GOVERNMENT OF CANADA

MISCELLANEOUS METAL MINING INDUSTRY, 1949

A D.B.S. PUBLICATION

Canada.

DOMINION BUREAU OF STATISTICS – DEPARTMENT OF TRADE AND COMMERCE

MISCELLANEOUS METAL MINING 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

700 – 20-11-50

Price 25 cents

Vol. 1 – Part I – E-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

MISCELLANEOUS METAL MINING INDUSTRY, 1949

including

Aluminum	Mercury
Antimony	Molybdenum
Barium	Pitchblende
Beryllium	Selenium
Bismuth	Tantalum-Columbium
Cadmium	Tellurium
Calcium	Thallium
Cerium	Tin
Chromium	Titanium (ilmenite)
Iron	Tungsten
Indium	Vanadium
Magnesium	Zirconium
Manganese	

The mining of certain metal-bearing ores, other than those commonly classified as gold, silver, copper, nickel, cobalt, lead and zinc, have been grouped, for statistical purposes, as a single industry by the Dominion Bureau of Statistics. Their production in some instances is confined to a relatively few operators and the annual extraction of certain types often fluctuates in an erratic manner according to demand and supply. Included in this report, with the finally-revised statistics relating to the Canadian production of these ores or metals, are notes and statistical data pertaining to various rare or semi-rare metals or metalliferous ores produced in other countries. Metals and metal-bearing ores produced in Canada during 1949 and classified as miscellaneous include antimony, barium, bismuth, cadmium, calcium, chromite, iron ore, magnesium, manganese ore, molybdenite, pitchblende, selenium, tellurium, titanium ore, tin and tungsten concentrates. In addition to particulars relating to these metals or minerals, the bulletin contains notes of a summary nature on aluminum, beryllium, mercury, vanadium, and a few of the rarer metals.

It should be noted that the majority of the metals listed above as Canadian products and including bismuth, cadmium, selenium and tellurium, represent by-products recovered in the refining of lead, zinc or copper and, for this reason, such statistics as relate to their production in Canada are included with those of either the silver-lead-zinc mining industry, the copper-gold-silver mining industry, or the non-ferrous smelting and refining industry.

There were 21 firms in the miscellaneous metals mining industry in 1949; employees numbered 3,275 to whom $8,894,642 were paid in salaries and wages. Fuel cost $678,189 and 80,561,517 k.w.h. of electricity was purchased for $482,369. Process supplies freight and ore treatment charges amounted to $4,615,772. The gross value of production was $21,466,327; this figure should not be compared directly with the production value of the preceding year, as Newfoundland is included for the first time in 1949.

TABLE 1. Principal Statistics[1] of the Miscellaneous Metal Mining Industry, 1948 and 1949

	1948	1949
Number of firms	25	21
Number of plants	26	21
Number of employees:		
Administrative and office	158	172
Workmen	1,138	3,103
Total	**1,296**	**3,275**
Salaries and wages.		
Salaries	$ 439,847	603,313
Wages	$ 3,438,680	8,291,329
Total	**$ 3,878,527**	**8,894,642**
Value of production (gross)	$ 8,725,661	21,466,327
Cost of fuel and electricity	$ 890,362	1,160,558
Process supplies used	$ 1,303,681	1,286,989
Smelter charges	$ 1,320	–
Freight	$ 1,905,304	3,328,783
Value of production (net)	$ 4,624,994	5,776,330

1. Does not include data relating to smelters and refineries or to mining in the Northwest Territories. Data for 1948 and 1949 cover only chromium, iron, manganese, molybdenum, titanium and tungsten.

TABLE 2. Average Number of Workmen, by Months, 1948 and 1949

Month	1948					1949			
	Surface		Underground	Mill		Surface		Underground	Mill
	Male	Female		Male	Female	Male	Female		Male
January	662	8	187	101	1	1,184	30	1,562	68
February	649	9	206	102	1	1,063	35	1,341	75
March	683	11	191	105	1	1,080	37	1,443	111
April	718	13	189	115	1	1,218	37	1,459	115
May	725	14	202	133	1	1,293	39	1,528	125
June	945	16	199	142	1	1,672	39	1,431	117
July	950	14	182	134	1	1,658	39	1,436	124
August	975	14	184	134	1	1,796	41	1,516	129
September	964	21	191	141	1	1,704	45	1,578	137
October	864	31	197	148	1	1,565	39	1,545	140
November	751	31	225	146	1	1,586	41	1,552	131
December	708	30	195	108	1	1,552	41	1,580	122
Average	**799**	**18**	**195**	**125**	**1**	**1,450**	**39**	**1,498**	**116**

Aluminum

Although there is no bauxite (the ore of aluminum) in Canada, the Canadian aluminum industry is exceeded in size only by that of the United States. The principal factor favouring the establishment of the industry in Canada is abundant and low-cost hydro-electric power at points where necessary raw materials can be cheaply and conveniently assembled.

The production of 369,466 short tons of aluminum ingots in 1949 was approximately the same as in the previous year, but still far below the peak production of 1943 when nearly a half-million tons of ingots were made.

Production in Canada is entirely by aluminum, Company of Canada, Limited, 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. In 1948 operations were concentrated at Arvida, Ile Maligne and Shawinigan Falls.

Fabricating plants of this company are located at Kingston and Etobicoke in Ontario, and at Arvida and Shawinigan Falls in Quebec. They 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 principal imported raw materials used in the Canadian aluminum industry are bauxite from British Guiana, coal and coke from the United States, fluorspar from Newfoundland, and cryolite from Greenland and the United States.

Aluminum is finding an increasingly wide field of usefulness. It is available from fabricating plants in many forms such as sheets, foil, castings, forgings, rolled and extruded shapes, tubes, rods, wire, powder and paste. Because of its light weight and strength when alloyed, it is widely used in the making of aircraft and for many other purposes where lightness of the structural metal is particularly desirable. Large tonnages are used for making cable for transmission of electricity, and for making cooking utensils and containers for food and beverages. It is finding an increasing number of architectural uses, being employed for window frames, screens, garage doors, heating and ventilating ducts, Venetian blinds, and ornamental spandrels on buildings. Small dwelling houses are also being built of aluminum. These uses have increased so rapidly in the past few years that they now constitute the principal use of aluminum insofar as tonnage is concerned.

In the transportation industry, aluminum is used in frames and wheels of cars, trucks and buses, and for the making of pistons. A new development in this field is the use of aluminum tubing for oil, gasoline, and water lines. Aluminum is also used to an increasing extent in the construction of railway equipment, in the fittings of ships, and for the construction of canoes and small boats.

Aluminum is being made into nails and into barbed wire. There has been a very large increase in the use of aluminum foil for wrapping food products, particularly frozen foods. In pre-war years Germany controlled the greater part of the trade in foil but Canada is now supplying a large part of that market.

The price of aluminum ingot was 15.5 cents per pound in 1949. Effective January 1, 1948, the United States import tariff on aluminum metal and alloys was reduced from 3 cents to 2 cents per pound.

TABLE 3. Production, Consumption, Imports and Exports of Aluminum Ingots, 1940-1949

Year	Production	Consumption	Exports	Imports
	(Tons of 2,000 pounds)			
1940	109,144	18,197	86,536	133
1941	213,873	19,717	192,757	3
1942	340,596	32,700	314,483	–
1943	495,749	40,100	375,383	1
1944	462,065	38,400	295,226	66
1945	215,712	40,800	382,286	51
1946	194,117	33,825	187,336	246
1947	299,066	50,265	230,175	616
1948	367,079	65,433	328,551	25
1949	369,466	58,767	288,364	40

TABLE 4. Imports of Aluminum and Bauxite, 1948 and 1949

Item	1948		1949	
	Cwt.	Value	Cwt.	Value
		$		$
Alumina	2,962	45,793	4,081	70,427
Bauxite ore	40,169,876	9,884,001	35,852,808	10,063,336
Cryolite	133,811	1,031,813	30,557	243,916
Aluminum:				
Pigs, ingots and blocks	492	10,581	791	12,658
Scrap	4,134	21,918	1,140	8,769
Angles, channels and beams	5,039	428,334	7,071	538,474
Bars, rods and wire	24,530	587,969	1,997	68,040
Leaf	–	165,454	–	136,529
Pipes and tubes	1,659	78,756	3,929	189,703
Plates, sheets and strips	44,585	1,367,683	64,745	2,069,646
Powder	491	32,204	598	39,456
Wire and cable	56	3,267	155	9,208
Household hollow ware	–	110,432	–	368,626
Manufactures n.o.p.	–	3,893,400	–	4,403,754

Cwt. = 100 pounds.

