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CANADA

THE MISCELLANEOUS METAL MINING INDUSTRY
1956



DOMINION BUREAU OF STATISTICS
Industry and Merchandising Division
Mineral Statistics Section

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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 Iron Mining Industry, 25¢
- F – The Miscellaneous Metal Mining Industry, 25¢
- G – The Smelting and Refining Industry, 25¢
- H – The Coal Mining Industry, \$1.00
- I – The Crude Petroleum and Natural Gas Industry, 25¢
- J – The Asbestos Mining Industry, 25¢
- K – The Feldspar and Quartz Mining Industry, 25¢
- L – The Gypsum Industry, 25¢
- M – The Peat Industry, 25¢
- N – The Salt Industry, 25¢
- O – The Talc and Soapstone Industry, 25¢
- P – The Miscellaneous Non-metal Mining Industry, 25¢
- Q – The Cement Manufacturing Industry, 25¢
- R – The Clay and Clay Products Industry, 25¢
- S – The Lime Industry, 25¢
- T – The Sand and Gravel Industry, 25¢
- U – The Stone Industry, 25¢
- V – Contract Drilling in the Mining Industry, 25¢

THE MISCELLANEOUS METAL MINING INDUSTRY

1956

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

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 of ores often fluctuates in an erratic manner according to demand and supply. Included in this report, with the statistics relating to the Canadian production of these ores or metals, are notes and statistical data pertaining to various rare or semi-rare metals of metaliferous ores produced in other countries. Metals and metal-bearing ores produced in Canada during 1956

and classified as miscellaneous, include antimony, bismuth, cadmium, calcium, cerium, Columbium magnesium, mercury, molybdenite, pitchblende, selenium, tellurium, titanium ore, tin, tantalum, tungsten, and uranium. In addition to particulars relating to these metals or minerals, the bulletin contains notes of a summary nature on aluminum, beryllium, columbium, 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 smelting and refining industry.

In 1955 and 1956 the data on the iron ore mining industry has been excluded from the Miscellaneous Metal Mining Industry, thus the figures are not directly comparable with those of the preceding years.

Of the 169 active establishments in the Miscellaneous Metal Mining Industry, there were 14 which made shipments of ore or metal-bearing concentrates.

The industry employed an average of 4,377 persons to whom \$20,532,485 were distributed as salaries and wages. Fuel cost \$2,887,224 and 124,274,062 kwh. of electricity were purchased for \$1,304,090. Process supplies containers freight and treatment charges amounted to \$9,521,246.

TABLE 1. Principal Statistics of the Miscellaneous Metal Mining Industry, Significant Years, 1921-1956

Year	Establishments	Employees	Salaries and wages	Cost of fuel and electricity	Cost of process supplies and containers	Gross value of products	Net value ¹ of production
	No.	No.	\$	\$	\$	\$	\$
1921	4	44	68,606	45,376	N.A.	230,164	N.A.
1929	8	94	42,837	10,217	"	6,400	"
1931	7	32	25,694	576	"	13,434	"
1933	5	24	14,275	1,178	"	343	"
1937	15	121	155,191	15,668	17,466	86,040	52,655
1939	31	331	455,278	92,405	81,991	524,977	349,404
1941	47	725	1,141,244	359,005	217,494	3,428,886	2,618,483
1944	27	1,385	2,809,013	951,929	657,430	5,360,993	3,303,143
1946	21	1,037	2,338,442	739,531	670,648	7,187,445	3,708,109
1949	21	3,275	8,894,642	1,160,558	1,286,989	21,466,327	15,689,997
1951	31	3,891	12,251,755	1,864,309	3,299,651	31,474,736	21,765,843
1953	54	5,784	23,023,639	3,132,808	6,907,890	51,076,472	35,136,282
1954 ²	180	6,494	24,603,658	3,553,358	10,174,222	83,379,952	66,138,130
1955 ³	223	2,826	12,663,195	1,844,436	4,355,385	35,103,488	28,305,111
1956	169	4,377	20,532,485	4,191,314	8,630,542	54,494,426	40,781,866

1. Gross value of production, less the value of fuel, electricity, process supplies, containers, freight and treatment charges.
2. Data for 1954 includes uranium mining which was not shown in preceding years.
3. Iron ore data excluded since 1955, but included in preceding years.

TABLE 2. Employees and Their Earnings in the Miscellaneous Metal Mining Industry, 1952-1956

Year	Number of employees					Number of man-hours worked (all employees)	Earnings		
	Office and administrative		Workmen		Total		Office and administrative	Workmen	Total
	Male	Female	Male	Female					
						\$	\$	\$	
1952	530	48	4,539	46	5,163	13,951,913	2,244,224	16,126,548	18,370,772
1953	593	74	5,076	41	5,784	13,230,772	3,042,167	19,981,472	23,023,639
1954	685	97	5,663	49	6,494	13,333,113	3,086,429	21,517,229	24,603,658
1955 ¹	542	55	2,215	14	2,826	6,787,269	2,720,159	9,943,036	12,663,195
1956 ¹	837	88	3,436	16	4,377	10,244,141	4,412,933	16,119,552	20,532,485

