DOMINION BUREAU OF STATISTICS – DEPARTMENT OF TRADE AND COMMERCE
CANADA

THE NON-FERROUS SMELTING AND REFINING INDUSTRY 1949

Published by Authority of the Rt. Hon. C.D. Howe,
Minister of Trade and Commerce

Prepared in the Mining, Metallurgical and Chemical Section,
Industry and Merchandising Division,
Dominion Bureau of Statistics, Ottawa

750- 25 - 9 - 50 Price 25 cents 1-I-F-1

NOTICE

It has been the practice of the Bureau of Statistics, since 1920, to issue an annual printed report on the Mineral Production of Canada. This report was comprised to a large extent of the data which had already been issued in bulletin form as statistics for each industry were completed. The final report was necessarily late in being issued, and its main use was for library purposes and for historical research. It also had the advantage of having complete statistics of the Canadian Mining Industry for a year in one volume.

Such a procedure necessitated the preparation of new manuscript, duplication of proof-reading, and extra costs in type-setting and printing. In order to avoid this extra cost, a system has been devised whereby libraries and other similar organizations may file the separate reports in a ring binder as issued, and if they so desire, may have them bound in a volume when the series for the year is complete.

The reports have been paged in such a manner that when bound they will correspond to the chapters of the annual printed report hitherto issued, but which will now be discontinued.

The following reports will constitute the complete volume on Mineral Statistics of Canada:

A General Review of the Mining Industry
B The Gold Mining Industry
C The Silver-Lead-Zinc Mining Industry
D The Nickel-Copper Mining, Smelting and Refining Industry
E The Miscellaneous Metal Mining Industry
F The Non-ferrous Smelting and Refining Industry
G The Coal Mining Industry
H The Natural Gas and Crude Petroleum Industry
I The Asbestos Mining Industry
J The Feldspar and Quartz Mining Industry
K The Gypsum Industry
L The Peat Industry
M The Salt Industry
N The Talc and Soapstone Industry
O The Miscellaneous Industrial or Non-metallic Minerals Mining Industry
P The Cement Manufacturing Industry
Q The Clay and Clay Products Industry
R The Lime Industry
S The Sand and Gravel Industry
T The Stone Industry
U Contract Diamond Drilling in the Mining Industry
V Appendix – Explanatory notes on the method of computing the quantities and values of the Mineral Production of Canada

THE NON-FERROUS SMELTING AND REFINING INDUSTRY

1949

The Non-ferrous Smelting and Refining Industry, as defined for statistical purposes, includes only those firms engaged primarily in the smelting of non-ferrous ores or concentrates and the refining of metals recovered therefrom.

The net value added by the industry in the processing of crude or semi-crude material during 1949 totalled $181,907,847 compared with $146,830,891 in 1948. Refined products included gold, silver, nickel, copper, lead, zinc, aluminum, tin, magnesium, calcium, barium, antimony, bismuth, cobalt, cadmium, selenium, tellurium and sulphur; other end products of individual plants or companies were copper-nickel matte, cobalt salts, cobalt oxide, nickel oxide, nickel salts, bauxite concentrates, arsenious oxide, sulphuric acid, platinum metals residues, zinc oxide, zinc dust, and blister and anode copper. Statistics relating to the production of pitchblende products at Port Hope, Ontario, are not included in this report.

It should be noted, in a study of these data, that firms operating both mines and smelters may vary from year to year the nominal values of crude ores, etc., shipped from their mines to their own smelters, with the result that in some years the mining industry proper is favoured economically at the expense of the non-ferrous smelting and refining industry and vice versa. The total annual net value of commodity production for the Dominion as a whole is, however, not affected by these arbitrary internal evaluations.

Fuels and electricity used by the industry in 1949 totalled $37,004,311 compared with $36,288,387 in 1948. The value of chemicals and other process supplies consumed during the year amounted to $31,816,026 as against $31,037,029 in the preceding year.

The average number of employees during 1949 was 19,150 compared with 19,701 in 1948 and salaries and wages amounted to $55,133,065 compared with $52,276,837 in the previous year.

Aluminum Company of Canada Ltd. - Production of aluminum is entirely by this company, which has its alumina plant at Arvida and reduction plants at Arvida, Ile Maligne, Shawinigan Falls, La Tuque and Beauharnois, all in the province of Quebec. These reduction plants have a total rated capacity of about 550,000 tons of aluminum a year or over 20 per cent of the estimated productive capacity of the world.

