

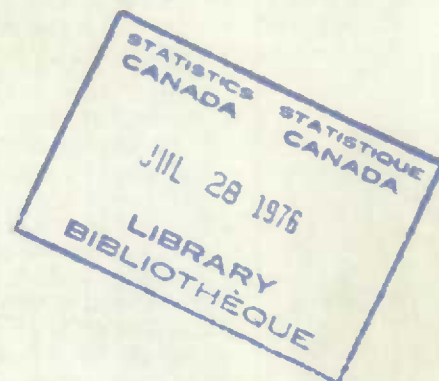
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DOMINION BUREAU OF STATISTICS

Industry and Merchandising Division

Mining, Metallurgical and Chemical Section

# THE MISCELLANEOUS METAL MINING INDUSTRY 1952



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# NOTICE

The annual reports prepared by the Industry and Merchandising Division of the Bureau of Statistics are divided into 3 volumes, as follows: **Volume I** — The Primary Industries, including mining, forestry and fisheries; **Volume II** — Manufacturing; **Volume III** — Merchandising and Services. The volumes are made up of parts, and the parts in turn are subdivided according to the industries which they comprise.

Volume I consists of the following parts:

- Part I — Mineral Statistics
- Part II — Forestry Statistics — Operations in the Woods
- Part III — Fisheries Statistics

Part I includes the following reports which constitute the complete series on Mineral Statistics of Canada. Individual reports are issued as the information becomes available; they are arranged in a form suitable for binding.

- A — General Review of the Mining Industry, 50¢
- B — The Gold Mining Industry, 50¢
- C — The Silver-Lead-Zinc Mining Industry, 25¢
- D — The Nickel-Copper Mining, Smelting and Refining Industry, 25¢
- E — The Miscellaneous Metal Mining Industry, 25¢
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- T — The Stone Industry, 25¢
- U — Contract Drilling in the Mining Industry, 25¢

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# THE MISCELLANEOUS METAL MINING INDUSTRY

1952

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 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 1952 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 some 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, the statistics of employment, etc., relating 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 46 firms in the miscellaneous metals industry in 1952 but only 15 were classed as producers. Salaries and wages for the 5,163 persons employed amounted to \$18,370,772. Fuel cost \$1,507,923 and 145,993,734 k.w.h. of electricity were purchased for \$1,074,271. Process supplies, freight and ore treatment charges amounted to \$11,537,420. Gross value of production was \$39,643,078.

TABLE 1. Principal Statistics<sup>1</sup> of the Miscellaneous Metal Mining Industry, 1950-1952

	1950	1951	1952
Number of firms .....	16	31	46
Number of plants .....	16	31	47
Number of employees:			
Administrative and office .....	274	330	578
Workmen .....	2,951	3,561	4,585
<b>Total</b> .....	<b>3,225</b>	<b>3,891</b>	<b>5,163</b>
Yearly earnings:			
Administrative and office .....	\$ 986,545	1,232,628	2,244,224
Workmen .....	\$ 7,592,424	11,019,127	16,126,548
<b>Total</b> .....	<b>\$ 8,578,969</b>	<b>12,251,755</b>	<b>18,370,772</b>
Gross value of products, f.o.b. shipping points .....	\$ 23,646,960	31,474,736	39,643,078
Cost of fuel and electricity .....	\$ 1,387,828	1,864,309	2,582,194
Process supplies used .....	\$ 3,272,336	3,299,651	5,758,407
Smelter charges .....	\$ —	200	615,808
Freight .....	\$ 3,878,485	4,544,733	5,163,205

1. Does not include data relating to smelters and refineries or to mining in the Northwest Territories. Data for 1949-1951 cover only antimony, chromium, iron, manganese, molybdenum, titanium and tungsten.



TABLE 2. Average Number of Workmen, by Months, 1931 and 1932

Month	1931						1932					
	Surface		Under-ground	Mill		Total	Surface		Under-ground	Mill		Total
	Male	Female		Male	Female		Male	Female		Male	Female	
January .....	1,422	30	1,510	136	2	3,100	2,104	43	1,819	233	4	4,203
February .....	1,393	28	1,483	139	2	3,045	2,098	43	1,815	238	4	4,198
March .....	1,447	30	1,509	137	2	3,125	2,084	39	1,829	257	4	4,213
April .....	1,577	31	1,528	131	2	3,269	2,008	43	1,876	270	4	4,201
May .....	1,709	29	1,526	153	2	3,419	2,164	43	1,972	280	4	4,463
June .....	1,947	28	1,569	168	2	3,714	2,489	42	1,974	287	4	4,796
July .....	2,046	28	1,551	165	2	3,762	2,555	45	2,002	303	4	4,909
August .....	1,939	53	1,646	189	2	3,829	2,597	44	2,024	302	4	4,971
September .....	2,023	41	1,651	198	2	3,915	2,552	41	2,036	305	4	4,938
October .....	2,024	51	1,632	215	2	3,924	2,395	36	2,037	317	4	4,789
November .....	1,933	52	1,649	224	2	3,860	2,302	39	2,045	285	4	4,675
December .....	1,836	42	1,649	159	2	3,688	2,279	37	2,026	287	4	4,633
<b>Average</b> .....	<b>1,776</b>	<b>38</b>	<b>1,576</b>	<b>169</b>	<b>2</b>	<b>3,561</b>	<b>2,304</b>	<b>42</b>	<b>1,955</b>	<b>280</b>	<b>4</b>	<b>4,585</b>

			Man hours worked in	
			1931	1932
Administrative and office .....			688,047	1,489,104
Workmen .....			7,305,632	12,462,809
<b>Total</b> .....			<b>7,993,679</b>	<b>13,951,913</b>

## Aluminum

Although there is no bauxite (the ore of aluminum) in Canada, the aluminum smelting industry in this country 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.

Aluminum ingot production in 1952 was 499,758 tons which was an increase of nearly 12 per cent above the previous year. The output exceeded the previous record made in 1943.

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. The La Tuque plant was not operated during 1952.

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.

The price of aluminum ingot was 18 cents per pound at the close of 1952. Effective January 1, 1948, the United States import tariff on aluminum metal and alloys was reduced from 3 cents to 2 cents per pound.

Smelter capacity in the Saguenay area in Quebec is now being expanded by about 50,000 tons annually, effective early in 1953. Also new power and ingot facilities in British Columbia will add another 100,000 tons.

TABLE 3. Production, Consumption, Imports and Exports of Aluminum Ingots, 1943-1952

Year	Production	Consumption	Exports	Imports
Tons of 2,000 pounds				
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
1950 .....	396,882	65,185	335,726	63
1951 .....	447,095	86,241	354,414	270
1952 .....	499,758	90,287	412,589	13

TABLE 4. Imports of Aluminum and Bauxite, 1951 and 1952

Item	1951		1952	
	Tons	\$	Tons	\$
Alumina .....	274	99,021	321	130,696
Bauxite ore .....	2,401,759	15,373,013	2,454,869	12,915,009
Cryolite .....	6,516	1,102,415	2,246	370,902
Aluminum:				
Pigs, ingots and blocks .....	270	174,684	13	46,912
Scrap .....	45	10,375	501	100,488
Angles, channels and beams .....	237	432,811	190	315,585
Bars, rods and wire .....	1,128	944,356	109	117,119
Leaf or foil .....		185,404		187,008
Pipes and tubes .....	183	201,031	127	153,102
Plates, sheets and strips .....	3,860	3,202,396	3,522	2,672,642
Powder .....	205	143,311	14	15,235
Wire and cable .....	14	12,712	25	20,055
Household hollow ware .....		697,887		688,519
Manufactures, n.o.p. ....		5,491,990		4,906,796

TABLE 5. Exports of Aluminum, 1951 and 1952

Item	1951		1952	
	Tons	\$	Tons	\$
Aluminum scrap .....	3,951	1,247,924	3,493	651,766
Aluminum in primary forms .....	354,414	112,019,417	412,590	142,743,465
Aluminum manufactures, n.o.p. ....		1,748,207		5,495,540
Aluminum, semi-fabricated .....	14,805	7,585,927	23,617	11,710,441
Aluminum kitchen utensils .....		240,413		103,995
Aluminum foil .....	1,613	1,937,547	1,261	1,632,724

TABLE 6. World Production of Aluminum, 1949-1952 (From the Annual Report of the American Bureau of Metal Statistics)

Country	1949	1950	1951	1952
Tons of 2,000 pounds				
United States .....	603,462	718,622	836,881	937,330
Canada .....	369,466	396,882	447,095	496,023
Brazil .....			444	1,196
<b>Total America .....</b>	<b>972,928</b>	<b>1,115,504</b>	<b>1,284,420</b>	<b>1,434,549</b>
Austria .....	16,309	19,828	29,078	40,468
France .....	59,679	66,926	100,423	116,987
Germany <sup>2</sup> .....	31,789	30,686	81,718	110,740
Great Britain .....	33,986	33,004	31,052	31,367
Italy .....	28,302	40,862	54,841	58,131
Hungary .....	9,039			
Norway .....	39,349	51,870	57,436	57,821
Spain .....	1,336	2,389	4,583	4,497
Sweden .....	4,331	4,505	7,441	8,862
Switzerland .....	23,148	20,944	29,762	32,518
Yugoslavia .....	2,748	2,129	3,117	2,825
<b>Total Europe .....</b>	<b>250,016</b>			
China, Taiwan .....	1,446	1,941	2,864	4,250
India .....	3,909	4,028	4,311	3,994
Japan .....	23,393	27,793	40,681	47,026

1. Excluding Russia and Russian zone of Germany.
2. Production beginning with 1949 Federal Republic of Germany.
3. Not available.



## Antimony

Antimony production in 1952 consisted of the antimony content of antimonial lead alloys varying from 5 to 25 per cent antimony made by the Consolidated Mining and Smelting Co. of Canada, Limited, at Trail, British Columbia; and antimony in flue dust and Dore slag shipped from that smelter. The 3,351 tons shown for shipments in 1951 included some antimony in flue dust and slag produced in earlier years but not previously recorded.

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 by ammunition and to flame proof canvas goods used by the armed forces.

The Canadian price for antimony was about 38 cents per pound at the end of the year.

