271,926	33,065,261	52,949	186,277
1929	428,221	51,223,115	68,732	334,279
1930	734,072	75,509,373	117,393	691,920
1931	765,544	62,859,355	253,363	558,801
1932	918,567	63,013,485	341,350	619,597

Canadian Copper Refineries Limited, a subsidiary of Noranda Mines, operated their plant at Montreal East, P.Q., continuously during 1932. This electrolytic refinery treated blister and anode copper produced at the Noranda smelter together with blister received from the Hudson Bay Mining and Smelting Co. Ltd., of Flin Flon, Manitoba. The company also refined scrap or other secondary copper. Preparations were made for enlarging the precious metal division of the refinery. Shipments of refined copper were made in 1932 to points in Canada and to United States, England, France, Belgium, Germany, Sweden, Holland and Italy.

ONTARIO - The International Nickel Company of Canada, Ltd., reported sales of nickel in all forms, including nickel in alloys, to be 34,406,953 pounds compared with 55,739,047 pounds in 1931, a decrease of 38 per cent. Copper sales, inclusive of copper sulphate produced in Wales, decreased from 96,919,677 pounds to 57,662,789 pounds or 41 per cent. Gold sales were 23,042 ounces, silver sales 652,638 ounces, and sales of platinum metals, 19,300 ounces. At the Copper Cliff smelter of the company three reverberatory furnaces were operated until the end of March after which two furnaces were used for the remainder of the year. This smelter treated 336,215 tons of dry concentrates and produced 27,033 tons of bessemer matte and 27,770 tons of blister copper. The Orford process plant was started at Copper Cliff in March, 1932, and treated 11,370 tons of bessemer matte, producing 6,651 tons of matte for refining at Port Colborne and 2,249 tons of blister copper.

The Coniston smelter of the same company was operated from January to July, treating 90,606 tons of ore and producing 9,679 tons of bessemer matte. The Port Colborne refinery of the International Nickel Company operated two electrolytic units from January 1st until August 1st. The refinery produced 14,125,388 pounds of nickel in the form of electrolytic cathodes and nickel in oxide.

The Ontario Refining Company, Limited, an associate company of the International Nickel Company, reports that in consequence of the reduced rate of world consumption of copper, the electrolytic copper refinery at Copper Cliff operated throughout the year at a greatly reduced rate even as compared with that of 1931. Blister copper produced by the International Nickel and Hudson Bay Mining and Smelting companies was treated in this plant. The company also treat. gold-bearing ores, slags, etc. Refined copper was produced in the form of wire bars, ingot bars, small ingots, V.C. cakes, billets, cathodes and slabs. Refined metal was shipped from the refinery to practically all copper consuming countries.

Falconbridge Nickel Mines Ltd., reports that its smelter at Falconbridge, Ontario, was in operation a total of 341 days during the year. The average grade of ore smelted contained 2.50 per cent nickel and 1.04 per cent copper. Production of refined nickel in the Norwegian refinery of the company totalled 5,408,373 pounds, sales aggregated 7,844,648 pounds. The following are data covering the operation of the Canadian smelter in 1932:-

Ore smelted	123,306 tons
Matte produced	4,947.6 short tons
Nickel produced in matte	2,908.17 short tons
Copper produced in matte	1,196.63 short tons
Metals per ton in ore	50.17 lbs.ni. - 20.91 lbs. cu.
Metallurgical losses per ton of ore ...	3.0 lbs.ni. - 1.5 lbs. cu.

On September 1st, 1932, authorization was granted to commence work on foundations for a 250 ton concentrator, sintering plant, smelter extension and the necessary additions to the crushing plant and ore bins to effect increased capacity. The new plant was expected to be in operation in April, 1933.

The Deloro Smelting and Refining Co. Ltd., with metallurgical works located at Deloro, Hastings county, Ontario, and specializing in the treatment of cobalt-silver-arsenic ores report continuous operations in 1932. The smelting and refining units of this plant operated on ores mined in Northern Ontario. Shipments comprised silver bullion, arsenic, arsenate of lime, cobalt oxide, cobalt metal, mixed oxides, nickel oxides, and silver-lead-bismuth bullion. Silver and arsenic were first produced in this plant in 1907 while black and grey cobalt oxides were first marketed by the company in 1911; mixed nickel and cobalt oxides were first made at Deloro in 1910.

In January, 1932, Eldorado Gold Mines Ltd. completed and placed in operation its radium refining plant at Port Hope, Ontario. The principal products will consist of radium, uranium and silver. Ores treated by the company are mined on the company's properties located at Great Bear Lake, N.W.T.