Fabricating plants are located at Kingston, and Etobicoke in Ontario and at Arvida and Shawinigan Falls in Quebec. These plants consume only a small part of the company's production, as the Aluminum Company of Canada is primarily a producer and exporter of aluminum ingots.

The reduction plants at La Tuque and Beauharnois were closed throughout 1949 and operations were concentrated at Arvida, Ile Maligne, and Shawinigan Falls.

Noranda Mines Ltd. (From the company's annual report) - The smelter treated 1,056,750 tons of ore, concentrate, and secondary materials such as refinery slag and scrap copper and brass, from which 144,973,232 pounds of anodes were produced. Included in the total tonnage treated were 454,929 tons of materials which were treated for other companies on a toll basis. After deducting the copper, gold and silver recovered from secondary materials, the estimated recovery of new metals was 137,003,133 pounds of fine copper, 281,757 ounces of gold and 1,779,057 ounces of silver. The estimated recovery from Horne Mine ore and concentrate was 51,896,244 pounds of copper, 185,418 ounces of gold and 524,315 ounces of silver.

Canadian Copper Refiners Limited - Refined copper production totalled 111,100 tons compared with 95,400 tons in 1948. Approximately one million dollars was spent on capital account last year, chiefly in connection with facilities for the production of vertically cast copper cake and billets.

International Nickel Company of Canada Ltd. (From President's address, April 1950) - The change from the Orford process to the new matte flotation process for the separation of nickel and copper was finally completed in July of last year. The entire output of nickel is now handled by this new process, which is working satisfactorily.

Since the introduction in the year 1946 of nickel oxide sinter as a source of nickel for alloy steel manufacture, a large volume of nickel in this product has been consumed by alloy steel makers in the United States and Canada.

An oxygen plant and an initial flash smelting copper furnace are now in the process of construction at Copper Cliff, Ontario, and should be in operation during 1951.

A major objecture of research efforts is the maximum utilization of ores. In this connection thorough study is being given to methods which will permit output of high grade by-product iron ore.

During the year 1949 more than 85 per cent of the refined nickel was consumed in the United States, Great Britain and Canada. Consumption levels were generally less than those of 1948 and did not remain steady throughout the twelve months, but fluctuated as a consequence of inventory changes on the part of consuming industries, work stoppages and uncertainties in the business outlook in the United

States. Demand was maintained at peak levels during the first four months of the year: subsequent mid-year contraction was followed by recovery in the fourth quarter.

At a time when there is great interest in cobalt for products such as alloys for jet engines, medicinal and other applications, the cobalt recovery at Port Colborne, Ontario, is being increased and this should result in additional sales in 1950. The cobalt is sold principally overseas either as oxide or as salts which are produced by the refinery at Clydach, Wales.

Falconbridge Nickel Mines Ltd. (From the company's annual report) - During the year, the milling and smelting units were operated very satisfactorily to give a record production. Metallurgical plants at Falconbridge treated 941,929 tons in 1949 with an average of 2,581 tons per day. Of this tonnage 597,165 tons or 63.4 per cent were milled and the balance, 344,765 tons, smelted direct. The smelter processed 477,729 tons of Falconbridge ores and concentrates and a small tonnage of custom ores and residues.

Mill equipment operated 99.5 per cent of possible time. Both furnaces continued to operate through the year.

Deloro Smelting and Refining Co. Ltd. - The cobalt refinery at Deloro, Ontario, treated ores from the cobalt district. Arsenical compounds produced at Deloro are made from the crude arsenic obtained from the O'Brien mine in Northwestern Quebec and from the silver-cobalt-arsenic ores of the Cobalt area.

Dominion Magnesium Ltd. - This firm was the only Canadian producer of magnesium during the war. Production temporarily ceased when the stockpile of metal became large enough to meet the current demands of the market. Equipment previously used for magnesium recovery is now used to produce metallic calcium. Calcium is being used by the research project on nuclear fission. Some barium metal was made in 1949 and some metallic strontium was produced on an experimental scale. Extensive research has developed a process which this company proposes to use to produce metallic titanium on a large commercial scale.

Hudson Bay Mining and Smelting Co. Ltd. (From the company's annual report) - Construction of the fuming plant, the operation of which was described in the Company's Annual Report for the year 1948, has proceeded according to schedule and completion is expected during the latter part of the current year. When the fuming plant is in full operation, all metallurgical operations of the company at normal capacity will require the mining and milling of 1,460,000 tons of ore per year and the treatment of the concentrates produced therefrom, together with 109,500 tons per year of zinc plant residue, but since concurrent operations will annually produce 51,000 tons of zinc residue, the net reduction of zinc stock pile residue will be at the rate of 58,500 tons per year.