1. Iron ore mining data excluded in 1955 and 1956.

TABLE 3. Average Number of Workmen, by Months, 1955 and 1956

Month	1955 ¹						1956					
	Surface		Under-ground	Mill		Total	Surface		Under-ground	Mill		Total
	Male	Female		Male	Female		Male	Female		Male	Female	
January	900	7	562	162	2	1,633	1,117	11	970	351	4	2,453
February	928	7	615	164	2	1,716	1,250	11	1,028	365	4	2,656
March	914	7	624	154	2	1,701	1,319	9	996	360	4	2,688
April	958	7	617	177	2	1,761	1,550	10	1,059	373	4	2,996
May	1,206	10	605	178	2	2,001	1,768	11	1,167	399	4	3,349
June	1,403	8	627	210	2	2,250	1,938	11	1,172	409	4	3,534
July	1,510	7	728	244	2	2,491	1,950	11	1,242	423	5	3,631
August	1,540	8	772	298	2	2,620	1,890	11	1,354	464	5	3,724
September	1,536	10	814	311	4	2,675	1,885	11	1,418	491	4	3,809
October	1,503	8	823	320	4	2,658	1,952	11	1,527	573	4	4,067
November	1,413	7	870	356	4	2,650	1,986	11	1,591	607	4	4,199
December	1,199	7	876	345	5	2,432	1,889	11	1,608	606	4	4,118
Average	1,258	11	714	243	3	2,229	1,724	11	1,264	448	5	3,452
Man-hours worked						5,570,775						8,201,606

1. Iron ore mining data excluded in 1955.

TABLE 4. Fuel and Electricity Used in the Miscellaneous Metal Mining Industry, 1956

Kind	Unit of measure	Quantity	Cost at plant
			\$
Bituminous coal (a) From Canadian mines	short ton	3	79
(b) Imported	"	23,940	432,383
Sub-bituminous coal (from Alberta mines only)	"	150	3,000
Anthracite coal	"	-	-
Lignite coal	"	-	-
Coke (for fuel only)	"	9	289
Gasoline, (includes gasoline used in cars and trucks)	Imp. gal.	701,602	254,115
Kerosene or coal oil	"	25,700	7,228
Fuel oil	"	9,831,399	2,171,811
Wood (cords of 128 cubic feet of piled wood)	cord	199	2,785
Gas (a) Liquefied petroleum gases (propane, etc.)	Imp. gal.	36,436	15,626
(b) Other manufactured gas	M cu. ft.	-	-
(c) Natural gas	"	-	-
Other fuel	-	-	8
Electricity purchased for power and lighting	k.w.h.	124,208,062	1,303,659
Electricity purchased for other purposes	"	66,000	331
Total (cost only) .....		...	4,191,314
Electricity generated (a) For own use	k.w.h.	75,551,886	...
(b) For sale	"	491,200	...

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.

Producers' shipments of aluminum ingots in 1956 amounted to 620,321 tons compared with 612,543 tons in the preceding year.

The Aluminum Company of Canada, Limited, operated its alumina plant at Arvida and the reduction plants at Arvida, Ile Maligne, Shawinigan Falls and Beauharnois. All of these plants are located in Quebec.

The plant at Kitimat, British Columbia, which began production in 1954 is being expanded. The electric power for this plant is generated at Kemano. Alumina for the smelter is brought by ship from Jamaica.

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 Canadian price of aluminum ingots in 1956 was 22.25 cents per pound in January, 23.5 cents in April, 24.5 cents in August and remained at this price through December. United States prices were January, 24.4 cents, April, 25.9 cents, August, 27.1 cents. The monetary exchange rate and import duties cause a price difference between the Canadian and United States markets.

TABLE 5. Production, Consumption, Imports and Exports of Aluminum Ingots, 1947-1956

Year	Producers' shipments	Consumption	Exports	Imports
	Tons of 2,000 pounds			
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
1953	548,445	88,548	459,692	35
1954	557,897	80,355	468,494	115
1955	612,543	91,522	506,879	99
1956	620,321	91,869	508,994	1,405

TABLE 6. Imports of Aluminum and Bauxite, 1955 and 1956

Item	1955		1956	
	Tons	\$	Tons	\$
Alumina	199,811	3,741,629	220,506	4,548,273
Bauxite ore	2,892,094	20,816,302	2,369,131	24,634,556
Cryolite	3,403	752,587	18,310	4,210,034
Aluminum:				
Pigs, ingots and blocks	99	58,390	1,405	813,501
Scrap	143	40,350	1,281	587,756
Angles, channels and beams	780	837,897	953	1,156,329
Bars, rods and wire	828	705,239	859	790,270
Leaf or foil	...	975,660	...	915,848
Pipes and tubes	864	865,847	1,902	2,162,029
Plates, sheets and strips	3,575	2,944,126	12,164	10,113,255
Powder and paste	218	148,543	237	140,232
Wire and cable	92	99,723	939	676,785
Household hollow-ware	...	2,044,315	...	1,448,952
Manufactures, n.o.p.	...	11,249,402	...	14,299,626

TABLE 7. Exports of Aluminum, 1955 and 1956

Item	1955		1956	
	Tons	\$	Tons	\$
Aluminum scrap	13, 122	4, 162, 487	8, 981	2, 588, 852
Aluminum in primary forms	506, 879	197, 659, 998	508, 994	227, 431, 686
Aluminum manufactures, n.o.p. ....	...	769, 689	...	770, 008
Aluminum, semi-fabricated	16, 658	9, 148, 811	7, 078	4, 785, 853
Aluminum kitchen utensils .....	...	34, 620	...	118, 421
Aluminum foil	900	951, 140	454	468, 672