TABLE 7. Production of Antimony 1943-1952

Year	In ores exported		Metal produced <sup>1</sup> in Canada		Total	
	Pounds	\$	Pounds	\$	Pounds	\$
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
1950 .....	—	—	643,540	215,586	643,540	215,586
1951 .....	5,398,328 <sup>2</sup>	817,391	1,303,836	619,322	6,702,164	1,436,713
1952 .....	1,242,840	111,856	1,088,060	489,627	2,330,900	601,483

1. No refined metal in 1945-1952; figures represent antimony content of antimonial lead.

2. Includes antimony in flue dust and Dore slag produced in 1949 and 1950 but not previously recorded.

TABLE 8. Production of Antimony Metal, Consumption, Imports and Exports, 1943-1952

Year	Production in Canada	Consumption in Canada <sup>2</sup>	Imports	Exports <sup>1</sup>
Tons of 2,000 pounds				
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 .....	—	767	1,292	—
1950 .....	—	997	1,606	—
1951 .....	—	740	681	—
1952 .....	—	667	861	—

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

2. Not including antimony in antimonial lead produced at the Trail smelter.

TABLE 9. Consumption of Antimony Metal, by Industries, 1949-1952

Industry	1949	1950	1951	1952
Tons of 2,000 pounds				
White metal foundries .....	683	907	632	594
Electrical apparatus plants .....	63	68	72	42
Brass foundries .....	11	14	16	12
Jewellery & Electro-plate .....	10	8	20	19
<b>Total accounted for .....</b>	<b>767</b>	<b>997</b>	<b>740</b>	<b>667</b>

TABLE 10. World Production of Antimony (content of ore), by Countries, 1948-1952

(Taken from the "Minerals Yearbook" published by the United States Bureau of mines.)

Country	1948	1949	1950	1951	1952
Metric tons					
North America:					
Canada <sup>2</sup> .....	141	72	292	591	1,134
Honduras.....	6	9	3	3	—
Mexico <sup>2</sup> .....	7,380	5,753	5,868	6,824	5,531
United States.....	5,887	1,484	2,265	3,150	1,960
South America:					
Argentina.....	4	4	4	4	4
Bolivia (exports).....	12,260	10,275	8,781	11,816	9,806
Peru.....	1,556	729	971	1,107	505
Europe:					
Austria <sup>5</sup> .....	269	379	409	498	389
Czechoslovakia.....	4,100	4	2,000 <sup>6</sup>	4	4
France.....	275	338	407	611	
Greece.....	—	49	350	500	350
Hungary <sup>7</sup> .....	4	4	4	4	4
Italy.....	553	503	671	794	779
Portugal.....	41	21	15	19	4
Spain.....	219	259	200	117	665 <sup>8</sup>
Yugoslavia.....	2,250	2,789	3,205	1,973	2,700 <sup>6</sup>
Asia:					
British Borneo: Sarawak.....	4	1	2	—	4
Burma <sup>6</sup> .....	121	70	40	200	4
China.....	3,251	4,000	6,000	8,000	8,000
Indochina.....	—	—	—	—	4
Iran.....	—	175 <sup>9</sup>	230 <sup>9</sup>	230 <sup>6,9</sup>	160
Japan.....	135	172	161	221	209
Thailand (Siam).....	92	265	87	65	70
Turkey (Asia Minor).....	600	460	1,288	3,360	1,400
Africa:					
Algeria.....	746	1,326	1,250	1,462	1,321
French Morocco.....	520	700	689	957	839
Southern Rhodesia.....	9	41	24	62	100
Spanish Morocco.....	272	150	353	213	10
Union of South Africa.....	4,106	4,461	8,311	15,858	7,211
Oceania:					
Australia.....	188	198	227	310	170 <sup>6</sup>
New Zealand.....	5	3	—	—	4
<b>Total (except U.S.S.R.).....</b>	<b>45,000</b>	<b>37,000</b>	<b>44,000</b>	<b>62,000</b>	<b>46,000</b>

1. Approximate metal content of ore produced, exclusive of antimonial lead ores.

2. Includes antimony content of antimonial lead.

3. Negligible.

4. Data not available; estimate included in total.

5. Excludes Soviet zone, but estimates for which are included in the totals.

6. Estimate.

7. Trianon Hungary.

8. Including Spanish Morocco.

9. Year ended March 20 of year following that stated.

10. Included in Spain.

## Barium

The commercial production of barium metal was introduced in Canada by the Dominion Magnesium Limited, at Haley, Ontario, in 1947. There was a small production in 1950, 1951 and 1952.

The raw material for making barium metal is imported so the output figures are not included in the statistics of Canada's mineral production.

## Beryllium

No beryllium ore has been mined since 1941 when some was produced in Renfrew County and stock piled. In 1950 a carload of this material was shipped to the United States. No shipments were made in 1952.

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 the 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 5 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 spark plugs 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 \$45 to \$48 per unit of BeO, 10 to 12 per cent.

## Bismuth

Bismuth was produced at the Trail smelter of the Consolidated Mining and Smelting Company of Canada, Limited, from the firm's own ores and also from custom ores. In Quebec, the Molybia Corporation, Limited, produced bismuth oxychloride concentrates.

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 December 1952 was \$2.25 per pound, in ton lots.

TABLE 11. Production of Primary Bismuth in all Forms<sup>1</sup>, 1943-1952

Year	Pounds	\$	Year	Pounds	\$
1943 .....	407,597	562,484	1948 .....	240,242	480,484
1944 .....	123,875	154,844	1949 .....	102,913	210,972
1945 .....	189,815	260,047	1950 .....	191,621	431,147
1946 .....	240,504	336,706	1951 .....	230,298	543,504
1947 .....	284,372	560,213	1952 .....	162,373	347,224

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



TABLE 12. Production of Bismuth Metal, Consumption, Imports and Exports, 1943-1952

Year	Production	Domestic consumption	Exports <sup>1</sup>	Imports
Tons of 2,000 pounds				
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 <sup>2</sup>	18	89	—
1950	97 <sup>2</sup>	33	57	—
1951	104 <sup>2</sup>	54	45	—
1952	71 <sup>2</sup>	53	17	—

1. Shipped for export by Canadian producers

2. Includes bismuth from foreign ores.

TABLE 13. Consumption of Bismuth Metal, by Industries, 1949-1952

Industry	1949	1950	1951	1952
Tons of 2,000 pounds				
Medicinals and pharmaceuticals	8	14	29	26
White metal foundries	10	14	18	20
Miscellaneous	—	5	7	7
<b>Total</b>	<b>18</b>	<b>33</b>	<b>54</b>	<b>53</b>

TABLE 14. World Production of Bismuth, by Countries, 1948-1952

(Taken from the "Minerals Yearbook" of the United States Bureau of Mines).

Country <sup>1</sup>	1948	1949	1950	1951	1952
Kilograms					
Argentina: Metal	2	2	2	2	2
In ore <sup>3</sup>	2	2	2	2	2
Australia (in ore) <sup>4</sup>	4,064	660 <sup>5</sup>	914 <sup>5</sup>	1,372	1,700
Belgian Congo (in ore)	456	540	668	225	700 <sup>3</sup>
Bolivia (in ore and bullion exported) <sup>6</sup>	35,142	8,222	24,443	69,081	2
Canada (metal) <sup>7</sup>	108,971	46,680	86,918 <sup>5</sup>	104,461	81,745
China (in ore) <sup>3</sup>	2	5,000	2	2	2
France (in ore)	56,000	59,000 <sup>5</sup>	78,000	2	2
Japan (metal)	23,327	25,946	33,049	42,010	44,000
Korea, South	104,000	173,420	2	12,500	56,300 <sup>3</sup>
Mexico (in impure bars)	154,000	249,000	263,000	338,000	304,952
Peru: Metal	205,861	215,707 <sup>5</sup>	226,851	262,655	320,000
In lead-bismuth alloy	47,225	2,398	—	—	—
South-West Africa (in ore) <sup>3</sup>	—	500	7,200	100	2
Spain (metal)	24,269	19,854	11,344	15,180	2
Sweden	—	—	—	—	2
Uganda	3,963	7,519	3,658	2,896	1,000 <sup>3</sup>
Union of South Africa (in ore)	437	5,045	7,649	3,184	1,000 <sup>3</sup>
United States	8	8	8	8	8
Yugoslavia	51,100	38,100	60,531	87,760	98,700
<b>World production, estimate</b>	<b>1,500,000</b>	<b>1,500,000</b>	<b>1,400,000</b>	<b>1,700,000</b>	<b>1,800,000</b>

1. Bismuth is believed to be produced also in Brazil, Burma, Germany, Norway, Rumania, U.S.S.R., and United Kingdom. Production figures are not available for these countries, but estimates are included in total.

2. Data not available. Estimate included in total.

3. Estimate.

4. Partly estimated. Excludes content of some bismuth-tungsten concentrates.

5. Revised figure.

6. Excludes bismuth content of tin concentrates exported.

7. Refined metal plus bismuth content of bullion exported.

8. Production included in total; Bureau of Mines not at liberty to publish separately.

## 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 British Columbia and Yukon 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 1952 amounted to 474 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, 1952 was \$1.75 per pound.

TABLE 15. Production of Cadmium in all Forms, 1943-1952

Year	British Columbia and Yukon		Manitoba and Saskatchewan		Canada	
	Pounds	\$	Pounds	\$	Pounds	\$
1943 .....	598,673	688,474	187,940	216,128	786,613	904,602
1944 .....	386,410	425,051	140,560	154,616	526,970	579,667
1945 .....	510,432	505,328	135,632	134,275	646,064	639,603
1946 .....	636,315	776,304	166,333	202,926	802,648	979,230
1947 .....	545,638	938,497	172,896	297,382	718,534	1,235,879
1948 .....	617,226	1,126,437	148,864	271,677	766,090	1,398,114
1949 .....	665,449	1,364,170	181,092	371,239	846,541	1,735,409
1950 .....	706,950	1,640,124	141,456	328,176	848,406	1,968,302
1951 .....	1,179,752	3,161,735	147,168	394,410	1,326,920	3,556,145
1952 .....	834,235	1,835,317	114,352	251,574	948,587	2,086,891

TABLE 16. Consumption and Exports of Cadmium Metal, 1943-1952

Year	Production	Domestic consumption	Exports
	Tons of 2,000 pounds		
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
1950 .....	419 <sup>1</sup>	116	349
1951 .....	633 <sup>1</sup>	146	460
1952 .....	410 <sup>1</sup>	116	310

1. Includes cadmium recovered from foreign ores.

Note. Statistics on imports are not available.