Consolidated Mining & Smelting Company of Canada Limited (From the company's annual report) - Metallurgical operations generally continued on about the same scale as in 1948. While lead production was off somewhat at 146,176 tons compared with 160,107 tons in 1948, zinc production was higher at 157,204 tons compared with 146,378 tons. Silver production was up considerably at 8,325,300 ounces compared with 6,344,701 ounces in 1948. There was a large increase in customs or intake, the total receipts being 134,510 tons compared with 68,392 tons.

Over-all metallurgical efficiencies were maintained at a high level. The second slag fuming furnace was completed and commenced operation in August, making possible the treatment of all current blast furnace slag and zinc plant residues, and also of substantial accumulations of these materials from past years, thus realizing upon metal that has been tied up in intermediate metallurgical products. Progress was made in the design of the new smelter and construction was started.

TABLE 1. Principal Statistics of the Non-ferrous Metallurgical Industry, 1947-1949

—		1947	1948	1949
Number of companies		9	9	10
Number of plants		16	17	16
Number of administrative and office employees		2,538	2,858	2,773
Salaries	$	7,690,271	8,917,548	9,870,736
Number of workmen		14,911	16,843	16,377
Wages	$	33,077,600	43,359,289	45,262,329
Value of plant products (gross)[1]	$	453,033,942	576,383,967	599,188,135
Estimated cost of ores, concentrates, etc., treated	$	283,199,047	362,227,660	348,459,951
Cost of fuel and purchased electricity	$	28,967,359	36,288,387	37,004,311
Process supplies (other than ores, fuel, etc.)	$	25,068,884	31,037,029	31,816,026
Value added by smelting (net)[2]	$	115,798,652	146,830,891	181,907,847

Note. Data in this report do not include those relating to Eldorado Mining and Refining Ltd. which mines and refines pitchblende products.

1. The gross value of production should not be interpreted as the ultimate sale value of finished metal only, as it represents the combined values of all industry (smelting, refining, etc.) and products (blister, copper matte, etc.) and in this sense represents a duplication in values.
2. See preceding text.

TABLE 2. Number of Workmen, by Months, 1948 and 1949 (Administrative and Office Employees not Included)

Month	1948		1949	
	Male	Female	Male	Female
January	15,831	56	16,177	54
February	16,078	52	16,481	55
March	16,338	54	16,839	56
April	16,560	56	16,737	53
May	17,247	61	16,849	54
June	17,501	64	16,569	55
July	17,599	64	16,593	59
August	17,395	60	16,479	60
September	17,326	61	16,085	61
October	17,088	61	15,768	57
November	16,229	54	15,744	55
December	16,225	53	15,543	55
Average	**16,785**	**58**	**16,321**	**56**

TABLE 3. Average Annual Metal Prices, in Canadian Dollars, 1940-1949

Year	Gold	Silver	Copper	Lead	Zinc
	Troy oz.	Troy oz.	Pound	Pound	Pound
	(Dollars)				
1940	38.50	0.382	0.101	0.034	0.034
1941	38.50	0.3826	0.101	0.034	0.034
1942	38.50	0.4216	0.101	0.034	0.034
1943	38.50	0.4525	0.1175	0.037	0.040
1944	38.50	0.430	0.120	0.045	0.043
1945	38.50	0.47	0.1255	0.05	0.0644
1946	36.75	0.8365	0.128	0.0675	0.0781
1947	35.00	0.72	0.2039	0.1367	0.1123
1948	35.00	0.75	0.2235	0.1804	0.1393
1949	36.00	0.7425	0.1997	0.158	0.1325

TABLE 4. Production of New Gold and Silver, 1945-1949 (From all types of ores)

Year	Gold		Silver	
	Fine ounces	$	Fine ounces	$
1945	2,696,727	103,823,990	12,942,906	6,083,166
1946	2,832,554	104,096,359	12,544,100	10,493,139
1947	3,070,221	107,457,735	12,504,018	9,002,893
1948	3,529,608	123,536,280	16,109,982	12,082,487
1949	4,119,302	148,294,872	17,641,493	13,098,808

TABLE 5. Source of Canadian Gold Production, 1945-1949

Year	In alluvial gold	In crude gold bullion produced at mines	In base bullion produced at lead smelters	In blister copper	In ores, matte, slags, etc. exported	Total gold produced
	%	%	%	%	%	fine oz.
1945	1.55	76.77	0.09	15.30	6.29	2,696,727
1946	2.15	80.91	0.16	13.48	3.30	2,832,554
1947	1.74	84.41	0.15	9.40	4.30	3,070,221
1948	2.23	83.19	0.22	10.01	4.35	3,529,608
1949	2.35	83.94	0.23	9.71	3.77	4,119,302