TABLE 5. Exports of Aluminum, 1948 and 1949

Item	1948		1949	
	Cwt.	Value	Cwt.	Value
		$		$
Aluminum scrap	456,794	5,141,641	87,683	1,104,105
Aluminum wire and cable	–	5,521,471	–	1
Aluminum manufactures, n.o.p.	–	3,323,163	–	2,071,415
Aluminum in bars, blocks, ingots and blooms	6,542,154	84,191,712	5,938,127	84,773,481
Aluminum in rods, sheets and circles	123,364	3,403,699	211,521	5,154,557
Aluminum kitchen utensils	–	464,742	–	152,780
Aluminum foil	–	–	17,815	741,206
Aluminum stampings and forgings	–	–	1,275	128,781

1. Reclassified.

TABLE 6. World Production of Aluminum, 1947-1949 (From the Annual Report of the American Bureau of Metal Statistics)

Country	1947	1948	1949
	(Tons of 2,000 pounds)		
United States	571,750	623,483	603,462
Canada	299,061	367,079	366,850
Total America	**870,811**	**990,535**	**970,312**
Austria	4,786	14,723	16,309
France	58,670	71,418	59,679
Germany	–	8,053	31,797
Great Britain	32,407	33,629	33,986
Italy	27,402	36,466	28,271
Norway	23,947	34,216	39,392
Hungary	5,735	5,679	–
Spain	1,102	577	728
Sweden	3,188	3,707	4,400
Switzerland	20,346	20,994	23,148
Total Europe[1]	**177,583**	**229,462**	–
Japan	2,976	7,672	3,911
India	3,553	3,771	23,389

1. Excluding Yugoslavia, Russia and Russian Zone of Germany.

Antimony

Since 1945 the production of antimony in Canada has been in the form of antimonial lead. The Consolidated Mining and Smelting Company of Canada, at Trail, British Columbia, produces, intermittently, alloys containing 25 per cent, 12 per cent and 5 per cent antimony. In 1949 the antimony content of alloy produced amounted to 158,288 pounds. There has been no production of antimony ore since 1942.

The greatest single use for antimony is as an alloying element with lead, to which it adds hardness and mechanical strength, such as in the manufacture of storage batteries and cable covering. It is alloyed with tin in the manufacture of babbitt bearings, and with lead and tin in solders, foil, collapsible tubes, and type metal. Its property of expansion on cooling when alloyed makes it particularly useful in the manufacture of type metal. During the war it was used to harden the lead used in ammunition and to flame proof canvass goods used by the armed forces.

The Canadian price for antimony was about 32 cents per pound at the end of the year.

TABLE 7. Production of Antimony 1940-1949

Year	In ores exported		Metal produced[1] in Canada		Total	
	Pounds	$	Pounds	$	Pounds	$
1940	44,700	3,800	2,549,792	392,668	2,594,492	396,468
1941	15,292	2,141	3,169,785	443,770	3,185,077	445,911
1942	78	13	3,041,030	516,975	3,041,108	516,988
1943	–	–	1,114,166	189,408	1,114,166	189,408
1944	–	–	1,937,933	281,000	1,937,933	281,000
1945	–	–	1,667,951	290,557	1,667,951	290,557
1946	–	–	642,145	96,332	642,145	96,322
1947	–	–	1,150,463	384,255	1,150,463	384,255
1948	–	–	310,062	113,173	310,062	113,173
1949	–	–	158,288	61,020	158,288	61,020

1. No refined metal in 1945-1949; figures represent antimony content of antimonial lead.

TABLE 8. Production of Antimony Metal, Consumption, Imports and Exports, 1940-1949

Year	Production in Canada	Consumption in Canada	Imports	Exports[1]
	(Tons of 2,000 pounds)			
1940	1,275	558	118	359
1941	1,585	955	1	676
1942	1,521	1,187	–	166
1943	567	1,303	120	6
1944	968	1,515	779	–
1945	–	778	517	–
1946	–	871	455	–
1947	–	1,189	1,440	–
1948	–	812	547	–
1949	–	880	1,292	–

1. Shipped for export; data not available from customs' records.

TABLE 9. Consumption of Antimony Metal[1], by Industries, 1945-1948

Industry	1945	1946	1947	1948
	(Tons of 2,000 pounds)			
In White metal foundries	614	743	948	700
Electrical apparatus plants	114	78	213	56
Brass foundries	9	21	11	13
Non-ferrous smelters	1	–	–	–
Silverware factories	9	29	17	23
Ammunition plants	26	–	–	–
Miscellaneous	5	5	–	20
Total	**778**	**871**	**1,189**	**812**

1. Includes some antimony in antimonial lead.

Barium

The commercial production of barium metal was introduced in Canada by the Dominion Magnesium Limited at Haley, Ontario, in 1947. Production (shipments) of barium metal in 1949 amounted to 131 pounds valued at $346, compared with 2,552 pounds at $7,988 in 1948. Raw materials were imported.

Beryllium

Beryllium is not produced in Canada, but there are several occurrences of beryl in pegmatite dikes. No mining of the beryl ore is being done at present.

In Ontario, intermittent work was done prior to 1941 on a beryl pegmatite in Lyndoch township, Renfrew county. A few tons of clean cobbed crystals were obtained, and about 200 tons of milling grade rock were stockpiled. Most of the work on the property was done by the present owners, Canadian Beryllium Mines and Alloys, Limited, 901 Royal Bank Building, Toronto, who, however, have reported no sales. A detailed examination of the main easterly workings, made in 1943 by the Bureau of Mines, Ottawa, and the Metals Controller's Office, indicated an average content of 0.188 per cent beryl in the total rock excavated, with a maximum for the richest quarry sections of 1.24 per cent. Grade of selected clean beryl crystals was 10.41 per cent BeO.

In Manitoba a little work was done several years ago on beryl showings in pegmatites opened originally for feldspar and lithium minerals in the Winnipeg River and Oiseau (Bird) River areas, but no shipments were reported.

In the Northwest Territories, exploration in the area north and east of the Yellowknife gold camp has disclosed numerous occurrences of beryl in pegmatites which also contain lithium minerals and tantalite-columbite. Some of these are considered to be of possible economic interest.

In Quebec, scattered occurrences of beryl are known in La Corne and Preissac townships, Abitibi county, often associated with molybdenite. None of these, however, is believed to be of economic importance.

Beryllium is used chiefly in the form of beryllium-copper alloys, the most important of which contains about 2 per cent beryllium. A beryllium-aluminum alloy containing 5 per cent beryllium is used as a deoxidizer in making aluminum-magnesium products. Straight beryllium metal has only limited applications, notably for the windows of X-ray tubes, where it is used for its transparency to the rays.

Ground beryl is used as a batch ingredient in sparkplugs and other ceramic specialties, to which it imparts high electrical and impact resistance and transverse strength. Some is also used in cooking utensil enamels. Consumption for such uses in the United States is estimated at about 100 tons a year.

New York price quotations, at the end of the year, for beryllium ore, f.o.b. mine, were $26-$30 per unit of BeO, 8 to 12 per cent.

Bismuth

During 1949 bismuth was produced by the smelter of the Consolidated Mining and Smelting Company of Canada Limited, at Trail, British Columbia from the firm's own ores and also from custom ores which were treated there. Output amounted to 105 tons, including 51 tons from Canadian ores and 54 tons from foreign ores.

Bismuth is too brittle to be used alone, but its alloys have many uses, such as in the manufacture of sprinkler plugs and other fire-protection devices, electrical fuses, low melting solders, dental amalgams, and tempering baths for small tools. Like antimony, bismuth expands on solidification and retains this property in a number of alloys, and is used in type metal. This group of bismuth-lead-tin-cadmium alloys is used by the airplane and automotive industries to prepare spotting fixtures, to make moulds for electroforming, to fill thin-walled tubing during bending, and to spray-coat wooden patterns and core boxes in foundries.

According to the "E & M J Metal and Mineral Markets", the price of bismuth during 1949 was $2.00 per pound in ton lots.