**TABLE 17. World Production of Cadmium, by Countries, 1948-1952**

(Taken from the "Minerals Yearbook" of the United States Bureau of Mines)

Country	1948	1949	1950	1951	1952
Kilograms					
Australia (Tasmania) .....	293,352	263,767 <sup>1</sup>	299,125 <sup>1</sup>	234,708	292,978
Belgian Congo .....	18,056	24,635	29,668 <sup>1</sup>	24,316	20,000 <sup>2</sup>
Belgium <sup>2</sup> .....	157,900	148,000	365,000	450,000	600,000 <sup>2</sup>
Canada .....	347,491	383,983	384,828 <sup>1</sup>	601,878	455,687
France .....	50,067	58,123	71,591	84,997	100,000 <sup>2</sup>
Germany, West .....	3,500	5,000	—	70,000	70,000 <sup>2</sup>
Italy .....	47,000	74,000 <sup>1</sup>	75,000 <sup>1</sup>	204,000	133,000
Japan .....	18,874 <sup>1</sup>	52,484	90,348	117,687	130,000 <sup>2</sup>
Mexico <sup>3</sup> .....	905,000	820,000	689,000	893,000	733,000
Norway .....	62,000	71,400	78,747	100,000	100,000 <sup>2</sup>
Peru .....	1,592	800	1,365	—	—
Poland .....	160,000 <sup>4</sup>	240,000 <sup>4</sup>	240,000 <sup>2</sup>	240,000 <sup>2</sup>	240,000 <sup>2</sup>
South-West Africa <sup>5</sup> .....	517,093 <sup>1</sup>	753,867 <sup>1</sup>	609,625 <sup>1</sup>	650,448	504,392
Spain .....	5,368	5,116	4,348	3,900	5,000 <sup>2</sup>
U.S.S.R. <sup>2, 6</sup> .....	58,000	58,000	70,000	80,000	90,000
United Kingdom .....	115,769	102,662	118,899 <sup>1</sup>	139,026	157,285
United States: Metal .....	3,439,555	3,639,432	4,021,254	3,680,537	3,804,633
Cadmium compounds (Cd. content) .....	87,405	92,079	154,540	89,402	81,345
<b>Total (estimate) .....</b>	<b>4,866,000</b>	<b>5,219,000</b>	<b>6,005,000</b>	<b>6,120,000</b>	<b>6,280,000</b>

1. Revised.

2. Estimate.

3. Cadmium content of flue dust exported for treatment elsewhere; represents in part shipments from stocks on hand. To avoid duplication of figures, data are not included in the total.

4. Planned production.

5. Cadmium content of concentrates exported for treatment elsewhere. To avoid duplication of figures, data are not included in the total.

6. Estimated average for 1936-1938 was 50,000.

**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. In 1952 the value of output is included with the data on magnesium.

uent with non-ferrous metals. It has been employed in the reduction of difficultly reducible metals, such as chromium, thorium, uranium, and zirconium.

Calcium has found increasing use as a deoxidizer in ferrous metallurgy and as an alloy constit-

In 1952, the New York price for calcium, 97-98 per cent as cast, was \$2.05 per pound.

**TABLE 18. Production (shipments) of Calcium Metal, 1945-1952**

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
1950-1952 .....	(Not available for publication)	



## Cerium

Cerium is obtained from monazite, a monoclinic phosphate of cerium metals containing about 32 per cent cerium oxide ( $\text{Ce}_2\text{O}_3$ ) and up to 18 per cent thorium ( $\text{ThO}_2$ ). 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

There was no Canadian production of chromite in 1952. This mineral was mined for several years in the Black Lake area in Quebec.

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 corrosion-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  $\text{Cr}_2\text{O}_3$  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  $\text{Cr}_2\text{O}_3$ . Refractory chromite should be fairly high in  $\text{Cr}_2\text{O}_3$  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 coarse grains mixed with blobs of silicate. The  $\text{Cr}_2\text{O}_3$  content is usually over 40 per cent.

The United States price, December, 1952, for chrome ore, 48 per cent  $\text{Cr}_2\text{O}_3$ , was \$43.00 – \$54.00 per long ton, f.o.b. Atlantic ports.

TABLE 19. Production of Chromite, 1943-1952

Year	Short tons	\$	Year	Short tons	\$
1943 .....	29,595	919,878	1948 .....	1,715	33,568
1944 .....	27,054	748,494	1949 .....	361	7,148
1945 .....	5,755	160,752	1950 .....	—	—
1946 .....	3,110	61,123	1951 .....	—	—
1947 .....	2,162	42,159	1952 .....	—	—

TABLE 20. World Production of Chromite, by Countries, 1948-1952

(Taken from the "Minerals Yearbook" of the United States Bureau of Mines.)

Country <sup>1</sup>	1948	1949	1950	1951	1952
	Metric tons				
North America:					
Canada .....	1,556	327 <sup>2</sup>	—	—	—
Cuba .....	116,624	97,368	65,820 <sup>2</sup>	79,065	61,808
Guatemala .....	444 <sup>2</sup>	300	289 <sup>2</sup>	1,138	60
United States.....	3,283	393	367	6,401	19,327
South America:					
Argentina .....	—	3	3	3	3
Brazil (exports) .....	1,626	3	3	3	3
Europe: <sup>4</sup>					
Albania.....	16,500 <sup>5</sup>	3	3	3	3
Greece .....	1,500	3,381	12,631	25,333	28,883
Portugal .....	176 <sup>2</sup>	88 <sup>2</sup>	45	33	3
Yugoslavia.....	62,613 <sup>2</sup>	109,120	114,736	99,639	107,700
Asia:					
Afghanistan .....	—	1,000	550	75	1,000
Cyprus (exports) .....	6,899	14,875	18,441	12,653	12,082
India .....	22,917	19,728	16,998	16,056	3
Japan .....	9,340	27,003	31,953	40,407	47,000 <sup>6</sup>
Pakistan.....	18,160	17,194 <sup>2</sup>	18,416 <sup>2</sup>	18,006	17,545
Philippines .....	256,854	246,744	250,511	334,571	543,514
Turkey .....	285,353 <sup>2</sup>	451,566 <sup>2</sup>	420,792 <sup>2</sup>	602,220	635,000 <sup>6</sup>
U.S.S.R. <sup>4,6</sup> .....	600,000	350,000	500,000	600,000	600,000
Africa:					
Egypt .....	191	50	36	—	—
Sierra Leone .....	7,886	22,101	7,518	16,425	3
Southern Rhodesia .....	230,703	243,506	291,525	300,267	322,666
Union of South Africa.....	412,783	404,351	496,324	545,306	580,024
Oceania:					
Australia .....	564	642	905	1,402	3
New Caledonia .....	75,021	88,992	84,801	88,792	107,660
Total (estimate) .....	2,100,000 <sup>2</sup>	2,000,000 <sup>2</sup>	2,300,000	2,800,000	3,200,000

1. In addition to countries listed, Bulgaria, Indochina, Iran, Sweden and United Kingdom produce chromite, but data on output are not available: estimates are included in total.

2. Revised figure.

3. Data not available; estimate included in total.

4. Output from U.S.S.R. in Europe included with U.S.S.R. in Asia.

5. Planned production as reported.

6. Estimate.

TABLE 21. Imports of Chrome Ores, 1943-1952

Year	Tons	\$	Year	Tons	\$
1943 .....	103,471	2,121,228	1948 .....	69,183	1,937,692
1944 .....	39,089	618,231	1949 .....	66,246	1,664,082
1945 .....	60,691	1,154,985	1950 .....	119,325	2,192,555
1946 .....	15,836	269,248	1951 .....	146,998	3,762,874
1947 .....	98,322	3,138,229	1952 .....	148,343	5,146,860

TABLE 22. Imports of Chrome Ores, by Principal Countries of Supply, 1951 and 1952

Imported from	1951		1952	
	Tons	\$	Tons	\$
Union of South Africa .....	55,569	445,484	33,469	327,072
Southern Rhodesia .....	23,717	918,227	18,898	770,107
India.....	—	—	—	—
Cuba .....	12,847	254,230	13,560	364,977
Turkey .....	11,090	419,853	16,731	754,645
French Oceania .....	—	—	—	—
United States .....	43,775	1,725,080	58,965	2,845,234
Philippines .....	—	—	6,720	84,825
Sierra Leone .....	—	—	—	—
Pakistan .....	—	—	—	—
<b>Total .....</b>	<b>146,998</b>	<b>3,762,874</b>	<b>148,343</b>	<b>5,146,860</b>

### Indium

Indium production in 1952 amounted to 404 ounces valued at \$909 as compared with 582 ounces valued at \$1,368 in 1951. Indium is recovered by the Consolidated Mining & Smelting Co. of Canada, Limited, 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 1952 the quoted price of indium at New York was \$2.25 per ounce troy. The price has remained at this level for the past seven years.



## Iron Ore

The shipments of iron ore from Canadian mines during 1952 amounted to 5,271,849 short tons valued at \$33,744,311, compared with 4,680,510 short tons worth \$31,141,112 in 1951 at shipping ports.

As a part of its program of expansion Steep Rock Iron Mines Limited continued the dredging of silt from above its Hogarth ("A") orebody and speeded this up by the addition of a second dredge. Development of its Errington ("B") underground mine was continued also. At the Helen mine of Algoma Ore Properties Limited in the Michipicoten area, progress was made in the preparation for mining at greater depth. In Newfoundland, Dominion Wabana Ore Limited continued its program of underground mine modernization. In British Columbia, the main event was the bringing into production of the Texada Island magnetite deposits by Texada Mines Limited. The Argonaut Co. Ltd. at Campbell River, B.C., increased its production of magnetite substantially and made a number of shipments to the

Atlantic Coast of the United States. Production of iron and steel ingots by Quebec Iron and Titanium Corporation at Sorel, Quebec, increased twofold.

In the field of iron ore development and general exploration, 1952 was an exceedingly active year in Canada. In Labrador, New Quebec. Iron Ore Company of Canada continued with the construction of railway, terminal, power, dock, and townsite facilities at a rapid rate. At Marmora, in south-eastern Ontario, the stripping of limestone overburden was commenced at a rate of about 30,000 tons per day. General exploration for iron ore was particularly active in New Quebec, in southeastern Ontario, and on the Pacific Coast of British Columbia, but was not confined to those areas.

Detailed technical information on the mining and development of the iron ore industry may be found in the annual report of the Department of Mines and Technical Surveys, Ottawa.