MANITOBA - The Hudson Bay Mining and Smelting Co. Ltd. smelted in the reverberatory furnace at Flin Flon during 1932 - 241,432 tons of Flin Flon ore and concentrates assaying: Au. oz., .352; Ag. oz., 4.06; cu., 9.65 per cent, from which there was produced and shipped blister copper with an average assay of: Au. oz. 3.212; Ag. oz.,38.69; cu., 98.90 per cent, and containing a total of 82,565 ounces gold, 943,417 ounces silver and 42,371,629 pounds of copper. In addition 23,711 tons of customs ore and concentrates were smelted, making a total of 265,143 tons of total new charge smelted by the reverberatory or 727 tons per day. The electrolytic zinc plant of the company operated continuously and efficiently during the year, treating 65,147 tons of zinc concentrates averaging gold .12 oz.; silver, 2.10 oz.; copper, 1.54 per cent; zinc, 43.9 per cent, from which were produced 41,736,600 pounds of zinc. In addition there was produced as a necessary part of the operation of the zinc plant, a zinc plant residue and a so-called cadmium precipitate. The cyanide annex continued to operate successfully during the year. This unit was designed to treat only 1,600 tons of tailings per day. Output was increased to nearly double this during 1932; 695,494 tons of sulphide ore tailings were treated, averaging gold .0410 ounces and silver, .545 ounces. From the treatment of these tailings there were recovered the following metals in the form of a so-called zinc dust precipitate, gold, 11,526.44 ounces; silver, 97,541.45 ounces; and copper, 55,249 pounds. The production from this source is included in the blister copper production given under the copper smelter.

BRITISH COLUMBIA - The Consolidated Mining and Smelting Company produced in its Trail plants during 1931 and 1932 the following metals:-

	1931 Pounds	1932 Pounds
Lead	277,685,229	253,237,783
Zinc	202,247,767	130,567,785
Copper	1,215,433	767,026
Silver	6,572,119	5,522,366
Bismuth	93,115	57
Cadmium	323,139	65,425

SALES

	1930 Pounds	1931 Pounds	1932 Pounds
Lead	251,400,000	260,200,000	252,700,000
Zinc	170,600,000	207,800,000	157,000,000

The quantity of metal stocked by the company remained approximately the same throughout 1932 but the value at which this metal was carried at the end of the year was down by over half a million dollars. The price received for the metal sold in 1932 was about $1,500,000 less than the average 1931 sales would have yielded on the same metal. No attempt was made by the company to reduce costs by highgrading the ore bodies, by letting the plants run down, or in any way discounting the future. Total production of the Sullivan mine for the year amounted to 1,447,448 tons comprising 6,403 tons of crude lead ore shipped to Tadanac and 1,441,045 tons of lead zinc ore to the concentrator at Kimberley, being 173,695 tons less than in 1931. New low costs were established in the lead smelting plant both for smelting a ton of ore and per ton of lead produced in spite of reduced tonnage. Recoveries were practically the same as the high record of 1931. The fuming plant costs showed a very satisfactory reduction. There was a big reduction in the cost of producing zinc from the zinc fume made by the slag fuming plant and a slight reduction in the cost of making zinc from zinc concentrates. This plant was only working at about half capacity. Operations in the cadmium plant were curtailed to suit the market, extra cadmium residues being stored for future demands. The sulphuric acid plants worked very successfully during the year. Most of the sulphur dioxide gases from the zinc plant roasters were converted into sulphuric acid.

The Granby Consolidated Mining, Smelting and Power Company Ltd., operating mines and a smelter at Anyox in the Nass river mining division, conducted continuous operations in 1932 and consideration given to employment of a maximum number of men. Milling of about 5,000 tons of ore a day was maintained. The United States copper tariff together with low copper prices necessitated curtailment of the usual shipments, however, metallurgical improvements made possible the shipment of approximately 300 tons of high grade gold-copper blister per month. Technical skill and efficiency have resulted in remarkably low costs of operation for which great credit is due the entire staff and personnel.

PRINCIPAL STATISTICS OF THE NON-FERROUS METALLURGICAL INDUSTRY IN CANADA, 1931 and 1932.