TABLE 10. **Production of Primary Bismuth in all Forms [1], 1940-1949**

Year	Pounds	$	Year	Pounds	$
1940	58,529	81,004	1945	189,815	260,047
1941	7,511	10,396	1946	240,504	336,706
1942	347,556	479,627	1947	284,372	560,213
1943	407,597	562,484	1948	240,242	480,484
1944	123,875	154,844	1949	102,913	210,972

1. Refined metal from Canadian ores plus bismuth content of bullion exported.

TABLE 11. Production of Bismuth Metal, Consumption, Imports and Exports, 1940-1949

Year	Production	Domestic consumption	Exports [1]	Imports
	(Tons of 2,000 pounds)			
1940	20	12	77	–
1941	–	16	51	–
1942	159	36	199	–
1943	204	65	73	–
1944	62	46	25	–
1945	95	35	41	–
1946	120	40	95	–
1947	142	71	61	–
1948	120	44	79	–
1949	105 [2]	14	89	–

1. Shipped for export by Canadian producers.
2. Includes bismuth from foreign ores.

TABLE 12. Consumption of Bismuth Metal, by Industries, 1945-1948

Industry	1945	1946	1947	1948
	(Tons of 2,000 pounds)			
In Medicinals and pharmaceuticals	15	11	44	28
White metal foundries	16	23	20	15
Miscellaneous	4	6	7	1
Total	**35**	**40**	**71**	**44**

Cadmium

Cadmium is recovered in Canada as a by-product of the electrolytic refining of zinc. The zinc refineries at Trail, British Columbia, and Flin Flon, Manitoba, both produce metallic cadmium. In British Columbia the greater portion of cadmium is derived from the lead-zinc ores of the Sullivan mine, but also a considerable amount of cadmium is recovered from the customs ores shipped from various mines in the province to the smelter of the Consolidated Mining & Smelting Company of Canada, Limited, at Trail. Cadmium is found in the copper-gold-zinc ores of the Flin Flon deposit on the Saskatchewan-Manitoba boundary and also in the zinc concentrates shipped by Sherritt-Gordon Mines Limited to Flin Flon for smelting and refining. Output in 1949 amounted to 423 tons.

Cadmium is used mainly in electroplating and in the manufacture of alloys and compounds, the most common use being as a protective coating for steel. To a much lesser extent it is used in copper alloys. The use of cadmium alloys in motor vehicle bearings and for solders has created a strong demand for the metal. Cadmium is used also in the arts, paints, ceramics, and dyeing, etc.

Cadmium is marketed in metallic form, 99.5 per cent pure and better, and as a sulphide. The principal compounds are cadmium sulphide, cadmium oxide, cadmium lithopone, and cadmium selenite.

The New York price for commercial sticks of cadmium in December, 1949 was $2.00 per pound.

TABLE 13. Production of Cadmium, 1940-1949

Year	British Columbia		Manitoba		Saskatchewan	
	Pounds	$	Pounds	$	Pounds	$
1940	778,791	905,734	57,742	67,154	71,594	83,264
1941	1,081,374	1,269,533	61,085	71,714	108,832	127,769
1942	972,413	1,147,447	29,236	34,498	147,314	173,831
1943	598,673	688,474	20,985	24,130	166,955	191,998
1944	386,410	425,051	20,921	23,013	119,639	131,603
1945	510,432	505,328	27,891	27,612	107,741	106,663
1946	636,315	776,304	63,410	77,360	102,923	125,566
1947	545,638	938,497	75,030	129,052	97,866	168,330
1948	617,226	1,126,437	67,926	123,965	80,938	147,712
1949	665,449	1,364,170	70,800	145,140	110,292	226,099

TABLE 14. Consumption and Exports of Cadmium Metal, 1940-1949

Year	Production	Domestic consumption	Exports
	(Tons of 2,000 pounds)		
1940	454	75	399
1941	625	149	455
1942	574	207	400
1943	393	168	286
1944	263	108	192
1945	319	87	175
1946	401	96	296
1947	359	72	309
1948	383	92	275
1949	423	111	317

Note. Statistics on imports are not available.

Calcium

The commercial production of calcium in Canada started in 1945 when the metal was recovered from lime by Dominion Magnesium Limited at its plant located at Haley, Ontario. Output in 1949 totalled 520,069 pounds valued at $1,040,138.

Calcium has found increasing use as a deoxidizer in ferrous metallurgy and as an alloy constituent with non-ferrous metals. It has been employed in the reduction of difficultly reducible metals, such as chromium, thorium, uranium, and zirconium. During the war an important calcium use was to make hydride, which is a convenient and portable source of hydrogen for inflating weather balloons. Uranium metal had been made by reaction of calcium with chloride or oxide and by reducing the oxide with calcium hydride; the latter was perhaps the first-applied (1941) relatively large-scale production method. The uranium was, however, in the form of highly impure pyrophoric powder and was not usable in the atomic bomb project. However, by the end of 1942 acceptable metal was being turned out.

In 1949, the New York price for calcium, 97-98 per cent as cast, was $2.00 per pound. The Canadian producer is able to sell an exceptionally high purity product for a much lower price.

TABLE 15. Production (shipments) of Calcium Metal, 1945-1949

Year	Pounds	$
1945	22,720	19,312
1946	53,548	68,720
1947	602,665	642,607
1948	895,203	1,723,266
1949	520,069	1,040,138

Cerium

Cerium is obtained from monazite, a monoclinic phosphate of cerium metals containing about 32 per cent cerium oxide (Ce_2O_3) and up to 18 per cent thoria (ThO_2). Monazite is distributed widely in igneous rocks throughout the world, especially in gneisses that have been intruded by pegmatites, but usually it forms only a small fraction of one per cent of the containing rock and only the natural concentrations in stream gravels and beach sands have paid for exploration. The chief commercial sources of monazite sand are beach deposits in Brazil and India. There are a few occurrences of monazite in Nova Scotia, Quebec and British Columbia, none of which is of commercial interest. It is usually found as small crystals in granites and pegmatites in the Canadian Shield and small quantities occur in association with the black sands of the Quesnel river, Lillooet district, British Columbia. In the United States there are commercial deposits in Carolina, Florida, and Idaho, and known occurrences in many other States.

In Canada, Shawinigan Chemicals, Limited, Shawinigan Falls, Quebec, has been producing cerium products from imported cerium chloride since 1940. The output is sold to the Belgo Canadian Manufacturing Company, Limited, of Montreal, for the manufacture of sparking flints.

Chromite

The production of chromite in Canada is obtained from the deposits in the Black Lake area of Quebec. Only 361 tons were mined in 1949.

Chromite is one of the principal alloying elements in a great variety of steels, chief of which in the amount of chromium used are the stainless and the corosion-resistant steels. It is used in high-speed tool steels, and as a hard, toughening element in vehicle axles and frames, and in aeroplane parts. Chromium in high-temperature alloys is being used for gas turbines, jet-propulsion units, and gas engine superchargers. For metallurgical uses chromite should contain a minimum of 48 per cent Cr_2O_3 with a chrome-iron ratio of 3 to 1 or higher, and the ore should be hard and lumpy.

Chrome ore is used for making refractory bricks or materials used in basic open-hearth furnaces, in arches of furnaces, and in parts of combustion chambers of high-pressure steam boilers, etc. It is used with magnesia to make chrome-magnesia refractories, an important use in Canada being in the manufacture of brucite magnesia bricks that contain up to 30 per cent Cr_2O_3. Refractory chromite should be fairly high in Cr_2O_3 and alumina and as low as possible in silica and iron. The ore should be hard and lumpy and not under 10-mesh, and the chromite should be present in an evenly and finely distributed form, not as course grains mixed with blobs of silicate. The Cr2O3 content is usually over 40 per cent.

The United States price, December, 1949, for chrome ore, 48 per cent Cr_2O_3 was $35.00 per long ton, f.o.b. Atlantic ports.