TABLE 23. Principal Statistics for the Iron Ore Mining Industry, 1950-1952

	1950	1951	1952
Active firms (including development) ..... No.	14	20	27
Producing mines ..... No.	4	5	6
Employees:			
Administrative and office ..... No.	268	302	486
Workmen ..... No.	2,834	3,336	3,987
<b>Total</b> ..... No.	<b>3,102</b>	<b>3,638</b>	<b>4,473</b>
Yearly earnings:			
Administrative and office ..... \$	969,096	1,141,375	1,921,935
Workmen ..... \$	7,261,589	10,216,315	14,033,266
<b>Total</b> ..... \$	<b>8,230,685</b>	<b>11,357,690</b>	<b>15,955,201</b>
Gross value of production ..... \$	23,413,549	31,141,112	33,744,311
Fuel and electricity used ..... \$	1,342,198	1,806,356	2,240,932
Process supplies used ..... \$	3,217,403	2,920,993	3,850,499
Freight and treatment charges ..... \$	3,771,018	4,542,998	4,647,321

TABLE 24. Production of Iron Ore<sup>1</sup>, 1943-1952

Year	Short tons	Value	Year	Short tons	Value
		\$			\$
1943.....	641,294	2,032,240	1948.....	1,337,244	7,487,611
1944.....	553,252	1,909,608	1949 <sup>2</sup> .....	3,675,096	21,203,907
1945.....	1,135,444	3,635,095	1950.....	3,605,261	23,413,547
1946.....	1,549,523	6,822,947	1951.....	4,680,510	31,141,112
1947.....	1,919,366	9,313,201	1952.....	5,271,849	33,744,311

1. Exclusive of titanium-bearing ores.

2. Newfoundland iron ore included for first time.

TABLE 25. Imports and Exports of Iron Ore, 1943-1952

Year	Imports			Exports
	From United States	From Newfoundland	Total <sup>1</sup>	
	Tons of 2,000 pounds			
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
1950.....	2,975,659	—	3,070,557	2,227,475
1951.....	3,690,269	—	3,831,418	3,225,767
1952.....	4,106,737	—	4,267,658	3,846,998

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

TABLE 26. Iron Ore Charged to Iron Blast Furnaces, 1943-1952

Year	Canadian	Imported	Total
Tons of 2,000 pounds			
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
1950.....	1,398,712	2,774,801	4,173,513
1951.....	1,476,440	3,168,581	4,645,021
1952.....	1,404,797	3,477,356	4,882,153

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

TABLE 27. World Production of Iron Ore, by Countries

(Taken from "Minerals Yearbook" published by the United States Bureau of Mines)

Country <sup>1</sup>	1948	1949	1950	1951	1952
Thousands of metric tons					
North America:					
Canada.....	1,213	3,334	3,271 <sup>2</sup>	4,246	4,722
Newfoundland.....	1,492	—	—	—	—
Cuba.....	37	12	12	17	101
Mexico.....	333	363	420	460	500
United States.....	102,625	86,301	99,619 <sup>2</sup>	118,375 <sup>5</sup>	99,490
South America:					
Argentina.....	33	40	40	50	3
Brazil.....	1,572 <sup>2</sup>	1,888 <sup>2</sup>	1,987 <sup>2</sup>	2,407	2,972
Chile <sup>4</sup> .....	2,545	2,597	2,976	3,252	2,209
Venezuela.....	—	—	198	1,270	1,970

**TABLE 27. World Production of Iron Ore, by Countries — Concluded**  
(Taken from "Minerals Yearbook" published by the United States Bureau of Mines)

Country <sup>1</sup>	1948	1949	1950	1951	1952
Thousands of metric tons					
<b>Europe</b>					
Austria .....	1,269	1,488	1,859	2,370	2,653
Belgium.....	89 <sup>2</sup>	42	46	79	135
Czechoslovakia .....	1,428	1,400 <sup>5</sup>	1,600 <sup>5</sup>	1,800 <sup>5</sup>	2,000 <sup>5</sup>
France <sup>6</sup> .....	23,061	31,424	29,983 <sup>2</sup>	35,264	41,176
Germany: East <sup>7</sup> .....	250 <sup>5</sup>	250 <sup>5</sup>	328 <sup>5</sup>	485	3
West <sup>7</sup> .....	7,276	9,112	10,882	12,923	15,404
Greece.....	—	—	5	53	137
Hungary.....	318	339	368	370 <sup>5</sup>	370 <sup>5</sup>
Italy.....	549 <sup>2</sup>	554	476	553	790
Luxembourg.....	3,399	4,137	3,845	5,625	7,245
Norway .....	199	275 <sup>2</sup>	298 <sup>2</sup>	332	769
Poland .....	659	699	790	900 <sup>5</sup>	1,000 <sup>5</sup>
Romania .....	209 <sup>5</sup>	324 <sup>5</sup>	395 <sup>5</sup>	478 <sup>5</sup>	560
Spain .....	1,631	1,876	2,088 <sup>2</sup>	2,389	2,891
Sweden .....	13,286 <sup>2</sup>	13,729 <sup>2</sup>	13,611	16,111	17,381
Switzerland.....	75	70	55	86	3
U.S.S.R. <sup>8</sup> .....	30,000	35,000	44,000	48,000	50,000
United Kingdom, Great Britain <sup>9</sup> .....	13,299	13,612	13,413 <sup>2</sup>	14,882	16,234
Yugoslavia .....	879	835	826 <sup>2</sup>	581	676
<b>Asia:</b>					
China.....	247 <sup>5,10</sup>	500 <sup>5</sup>	2,000 <sup>5</sup>	3,000 <sup>5</sup>	4,000
Hong Kong .....	1	60	172	164	130
India .....	2,321	2,854	3,005 <sup>2</sup>	3,642	3,455 <sup>5</sup>
Japan <sup>11</sup> .....	561	794	927 <sup>2</sup>	1,168	1,295
Korea, North.....	200 <sup>5</sup>	3	3	3	3
Malaya .....	1	9	507	860	1,031
Philippines.....	18	370	599	903	1,170
Portuguese India .....	8	151	131	436	494
Thailand .....	—	—	3	6	3
Turkey.....	192	211	234	226	482
U.S.S.R. ....	8	8	8	8	8
<b>Africa:</b>					
Algeria .....	1,872	2,538	2,573	2,823	3,092
French Morocco .....	301 <sup>2</sup>	357	319	533	651
Liberia .....	—	—	—	171	904
Northern Rhodesia.....	12	2	—	—	6
Sierra Leone.....	968	1,104 <sup>13</sup>	1,185	1,204	1,401
Southern Rhodesia.....	30	51	57	52	65
Spanish Morocco .....	885 <sup>2</sup>	893 <sup>2</sup>	951 <sup>2</sup>	937	970
Tunisia .....	696 <sup>2</sup>	712	758	923	977
Union of South Africa .....	1,164	1,242	1,189	1,421	1,759
<b>Oceania:</b>					
Australia.....	2,077	1,484	2,403	2,468	2,785
New Caledonia .....	—	—	15	—	3
New Zealand .....	5	4	4	3	3
<b>Total (estimate).....</b>	<b>219,000</b>	<b>223,000</b>	<b>250,000<sup>2</sup></b>	<b>294,000</b>	<b>297,000</b>

1. In addition to countries listed, Bulgaria, Egypt, Madagascar, Portugal and South-West Africa report production in past years, but quantity produced is believed insufficient to affect estimate of world total.

2. Revised figure.

3. Data not available; estimate included in total.

4. Production of Tofo mines.

5. Estimate.

6. Including Moselle (Lorraine).

7. Exclusive of maganiferous iron ore are carrying 12 to 30 percent manganese.

8. U.S.S.R. in Asia included with U.S.S.R. in Europe.

9. Exclusive of bog ore, which is used mainly for purification of gas.

10. Production of National Resources Commission only.

11. Includes iron sand production as follows: 1948, 2,588 tons; 1949, 33,120 tons; 1950, 101,544 tons; 1951, 213,924 tons.

12. Less than 500 tons.

13. Marketable ore only: washed fines are excluded.



## Magnesium

Magnesium is produced from dolomite by the Dominion Magnesium Limited, Haley, Ontario. This firm uses the Pidgeon process. At Arvida, Quebec the Aluminum Company of Canada Limited treats

brucite, brought from Wakefield, Quebec, by converting it to magnesium chloride and thence to magnesium metal.

TABLE 28. Production of Primary Magnesium Metal, 1943-1952

Year	Quebec		Ontario		British Columbia		Canada	
	Pounds	\$	Pounds	\$	Pounds	\$	Pounds	\$
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	1,607,264	—	—	7,358,545	1,607,264
1946 .....	—	—	320,677	75,538	—	—	320,677	75,538
1947-1952 .....	Not available for publication							

TABLE 29. Consumption of Magnesium Metal, 1949-1952

	1949	1950	1951	1952
	Pounds			
In non-ferrous smelters .....	634,542	—	—	—
In white metal alloy foundries .....	192,535	706,118	1,884,331	1,420,585
In brass and bronze foundries .....	105,651	69,543	270,325	113,427
In aluminum products .....	42,331	298,544	508,650	703,873
Total accounted for .....	975,059	1,074,205	2,663,306	2,237,885

TABLE 30. World Production of Magnesium Metal, by Countries, 1948-1952

(Taken from the "Minerals Yearbook" published by the United States Bureau of Mines).

Country <sup>1</sup>	1948	1949	1950	1951	1952
	Metric tons <sup>2</sup>				
Canada .....	3	3	1,600	4,000	5,000 <sup>4</sup>
France .....	546	492	446	875	1,090
Germany, West .....	—	—	—	—	—
Italy .....	—	—	122	677	976
Norway .....	—	—	—	120	1,300
Switzerland .....	—	—	250	250	300
United Kingdom <sup>5</sup> .....	3,500	5,100	4,900	8,000	4,800
United States .....	9,075	10,521	14,266	37,086	95,999
Total (estimate) .....	31,000	35,000	41,000	81,000	151,000

1. Magnesium is also produced in China, Taiwan and U.S.S.R. but production data are not available; estimate included in total.

2. This table incorporates a number of revisions of data published in previous magnesium chapters.

3. Data not available; estimate included in total.

4. Estimate.

5. From 1948-51 inclusive figures relate to total alloy ingot production, both primary and secondary. From 1952, a revised series relating to production of primary metal and secondary alloy ingots only is given.

## Manganese

Production of manganese ore in Canada has been spasmodic due to the limited number of known deposits. No production was recorded for 1952.

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 90 to 93 cents per long ton unit, C.I.F. U.S. ports.

TABLE 31. Production of Manganese Ore, 1943-1952

Year	Tons	Value	Year	Tons	Value
		\$			\$
1943 .....	48	985	1948 .....	3	88
1944 .....	—	—	1949 .....	—	—
1945 .....	—	—	1950 .....	—	—
1946 .....	—	—	1951 .....	—	—
1947 .....	225	7,875	1952 .....	—	—

TABLE 32. Imports of Manganese Ore, 1943-1952

Year	Tons	\$	Year	Tons	\$
1943 .....	51,234	1,445,252	1948 .....	230,298	6,449,819
1944 .....	85,795	2,370,109	1949 .....	137,854	4,475,522
1945 .....	198,277	4,571,592	1950 .....	135,697	4,993,912
1946 .....	144,023	2,484,707	1951 .....	222,082	9,078,011
1947 .....	223,503	6,145,568	1952 .....	194,405	8,273,722

TABLE 33. Imports of Manganese Ore, by Principal Countries of Supply, 1949-1952

—	1949	1950	1951	1952
	Tons			
From:				
Cuba .....	—	—	—	3,864
Gold Coast .....	27,904	87,328	88,687	63,112
India .....	15,456	25,879	17,467	13,954
Chile.....	890	701	—	—
United States.....	93,571	21,718	95,086	74,393
United Kingdom.....	33	71	106	50
Brazil.....	—	—	8,288	5,152
French Oceania.....	—	—	7,744	—
Turkey .....	—	—	4,704	25,688
Union of South Africa.....	—	—	—	7,520
Philippines .....	—	—	—	672
Total imports.....	137,854	135,697	222,082	194,405

**TABLE 34. World Production of Manganese Ore, by Countries <sup>1</sup>, 1948-1952**  
(Taken from the "Minerals Yearbook" of the United States Bureau of Mines.)