TABLE 8. World production of bauxite, by countries
(Taken from, "Minerals Yearbook" of the United States Bureau of Mines)

Country	1951	1952	1953	1954	1955
	in long tons ¹				
North America:					
Haiti .....	...	...	...	...	...
Jamaica .....	...	375, 875 ²	1, 203, 208 ²	1, 998, 144 ²	3, 000, 000 ³
United States (dried equivalent of crude ore)	1, 848, 676	1, 667, 047	1, 579, 739	1, 994, 896	1, 788, 341
Total	1, 848, 676	2, 042, 922	2, 782, 947	3, 993, 040	4, 788, 000³
South America:					
Brazil	18, 732	14, 093	18, 524	27, 182	31, 250
British Guiana	2, 002, 757	2, 387, 953	2, 754, 598	2, 309, 934	2, 435, 298
Surinam	2, 657, 364	3, 172, 854	3, 222, 630	3, 371, 703	3, 013, 580
Total	4, 678, 853	5, 574, 900	5, 995, 752	5, 708, 819	5, 480, 128
Europe:					
Austria	8, 877	14, 940	17, 932	16, 993	18, 838
France	1, 127, 429	1, 101, 341	1, 137, 864	1, 254, 671	1, 469, 229
Germany, West	5, 296	7, 073	7, 724	4, 153	3, 814
Greece	161, 072	280, 414	323, 058	347, 937	492, 273
Hungary	741, 000	1, 188, 000	1, 372, 000	1, 240, 000	1, 221, 000
Italy	171, 266	261, 353	267, 100	290, 423	320, 815
Rumania ³	9, 800	9, 800	14, 300	14, 800	15, 800
Spain	10, 414	11, 512	5, 106	5, 644	6, 290
U.S.S.R. ³	837, 000	886, 000	886, 000	984, 000	984, 000
Yugoslavia	490, 417	603, 753	470, 016	675, 846	772, 527
Total ³	3, 563, 000	4, 384, 000	4, 501, 000	4, 835, 000	5, 305, 000
Asia:					
India	67, 047	63, 505	70, 848	74, 748	80, 700
Indonesia	387, 500	338, 326	147, 191	170, 504	259, 512
Malaya .....	...	21, 796	152, 171	165, 622	222, 164
Taiwan (Quemoy)	8, 800 ³	4	4	4	4
Total	464, 300	423, 627	370, 210	410, 874	562, 400
Africa:					
French West Africa .....	...	108, 017	332, 760	424, 195	485, 216
Gold Coast (exports)	129, 329	74, 369	115, 076	163, 517	116, 285
Mozambique	3, 276	2, 449	3, 058	2, 398	2, 611
Total	132, 605	184, 835	450, 894	590, 110	604, 112
Oceania: Australia	5, 084	7, 235	4, 052	5, 487	7, 563
World Total (estimate)	10, 700, 000	12, 600, 000	14, 100, 000	15, 550, 000	16, 750, 000

1. This table incorporates a number of revisions of data published in previous bauxite chapters. Data do not add to tables shown due to rounding where estimated figures are included in the detail.

2. Exports.
3. Estimate.
4. Negligible.

TABLE 9. World Production of Aluminum, (From the Annual Report of the American Bureau of Metal Statistics)

Country	1952	1953	1954	1955	1956
Tons of 2,000 pounds					
United States	937,330	1,252,013	1,460,565	1,565,721	1,678,954
Canada	499,758	548,445	557,897	612,543	614,721
Brazil	1,196	1,322	1,612	1,834	17,856
Total America	1,438,284	1,801,780	2,020,074	2,180,098	2,311,531
Austria	40,468	47,924	63,038	63,050	65,490
France	116,987	123,623	132,545	142,390	165,096
Germany (West)	110,740	117,880	142,519	151,087	162,437
Great Britain	31,367	34,626	35,395	27,378	30,892
Italy	58,235	61,137	63,452	67,741	69,896
Hungary	26,000	33,000	35,000	40,783	41,000
Norway	56,330	58,609	67,583	79,101	102,172
Spain	4,532	4,823	4,545	11,498	14,935
Sweden	9,253	10,800	11,861	11,735	13,734
Switzerland	32,518	31,967	28,660	33,289	33,179
Yugoslavia	2,825	3,078	3,854	12,675	16,162
Total Europe¹	489,255	527,467	588,452	640,727	714,993
China, Taiwan	4,250	5,407	7,862	7,717	9,655
India	3,994	4,210	5,472	8,092	7,281
Japan	47,026	50,147	58,543	63,399	72,748
Total Asia²	55,270	59,764	71,877	79,208	89,684
Australia				1,450	10,416
Russia	275,000	325,000	375,000	450,000	485,000
Total	2,257,809	2,714,011	3,055,403	3,351,483	3,611,624

1. Excluding East Germany.

2. Excluding Korea.

Antimony

Antimony production consists 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 Doré slag shipped from that smelter.