TABLE 16. Production of Chromite, 1940-1949

Year	Short tons	$	Year	Short tons	$
1940	335	5,730	1945	5,755	160,752
1941	2,372	42,679	1946	3,110	61,123
1942	11,456	343,568	1947	2,162	42,159
1943	29,595	919,878	1948	1,715	33,568
1944	27,054	748,494	1949	361	7,148

TABLE 17. Imports of Chrome Ores, 1940-1949

Year	Tons	$	Year	Tons	$
1940	29,938	554,413	1945	60,691	1,154,985
1941	92,952	1,460,209	1946	15,836	269,248
1942	87,628	1,271,482	1947	98,322	3,138,229
1943	103,471	2,121,228	1948	69,183	1,937,692
1944	39,089	618,231	1949	66,246	1,664,082

TABLE 18. Imports of Chrome Ores, by Principal Countries of Supply, 1948 and 1949

Imported from	1948		1949	
	Tons	$	Tons	$
Union of South Africa	27,140	394,818	28,417	470,759
Southern Rhodesia	4,733	184,111	7,040	269,614
British India	–	–	560	8,282
Cuba	465	10,947	–	–
Turkey	1,232	46,429	560	25,628
Portuguese Africa	–	–	–	–
United States	31,132	1,206,837	23,386	757,195
Philippines	4,480	94,550	6,283	132,604
Total	**69,183**	**1,937,692**	**66,246**	**1,664,082**

Indium

Indium production in 1949 amounted to 689 ounces valued at $1,550. The previous production of this metal in Canada was in 1942 when the Consolidated Mining and Smelting Co. of Canada Limited obtained 470 troy ounces valued at $4,710 from the treatment of zinc refinery residues.

The major use has been in heavy-duty composite metal bearings employed extensively in airplanes, tanks and other mobile equipment. A zinc-indium alloy was used in applying a noncorrosive plating to hollow-steel airplane propellers. Minor uses have been in solder and brazing alloys and alloyed with gold and silver for jewellery and plated articles. The first commercial use about 1927 was as a non-tarnish coating on silverware. Low-melting paint alloys also have been manufactured recently. Indium foil was used as a neutron indicator in the atomic bomb project uranium-graphite piles. Low-energy neutrons, about 1.5 electron-volt, are particularly effective in inducing artificial radioactivity in indium.

At the close of 1949 the quoted price of indium was $2.25 per ounce troy. The price has remained at this level for the past four years.

Iron Ore

Production of iron ore in Canada during 1949 at 3,675,096 tons was much greater than in preceding years. The entry of Newfoundland into Confederation added Wabana mines to the list of Canadian producers. The Ontario mines also increased their output. Some iron ore was exported from British Columbia to the United States.

Algoma Ore Properties Limited — This company is a subsidiary of Algoma Steel Corporation. It holds a number of mineral properties in the Michipicoten area northeast of Lake Superior, including the Helen mine, Siderite Hill and the Goulais magnetite deposits north of Sault Ste. Marie.

The new underground mine at the Helen was developed further on two levels to a depth of 600 feet. It is equipped to produce 4,500 long tons a day, using the block caving method to mine the ore and a series of belt conveyors to bring it to surface. At the end of 1949 the daily production from underground was 1,500 tons. The Victoria open pit, aided by substantial extensions of the Victoria orebody found recently, will furnish the balance to make 4,500 tons a day until the new underground mine is in full operation in 1950.

The Siderite Hill ore was discovered by company men in 1948 in the course of a systematic examination of company lands held for many years. The main outcrop is on a hill that rises 300 feet above the surrounding ground. This will permit open-pit mining of considerable tonnage of ore. It is intended to develop this property as a separate operation with about the same output as the Helen.

Steep Rock Iron Mines Limited — The company's output of hematite continues to come from "B" Pit now called the Errington mine. Two standard grades are shipped, Seine River for blast-furnace feed and Steep Rock open-hearth lump. The Steep Rock grade is divided into lump ore, minus 10 plus 4 inches, and charge ore, minus 4 plus 1½ inches.

Drilling extended the known length of "B" orebody to 4,000 feet. The open pit now has a length of 3,000 feet and can be worked economically for several years more.

Preparations were being made to open an underground mine in "B" orebody, commencing in the spring of 1950. A vertical shaft is to be sunk to an initial depth of 1,200 feet in the hanging wall at a distance of 2,000 feet from the open pit. From this shaft three levels beneath the open pit will be developed, to make 5 million tons of ore available from each level.

Arrangements have been made for the development of "A" orebody, now known as the Hogarth mine. A contract was let for the removal of silt from the northern part of the lake bed. This contract is to be completed by the fall of 1954. The higher parts of the orebody will be exposed so that production of ore is expected in 1953.

The development of "C" orebody will be undertaken by the Inland Steel Company of Chicago.

Wabana Mines — The hematite ores at Wabana are mined by the Dominion Steel and Coal Corporation. The cost of mining and transportation is low with sufficient reserves available. The use of the ore on this continent is restricted due to the phosphorus and silica content. Large amounts have been sold to Great Britain and Germany, but present exchange difficulties have interfered with this trade.

Mechanization of the Wabana mines has proceeded rapidly during recent years and production methods have improved.

Labrador and New Quebec — This area is being explored by Hollinger Consolidated Gold Mines Limited and M.A. Hanna Company. The reserve of ore is estimated at 357 million long tons, of which 241 million tons is in the Hollinger North Shore Exploration Company's concession in Quebec, and 116 million tons is in the concession of Labrador Mining and Exploration Company on the Newfoundland side of the border. Late in 1949 it was announced that an agreement had been made with Iron Ore Company of Canada to finance the project to the point of production. This company represents six steel companies in the United States, including M. A. Hanna Company, which will market the 10 million tons a year considered to be the minimum payable tonnage.

TABLE 19. Principal Statistics for the Iron Ore Mining Industry, 1947-1949

		1947	1948	1949
Active firms	No.	6	16	13
Employees:				
On salary	No.	67	86	171
Wage-earners	No.	678	924	3,086
Total	**No.**	**745**	**1,010**	**3,257**
Salaries and wages:				
Salaries	$	246,391	270,885	603,013
Wages	$	1,790,563	2,953,465	8,248,733
Total	**$**	**2,036,954**	**3,224,350**	**8,851,746**
Gross value of production	$	9,313,201	7,487,611	21,203,907
Fuel and electricity used	$	679,082	825,662	1,160,183
Process supplies used	$	384,124	1,197,471	1,284,198
Freight and treatment charges	$	2,854,530	1,888,561	3,328,783
Net value	**$**	**5,395,465**	**3,575,917**	**15,430,743**

TABLE 20. Production of Iron Ore[1], 1940-1949

Year	Short tons	Value	Year	Short tons	Value
		$			$
1940	414,603	1,211,305	1945	1,135,444	3,635,095
1941	516,037	1,426,057	1946	1,549,523	6,822,947
1942	545,306	1,517,077	1947	1,919,366	9,313,201
1943	641,294	2,032,240	1948	1,237,244	7,487,611
1944	553,252	1,909,606	1949[2]	3,675,096	21,203,907

1. Exclusive of titanium-bearing ores.
2. Newfoundland iron ore included for first time.

TABLE 21. Imports and Exports of Iron Ore, 1940-1949

Year	Imports		Total[1]	Exports
	From United States	From Newfoundland		
	(Tons of 2,000 pounds)			
1940	524,849	716,317	2,418,237	251,626
1941	2,212,437	962,259	3,254,655	282,068
1942	2,033,961	610,871	2,701,968	295,960
1943	2,978,388	911,450	3,906,425	374,677
1944	2,501,737	624,890	3,126,649	308,424
1945	2,988,484	736,665	3,739,867	771,495
1946	1,686,236	518,566	2,281,677	1,145,256
1947	3,126,307	755,612	3,944,550	1,749,976
1948	3,392,063	820,692	4,300,163	1,070,277
1949	2,350,149	42,285	2,517,235	2,550,299

1. Includes some ore from other countries, principally Brazil.

TABLE 22. Iron Ore Charged to Iron Blast Furnaces, 1940-1949

Year	Canadian	Imported	Total
	(Tons of 2,000 pounds)		
1940	154,643	2,188,074	2,342,717
1941	166,263	2,542,826	2,709,089
1942	229,253	3,383,439	3,612,692
1943	302,780	2,955,671	3,258,451
1944	266,150	3,227,039	3,493,189
1945	235,757	2,797,697	3,033,454
1946	358,173	2,167,900	2,526,073
1947	252,085	3,420,890	3,672,975
1948	193,935	3,716,683	3,910,618
1949	1,107,250	2,738,816	3,846,066

Note. Newfoundland ore, classified as Canadian in 1949, was included in imported ore in previous years.

Magnesium

The stockpile of magnesium metal at the plant of the Dominion Magnesium Limited, Haley, Ontario was sufficient to supply to market during 1949. Indications are that production may be resumed early in 1950. The magnesium plant of the Aluminum Company of Canada, at Arvida, Quebec did not operate during the year.

The market price of 20.5 cents per pound remained constant throughout the year.