Country <sup>1</sup>	1948	1949	1950	1951	1952
	Metric tons <sup>2</sup>				
<b>North America:</b>					
Canada (shipments).....	3	—	—	—	—
Cuba.....	29,073	62,503	79,209	154,091	251,677 <sup>3</sup>
Mexico.....	53,800	53,900	32,400	66,100	102,000
United States (shipments).....	118,931	114,427	121,971	86,407	105,502
<b>South America:</b>					
Brazil (exports).....	141,253	149,896	148,339	119,900	160,000 <sup>3</sup>
Chile.....	22,119	28,870	33,530	36,578	38,000 <sup>3</sup>
Peru.....	—	—	762	699	597
<b>Europe:</b>					
Greece.....	900	150	320	3,000 <sup>3</sup>	8,500 <sup>3</sup>
Hungary.....	40,000 <sup>3</sup>	4	4	4	4
Italy.....	24,233	24,302	16,208	27,743	40,351
Portugal.....	280	508	798	7,615	11,065
Romania.....	47,000 <sup>3</sup>	65,000 <sup>3</sup>	4	4	4
Spain.....	18,525	18,651	19,002	20,790	29,292 <sup>5</sup>
Sweden.....	28	—	58	4	4
U.S.S.R. (estimate).....	1,800,000	1,500,000	2,000,000	2,500,000	2,500,000
Yugoslavia (estimate).....	12,000 <sup>3</sup>	12,000 <sup>3</sup>	13,333	12,743	12,687
<b>Asia:</b>					
China.....	22,000 <sup>36</sup>	4	4	4	4
India.....	534,316	656,190	897,100	1,304,536	1,291,755 <sup>7</sup>
Iran <sup>8</sup> .....	—	4,200 <sup>3</sup>	9,360 <sup>3</sup>	4	9,327
Japan.....	55,000	100,000	134,066	198,000	180,000 <sup>3</sup>
Philippines.....	25,565	26,283	29,867	22,343	20,627
Portuguese India.....	5,893	16,220	38,220	86,793	112,849
Turkey.....	8,327	22,576	32,178	50,517	101,808
<b>Africa:</b>					
Angola.....	400	18,600	9,308	46,192	55,094
Belgian Congo.....	12,765	12,247	16,990	70,945	150,000 <sup>3</sup>
Egypt.....	59,919	138,568	152,169	155,364	209,164
French Morocco.....	214,412	233,825	287,265	372,233	426,316
Gold Coast (exports) <sup>9</sup> .....	640,088	752,963	722,784	819,018	794,187
Northern Rhodesia.....	3,961	4,039	1,751	1,280	3,989
Southern Rhodesia.....	10	166	—	—	1,433
South West Africa.....	—	—	993	6,560	26,507
Spanish Morocco.....	13	653	36	1,122	5
Tunisia.....	—	—	—	—	—
Union of South Africa.....	276,393	655,175	790,937	758,870	874,637
<b>Oceania:</b>					
Australia.....	3,502	13,303	15,108	8,096	5,000 <sup>3</sup>
Fiji.....	71	102	203	641 <sup>7</sup>	4
New Caledonia.....	—	2,100	5,392	20,135	16,850
New Zealand.....	533	310	358	408	4
Papua.....	160 <sup>10</sup>	163 <sup>10</sup>	60 <sup>10</sup>	21	41
<b>Total (estimate).....</b>	<b>4,200,000</b>	<b>4,800,000</b>	<b>5,800,000</b>	<b>7,100,000</b>	<b>7,700,000</b>

1. In addition to countries listed. Argentina, Bulgaria and Korea have produced manganese ore; date of output are not available, but estimates for them are included in the totals. Czechoslovakia and Germany report production of manganese ore, but it is believed that the product so reported averages less than 30 per cent Mn and therefore would be ferruginous manganese ore under the classification used in this report, hence the output is not included in this table.

2. This table incorporates a number of revisions of data published in previous Minerals Yearbook manganese chapters.

3. Estimate

4. Data not available; estimate included in total.

5. Spanish Morocco included in figure for Spain.

6. Incomplete data.

7. Exports.

8. Year ending March 20 of year following that stated. 1952 is a calendar year.

9. Dry weight.

10. Year ending June 30 of year stated.



## Mercury

There has been no production of mercury in Canada since September, 1944, and all shipments since then have been from producer's 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.

During 1952 the price of mercury fluctuated from \$187 to \$215 per 76 pound flask. The higher price was quoted at the close of the year.

TABLE 35. Production of Mercury, 1940-1952

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	1945-1952.....	Nil	—

TABLE 36. Production of Mercury, Consumption, Imports and Exports, 1942-1951

Year	Production	Consumption	Imports	Exports
	Pounds			
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 .....	—	344,516	412,649	17,084
1948 .....	—	552,216	803,878	175
1949 .....	—	460,577	278,069	8
1950 .....	—	166,716	614,005	8,100
1951 .....	—	171,886	308,172	58,235
1952 .....	—	159,216	144,439	1,500

TABLE 37. Consumption of Mercury by Principal Uses, 1948-1952

Industry	1948	1949	1950	1951	1952
	Pounds				
Pharmaceuticals and fine chemicals.....	41,565	62,309	56,088	32,041	25,864
Heavy chemicals .....	479,000	373,131	88,094	104,483	103,385
Electrical apparatus .....	13,151	9,137	6,534	19,362	13,967
Gold mines <sup>1</sup> .....	6,000	6,000	6,000	6,000	6,000
Miscellaneous <sup>1</sup> .....	12,500	10,000	10,000	10,000	10,000
<b>Total</b> .....	<b>552,216</b>	<b>460,577</b>	<b>166,716</b>	<b>171,886</b>	<b>159,216</b>

1. Estimated.

**TABLE 38. World Production of Mercury, by Countries, 1948-1952**

(Taken from the "Minerals Yearbook" of the United States Bureau of Mines)

Country <sup>1</sup>	1948	1949	1950	1951	1952
Flasks of 34.5 kilograms or 76 pounds					
Algeria .....	381	115	—	—	2
Austria .....	2	6 <sup>3</sup>	44	31	2
Bolivia, (exports) .....	1	—	—	19	2
Chile .....	467	754	319	114	2
China .....	290	290 <sup>4</sup>	1,450 <sup>4</sup>	4,000 <sup>4</sup>	2
Czechoslovakia .....	800	800 <sup>4</sup>	2	2	2
Honduras .....	—	—	—	11	2
Italy .....	38,233	44,527	53,346	53,839	55,869
Japan .....	1,689	2,461	1,312	1,847	2,997
Mexico .....	4,786	5,250	3,713	8,064	8,702
Peru .....	—	—	—	2	2
Spain .....	22,684	32,289	51,808 <sup>3</sup>	44,480	39,135
Turkey .....	27	—	—	2	2
United States .....	14,388	9,930	4,535	7,293	12,547
Yugoslavia .....	10,936	12,764	14,368	14,649	14,620
<b>Total<sup>4</sup></b> .....	<b>107,000<sup>3</sup></b>	<b>121,000<sup>3</sup></b>	<b>143,000<sup>3</sup></b>	<b>148,000<sup>3</sup></b>	<b>150,000</b>

1. Mercury is also produced in Romania and U.S.S.R., but production data are not available; estimates included in total.

2. Data not yet available; estimates included in totals.

3. Revised figure.

4. Estimate.

### Molybdenum

Operations at the La Corne mine were resumed June 1951 by the Molybia Corporation Limited. The milled products were molybdenite concentrates and bismuth oxychloride. Most of the concentrates were shipped to European markets. In 1952 operations were suspended for a few months to permit development work to be done.

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 hardwearing 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, in new alloys suitable for electrical resistance and contacts, and for heating elements containing 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 39. Production of Molybdenite, 1943-1952**

Year	Ores milled	Ores and concentrates shipped or used		Total MoS <sub>2</sub> content of <sup>2</sup> shipments
		Tons	\$	
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 .....	—	—	—	—
1950 .....	—	108.9 <sup>1</sup>	60,059	103,550
1951 .....	40,139	241	228,958	381,596
1952 .....	82,294	331	409,831	505,964

1. Shipped from stock pile.

**TABLE 40. World Production of Molybdenum in Ores and Concentrates, by Countries, 1948-1952**  
(Taken from the "Minerals Yearbook" of the United States Bureau of Mines)

Country <sup>1</sup>	1948	1949	1950	1951	1952
	Metric tons				
Australia .....	2	4	3	1	2
Austria .....	2	9	18	19	22
Canada .....	83	—	28	104	135
Chile .....	532	558	992	1,725	1,644
China: Manchuria .....	2	2	2	2	2
Other provinces .....	2	2	2	2	2
Finland .....	—	—	—	—	2
France .....	—	—	—	—	2
Japan .....	1	—	13	54	87
Korea, Republic of .....	2	11	—	2	2
Norway .....	79	71	67	125	122
Peru .....	2	2	1	3	2
Sweden .....	1	5	6	2	2
United States .....	12,114	10,219	12,918	17,625	19,622
Yugoslavia .....	—	243	174	308	2
<b>Total (estimate) .....</b>	<b>13,600</b>	<b>11,500</b>	<b>14,600<sup>4</sup></b>	<b>20,500</b>	<b>22,200</b>

1. Molybdenum is also produced in Greece, North Korea, Romania, Spain, Turkey and U.S.S.R., but production data are not available. Estimates are included in the total.

2. Data not yet available; estimate included in total.

3. Estimated exports.

4. Revised figure.

### Pitchblende

Radioactive ores of uranium are mined at Great Bear Lake, in the Northwest Territories and at Lake Athabaska, Saskatchewan.

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

**TABLE 41. Canadian Refinery Production of Pitchblende Products, 1933-1952**

Year	\$	Year	\$
1933 <sup>1</sup> .....	247,900	1938 .....	1,045,458
1934 .....	159,400	1939 .....	1,121,553
1935 .....	413,700	1940 .....	410,176
1936 .....	605,500	1941-1952 .....	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 ranged from \$3.00 to \$3.50 per pound during 1952.