The greatest single use for antimony is as an alloying element with lead to which it adds hardness and mechanical strength such as in the manufacture of storage batteries and cable covering. It is alloyed with tin in the manufacture of babbitt bearings and

with lead and tin in solders, foil, collapsible tubes and type metal. Its property of expansion on cooling when alloyed makes it particularly useful in the manufacture of type metal. During the war it was used to harden the lead used in ammunition and to flame-proof canvas goods used by the armed forces.

The New York price quotations on antimony were 36.47 cents per pound throughout 1956. This price was for grade 99½% in lots of 10,000 pounds or more.

TABLE 10. Production of Antimony, 1947-1956

Year	In ores and slags exported		In antimonial lead produced		Total	
	Pounds	\$	Pounds	\$	Pounds	\$
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 ¹	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
1953	814,678	40,677	673,418	251,185	1,488,105	291,862
1954	271,350	19,334	1,030,983	329,915	1,302,333	349,249
1955	455,732	38,737	1,565,994	524,608	2,021,726	563,345
1956	331,790	27,373	1,808,642	660,154	2,140,432	687,527

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

TABLE 11. Production of Antimony Metal, Consumption and Imports, 1947-1956

Year	Production in Canada	Consumption in Canada ¹	Imports
	Tons of 2,000 pounds		
1947	—	1,189	1,440
1948	—	812	547
1949	—	767	1,292
1950	—	997	1,606
1951	—	740	681
1952	—	667	861
1953	—	803	865
1954	—	805	1,022
1955	—	846	679
1956	—	739	902

Note: Export data are not available from customs records.

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

TABLE 12. Consumption of Antimony Metal, by Industries, 1951-1955

Industry	1951	1952	1953	1954	1955
	Tons of 2,000 pounds				
White metal foundries	532	594	749	704	750
Electrical apparatus plants	72	42	23	—	5
Brass foundries	16	12	10	9	14
Jewellery and electroplate	20	19	21	92	25
Total accounted for.....	740	667	803	805	794

TABLE 13. World Production of Antimony (Content of ore)¹, by Countries²

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

Country ²	1951	1952	1953	1954	1955
	Short tons ³				
North America:					
Canada ⁴	3,351	1,165	744	651	985
Honduras	5	—	—	—	—
Mexico ⁴	7,522	6,097	4,063	4,610	4,209
United States	3,472	2,150	372	766	633
Total	14,345	9,422	5,179	6,027	5,827
South America:					
Argentina.....	45 ⁶	7	7	7	7
Bolivia (exports)	13,025	10,809	6,376	5,751	5,907
Peru	1,220	567	1,062	933	960
Total	14,290⁶	11,430⁶	7,490⁶	6,740⁶	6,874

TABLE 13. World Production of Antimony (Content of ore)¹, by Countries² - Concluded

Country	1951	1952	1953	1954	1955
	Short tons ³				
Europe:					
Austria	549	429	543	429	441
Czechoslovakia ⁶	1,800	1,800	1,800	1,800	7
France	674	518	331	—	7
Germany, West	53	52	55	7	7
Greece	551	386	600 ⁶	60 ⁶	—
Italy	799	692	465	317	358
Portugal	21	155	1	6	7
Spain	184	288	254	121	200 ⁶
Yugoslavia (metal)	1,355	1,465	1,554	1,711	1,769
Total^{2,6}	6,500	6,200	5,900	4,700	5,100
Asia:					
British Borneo: Sarawak	—	—	—	—	—
Burma ⁶	220	100	130	55	60
China ⁶	7,700	8,800	11,000	12,000	13,000
Iran ⁸	176	265	110	50	7
Japan	247	230	354	291	333
Thailand (Siam)	72	77	50	78	28
Turkey	2,984	1,274	951	1,080	1,841
Total⁶	11,400	10,700	12,600	13,500	15,400
Africa:					
Algeria	1,391	1,456	1,995	2,535	1,124
French Morocco	1,055	925	64	429	349
Southern Rhodesia	68	110	26	72	223
Spanish Morocco	235	475	341	330	397
Union of South Africa	17,480	7,949	3,009	9,528	15,641
Total	20,229	10,915	5,435	12,894	17,734
Oceania:					
Australia	463	268	251	131	371
New Zealand	—	7	12	—	—
Total	463	275	263	131	371
World total estimate²	65,000	50,000	40,000	45,000	50,000

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

2. Antimony is also produced in Hungary and U.S.S.R.; an estimate for Hungary is included in the total, but there is too little information to include an estimate for U.S.S.R.

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

4. Includes antimony content of antimonial lead.

5. Negligible.

6. Estimate.

7. Data not available; estimate included in total.

8. Year ended March 20, of year following that stated.

TABLE 14. Imports of Antimony Oxide, by Principal Countries of Supply

	1952	1953	1954	1955	1956
			pounds		
United Kingdom	138,000	74,000	181,460	130,000	198,880
United States	35,213	52,610	73,652	90,969	56,230
Belgium	—	2,240	2,240	2,240	6,721
Germany, West	—	—	22,046	63,000	—
Total	173,213	128,850	279,398	286,209	261,831

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 during the years 1950 to 1956.

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 stockpiled. In 1950 a carload of this material was shipped to the United States. No shipments were made in 1956.

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 Come 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 \$46 to \$48 per unit of BeO, basis 10 to 12 per cent BeO.