	1931	1932
Number of companies	11	10
Number of plants	14	13
Capital employed	$ 175,669,195	149,708,860
Number of salaried employees	878	739
Salaries	$ 2,131,079	1,690,710
Number of wage-earners	6,982	4,604
Wages	$ 11,114,248	7,088,260
Cost of fuel and electricity	$ 6,053,398	4,435,394
Estimated cost of ores, concentrates, etc., treated	$ 48,336,301	37,719,947
Value of smelter products	$ 98,565,755	76,442,076
Value added by smelting	$ 50,229,454	38,722,129

FUEL(x) and ELECTRICITY USED IN THE NON-FERROUS SMELTING AND REFINING INDUSTRY, 1932.

Kind	Unit of measure	Quantity	Value $
Bituminous coal - Canadian	tons	91,171	505,790
Imported	tons	17,680	102,716
Anthracite	tons	172	2,646
Coke	tons	5,205	51,395
Gasoline (exclusive of that used in motor cars)	Imp.gal.	52,646	16,236
Fuel oil and diesel oil	Imp. gal.	7,641,044	310,596
Kerosene or coal oil	Imp. gal.	9,476	1,992
Wood (cords of 128 cubic feet)	cords	3,450	16,760
Gas - Manufactured	M cu.ft.	162,233	17,616
Natural	M cu.ft.	...	...
Other fuel	xxx	...	12,973
Electricity purchased	K.W.H.	978,784,118	3,396,674
TOTAL	xxx	...	4,435,394
Electricity generated for own use	K.W.H.	88,811,728	...

(x) Not including furnace charges.

FUEL USED AS FURNACE CHARGE IN NON-FERROUS SMELTING AND REFINING INDUSTRY, 1932.

Kind	Unit of measure	Quantity	Value $
Coal	tons	230,029	1,675,067
Coke	tons	97,097	957,159
Charcoal briquettes	tons	90	3,126

POWER EMPLOYED IN THE NON-FERROUS SMELTING AND REFINING INDUSTRY, 1932.

Kind	Number of units	Total horse power
Steam engines and steam turbines	32	16,542
Gasoline, gas and oil engines	12	408
Hydraulic turbines or water wheels	21	65,160
Electric motors operated by purchased power	4,551	252,565
Electric motors operated by company's power	824	16,753
Boilers	54	25,741

METAL PRICES, 1928-1932

Metal	Market	Unit of measure	1928	1929	1930	1931	1932
Arsenic	New York	Pound	0.04	0.04	0.04	0.045	0.04
Cobalt	New York	Pound	2.63	2.52	2.50	2.50	2.50
Cobalt oxide	New York	Pound	2.10	2.10	2.00	1.75	1.35
Copper	New York	Pound	0.1457	0.1811	0.1298	0.0837(x)	0.05555
Copper	London	Pound	...	...	...	...	0.06380(x)
Lead	London	Pound	0.0458	0.0505	0.0392	0.2710(x)	0.0211(x)
Silver	New York	Ounce	0.5818	0.5299	0.3815	0.2987(x)	0.3167(x)
Zinc	London	Pound	0.0549	0.0538	0.0360	0.0255(x)	0.0240(x)

(x) Canadian funds.

WORLD DATA

The American Bureau of Metal Statistics reportsthat the lead refinery capacity of the world aggregates about 1,150,000 short tons in the United States and about 1,880,000 tons elsewhere, a grand total of 3,030,000 tons. However, probably not more than 900,000 tons in the United States and 1,450,000 tons elsewhere, a grand total of 2,350,000 tons, is to be rated as useful and effective, the remainder being obsolete, incapable of economical ore supply, or otherwise useless. The capacity of American zinc metallurgical works at the end of 1932 was estimated as being nominally for the production of 700,000 short tons of spelter per annum by distilling and 231,000 tons by electrolysis, a total of 931,000 tons, the same as at the end of 1931, but the first class effective capacity is something less, probably not more than for 850,000 tons, and perhaps considerably less than that.

The effective zinc smelting capacity outside of the United States was estimated at the end of 1932 at 1,150,000 metric tons whereof 275,000 tons was in Australia, Canada and Mexico, and 875,000 tons elsewhere. This estimate, both as to total and as to division is substantially the same as was adopted in the formation of the International cartel in July, 1931. The American Bureau of Metal Statistics reports the metallic copper production of the world in 1931 and 1932 as follows:-

(Tons of 2,000 lbs.)