TABLE 42. Production<sup>1</sup> of Selenium, 1943-1952

Year	Pounds	\$	Year	Pounds	\$
1943 .....	374,013	654,523	1948 .....	390,894	781,788
1944 .....	298,592	537,466	1949 .....	318,225	652,361
1945 .....	379,187	728,039	1950 .....	261,973	633,975
1946 .....	521,867	949,798	1951 .....	382,603	1,239,633
1947 .....	501,090	937,038	1952 .....	242,030	786,599

1. Includes some recoverable selenium in blister not necessarily recovered in the designated year.

TABLE 43. Refinery output of selenium from primary and scrap materials, 1931-1952

Year	Pounds	Year	Pounds	Year	Pounds
1931 .....	21,500	1939 .....	158,333	1947 .....	496,765
1932 .....	—	1940 .....	198,057	1948 .....	378,316
1933 .....	48,221	1941 .....	423,070	1949 .....	288,166
1934 .....	104,924	1942 .....	527,374	1950 .....	289,714
1935 .....	366,425	1943 .....	374,013	1951 .....	371,060
1936 .....	351,133	1944 .....	300,519	1952 .....	254,478
1937 .....	401,497	1945 .....	416,716		
1938 .....	335,370	1946 .....	497,070		

## 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)<sub>2</sub>O<sub>6</sub>. 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 Peg Tantalum mine, Ross

Lake, Northwest Territories, were made by Tantalum Refining and Mining Corporation, during 1947.

United States quotations for tantalum ore, December, 1951 were, per pound  $Ta_2O_5$ , \$2.50 and up 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 1952.

TABLE 44. Production<sup>1</sup> of Tellurium, 1943-1952

Year	Pounds	\$	Year	Pounds	\$
1943 .....	8,600	15,050	1948 .....	11,425	19,994
1944 .....	10,661	18,657	1949 .....	11,692	21,046
1945 .....	484	929	1950 .....	10,075	19,143
1946 .....	15,848	24,405	1951 .....	8,913	16,400
1947 .....	9,194	16,090	1952 .....	6,035	10,259

1. Includes some recoverable tellurium in blister copper, which was not necessarily recovered in the designated year.

TABLE 45. Consumption of Tellurium Metal in Steel and White Metal Foundries, 1943-1952

Year	Steel foundries	White metal foundries	Year	Steel foundries	White metal foundries
	Pounds			Pounds	
1943 .....	135	453	1948 .....	—	947
1944 .....	398	531	1949 .....	—	310
1945 .....	—	308	1950 .....	—	962
1946 .....	—	1,372	1951 .....	—	672
1947 .....	—	974	1952 .....	—	1,237

TABLE 46. Refinery output of Tellurium, 1934-1952

Year	Pounds	Year	Pounds	Year	Pounds
1934 .....	5,130	1941 .....	11,453	1948 .....	8,739
1935 .....	16,425	1942 .....	9,500	1949 .....	8,726
1936 .....	35,618	1943 .....	8,600	1950 .....	6,010
1937 .....	40,913	1944 .....	9,900	1951 .....	6,301
1938 .....	51,254	1945 .....	...	1952 .....	5,710
1939 .....	3,554	1946 .....	14,200		
1940 .....	3,491	1947 .....	6,169		



## 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 Com-

pany, 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 \$12.50 per pound nominal, December, 1952.

## Tin

No economic deposits of tin have been found in Canada up to the present. Minor occurrences, principally of cassiterite ( $\text{SnO}_2$ ) 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 south-eastern 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 1952 the average price of tin quoted in New York was \$1.20 per pound. The quotation at the year-end was \$1.21 per pound. The Canadian price at Montreal was \$1.19 per pound in January and \$1.18 in December.

TABLE 47. Production of New Tin, Domestic Consumption, Imports and Exports, 1943-1952

Year	Production	Domestic consumption	Exports	Imports	Stocks at end of period
Tons of 2,000 pounds					
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
1950.....	398	5,069	—	5,395	1
1951.....	173	5,299	—	6,872	1
1952.....	106	4,693	—	4,423	1

1. Not available.

TABLE 48. Production of New Tin, 1943-1952

Year	Pounds	\$	Year	Pounds	\$
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	1950.....	796,403	828,259
1946.....	874,186	507,028	1951.....	346,718	494,073
1947.....	714,198	517,794	1952.....	212,113	253,581

TABLE 49. Consumption of Tin (Ingots or Bars), by Principal Industries, 1948-1952

	1948	1949	1950	1951	1952
Tons of 2,000 pounds					
In white metal foundries (solder, babbitt, etc).....	1,636	1,358	1,953	1,819	1,447
In steel plants (chiefly for tinplate).....	2,443	2,853	2,439	3,000	2,819
In brass and bronze foundries.....	315	219	178	347	252
In other industries.....	137	405	499	133	175
<b>Total</b> .....	<b>4,531</b>	<b>4,835</b>	<b>5,069</b>	<b>5,299</b>	<b>4,693</b>



TABLE 30. World Mine Production of Tin (Content of Ore), by Countries, 1948-1952

(Taken from "Minerals Yearbook" published by the United States Bureau of Mines)

Country	1948	1949	1950	1951	1952
Long tons <sup>1</sup>					
<b>North America:</b>					
Canada .....	309	276	356	155	95
Mexico .....	182	358	440	366	373
United States .....	5	68	94	88	99
<b>Total North America .....</b>	<b>496</b>	<b>702</b>	<b>890</b>	<b>609</b>	<b>567</b>
<b>South America:</b>					
Argentina .....	273	268	267	242	239 <sup>2</sup>
Bolivia (exports) .....	37,336	34,115	31,213	33,132	31,959
Brazil .....	570	325	180	197	180 <sup>2</sup>
Peru <sup>3</sup> .....	64	51	38	86	31
<b>Total South America .....</b>	<b>38,243</b>	<b>34,759</b>	<b>31,698</b>	<b>33,657</b>	<b>32,409</b>
<b>Europe:</b>					
France .....	76	73	117	170 <sup>2</sup>	354 <sup>2</sup>
Germany, East <sup>2</sup> .....	—	120	120	298	420
Italy .....	—	—	—	—	—
Portugal <sup>4</sup> .....	706	785	690	902	1,028
Spain .....	261	666	575 <sup>2</sup>	716 <sup>2</sup>	589
United Kingdom <sup>5</sup> .....	1,281	1,217	1,230 <sup>2</sup>	1,210 <sup>2</sup>	954
<b>Total Europe<sup>6</sup> .....</b>	<b>2,324</b>	<b>2,861</b>	<b>2,732</b>	<b>3,296</b>	<b>3,345</b>
<b>Africa:</b>					
Belgian Congo <sup>7</sup> .....	13,539	13,760	13,464	13,669	13,798
French Cameroon .....	102	73	67	72	86
French Morocco .....	—	—	—	13	14
French West Africa .....	—	26	51	65	110
Mozambique .....	1	1	1	8	3
Nigeria .....	9,237	8,824	8,258	8,529	8,318
Northern Rhodesia .....	—	7	4	2	11
Southern Rhodesia .....	105	70	65	40	30
South West Africa .....	111	120	100	76	86
Swaziland .....	20	32	37	32	36
Tanganyika (exports) .....	97	109	97	67	47
Uganda (exports) .....	190	128	192	118	82
Union of South Africa .....	457	471	643	746	935
<b>Total Africa .....</b>	<b>23,859</b>	<b>23,621</b>	<b>22,979</b>	<b>23,437</b>	<b>23,556</b>
<b>Asia:</b>					
Burma .....	1,147	1,781	1,520	1,624	1,103
China <sup>2</sup> .....	6,300	4,300	7,500	7,500	8,600
Indochina .....	30	40	62	92	156
Indonesia .....	30,562	28,965	32,102	30,986	35,003
Japan .....	118	190	326	426	639
Malaya .....	44,815	54,910	57,537	57,167	56,838
Thailand .....	4,240	7,815	10,364	9,502	9,473
<b>Total Asia .....</b>	<b>87,212</b>	<b>98,001</b>	<b>109,411</b>	<b>107,297</b>	<b>111,812</b>
<b>Australia .....</b>	<b>1,885</b>	<b>1,882</b>	<b>1,855</b>	<b>1,577</b>	<b>1,556</b>
<b>Total (estimate)<sup>6</sup> .....</b>	<b>154,000</b>	<b>161,800</b>	<b>169,600</b>	<b>169,900</b>	<b>173,200</b>

1. The table incorporates a number of revisions of data published in previous tin chapters.

2. Estimated by authors of the chapter to appear in Minerals Yearbook and in a few instances from the Statistical Bulletin of the International Tin Study Group, The Hague.

3. Minor constituent of other base metal ores.

4. Excluding mixed concentrates.

5. Intake by smelters.

6. Excluding production of U.S.S.R.

7. Including Ruanda-Urundi.

## Titanium

At Lac Tio, Quebec, the Quebec Iron and Titanium Corporation mined ilmenite and shipped the ore by rail to Havre St. Pierre on the St. Lawrence and thence by boat to the smelter at Sorel, Quebec. Of the 266,410 tons of ore received at the smelter about 104,166 tons were treated to yield about 32,422 tons of iron (remelt) and steel ingots and over 42,000 tons of slag. The slag, having a titanium dioxide content of about 73 per cent, was exported for further treatment. General statistics on the mining of ilmenite are included in the Miscellaneous Metals Industry but the statistics on smelting are included in The Non-ferrous Smelting and Refining Industry.

For several years titanium-bearing ores have been shipped from the Baie St. Paul area in Quebec for treatment in the United States.

Some metallic titanium was produced from imported raw material by the Dominion Magnesium Limited, Haley, Ontario.

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. Ferro-titanium and ferrocenon-titanium are used under special circumstances to purify steel. It is all imported from the United States.

Prices (nominal) f.o.b. U.S. Atlantic ports at the end of 1952 were: Ilmenite, 56 to 60%  $\text{TiO}_2$ , \$18 to \$20 per gross ton; rutile, 94%  $\text{TiO}_2$ , 7 to  $8\frac{1}{2}$  cents per pound. The nominal quotation for titanium metal, 99.3 per cent, was \$5 per pound.