TABLE 15. World Production of Beryl, by Countries¹
(Taken from the "Minerals Yearbook" of the United States Bureau of Mines)

Country ¹	1951	1952	1953	1954	1955
	Short tons ²				
North America:					
Canada.....	—	—	—	—	—
United States (mine shipments).....	484	515	751	669	500
Total	484	515	751	669	500
South America:					
Argentina.....	171	694	683	705	1,488
Brazil.....	1,918	3,177	2,126	1,581	1,820 ⁴
Surinam.....	—	—	2	10	—
Total	2,089	3,871	2,811	2,296	3,308
Europe:					
France.....	2	—	5	5	5
Norway.....	—	—	—	—	—
Portugal.....	112	103	414	368	327
Total (estimate)¹	220	210	520	480	440
Asia:					
Afghanistan.....	2	—	—	35 ⁶	—
India.....	237	600 ⁶	199 ³	392 ³	845 ³
Korea, Republic of.....	—	7	4	4 ³	6 ³
Total	239	600⁶	203	431	851

TABLE 15. World Production of Beryl, by Countries¹ — Concluded

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

Country ¹	1951	1952	1953	1954	1955
	Short tons ²				
Africa:					
Belgian Congo (including Ruanda-Urundi).....	—	—	8	50	362
British Somaliland.....	—	—	—	—	19
French Morocco.....	93	142	36	17	2
Madagascar.....	584	438	516	648	316
Mozambique.....	254	229	276	500 ⁵	960
Northern Rhodesia.....	4	9	6	1	20
Southern Rhodesia.....	1,110	1,186	1,774	1,077	965
South West Africa.....	830	592	590	564	472
Tanganyika.....	—	—	—	—	—
Uganda.....	2	3	55	77	110
Union of South Africa.....	654	413	531	203	126
Total.....	3,531	3,012	3,792	3,137	3,352
Australia.....	126	98	140	166	230
World total (estimate).....	6,700	8,300	8,200	7,200	8,700

1. In addition to the countries listed, beryl has been produced in a number of countries for which no production data are available, except for U.S.S.R. their aggregate output is not significant.

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

3. United States imports.

4. Exports.

5. Data not available; estimate included in total.

6. Estimate.

7. Less than 0.5 ton.

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 Molybda Corporation, Limited, produced bismuth oxychloride concentrates and metallic bismuth. At the Smelter of Deloro Smelting and Refining Company bismuth-lead-silver by-products bullion was produced.

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 amal-

gams 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 New York price of bismuth December, 1956 was \$2.25 per pound, in ton lots.

TABLE 16. Production of Primary Bismuth in all Forms¹, 1947-1956

Year	Pounds	\$	Year	Pounds	\$
1947.....	284,372	560,213	1952.....	162,373	347,224
1948.....	240,242	480,484	1953.....	117,366	209,557
1949.....	102,913	210,972	1954.....	258,675	572,183
1950.....	191,621	431,147	1955.....	265,896	572,362
1951.....	230,298	543,504	1956.....	285,861	544,900

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

TABLE 17. Production of Bismuth Metal, Consumption, Imports and Exports, 1947-1956

Year	Production	Domestic consumption	Exports ¹	Imports
Tons of 2,000 pounds				
1947.....	142	71	61	2
1948.....	120	44	79	80
1949.....	105 ²	18	89	136
1950.....	97 ²	33	57	—
1951.....	104 ²	54	45	—
1952.....	71 ²	53	17	1
1953.....	36 ²	34	—	—
1954.....	113 ²	37	67	—
1955.....	80 ²	46	28	3
1956.....	78	20	66	12

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

TABLE 18. Consumption of Bismuth Metal, by Industries, 1951-1955

Industry	1951	1952	1953	1954	1955
Tons of 2,000 pounds					
Medicinals and pharmaceuticals	29	26	8	10	21
White metal foundries	18	20	21	18	18
Miscellaneous	7	7	5	9	7
Total	54	53	34	37	46

TABLE 19. World Production of Bismuth, by Countries

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

Country ¹	1951	1952	1953	1954	1955
Pounds ²					
North America:					
Canada (metal) ³	230, 298	162, 373	117, 366	258, 675	207, 670
Mexico ³	745, 100	672, 297	739, 209	795, 900	773, 800
United States	4	4	4	4	4
South America:					
Argentina: Metal	6	1, 100 ⁵	6	6	16, 314
In ore ⁵	6	1, 100	1, 340	10, 140	20, 720
Bolivia (in ore, bullion, exported) ⁷	150, 788	35, 119	138, 731	101, 467	94, 600
Peru ³	579, 049	714, 828	631, 990	691, 726	734, 714
Europe:					
France (in ore).....	198, 000	190, 000	159, 000	23, 631	69, 445
Spain (metal)	33, 466	27, 044	56, 006	32, 985	43, 500
Sweden	—	6	6	6	145, 500
Yugoslavia (metal)	193, 476	217, 600	217, 047	241, 842	229, 516
Asia:					
China (in ore).....	6	6	6	6	6
Japan (metal)	92, 615	96, 068	110, 159	118, 610	142, 364
Korea, Republic of	27, 600	243, 000	529, 000	254, 000	287, 000
Africa:					
Belgian Congo (in ore)	496	1, 036	—	2, 127	6
Mozambique	1, 567	11, 199	7, 057	1, 905	4, 145
South West Africa (in ore) ⁵	200	—	100	2, 500	2, 370
Uganda	6, 385	6, 200	1, 100	400	320
Union of South Africa (in ore).....	7, 019	3, 391	2, 200 ⁵	1, 120	228
Australia (in ore)	2, 575	3, 153	880	1, 345	6
Total (estimate)¹.....	3, 900, 000	3, 900, 000	4, 200, 000	3, 600, 000	3, 800, 000