TABLE 23. Production of Primary Magnesium Metal, 1941-1949

Year	Quebec		Ontario		British Columbia		Canada	
	Pounds	$	Pounds	$	Pounds	$	Pounds	$
1941	–	–	–	–	10,905[1]	2,944	10,905	2,944
1942	141,081	62,076	473,910	208,520	193,727	85,240	808,718	355,836
1943	–	–	7,153,974	2,074,652	–	–	7,153,974	2,074,652
1944	–	–	10,579,778	2,575,695	–	–	10,579,778	2,575,695
1945	–	–	7,358,545	1,307,264	–	–	7,358,545	1,607,264
1946	–	–	320,677	75,538	–	–	320,677	75,538
1947-1949	Not available for publication							

1. Magnesium powder.

TABLE 24. Consumption of Magnesium Metal, 1946-1948

–	1946	1947	1948
	(Pounds)		
In non-ferrous smelters	441,000	340,460	425,088
In white metal alloy foundries	142,445	174,510	382,684
In brass and bronze foundries	17,266	13,287	31,782
In aluminum products	15,061	32,280	58,947
Total Accounted For	**615,772**	**560,537**	**898,501**

Manganese

Production of manganese ore in Canada has been spasmodic due to limited number of known deposits. No production was recorded for 1949. During 1947 and 1948 development work on deposits in Magdalin Islands, Quebec failed to produce commercial quantities of ore. The deposit of bog manganese in New Brunswick was not further developed.

Most of the imported ore is used in making addition agents for steel manufacturing. High grade manganese dioxide is used in making dry cell batteries. Manganese compounds are used in the glass, enamel, paint and rubber industries. Price quotations of manganese ore, basis 48% Mn, were 82 to 84 cents per long ton unit, C.I.F. U.S. ports.

TABLE 25. Production of Manganese Ore, 1940-1949

Year	Tons	Value	Year	Tons	Value
		$			$
1940	152	4,315	1945	–	–
1941	1	1	1946	–	–
1942	435	8,932	1947	225	7,875
1943	48	985	1948	3	88
1944	–	–	1949	–	–

1. 7,500 pounds manganese metal produced at the mine from Nova Scotia manganese ore.

TABLE 26. Imports of Manganese Ore, 1940-1949

Year	Tons	$	Year	Tons	$
1940	70,460	777,416	1945	198,277	4,571,592
1941	104,473	1,170,768	1946	144,023	2,484,707
1942	57,389	860,248	1947	223,503	6,145,568
1943	51,234	1,445,252	1948	230,298	6,449,819
1944	85,795	2,370,109	1949	137,854	4,475,522

TABLE 27. Imports of Manganese Ore, by Principal Countries of Supply, 1947-1949

—	1947	1948	1949
	(tons)		
From:			
Gold Coast	109,903	60,516	27,904
British India	12,711	—	15,456
Chile	—	—	890
United States	100,889	169,746	93,571
United Kingdom	—	36	33
Total imports	**223,503**	**230,298**	**137,854**

Mercury

There has been no production of mercury in Canada since September, 1944, and all shipments since then have been from producers' stocks. All of the Canadian production in the past came from the Pinchi mine of The Consolidated Mining and Smelting Company of Canada, Limited, and from the Takla mine of Bralorne Mines Limited, both mines being in the Omineca Mining Division, British Columbia. The mines have remained idle because world prices have been too low to permit profitable operation.

During 1949 the price of mercury fluctuated from $71 to $90 per 76 pound flask. The lower price was quoted at the close of the year.

TABLE 28. Production of Mercury, 1940-1949

Year	Pounds	$	Year	Pounds	$
1940	153,830	369,317	1943	1,690,240	4,559,200
1941	536,304	1,335,697	1944	735,908	1,210,375
1942	1,035,914	2,943,807	1945-1949	Nil	—

TABLE 29. Production of Mercury, Consumption, Imports and Exports, 1940-1949

Year	Production	Consumption	Imports	Exports
	(pounds)			
1940	153,830	75,643	78,597	108,000
1941	536,304	151,351	8,599	360,164
1942	1,035,196	185,118	1,971	692,753
1943	1,690,240	201,982	2,047	1,304,692
1944	735,908	130,515	35,428	362,670
1945	—	100,700	27,101	261,720
1946	—	102,320	152,719	57,005
1947	—	344,518	412,649	17,084
1948	—	552,216	803,878	175
1949	—	366,016	278,069	8

TABLE 30. Consumption of Mercury by Principal Uses, 1944-1948

Industry	1945	1946	1947	1948
	(pounds)			
Pharmaceuticals and fine chemicals	20,652	26,183	60,578	41,565
Heavy chemicals	53,701	45,005	260,000	479,000
Electrical apparatus	2,353	12,192	5,438	13,151
Gold mines	10,000[1]	6,500	6,000	6,000
Miscellaneous	11,847	12,490	12,500	12,500
Total	**100,700**	**102,320**	**344,516**	**552,216**

1. Estimated.

Molybdenum

The Molybdenite Corporation of Canada, Limited suspended mining operations at the La Corne mine late in 1947. No shipments of molybdenite were made from the stockpile at La Corne, Quebec during 1949. There was no mining of molybdenum ore in Canada during the period under review.

Molybdenum has a widening range of uses, but by far the greater part of the output is used in steel to intensify the effect of other alloying metals, particularly nickel, chromium, and vanadium. These steels usually contain from 0.15 to 0.4 per cent molybdenum, but in some instances the percentage is considerably higher. For high-speed tool-steels as much as 9 per cent is added.

Molybdenum alloys are used widely for the hard-wearing and other important parts of airplanes. They are used in the automobile industry; in high-grade structural die and stainless steels; in heat and corrosion resistant alloys; and to some extent in high-speed tool steels. Molybdenum is used in cast iron and in permanent magnets. Much molybdenum wire and sheet is used in the incandescent lamp and in the radio industries; and new alloys suitable for electrical resistance and contacts and for heating elements contain molybdenum. An appreciable amount of molybdenum is used in the glass industry in which heavy sheets of the metal act as electrodes to conduct the current through the molten glass in the electric furnaces.

TABLE 31. Production of Molybdenite, 1940-1949

Year	Ores milled	Ores and concentrates shipped or used		Total MoS_2 content of shipments
	Tons	Tons	Value	Pounds
			$	
1940	3,936	11.1	10,280	1
1941	28,100	98.3	88,470	173,991
1942	39,708	113.7	134,963	158,780
1943	120,576	392.4	549,515	653,200
1944	187,130	1064.0	1,079,698	1,870,132
1945	80,575	489.1	411,663	839,419
1946	84,280	368.2	295,640	676,844
1947	83,665	396.0	309,048	759,795
1948	–	173.5	137,143	304,762
1949	–	–	–	–

1. Not known.

Pitchblende

Pitchblende, the ore of radium and uranium, is mined in Canada only in the Great Bear district of the Northwest Territories. Prospecting reports indicate that radioactive minerals have been found at Contact Lake, Northwest Territories; Lake Athabaska, Saskatchewan; and Theano Point, Ontario.

Statistics on Pitchblende ores and products have not been available since 1940.

TABLE 32. Canadian Refinery Production of Pitchblende Products, 1933-1948

Year	$	Year	$
1933[1]	247,900	1938	1,045,458
1934	159,400	1939	1,121,553
1935	413,700	1940	410,176
1936	605,500	1941-1949	2
1937	876,540		

1. First production.
2. Not available for publication.

Selenium

The occurrence of selenium is fairly widespread throughout the world, but it is of commercial importance only in its association with copper sulphide ores from which it is recovered as a by-product in the refining of copper. A variety of uses have been developed for the metal, but relatively small quantities are involved. In Canada refined selenium and certain selenium salts are produced and most of the output is exported.

Canadian production of selenium is obtained from the refineries of The International Nickel Company of Canada, Ltd., at Copper Cliff, Ontario, and Canadian Copper Refineries, Ltd., at Montreal East, Quebec. At Copper Cliff, the metal is derived from International Nickel's copper-nickel ores. The plant has a demonstrated capacity of 270,000 pounds of selenium a year and is probably capable of a larger production. At Montreal East, selenium is recovered from the treatment of copper anodes made from the copper-gold ores of Noranda, Quebec, and from blister copper from the copper-zinc ores of Hudson Bay Mining and Smelting Co. Ltd., on the Manitoba-Saskatchewan boundary. The Montreal East plant has an annual rated capacity of 450,000 pounds of selenium, which is larger than any other selenium plant in the world. This plant also produces selenium dioxide, sodium selenate, and sodium selenite.