	1931		1932	
	Smeltery	Refinery(c)	Smeltery	Refinery(c)
United States	612,732	824,399	309,160	462,876
Mexico	47,427	...	37,440	...
Canada	119,925	95,280	107,213	89,261
Chile	237,711	216,920	108,175	101,813
Peru	48,655	...	22,910	...
Germany	61,178	158,180	56,107	171,077
Other Europe plus Africa(d)	223,920	198,711	201,208	145,474
Russia	34,278(a)	53,377	35,300(a)	54,187
Japan	84,225(b)	84,225	77,873(b)	77,873
India	4,557	4,557	4,976	4,976
Other Asia	1,000	...	1,000	...
Austtalasia	14,796	14,488	16,472	14,904
TOTAL	1,490,404	1,650,137	977,834	1,122,441
Secondary.....	12,893	142,995	18,183	162,113
TOTAL NEW COPPER	1,477,511	1,507,142	959,651	960,328

(a) Estimated the same as production of new refined copper.
(b) Estimated the same as production of refined copper which includes a small quantity of secondary.
(c) Includes production of secondary by primary refiners.
(d) Africa is aggregated with "Other Europe" owing to interlocking of metallurgy.

WORLD PRODUCTION OF LEAD(a)

(Short tons)

Country	1922	1929	1931	1932
North America	649,022	1,121,394	796,202	560,727
South America	6,547	34,038	14,992	15,306
Total Europe	314,647	458,279	442,795	399,233
Total Asia	53,441	100,743	88,794	86,362
Australia	118,064	195,403	171,607	208,577
Africa	37,419	22,663	21,067	15,523
GRAND TOTAL	1,179,140	1,932,520	1,535,457	1,285,728

(a) In general, output is reported in terms of base bullion allocated as far as possible according to origin of ore, according to the American Bureau of Metal Statistics.

Summaries of zinc production by the metallurgical works of the world whose principal business is the reduction of ore, as compiled by the American Bureau of Metal Statistics, are as follows:-

	Short tons
1923	1,059,821
1929	1,620,898
1931	1,113,172
1932	875,135

WORLD PRODUCTION OF ALUMINIUM

(Supplied by the American Bureau of Metal Statistics)

(In metric tons)

	1922	1929	1931	1932
United States	33,600	102,100	80,500	47,600
Canada	10,000	42,000	31,000	18,000
Europe	48,200	137,898	106,583	90,387
TOTAL FOR WORLD	91,800	281,998	218,083	155,987

DIRECTORY

CANADIAN COPPER SMELTING COMPANIES, 1932.

Name	Head Office Address	Plant Location
Noranda Mines Ltd.	2 King St.E., Toronto, Ont.	Noranda, P.Q.
International Nickel Co. of Canada, Ltd.	67 Wall St., New York City, U.S.A.	Copper Cliff and Coniston, Ont.
Falconbridge Nickel Mines Ltd.	100 Adelaide St.W.,Toronto, Ont.	Falconbridge, Ont.
Hudson Bay Mining & Smelting Co. Ltd.	404 Dundas St.,Woodstock, Ont.	Flin Flon, Man.
Granby Consolidated Mining, Smelting & Power Co. Ltd.	789 Pender St.W.,Vancouver, B.C.	Anyox, B.C.

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CANADIAN ELECTROLYTIC COPPER REFINING COMPANIES, 1932.

Canadian Copper Refiners Ltd.	2 King St. E., Toronto, Ont.	Montreal East, P.Q.
Ontario Refining Co. Ltd.	Copper Cliff, Ont.	Copper Cliff, Ont.

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CANADIAN LEAD SMELTING COMPANIES, 1932.

Consolidated Mining and Smelting Co. of Canada, Ltd.	Dominion Square Bldg., Montreal, P.Q.	Trail, B.C.

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CANADIAN ELECTROLYTIC ZINC REFINING COMPANIES, 1932.

Consolidated Mining and Smelting Co. of Canada, Ltd.	Dominion Square Bldg., Montreal, P.Q.	Trail, B.C.
Hudson Bay Mining and Smelting Co. Ltd.	404 Dundas St., Woodstock, Ont.	Flin Flon, Man.

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CANADIAN SMELTERS AND REFINERS OF COBALT-SILVER-ARSENIC ORES, 1932.

Deloro Smelting and Refining Co. Ltd.	Deloro, Ontario [illegible]	Deloro, Ont.

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CANADIAN REFINERS OF URANIUM RADIUM ORES, 1932.

Eldorado Gold Mines Ltd.	Star Bldg., Toronto, Ont.	Port Hope, Ont.

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CANADIAN PRODUCERS OF PRIMARY ALUMINIUM, 1932.

Aluminum Company of Canada, Ltd.	Canada Life Bldg.,Toronto, Ont.	Arvida and Shawinigan Falls, P.Q.

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