1. Bismuth is believed to be produced also in Brazil East, Germany, Rumania, and U.S.S.R. Production figures are not available for these countries, but estimates are included in total.
2. This table incorporates a number of revisions of data published in previous bismuth chapters.
3. Refined metal, plus bismuth content of bullion exported.
4. Production included in total; Bureau of Mines not at liberty to publish separately.
5. Estimate.
6. Data not available; estimate included in total.
7. Excludes bismuth content of tin concentrates exported.

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 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.

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, 1956 was \$1.70 per pound.

TABLE 20. Production of Cadmium in all Forms, 1947-1956

Year	British Columbia and Yukon		Manitoba and Saskatchewan		Canada	
	Pounds	\$	Pounds	\$	Pounds	\$
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
1953.....	960,288	1,920,576	157,997	315,994	1,118,285	2,236,570
1954.....	932,184	1,584,713	154,596	262,813	1,086,780	1,847,526
1955.....	1,727,390	2,936,564	191,691	325,875	1,919,081	3,262,439
1956.....	2,160,710	3,673,207	156,986	266,876	2,317,696	3,940,083

TABLE 21. Consumption and Exports of Cadmium Metal, 1947-1956

Year	Production	Domestic consumption	Exports
	Tons of 2,000 pounds		
1947.....	359	72	309
1948.....	383	92	275
1949.....	423	111	317
1950.....	419 ¹	116	349
1951.....	633 ¹	146	460
1952.....	410 ¹	74	310
1953.....	489 ¹	133	485
1954.....	529 ¹	113	388
1955.....	857 ¹	174	881
1956.....	966 ¹	143	961

1. Includes cadmium recovered from foreign ores.

Note: Statistics on imports are not available.

TABLE 22. World Production¹ of Cadmium, by Countries
(Taken from the "Minerals Yearbook" of the United States Bureau of Mines)

Country	1951	1952	1953	1954	1955
Thousands of pounds					
Australia	517	641	665	645	674
Belgian Congo	54	45	71	139	366
Belgium	990	1,210	1,040	1,100	1,050
Canada	1,327	949	1,118	1,087	1,971
France	187	195	283	313	397
Germany, West	154	141	227	618	709
Italy	441	293	401	458	433
Japan	259	367	459	600	750
Mexico ³	1,969	1,618	2,113	1,130	2,855
Norway	221	163	197	178	255
Peru	—	38	23	66	138
Poland ²	400	420	485	500	550
South West Africa ⁴	1,434	1,112	1,194	1,620	1,402
Spain	9	12	16	21	22 ²
U. S. R. ²	180	225	275	300	330
United Kingdom	326	347	380	315	332
United States: Metallic cadmium	8,114	8,388	9,682	9,416	9,754
Cadmium compounds (Cd. content)	197	179	85	136	190
Total (estimate)	13,380	14,610	15,410	15,900	17,920

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

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

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. From 1950 to 1955 the value of output was included in the data on magnesium.

Calcium has found increasing use as a deoxidizer in ferrous metallurgy and as an alloy constituent with non-ferrous metals. It has been employed in the reduction of refractory ores of metals, such as chromium, thorium, uranium and zirconium.

TABLE 23. Production (shipments) of Calcium Metal, 1945-1956

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
1950-1955	(Not available for publication)	
1956 ¹	394,900	515,305

1. Output.

TABLE 24. Exports of Calcium, by Countries to which shipped

Country	1955	1956
	\$	\$
United Kingdom	507,706	616,605
Australia	165	—
Belgium	12,030	—
Italy	788	—
Sweden	330	3,243
United States	762,260	12,560
France	—	16,360
Germany West	—	330
Total	1,283,279	649,098

Cerium

A few tons of rock containing cerium and other rare earths were shipped from the Parry Sound district to a metallurgical plant in the United States, during 1955. This experimental shipment was valued at \$988. No production was reported in 1956.

Cerium is obtained from monazite, a monoclinic phosphate of cerium metals containing about 32 per cent cerium oxide (Ce_2O_3) and up to 18 per cent thorium (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 1956. 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 Cr_2O_3 with a chrome-iron ratio of 3 to 1 or higher, and the ore should be hard and lumpy.

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

The United States price, December, 1956, for chrome ore, 48 per cent Cr_2O_3 , was \$52 to \$56 per long ton, f.o.b. Atlantic ports.