Selenium is generally marketed as amorphous powder, but cakes and sticks are also obtainable. Other selenium products marketed are ferro-selenium, sodium selenate, sodium selenite, selenious acid, and selenium dioxide. No figures are available to show the relative consumption of selenium by uses. The most important uses are in the glass, rubber, and paint industries, but many new uses have been developed as a result of research during the war. Among the more interesting of the latter is the use of selenium in electrical dry plate rectifiers for radar equipment and aircraft generators. Its use in rectifiers for numerous electronic devices, battery charging, electroplating, and welding has been increasing.

In the manufacture of glass, selenium is used to neutralize the green colour caused by iron impurities. When sufficient selenium is added the glass turns a ruby colour highly suitable for signal lenses. In the manufacture of rubber the addition of selenium in concentrations of from 0.1 to 2.0 per cent promotes resistance to heat, oxidation, and abrasion. It is also used as an accelerator in the vulcanization of synthetic rubber.

The New York price for selenium remained at $2.00 per pound throughout 1949.

TABLE 33. Production of Selenium, 1940-1949

Year	Pounds	$	Year	Pounds	$
1940	179,860	343,533	1945	379,187	728,039
1941	406,930	777,236	1946	521,867	949,798
1942	495,369	951,108	1947	501,090	937,038
1943	374,013	654,523	1948	390,894	781,788
1944	298,592	537,466	1949	318,225	652,361

Tantalum-Columbium

Canada produces no tantalite or columbite and the known occurrences of these minerals are scarce and of undetermined economic interest. The minerals tantalite and columbite are the tantalate and columbate, respectively, of iron and manganese, with the general formula $(Fe,Mn)(Ta,Cb)_2O_8$. They grade one into the other according as whether tantalum or columbium predominates. The occurrence of all tantalum-columbium minerals is restricted to granite-pegmatites, or to residual or alluvial deposits derived from such rock. The chief world sources of tantalite proper have been Western Australia, Belgian Congo, Southern Rhodesia, Uganda, United States and Brazil. The supply of columbite has come mainly from Nigeria, Belgian Congo, Southwest Africa, Argentina and Brazil. The annual world output of tantalite-columbite is small and complete data on same are not available at present.

Experimental tests on the milling of tantalum-columbite ore from the Pey Tantalum mine, Ross Lake, Northwest Territories, were made by Tantalum Refining and Mining Corporation during 1947.

United States quotations for tantalum ore, December, 1949 were, per pound Ta_2O_5, $2 to $2.75 for 60 per cent concentrate, the price depending on the source. Columbium metal, per kilo, base prices: rod $280; sheet $250. Tantalum metal, per kilo, base prices, $160.60 for C.P. rod; sheet $143; discounts on volume business.

Tellurium

Tellurium, like its associated element selenium, is commonly found in small amounts in copper-sulphide and gold ores. The potential production as a by-product in the refining of copper is great but its recovery is restricted to meet the relatively minor quantities required by industry.

Tellurium is recovered commercially in Canada at the Copper Cliff, Ontario, plant of The International Nickel Company of Canada, Limited, and at the Montreal East Refinery of Canadian Copper Refiners, Limited. At Copper Cliff it is recovered from the slimes formed in the process of refining copper produced from the Sudbury nickel-copper ores. At Montreal East it is obtained from the refining of copper anodes made from copper ores at Noranda, Quebec, and from blister copper originating from the copper-zinc ores of Hudson Bay Mining and Smelting Co., Limited at Flin Flon on the Manitoba-Saskatchewan boundary.

The price of tellurium was quoted at $1.75 a pound in New York throughout 1949.

TABLE 34. Production of Tellurium, 1940-1949

Year	Pounds	$	Year	Pounds	$
1940	3,491	5,607	1945	484	929
1941	11,453	18,394	1946	15,848	24,405
1942	11,084	17,735	1947	9,194	16,090
1943	8,600	15,050	1948	11,425	19,994
1944	10,661	18,657	1949	11,692	21,046

TABLE 35. Consumption of Tellurium Metal in Steel and White Metal Foundries, 1940-1948

Year	Steel foundries	White metal foundries
	(pounds)	
1940	400	629
1941	185	492
1942	50	612
1943	135	453
1944	398	531
1945	–	308
1946	–	1,372
1947	–	974
1948	–	947

Thallium

There has been no production of thallium in Canada since 1944. The first commercial production of this element in this country was in 1944 when 128 pounds valued at $1,690 were contained in residues produced by Hudson Bay Mining and Smelting Company, Limited at the Flin Flon smelter, Manitoba. These residues were exported for treatment in foreign plants. Thallium metal was quoted in the United States at $15.00 per pound nominal, December, 1949.

Tin

No economic deposits of tin have been found in Canada up to present. Minor occurrences, principally of cassiterite (SnO_2) the most important tin mineral, are found in the New Ross area, Lunenburg county, Nova Scotia; in the Sudbury mining division of Ontario: in the Lac du Bonnet district of southeastern Manitoba; in southern British Columbia; in the Mayo district, Yukon, and in the Yellowknife, area, northwest Territories. Those in Nova Scotia, Ontario, Manitoba, and the Northwest Territories are found largely in pegmatite dykes. In Yukon, crystalline cassiterite is found in placer gravels along numerous creeks and in one small lode deposit. In British Columbia, tin is found associated with base metal sulphide ores. The last mentioned type of occurrence is the only one that has been exploited, and is the source of the small Canadian production. The lead-zinc-silver orebody of the Sullivan mine, Kimberley, British Columbia, contains a very small percentage of tin. Since 1941, The Consolidated Mining and Smelting Company of Canada, Limited has been recovering a portion of this tin as a by-product from the concentration of its lead-zinc ore.

In 1949 the average price of tin quoted in New York was 99.34 cents per pound. The quotation at the year-end was 80 cents per pound. The Canadian price at Montreal was 105 cents per pound in January and 89 cents in December.

TABLE 36. Production of New Tin, Domestic Consumption, Imports and Exports, 1940-1949

Year	Production	Domestic consumption	Exports	Imports	Stocks at end of period
	(Tons of 2,000 pounds)				
1940	–	3,868	–	5,918	2,655
1941	32	6,436	–	8,719	4,621
1942	619	3,571	–	3,601	5,120
1943	390	2,865	–	1,311	3,920
1944	258	3,383	–	1,341	2,622
1945	425	4,108	–	3,597	2,565
1946	437	4,152	–	3,514	2,430
1947	357	4,063	–	2,601	3,152
1948	346	4,531	–	4,029	2,944
1949	310	4,835	–	4,117	739

TABLE 37. Production of New Tin, 1941-1949

Year	Pounds	$	Year	Pounds	$
1941[1]	64,744	33,667	1946	874,186	507,028
1942	1,237,863	643,689	1947	714,198	517,794
1943	776,937	450,623	1948	691,332	688,567
1944	516,626	299,643	1949	619,117	633,047
1945	849,983	492,990			

1. First commercial production.

TABLE 38. Consumption of Tin (Ingots or Bars), by Principal Industries, 1945-1948

	1945	1946	1947	1948
	(Tons of 2,000 pounds)			
In white metal foundries (solder, babbitt, etc.)	1,320	1,321	1,300	1,636
In steel plants (chiefly for tinplate)	2,010	2,518	2,347	2,443
In brass and bronze foundries	532	208	307	315
In other industries	246	105	109	137
Total Accounted For	**4,108**	**4,152**	**4,063**	**4,531**

Titanium

The Dominion Magnesium Limited, Haley, Ontario, has developed a process for the production of metallic titanium. The properties of this metal are such that wide applications for its use should be found if the cost of production is sufficiently reduced. The metal melts at 1800°C, can be rolled and drawn, has a specific gravity of 4.5 (iron is 7.8) and scratches quartz. It has excellent corrosion resistance, except for certain acids, and shows no tarnish after thirty days' exposure to salt spray. The tensile strength of the annealed metal is 82,000 pounds per square inch. Cold-worked to 50 per cent reduction, the tensile strength is 126,000 pounds per square inch.

In recent years the production of titanium-bearing ores has been from the Baie St. Paul area in Quebec. Development of the ilmenite deposit at Allard Lake in Quebec indicates large tonnages of titanium-iron ore. It is proposed to ship this ore by rail to Havre St. Pierre on the St. Lawrence, thence to a smelter where the iron will be separated as pig iron and the slag will be used to produce titanium pounds.