TABLE 6. Source of Canadian Silver Production, 1945-1949

Source	1945	1946	1947	1948	1949
	(Per cent)				
In silver-cobalt ores	3.68	3.05	2.41	6.08	5.41
In base bullion[1]	39.52	46.72	43.96	41.03	52.81
In gold bullion and placer	3.38	3.79	4.03	3.82	3.84
In blister and anode copper	36.55	31.72	31.43	27.47	27.00
In matte, copper ores and silver-lead ores, etc., exported (other than silver-cobalt ores)	16.87	14.72	18.17	21.60	10.94

1. Chiefly from silver-lead ores. Includes silver bullion from silver-lead ores.

TABLE 7. Production of New Copper, 1945-1949 (From all types of ores)

Year	Copper in all forms[1]		Refined copper
	Tons	$	Tons
1945	237,457	59,322,261	228,861
1946	183,968	46,632,093	167,221
1947	225,862	91,541,888	202,427
1948	240,732	107,159,756	221,275
1949	263,457	104,719,151	226,083

1. Blister copper plus recoverable copper in concentrates and matte exported.

TABLE 8. Production of New Copper, by Sources, 1948 and 1949

	1948		1949	
	Tons	Value	Tons	Value
		$		$
In blister and anode copper produced[1]	212,817	95,129,075	224,422	89,647,631
In ores, concentrates and any copper matte exported	21,548	9,611,174	30,672	12,228,151
In nickel-copper matte exported	6,367	2,419,507	8,363	2,843,369
Total	**240,732**	**107,159,756**	**263,457**	**104,719,151**

1. Contains a relatively small quantity of copper contained in gold and silver ores shipped to Canadian smelters.

TABLE 9. Production[1] of Nickel, 1945-1949

Year	Tons	$
1945	122,565	61,982,133
1946	96,062	45,385,155
1947	118,621	70,650,764
1948	131,740	86,904,235
1949	128,689	99,173,289

1. Includes nickel in matte exported, refined nickel produced in Canada, and nickel in oxides and salts sold or produced.

TABLE 10. Production of New Lead, 1945-1949 (From all types of Canadian ores)

Year	Lead in all forms[1]		Refined lead
	Tons	$	Tons
1945	173,497	17,349,723	163,142
1946	176,987	23,893,230	165,744
1947	161,668	44,200,124	162,000
1948	167,251	60,344,146	160,025
1949	159,775	50,488,879	146,149

1. Lead content of base bullion produced from Canadian ores plus recoverable lead in ores exported.

TABLE 11. Production of New Zinc, 1945-1949 (From all types of Canadian ores)

Year	Zinc in all forms[1]		Refined zinc[2]
	Tons	$	Tons
1945	258,607	33,308,556	182,266
1946	235,310	36,755,450	185,683
1947	207,863	46,486,010	177,878
1948	234,164	65,237,956	196,575
1949	238,262	76,372,147	206,045

1. Refined zinc produced in Canada plus recoverable zinc in ores exported.
2. Includes some refined zinc from foreign ores.

TABLE 12. Production of Bismuth and Cadmium, 1945-1949

Year	Bismuth		Cadmium	
	Pounds	$	Pounds	$
1945	189,815	260,047	646,064	639,603
1946	240,504	336,706	602,648	979,230
1947	284,372	560,213	718,534	1,235,879
1948	240,242	480,484	766,090	1,398,114
1949	102,913	210,992	846,541	1,735,409

TABLE 13. Production of Selenium and Tellurium, 1945-1949

Year	Selenium		Tellurium	
	Pounds	$	Pounds	$
1945	379,187	728,039	484	929
1946	521,867	949,798	15,848	24,405
1947	501,090	937,038	9,194	15,814
1948	390,894	781,788	11,425	19,994
1949	318,425	652,361	11,092	21,946

TABLE 14. Production of New Aluminum and Magnesium, 1945-1949

Year	Aluminum[1]	Magnesium	
		Pounds	$
	tons		
1945	215,713	7,358,545	1,607,264
1946	193,400	320,677	75,538
1947	299,061	Not available for publication	
1948	367,079		
1949	369,466		

1. All from imported ores.

TABLE 15. Production of New Antimony and Tin, 1945-1949

Year	Antimony (Content of antimonial lead)		Tin	
	Pounds	$	Pounds	$
1945	1,667,951	290,557	849,983	492,990
1946	642,145	96,322	874,186	507,028
1947	1,150,463	384,255	714,198	517,794
1948	310,062	113,173	691,332	688,567
1949	158,288	61,020	619,117	63,047