TABLE 25. Production of Chromite, 1945-1956

Year	Short tons	\$	Year	Short tons	\$
1945	5,755	160,752	1950	—	—
1946	3,110	61,123	1951	—	—
1947	2,162	42,159	1952	—	—
1948	1,715	33,568	1953	—	—
1949	361	7,148	1954-1956	—	—

TABLE 26. World Production of Chromite, by Countries

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

Country ¹	1951	1952	1953	1954	1955
	Short tons ²				
North America:					
Canada	—	—	—	—	—
Cuba	87,154	68,132	77,205	80,011	81,745
Guatemala	1,254	116	441	146	320
United States	7,056	21,304	58,817	163,365	153,253
Total	95,464	89,552	136,463	243,522	235,318

TABLE 26. World Production of Chromite, by Countries - Concluded

Country ¹	1951	1952	1953	1954	1955
	Short tons ²				
South America:					
Argentina.....	—	—	—	³	—
Brazil.....	2,663	2,920	3,942	2,108	3,000 ⁵
Total	2,663	2,920	3,942	4,800⁵	3,000⁵
Europe:					
Albania ⁵	50,000	57,000	61,000 ⁶	129,000	161,000 ⁶
Greece.....	27,925	35,452	40,520	29,549	37,635
Portugal.....	36	119	⁶	²³	—
U.S.S.R. ^{5,7}	600,000	600,000	600,000	600,000	600,000
Yugoslavia.....	109,833	118,192	139,950	137,216	139,119
Total^{1,5}	800,000	800,000	900,000	900,000	1,000,000
Asia:					
Afghanistan.....	83	—	—	—	—
Cyprus (exports).....	13,948	14,867	9,115	10,080	9,599
India.....	18,706	40,530 ⁸	72,543	50,968	72,000 ⁵
Iran.....	9,728	22,046	23,657	23,406	17,000 ⁵
Japan.....	45,134	51,975	41,418	36,138	29,050
Pakistan.....	19,848	19,040	25,760	24,527	31,808
Philippines.....	368,801	599,121	614,086	442,230	659,310
Turkey.....	682,793	889,466	1,005,883	619,001	710,253
Total⁷	1,159,041	1,637,045	1,792,462	1,206,350	1,529,000⁵
Africa:					
Egypt.....	—	—	231	584	926
Sierra Leone.....	18,139	26,312	27,277	21,011	22,110
Southern Rhodesia.....	330,987	355,679	463,028	442,506	449,202
Union of South Africa.....	600,763	639,366	798,562	706,935	597,368
Total	949,889	1,021,357	1,289,098	1,171,036	1,069,606
Oceania:					
Australia.....	1,545	1,565	3,070	5,536	—
New Caledonia.....	97,876	118,809	134,032	93,645	50,790
Total	99,421	120,374	137,102	99,181	50,790
World total (estimate)¹	3,100,000	3,700,000	4,300,000	3,600,000	3,900,000

1. In addition to countries listed, Bulgaria and Romania produce chromite, but data on output are not available; estimates are included in total.

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

3. Data not available; estimate included in total.

4. Exports.

5. Estimate.

6. Data from Economic Survey for Europe 1954-1955 (United Nations)

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

8. Does not include 23,813 tons of low-grade ore accumulated from production from 1943 to 1948.

TABLE 27. Imports of Chrome Ores, 1947-1956

Year	Tons	\$	Year	Tons	\$
1947.....	98,322	3,138,229	1952.....	148,343	5,146,860
1948.....	69,183	1,937,692	1953.....	118,092	3,006,549
1949.....	66,246	1,664,082	1954.....	37,566	571,984
1950.....	119,325	2,192,555	1955.....	51,854	971,522
1951.....	146,998	3,762,874	1956.....	64,965	1,529,411

TABLE 28. Imports of Chrome Ores, by Principal Countries of Supply, 1955 and 1956

Imported from	1955		1956	
	Tons	\$	Tons	\$
Union of South Africa	9,805	112,597	18,468	220,466
Rhodesia, Nyasaland	7,349	179,254	6,593	201,667
U.S.S.R.	110	1,375	—	—
United States	5,029	172,257	18,142	593,351
Philippines	14,896	197,505	17,344	264,974
Cuba	14,165	308,534	2,093	56,953
Pakistan	—	—	205	4,195
Turkey	—	—	2,120	87,805
Total	51,854	971,522	64,965	1,529,411

Indium

Indium production in 1956 amounted to 363,192 ounces valued at \$795,390 as compared with 104,774 ounces valued at \$232,598 in 1955. 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 1956 the quoted price of indium at New York was \$2.25 per ounce troy. The price has remained at this level for the past ten years.

TABLE 29. Production of Indium, 1942-1956

Year	Troy ounces	\$	Year	Troy ounces	\$
1942	470	4,710	1952	404	909
1943-1948	—	—	1953	5,752	9,588
1949	689	1,550	1954	477	1,278
1950	4,952	12,083	1955	104,774	232,598
1951	582	1,368	1956	363,192	795,390

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 30. Production of Primary Magnesium Metal, 1943-1956

Year	Quebec		Ontario		Canada	
	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
1947-1955	Not available for publication					
1956	4, 572, 564	1, 536, 688	14, 639, 734	4, 543, 202	19, 212, 298	6, 079, 890

TABLE 31. Consumption of Magnesium Metal, 1951-1955

	1951	1952	1953	1954	1955
	Pounds				
In white metal alloy foundries	1, 884, 331	1, 420, 585	1, 796, 134	1, 743, 198	605, 658
In brass and bronze foundries	270, 325	113, 427	147, 671	121, 533	75, 813
In aluminum products	508, 650	703, 873	883, 973	751, 089	984, 068
Total accounted for	2, 663, 306	2, 237, 885	2, 827, 778	2, 615, 820	1, 665, 539