The paint industry uses, in addition to titanium white, a considerably larger amount of mixed pigments containing titanium, also imported from the United States. Titanium white has many other uses, such as: to make paper opaque; to make rubber white; in ceramic glazes; for printing inks; in linoleum; in cosmetics; and to de-lustre artificial silk.

Titanium is used in many other forms. Ferrotitanium and ferrocarbon-titanium are used under special circumstances to purify steel. It is all imported from the United States.

Prices (nominal) f.o.b. Atlantic ports at the end of 1949 were: Ilmenite, 56 to 60% TiO_2, $14 to $16 per gross ton. Rutile, 94% TiO_2, 4 to 5 cents per pound. The nominal quotation for titanium metal, 96-98 per cent, was $5 per pound.

TABLE 39. Production of Titanium Ore[1], 1940-1949

Year	Short tons	$	Year	Short tons	$
1940	4,535	24,510	1945	14,147	67,575
1941	12,651	49,110	1946	1,406	7,735
1942	10,031	50,906	1947	7,104	36,036
1943	69,437	308,290	1948	4,441	21,091
1944	33,973	165,195	1949	540	2,892

1. All from Quebec.

TABLE 40. Imports of "Antimony Oxide, Titanium Oxide and White Pigments Containing not less than 14 Per Cent by Weight of Titanium", 1940-1949

Year	From the United Kingdom		From the United States		Total Imports	
	Pounds	$	Pounds	$	Pounds	$
1940	477,912	65,747	8,292,103	717,210	8,700,015	782,957
1941	418,962	64,302	12,801,017	1,257,065	13,219,979	1,321,367
1942	115,360	27,697	14,527,348	1,395,345	14,642,708	1,423,042
1943	33,700	8,094	16,855,800	1,525,368	16,889,500	1,533,462
1944	–	–	20,174,795	1,871,434	20,174,795	1,871,434
1945	79,440	16,752	21,279,636	2,029,137	21,359,076	2,045,889
1946	76,800	11,678	23,854,188	2,182,007	23,930,988	2,193,685
1947	17,920	4,862	27,294,577	2,960,964	27,312,497	2,965,826
1948	121,968	25,057	39,119,325	4,572,006	39,292,704	4,610,340
1949	1,436,162	254,809	40,150,356	4,902,730	41,586,518	5,157,539

TABLE 41. Consumption of Titanium Oxide, by Industries, 1947 and 1948

Industry	1947		1948	
	Pounds	Cost at works	Pounds	Cost at works
		$		$
Paints:				
Extended titanium dioxide pigments	14,083,236	1,167,946	17,582,375	1,609,929
Titanium dioxide	8,099,513	1,527,934	11,532,604	2,378,389
Polishes and dressings	276,469	39,424	308,655	43,153
Pulp and paper	654,000	120,611	644,000	130,594
Total Accounted for	23,113,218	2,855,915	30,072,634	4,162,065

TABLE 42. Consumption of Ferrotitanium in Manufacture of Steel, 1939-1948

Year	Tons	$	Year	Tons	$
1939	118	23,498	1944	786	149,527
1940	118	24,233	1945	656	123,975
1941	181	52,128	1946	416	73,485
1942	439	66,555	1947	500	86,228
1943	614	118,416	1948	442	81,129

Tungsten

Production of tungsten concentrates ceased at the Emerald mine of Canadian Explorations Limited near Salmo in southern British Columbia. Shipments in 1949 were made from the accumulated stockpile.

As an alloying metal in steel, tungsten (usually as ferrotungsten, but sometimes as calcium tungstate or scheelite concentrate) is used essentially to impart hardness and toughness, which are maintained even when the steel is heated to a high temperature. Almost 80 per cent of the consumption of tungsten in the United States is used for the production of high-speed steels for cutting tools, in which the tungsten content is 15 to 20 per cent. Minor amounts of tungsten are used in steels for dies, valves, and valve seats for internal combustion engines, and for permanent magnets. Stellite, the best known non-ferrous alloy, contains 10 to 15 per cent tungsten with higher percentages of chromium and cobalt. Tungsten carbide is widely used as an extra hard cutting tool and is now being used as inserts into detachable bits for rock drilling. Pure tungsten is used in lamp filaments, in radio tubes, contact points, etc.

The price of tungsten concentrate is an arbitrary agreement between the Canadian producer and the buyers. The average price in 1949 was $20 per short ton unit of WO_3.

TABLE 43. Production (Commercial Shipments) of Crude Tungsten Concentrates, 1940-1949

Year	Crude	WO_3 content	$
	Pounds	Pounds	
1940	12,002	[1]	7,303
1941	82,846[2]	42,356	38,712
1942	520,981	321,847	406,275
1943	1,508,621	817,763	1,083,538
1944	886,745	283,253	245,780
1945	1,153	792	1,045
1946	–	–	–
1947	668,000	496,023	680,792
1948	1,409,297	1,046,160	1,046,160
1949	334,000	252,380	252,380

1. Not recorded.
2. Includes export of considerable low-grade material to United States.

TABLE 44. Consumption of Ferrotungsten in Steel Furnaces, 1939-1948

Year	Short tons	Cost at works	Year	Short tons	Cost at works
		$			$
1939	106	173,250	1944	86	287,116
1940	376	829,859	1945	138	455,317
1941	482	1,003,314	1946	260	402,174
1942	203	524,007	1947	366	888,904
1943	550	1,721,967	1948	187	590,584

Vanadium

Some of the magnetites of the Rainy River district in Ontario are known to contain relatively small quantities of vanadium and some research has been conducted as to its economic recovery. There is no production of either the metal or its ores in Canada at the present time.

The principal world occurrences of vanadium are in Arizona, Colorado and Utah in the United States; Minasragra in Peru; Broken Hill in northern Rhodesia; and Grootfontein district in South West Africa.

The metal is employed chiefly in the manufacture of alloy steels and irons. It is also used in the form of ammonia meta-vanadate as a catalyst in the manufacture of sulphuric acid and in the non-ferrous, glass, ceramic and colour industries.

The United States Bureau of Mines reports that vanadium has been and is now being obtained by some countries from other than vanadium ores, including petroleum, bauxite, phosphate rock and titaniferous magnetites.

Vanadium ore was quoted December, 1949, at 27½ cents per pound contained V_2O_5, f.o.b. shipping point, by "E & M J Metal and Mineral Markets", New York.