TABLE 51. Producers' Shipments of Titanium Ore<sup>1</sup> to Foreign Smelters 1943-1952

Year	Short tons	\$	Year	Short tons	\$
1943 .....	69,437	308,290	1948 .....	4,441	21,091
1944 .....	33,973	165,195	1949 .....	540	2,892
1945 .....	14,147	67,575	1950 .....	1,253	7,706
1946 .....	1,406	7,735	1951 .....	1,674	9,790
1947 .....	7,104	36,036	1952 .....	51	459

1. All from Quebec.

TABLE 52. Imports of "Antimony Oxide, Titanium Oxide and White Pigments Containing Not Less Than 14 Per Cent by Weight of Titanium", 1943-1952

Year	From the United Kingdom		From the United States		Total imports	
	Pounds	\$	Pounds	\$	Pounds	\$
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
1950 .....	6,275,776	935,706	47,974,645	6,117,925	54,250,421	7,053,631
1951 <sup>1</sup> .....	7,192,312	1,623,779	52,103,681	6,838,500	59,295,993	8,462,279
1952 <sup>1</sup> .....	5,471,764	1,090,786	42,938,755	5,365,582	48,410,519	6,456,368

1. Excludes antimony oxide.

TABLE 53. Consumption of Titanium Oxide, by Industries, 1951 and 1952

Industry	1951		1952	
	Pounds	Cost at works	Pounds	Cost at works
		\$		\$
Paints:				
Extended titanium dioxide pigments.....	25,504,331	2,483,473	25,546,557	2,388,204
Titanium dioxide.....	16,666,584	4,030,835	15,756,185	3,841,422
Polishes and dressings.....	242,959	53,121	206,005	43,443
Pulp and paper.....	1,006,000	273,765	1,742,000	402,580
Linoleum and oilcloth.....	2,859,173	399,162	3,850,195	504,336
Rubber goods.....	1,116,101	295,149	1,068,782	249,838
Miscellaneous non-metallic minerals.....	524,998	131,249	488,646	122,162
<b>Total accounted for.....</b>	<b>47,920,146</b>	<b>7,666,754</b>	<b>48,667,370</b>	<b>7,551,985</b>

TABLE 54. World Production of Titanium Concentrates (Ilmenite and Rutile), by Countries<sup>1</sup>, 1948-1952  
(Taken from the "Minerals Yearbook" published by the United States Bureau of Mines)

Country	1948	1949	1950	1951	1952
Metric tons					
<b>Ilmenite</b>					
Australia <sup>2</sup> .....	11,756	9,884	12,417	12,091	3
Brazil.....	7,900 <sup>4</sup>	650	—	—	3
Canada.....	4,029	490	3,177 <sup>5</sup>	19,235 <sup>5</sup>	38,276 <sup>5</sup>
Egypt.....	1,601	635	260	317	3
India.....	233,098	313,126	216,076	223,092	3
Malaya.....	12,909	20,034	25,315	44,191 <sup>4</sup>	22,046 <sup>4</sup>
Norway.....	90,017	99,013	105,150	105,150	118,270
Portugal.....	155	919	66	169	75
Senegal.....	3,690	8,338	540	2,500	4,622
Spain.....	181	376	637	437	1,110
United States.....	348,126	364,989	424,851	486,099	479,524
<b>Total ilmenite.....</b>	<b>713,500</b>	<b>819,170</b>	<b>788,000</b>	<b>893,000</b>	<b>893,000<sup>6</sup></b>
<b>Rutile</b>					
Australia <sup>7</sup> .....	15,348	13,958	17,985	35,534	3
Brazil.....	—	—	8	—	3
French Cameroon.....	576	403	25	106	294
French Equatorial Africa.....	—	—	6	—	—
India.....	129	—	8	8	3
Norway.....	—	16	8	8	43
Senegal.....	—	—	—	8	8
United States.....	6,695	10,875	9	9	9
<b>Total rutile.....</b>	<b>22,748</b>	<b>25,500</b>	<b>25,300</b>	<b>42,000</b>	<b>47,000<sup>6</sup></b>

1. This table incorporates a number of revisions of data published in previous titanium chapters.

2. Estimated ilmenite content of all ilmenite-bearing concentrates.

3. Data not available; estimate included in totals.

4. Exports.

5. Includes titanium slag containing approximately 70 per cent TiO<sub>2</sub>.

6. Estimate.

7. Estimated rutile content of all rutile-bearing concentrates.

8. Figure withheld in order to avoid disclosure of U.S. production by differences: see footnote 9.

9. Figure withheld in order to avoid disclosure of individual company operation.



TABLE 55. Consumption of Ferrotitanium in Manufacture of steel, 1943-1952

Year	Tons	\$	Year	Tons	\$
1943 .....	614	118,416	1948 .....	442	81,129
1944 .....	786	149,527	1949 .....	142	29,067
1945 .....	656	123,975	1950 .....	143	30,664
1946 .....	416	73,485	1951 .....	164	50,641
1947 .....	500	86,228	1952 .....	229	97,827

## Tungsten

The major portion of the tungsten output came from mines in British Columbia. Some scheelite was produced from the gold mines in Northern Ontario. The Northwest Territories contributed a small tonnage of tungsten concentrates.

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.

In United States a ceiling price was established at \$65 per short ton unit of  $WO_3$ . Prices to foreign countries declined as the supply of tungsten increased.

TABLE 56. Production (Commercial Shipments) of Crude Tungsten Concentrates, 1943-1952

Year	Crude	$WO_3$ content	Value
	Pounds	Pounds	\$
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
1950 .....	1,886,000 <sup>1</sup>	284,078	160,343
1951 .....	4,145	2,833	7,098
1952 .....	3,670,686	1,434,641	4,307,879

1. Includes export of considerable low-grade material to United States.

TABLE 57. Consumption of Ferrotungsten in Steel Furnaces, 1943-1952

Year	Short tons	Cost at works	Year	Short tons	Cost at works
		\$			\$
1943 .....	550	1,721,967	1948 .....	187	590,584
1944 .....	86	287,116	1949 .....	190	428,535
1945 .....	138	455,317	1950 .....	117	302,872
1946 .....	260	402,174	1951 .....	364	2,726,887
1947 .....	366	888,904	1952 .....	212	1,609,590

**TABLE 58. World Production of Tungsten Ores, by Countries<sup>1</sup>, of Concentrates containing 60 per WO<sub>3</sub> - 1948-1952**

(Taken from the "Minerals Yearbook" published by the United States Bureau of Mines)

Country	1948	1949	1950	1951	1952
Metric tons					
<b>North America</b>					
Canada .....	791	191	215	15	923
Mexico .....	133	65	67	325	443
United States (shipments) .....	3,659	2,508	4,373	5,693	6,905
<b>Total North America .....</b>	<b>4,583</b>	<b>2,764</b>	<b>4,655</b>	<b>6,033</b>	<b>8,271</b>
<b>South America</b>					
Argentina .....	33	30 <sup>2</sup>	20 <sup>2</sup>	100	600
Bolivia (exports) .....	2,485	2,543	2,461	2,718	3,707
Brazil (exports) .....	1,144	575	759	1,422	1,800 <sup>2</sup>
Peru .....	353	455	516	655	630
<b>Total South America .....</b>	<b>4,015</b>	<b>3,600<sup>2</sup></b>	<b>3,760<sup>2</sup></b>	<b>4,895</b>	<b>6,700<sup>2</sup></b>
<b>Europe:</b>					
Finland .....	4	49	20	8	47
France .....	567	792	442	765	1,000 <sup>2</sup>
Italy .....	4	3	2	6	5
Portugal .....	2,944	2,700	2,500	4,680	4,900
Spain .....	876	888	850	2,553	2,400
Sweden .....	317	468	362	450 <sup>2</sup>	380 <sup>2</sup>
U.S.S.R. <sup>2</sup> .....	5,000	6,000	7,500	7,500	3
United Kingdom .....	46	81	76	61	55
<b>Total Europe (estimate) .....</b>	<b>9,800</b>	<b>11,000</b>	<b>11,800</b>	<b>16,000</b>	<b>8,800<sup>4</sup></b>
<b>Asia:</b>					
Burma .....	1,824	740	930	1,647	1,260
China .....	12,200	9,000 <sup>2</sup>	12,000 <sup>2</sup>	15,800 <sup>2</sup>	20,000 <sup>2</sup>
Hong Kong .....	—	—	—	23	104
India .....	—	—	2	15	—
Japan .....	9	20	64	86	239
Korea; Republic of .....	1,245	1,448	2,000	1,269	3,500
North Korea .....	1,000	1,000	1,000 <sup>2</sup>	1,200 <sup>2</sup>	1,200 <sup>2</sup>
Malaya, Federation of .....	87	69	27	54	79
Thailand .....	800	1,100	1,200	1,350	1,600
<b>Total Asia (estimate) .....</b>	<b>17,200</b>	<b>13,400</b>	<b>17,000</b>	<b>21,400</b>	<b>28,000</b>
<b>Africa:</b>					
Algeria .....	—	—	—	17	75
Belgian Congo .....	236	276	164	330	500 <sup>2</sup>
Egypt .....	15	—	—	7	21
French Morocco .....	1	—	7	38	13
Nigeria .....	4	5	5	23	23
Southern Rhodesia .....	80	26	64	231	420
South-West Africa .....	13	6	4	33	118
Tanganyika (exports) .....	1	42	15	15	14
Uganda (exports) .....	115	180	218	167	109
Union of South Africa .....	151	416	96	188	263
<b>Total Africa .....</b>	<b>616</b>	<b>951</b>	<b>573</b>	<b>1,049</b>	<b>1,600<sup>2</sup></b>
<b>Oceania:</b>					
Australia .....	1,234	1,371	1,235	1,892	2,000 <sup>2</sup>
New Zealand .....	28	28	24	35	35 <sup>2</sup>
<b>Total Oceania .....</b>	<b>1,262</b>	<b>1,399</b>	<b>1,259</b>	<b>1,927</b>	<b>2,035<sup>2</sup></b>
<b>Grand total (estimate) .....</b>	<b>37,500</b>	<b>33,100</b>	<b>39,000</b>	<b>51,300</b>	<b>55,400<sup>4</sup></b>

1. This table incorporates a number of revisions of data published in previous Minerals Yearbook tungsten chapters.

2. Estimate

3. Data not available; no estimate included in totals.

4. Excluding U.S.S.R.



## 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, 1952 at 31 cents per pound contained  $V_2O_5$ , f.o.b. shipping point, by "E & M.J. Metal and Mineral Markets", New York.

## Zirconium

Zirconium ores are not mined in Canada. The Dominion Magnesium Limited, Haley, Ontario, produced zirconium from imported raw materials.

Zirconium is important in certain steel making, ordinarily being added in the form of zirconium-ferrosilicon alloy; its function is that of a powerful

deoxidizer, degasifier, and grain refiner, zirconium-treated steel being particularly suitable for tools subject to violent stresses, such as stock drills.

Prices quoted in December, 1952, were: zircon ore, 65 per cent  $ZrO_2$ , \$42 to \$43 per long ton at Atlantic seaboard; zirconium powder, \$7. to \$8. per pound according to quantity.