TABLE 16. Production of Molybdenite Concentrates and Tungsten Concentrates, 1945-1949

Year	Molybdenite concentrates		Tungsten concentrates	
	Tons (gross wt.)	$	Tons (gross wt.)	$
1945	489	411,663	1,153	1,045
1946	318	295,640	–	–
1947	380	309,048	668,000	680,792
1948	152	137,143	1,409,297	1,046,160
1949	–	–	334,000	252,380

TABLE 17. Production of Cobalt and Arsenic, 1945-1949

Year	Cobalt[1]		Arsenic[2]	
	Pounds	$	Tons	$
1945	109,123	90,026	1,023	130,909
1946	73,900	70,215	373	38,264
1947	572,673	875,644	394	49,348
1948	1,544,852	2,029,178	581	82,909
1949	619,065	952,469	263	26,332

1. Content in metal and oxides produced in Canada and in ores exported.
2. Refined arsenic produced in Canada plus arsenic content of crude arsenic exported. Excludes arsenic in ores exported from British Columbia as it is not paid for.

TABLE 18. Platinum Metals[1] Produced, 1945-1949

Year	Platinum		Palladium and other platinum metals	
	Ounces	$	Ounces	$
1945	208,234	8,017,010	458,674	18,871,074
1946	121,771	7,672,791	117,566	5,162,801
1947	94,570	5,582,467	23,218	2,296,884
1948	121,404	10,622,850	148,343	6,295,132
1949	153,784	11,596,002	182,233	8,289,915

1. From 1945 the figures represent the metal content of concentrates produced from nickel-copper ores. For earlier years the figures refer to refined metals recovered and the contents of concentrates sold. 1945 includes an accumulated revision of previous years.

TABLE 19. Capacities of Canadian Copper Smelting and Refining Works, 1949

Company	Blast furnaces		Reverberatories		Converters
	Number	Annual capacity: tons of ore and concentrates	Number	Annual capacity: tons or ore and concentrates	Number
Falconbridge Nickel Mines, Ltd.	2	500,000	–	–	3
Hudson Bay Mining & Smelting Co. Ltd.	–	–	1	575,000	3
Noranda Mines Ltd.	–	–	2	1,300,000	5
International Nickel Co. of Canada Ltd:					
Copper Cliff	2	430,000	9	3,500,000	20
Coniston	4	950,000	–	–	5
	Annual Capacity, 1948 (short tons)				
Electrolytic Copper Refineries:					
Canadian Copper Refiners, Ltd.	130,000				
International Nickel Co. of Canada, Ltd.	168,000				

TABLE 20. Lead Smelting Capacity of Canada, 1949.

Company	Number of blast furnaces	Annual capacity tons of charge
Consolidated Mining & Smelting Company of Canada, Limited, Trail, British Columbia	5	711,100

TABLE 21. Capacity of Electrolytic Zinc Plants in Canada, 1949

Company	Estimated annual capacity for cathode zinc
	short tons
Consolidated Mining & Smelting Company of Canada, Ltd.	172,875
Hudson Bay Mining & Smelting Co., Ltd	57,185

Directory of Firms in the Non-ferrous Smelting and Refining Industry, 1949

Name of Firm	Head or Executive Office Address	Location of Plant
Quebec:		
Aluminum Company of Canada Ltd.	1700 Sun Life Bldg., Montreal	Arvida, La Tuque, Shawinigan Falls, Isle Maligne, Beauharnois
Canadian Copper Refiners Ltd.	1600 Royal Bank Bldg., Toronto, Ontario	Montreal East
Noranda Mines Limited	1600 Royal Bank Bldg., Toronto, Ontario	Noranda
Ontario:		
Deloro Smelting & Refining Co., Ltd.	Deloro	Deloro
Dominion Magnesium Ltd.	67 Yonge St., Toronto	Haley
Eldorado Mining and Refining		Port Hope
Falconbridge Nickel Mines Ltd.	304 Bay St., Toronto	Falconbridge
International Nickel Co. of Canada Limited	Copper Cliff	Copper Cliff, Coniston, Port Colborne
Cobalt Chemical and Refinery Co. Ltd	Cobalt	Cobalt
Manitoba:		
Hudson Bay Mining and Smelting Co. Limited	500 Royal Bank Bldg., Winnipeg	Flin Flon
British Columbia:		
Consolidated Mining & Smelting Co. of Canada Limited	Trail	Trail