Directory of Firms in the Miscellaneous Metal Mining Industry, 1949

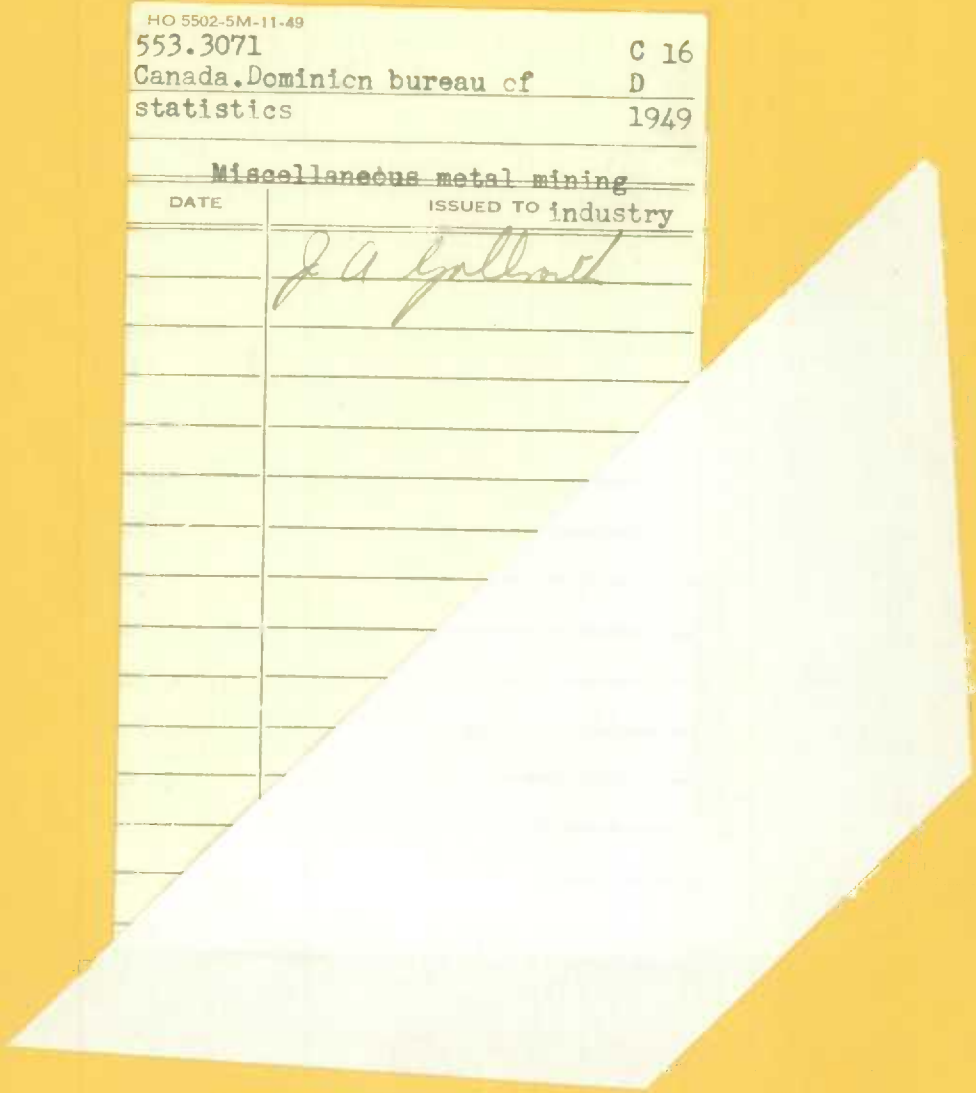
Name of firm and product	Head office address	Location of mine or plant
ALUMINUM:		
Aluminum Company of Canada Limited	1700 Sun Life Building, Montreal, Quebec	Arvida, Quebec; Shawinigan Falls, Quebec; La Tuque, Quebec; Ile Maligne, Quebec; Beauharnois, Quebec
ANTIMONY:		
Consolidated Mining & Smelting Company of Canada Ltd.	215 St. James St., Montreal, Quebec	Trail, British Columbia
BARIUM:		
Dominion Magnesium Ltd.	Haley, Ontario	Haley, Ontario
BERYL:		
Canadian Beryllium Mines & Alloys Ltd.[1]	100 Adelaide St. W., Toronto, Ontario	Renfrew County, Ontario
BISMUTH:		
Deloro Smelting & Refining Co. Ltd.	900 Victoria Building, Ottawa, Ontario	Deloro, Ontario
Consolidated Mining & Smelting Company of Canada Ltd.	215 St. James St., Montreal, Quebec	Trail, British Columbia
Molybdenite Corp. of Canada Ltd[1]	59 St. James St. W., Montreal, Quebec	La Corne Tp., Quebec
CADMIUM:		
Consolidated Mining & Smelting Company of Canada Ltd.	215 St. James St., Montreal, Quebec	Trail, British Columbia
Hudson Bay Mining & Smelting Co. Ltd.	500 Royal Bank Building, Winnipeg, Manitoba	Flin Flon, Manitoba
Western Exploration	Silverton, British Columbia	Kaslo, British Columbia
CHROMITE:		
Chrome Association[1]	342 Notre Dame St., Black Lake, Quebec	Black Lake, Quebec
Chromite Ltd.[1]	404 Notre Dame St. W., Montreal, Quebec	Cleveland Tp., Quebec
Pare, Orel	Black Lake, Quebec	Coleraine Tp., Quebec
IRON ORE:		
Dominion Wabana Ore Ltd.	Sydney, Nova Scotia	Bell Island, Newfoundland
Fenimore Iron Mines Ltd.[1]	123 St. James St. W., Montreal, Quebec	New Quebec
Fort Chimo Mines Ltd.[1]	25 King St. W., Toronto, Ontario	New Quebec
Great Mountain Iron Corp.[1]	516 Canada Cement Building, Montreal, Quebec	Connelly Lake, Ungava
Hollinger North Shore Exploration Co. Ltd.[1]	721 Royal Bank Building, Montreal, Quebec	New Quebec
Mistassini Explorations Ltd.[1]	84 Bay St., Toronto, Ontario	Lake Albanel, Quebec
Norancon Exploration (Quebec) Ltd.[1]	Noranda, Quebec	Ungava district, Quebec
Quebec Labrador Development Co. Ltd.[1]	100 Adelaide St. W., Toronto, Ontario	New Quebec
United Dominion Mining Co. Ltd.[1]	465 St. John St., Montreal, Quebec	Saguenay Co., Quebec

1. Active but not producing.

Directory of Firms in the Miscellaneous Metal Mining Industry, 1949 – (Concluded)

Name of firm and product	Head office address	Location of mine or plant
IRON ORE (con.):		
Algoma Ore Properties Ltd.	Cornwall Building, Sault Ste. Marie, Ontario	Algoma district, Ontario.
Michipicoten Iron Mines Ltd	25 King St. W., Toronto, Ontario	Algoma district, Ontario.
Rebair Gold Mines Ltd.[1]	9 Adelaide St. E., Toronto, Ontario	Atikokan, Ontario
Steep Rock Iron Mines Ltd.	25 King St. W., Toronto, Ontario	Rainy River District, Ontario
Sheffield Iron Mines Ltd.[1]	69 York St., Toronto, Ontario	Tamworth, Ontario
Coast Iron Co. Ltd.	475 Howe St., Vancouver, British Columbia	Quinsam Lake
INDIUM:		
Consolidated Mining & Smelting Company of Canada Ltd.[1]	215 St. James St., Montreal, Quebec	Trail, British Columbia
LITHIUM:		
Canadian Lithium Co. Ltd.[1]	57 Queen St., Toronto, Ontario	Abitibi Co., Quebec
La Corne Lithium Mines Ltd.[1]	320 Bay St., Toronto, Ontario	La Corne, Quebec
MANGANESE:		
Quebec Manganese Mines Ltd.[1]	231 St. James St. W., Montreal, Quebec	Magdalen Islands, Quebec
MAGNESIUM:		
Dominion Magnesium Ltd.	67 Yonge St., Toronto, Ontario	Haley, Ontario
Aluminum Co. of Canada Ltd.	1700 Sun Life Building, Montreal, Quebec	Arvida, Quebec
MERCURY:		
Bralorne Mines Ltd.[1]	555 Burrard St., Vancouveur, British Columbia	Omineca district, British Columbia
Consolidated Mining & Smelting Company of Canada Ltd.[1]	215 St. James St., Montreal, Quebec	Pinchi Lake, British Columbia
MOLYBDENITE:		
Molybdenite Corp. of Canada Ltd.	59 St. James St. W., Montreal, Quebec	La Corne, Quebec
Quyon Molybdenite Co. Ltd.[1]	Quyon, Quebec	Quyon, Quebec
SELENIUM—TELLURIUM:		
International Nickel Co. of Canada Ltd.	Copper Cliff, Ontario	Copper Cliff, Ontario
Canadian Copper Refiners Ltd.	1600 Royal Bank Building, Toronto, Ontario	Montreal East, Quebec
TANTALUM—COLUMBITE:		
Tantalum Refining & Mining Corporation of America[1]	11 King St. W., Toronto, Ontario	Moss Lake, Northwest Territories
THALLIUM:		
Hudson Bay Mining & Smelting Co. Ltd.[1]	500 Royal Bank Building, Winnipeg, Manitoba	Flin Flon, Manitoba
TIN:		
Consolidated Mining & Smelting Company of Canada Ltd.	215 St. James St., Montreal, Quebec	Trail, British Columbia
Mountain Crest Mines Ltd.[1]	1445 MacKay St., Montreal, Quebec	Charlevoix, Quebec
TITANIUM ORE:		
Baie St. Paul Titanic Iron Ore Co.	Baie St. Paul, Quebec	St. Urbain, Quebec
Coulombe, J.[1]	71 Ave. Royal Monument, Quebec, Quebec	St. Urbain, Quebec
Kennco Explorations, Ltd.[1]	244 Bay St., Toronto, Ontario	Allard Lake, Quebec
Quebec Iron and Titanium Corp.	1522 Sherbrooke St. W., Montreal, Quebec	Lac Tio, Quebec
TUNGSTEN CONCENTRATES:		
Canadian Exploration Ltd.	Royal Bank Building, Vancouver, British Columbia	Salmo, British Columbia

1. Active but not producing.



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