Directory of Firms in the Miscellaneous Metal Mining Industry, 1952

Name of firm and product	Head office address	Location of mine or plant
<b>Aluminum:</b>		
Aluminum Company of Canada Limited .....	1700 Sun Life Building, Montreal, Quebec.	Arvida, Quebec; Shawinigan Falls, Quebec; La Tuque, Quebec; Ile Maligne, Quebec; Beauharnois, Quebec
B.C. Aluminum Co. Ltd. ....	1840 West First St., Vancouver, B.C. ....	New Westminster
<b>Antimony:</b>		
Consolidated Mining & Smelting Company of Canada Ltd. ....	215 St. James St., Montreal, Quebec .....	Trail, British Columbia
Antimony Gold Mining & Smelting Co. Ltd. ....	67 Yonge St., Toronto, Ontario .....	West Gore, N.S.
Gray Rock Mining Co. Ltd. ....	207 W. Hastings St., Vancouver, B.C. ....	Gold Bridge, B.C.
<b>Barium:</b>		
Dominion Magnesium Ltd. ....	Haley, Ontario .....	Haley, Ontario
<b>Beryl:</b>		
Canadian Beryllium Mines & Alloys Ltd. <sup>1</sup> .....	100 Adelaide St. W., Toronto, Ontario .....	Renfrew County, Ontario
<b>Bismuth:</b>		
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. ....	59 St. James St. W., Montreal, Quebec .....	La Corne Tp., Quebec
<b>Cadmium:</b>		
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, Man. ..	Flin Flon, Manitoba
Ainslie Mining Ltd. ....	490 Baker St., Nelson, B.C. ....	Ainsworth, B.C.
Base Metals Mining Corp. Ltd. ....	850 West Hastings St., Vancouver, B.C. ....	Kaslo, B.C.
Britannia Mining & Smelting Co. Ltd. ....	Britannia Beach, B.C. ....	Britannia Beach, B.C.
Canadian Exploration Ltd. ....	Royal Bank Bldg., Vancouver, B.C. ....	Salmo, B.C.
Cronin Babine Mines Ltd. ....	744 W. Hastings St., Vancouver, B.C. ....	Smithers, B.C.
Highland-Bell Ltd. ....	844 W. Hastings St., Vancouver, B.C. ....	Beaverdell, B.C.
Kootenay Belle Gold Mines Ltd. ....	916 Stock Exchange Bldg., Vancouver, B.C. ....	Reftallack, B.C.
Reeves MacDonald Mines Ltd. ....	413 Granville St., Vancouver, B.C. ....	Remac, B.C.
Mastodon Zinc Mines Ltd. ....	844 W. Hastings St., Vancouver, B.C. ....	Revelstoke, B.C.
Scranton Mines Ltd. ....	Ainsworth, B.C. ....	Ainsworth, B.C.
Sheep Creek Gold Mines Ltd. ....	413 Granville St., Vancouver, B.C. ....	Zintcon, B.C.
Silver Standard Mines Ltd. ....	602 W. Hastings St., Vancouver, B.C. ....	Hazelton, B.C.
Silbak Premier Mines Ltd. ....	Premier, B.C. ....	Premier, B.C.
Tulsequah Mines Ltd. ....	Trail, B.C. ....	Tulsequah, B.C.
Van Roi Consolidated Mines Ltd. ....	525 Seymour St., Vancouver, B.C. ....	Silverton, B.C.
Vancouver Island Base Metals Ltd. ....	850 W. Hastings St., Vancouver, B.C. ....	Duncan, B.C.
Violamac Mines (B.C.) Ltd. ....	New Denver, B.C. ....	New Denver, B.C.
Western Exploration Co. Ltd. ....	Silverton, B.C. ....	Silverton, B.C.
Western Mines Ltd. ....	1768 East Hastings St., Vancouver, B.C. ....	Ainsworth, B.C.
United Keno Hill Mines Ltd. ....	85 Richmond St. W., Toronto, Ont. ....	Elsa, Yukon



## Directory of Firms in the Miscellaneous Metal Mining Industry, 1952 - Concluded

Name of firm and product	Head office address	Location of mine or plant
<b>Chromite:</b>		
Colonial Chrome Co. Ltd. <sup>1</sup> .....	420 Lexington Ave., New York, N.Y., U.S.A.	Black Lake, Quebec
Gunnar Gold Mines Ltd. <sup>1</sup> .....	80 King St., Toronto, Ont.	Bird River, Manitoba
<b>Iron Ore:</b>		
Dominion Wabana Ore Ltd. ....	Sydney, Nova Scotia	Bell Island, Newfoundland
Penimore Iron Mines Ltd. <sup>1</sup> .....	123 St. James St. W., Montreal, Quebec	New Quebec
Hollinger North Shore Exploration Co. Ltd. <sup>1</sup> .....	721 Royal Bank Building, Montreal, Que.	New Quebec
Iron Ore Company of Canada <sup>1</sup> .....	810 Cote de Liesse Road, Montreal, Quebec	New Quebec, Labrador
Quebec Labrador Development Co. Ltd. <sup>1</sup> .....	100 Adelaide St. W., Toronto, Ontario	New Quebec
Trent River Iron Ltd. ....	54 Rideau St., Ottawa, Ontario	Bristol Tp., Quebec
Pershing Amalgamated Mines Ltd. <sup>1</sup> .....	1410 Stanley St., Montreal, Que.	Beresford Twp., Quebec
Algoma Ore Properties Ltd. ....	Cornwall Building, Sault Ste. Marie, Ont.	Algoma district, Ontario
Bethlehem Mines Corporation <sup>1</sup> .....	701 East Third St., Bethlehem, Pa., U.S.A.	Marmora, Ontario
Caland Ore Company <sup>1</sup> .....	38 S. Dearborn St., Chicago, U.S.A.	Rainy River, Ontario
Head of the Lakes Iron Ltd. <sup>1</sup> .....	85 Richmond St. W., Toronto, Ontario	Quetico Park, Ontario
Jalore Mining Co. Ltd. <sup>1</sup> .....	68 Yonge St., Toronto, Ontario	Michipicoten, Ontario
Mag-Iron Mining & Milling Co. Ltd. ....	49 Wellington St. E., Toronto, Ontario	Hastings Co., Ontario
Nipiron Mines Ltd. ....	302 Bay St., Toronto, Ontario	Lake Nipissing, Ontario
Steep Rock Iron Mines Ltd. ....	25 King St. W., Toronto, Ontario	Rainy River District, Ontario
The Argonaut Co. Ltd. ....	Box 1000, Campbell River, B.C.	Comox, B.C.
Anyo Metals Ltd. <sup>1</sup> .....	25 King St. W., Toronto, Ont.	Zeballos, B.C.
Sulgas Properties Ltd. ....	714 W. Hastings St., Vancouver	Skeena, B.C.
Texada Mines Ltd. ....	Box 35, Vananda, B.C.	Texada Island, B.C.
<b>Indium:</b>		
Consolidated Mining & Smelting Company of Canada Ltd. <sup>1</sup> .....	215 St. James St., Montreal, Quebec	Trail, British Columbia
<b>Lithium:</b>		
Lithium Corp. of Canada Ltd. <sup>1</sup> .....	403 Avenue Bldg., Winnipeg	Cat Lake, Manitoba
<b>Manganese:</b>		
Quebec Manganese Mines Ltd. <sup>1</sup> .....	231 St. James St. W., Montreal, Quebec	Magdalen Islands, Quebec
<b>Magnesium:</b>		
Dominion Magnesium Ltd. ....	67 Yonge St., Toronto, Ontario	Haley, Ontario
Aluminum Co. of Canada Ltd. ....	1700 Sun Life Building, Montreal, Que.	Arvida, Quebec
<b>Mercury:</b>		
Bralorne Mines Ltd. <sup>1</sup> .....	555 Burrard St., Vancouver, B.C.	Omineca district, British Columbia
Consolidated Mining & Smelting Company of Canada Ltd. <sup>1</sup> .....	215 St. James St., Montreal, Quebec	Pinchi Lake, British Columbia
<b>Molybdenite:</b>		
Acme Molybdenite Mining Co. Ltd. <sup>1</sup> .....	402 Bank of Canada Bldg., Montreal Que.	Maniwaki, Quebec
Quebec Metallurgical Industries Ltd. <sup>1</sup> .....	88 Metcalfe St., Ottawa	Clarendon Twp., Que.
Molybia Corporation Ltd. ....	31 St. James St. W., Montreal, Quebec	La Corne, Quebec
<b>Selenium - Tellurium:</b>		
International Nickel Co. of Canada Ltd. ....	Copper Cliff, Ontario	Copper Cliff, Ontario
Canadian Copper Refiners Ltd. ....	1600 Royal Bank Building, Toronto, Ont.	Montreal East, Quebec
<b>Tantalum - Columbite:</b>		
Tantalum Refining & Mining Corporation of America <sup>1</sup> .....	11 King St. W., Toronto, Ontario	Ross Lake, Northwest Territories
<b>Thallium:</b>		
Hudson Bay Mining & Smelting Co. Ltd. <sup>1</sup> .....	500 Royal Bank Building, Winnipeg, Man.	Flin Flon, Manitoba
<b>Tin:</b>		
Consolidated Mining & Smelting Company of Canada Ltd. ....	215 St. James St., Montreal, Quebec	Trail, British Columbia
Mountain Crest Mines Ltd. <sup>1</sup> .....	1445 MacKay St., Montreal, Quebec	Charlevoix, Quebec
<b>Titanium Ore:</b>		
Baie St. Paul Titanic Iron Ore Co. ....	Baie St. Paul, Quebec	St. Urbain, Quebec
Quebec Iron and Titanium Corp. ....	1522 Sherbrooke St. W., Montreal, Que.	Lac Tlo, Quebec
St. Lawrence Iron & Titanium Mines Ltd. ....	1200 St. Alexander St., Montreal, Que.	St. Urbain, Quebec
Terrebonne Titanium Co. Ltd. ....	Ste. Marguerite, Lac Masson, Quebec	Terrebonne, Quebec
Titanium Development Corporation .....	1410 Stanley St., Montreal	Beresford Twp., Quebec
<b>Tungsten Concentrates:</b>		
Coniaurum Mines Ltd. ....	25 King St. W., Toronto	Porcupine, Ontario
Hollinger Consolidated Gold Mines Ltd. ....	Timmins, Ontario	Timmins, Ontario
Arrow Tungsten Mines Ltd. ....	330 Bay St., Toronto	Ymer, B.C.
Black Diamond Tungsten Ltd. ....	525 Seymour St., Vancouver	Atlin, B.C.
Canadian Exploration Ltd. ....	Royal Bank Building, Vancouver, B.C.	Salmo, British Columbia
Salmo Prince Mines Ltd. ....	826 Vancouver Block, Vancouver	Salmo, B.C.
Western Tungsten Copper Mines Ltd. ....	505 Dunsuir St., Vancouver	Skeena Crossing, B.C.
Tungsten Corporation of Canada .....	43 King St. W., Toronto	Outpost Island, N.W.T.
Dublin Placers .....	Mayo, Yukon	Dublin Creek, Yukon
<b>Zirconium:</b>		
Dominion Magnesium Ltd. ....	67 Yonge St., Toronto, Ontario	Haley, Ontario

1. Active but not producing.

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