TABLE 32. World Production of Magnesium Metal, by Countries

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

Country ¹	1952	1953	1954	1955	1956
	Short tons ¹				
Canada ²	5, 500	6, 600	6, 600	7, 700	10, 000
China, Manchuria	3	3	3	3	3
France	1, 166	1, 098	1, 268	1, 670	1, 676
Germany - West ⁴	—	—	154	144	194
Italy	1, 079	1, 595	1, 836	3, 161	4, 097
Japan	—	—	23	148	1, 400
Norway	338	3, 853	5, 183	7, 441	7, 700
Switzerland	331	275 ²	—	—	—
United Kingdom ⁴	5, 071	5, 936	5, 577	6, 054	4, 064
United States	105, 821	93, 075	69, 729	61, 135	68, 346
U.S.S.R. ²	45, 000	55, 000	45, 000	55, 000	60, 000
Total (estimate)	165, 000	168, 000	136, 000	143, 000	158, 000

1. This table incorporates a number of revisions of data published in Previous magnesium chapters.
2. Estimate.
3. Data not available; estimate included in total.
4. Primary metal and remelt alloys.

Manganese

Production of manganese ore in Canada has been spasmodic due to the limited number of known deposits. During 1956 a small shipment manganese bearing silica was exported from British Columbia. In New Brunswick extensive development work was done by Strategic Materials Corporation on the manganese-iron deposits. Test lots of ores were shipped to the firm's pilot plant where a process was developed for the production of ferro-manganese.

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 \$1.12 to \$1.17 per long ton unit, c.i.f. U.S. ports.

TABLE 33. Production of Manganese Ore, 1943-1956

Year	Tons	Value	Year	Tons	Value
		\$			\$
1943	48	935	1948	3	83
1944	-	-	1949	-	-
1945	-	-	1950	-	-
1946	-	-	1951	-	-
1947	225	7,875	1952-1955	-	-
			1956 .....	...	1,900

TABLE 34. Imports of Manganese Oxide, 1947-1956

Year	Tons	\$	Year	Tons	\$
1947	223,503	6,145,568	1952	194,405	8,273,722
1948	230,298	6,449,819	1953	66,682	2,719,363
1949	137,854	4,475,522	1954	48,962	2,277,043
1950	135,697	4,993,912	1955	175,282	7,338,259
1951	222,082	9,078,011	1956	207,977	9,137,278

TABLE 35. Imports of Manganese Oxide, by Principal Countries of Supply, 1952-1956

	1952	1953	1954	1955	1956
	Tons				
From:					
Belgium	-	12,340	2,240	-	-
Cuba	3,964	-	6,940	5,355	23,361
Gold Coast	63,112	10,035	5,600	56,011	30,688
India	13,954	11,043	1,794	42,199	26,199
France	-	-	5	-	-
United States	74,393	31,709	32,304	47,201	94,019
United Kingdom	50	55	75	95	171
Netherlands	-	-	-	35	-
Brazil	5,152	-	-	-	-
Mexico	-	-	-	3,506	2,561
Turkey	25,688	-	-	-	1,144
Union of South Africa	7,520	1,500	-	8,926	3,350
Philippines	672	-	-	-	-
Belgian Congo	-	-	-	11,951	26,484
Total imports	194,405	66,682	48,962	175,282	207,977

TABLE 36. World Production of Manganese Ore, by Countries ¹.
(Taken from the "Minerals Yearbook" of the United States Bureau of Mines)

Country ¹	1951	1952	1953	1954	1955
	Short tons ²				
North America:					
Canada (shipments)	—	—	—	—	—
Cuba	169,856	277,425	339,353	296,301	346,680
Mexico	87,292	157,403	269,863	277,995	97,326
United States (shipments)	105,007	115,379	157,536	206,128	297,255
Total	362,155	550,208	816,755	780,925	731,261
South America:					
Argentina	1,323	2,535	5,512	1,323	5,512
Brazil	224,366	274,732	255,058	179,157	178,699
Chile	47,437	59,356	60,207	58,400	53,400 ³
Peru	1,043	1,221	3,500 ³	3,123	3,801
Total	274,169	337,844	324,277	242,003	246,412 ³
Europe:					
Greece	17,842	21,356	15,577	18,697	27,148
Hungary (concentrates) ³	44,000	44,000	44,000	44,000	50,600
Italy	31,479	45,484	44,157	53,843	52,371
Portugal	8,394	12,197	13,913	10,627	4,351
Rumania	4	4	4	4	391,000 ³
Spain	22,917	31,408	36,044	39,511	45,839
Sweden	5,500	50,700	49,600	8,800	8,800 ³
U.S.S.R. ³	2,800,000	2,800,000	3,900,000 ⁵	4,400,000 ⁵	4,400,000 ⁵
Yugoslavia	4,600	4,600	5,200	5,000	4,900
Total ^{3,1}	3,000,000	3,200,000	4,400,000	4,900,000	5,000,000
Asia:					
Burma	2,200 ³	7,280	9,610	4,150	342
India	1,447,453	1,637,733	2,130,511	1,583,511	1,702,757
Indonesia	—	8,634	20,310	16,442	38,810
Iran ⁶	4,379	3,583	4,400 ³	3,800	7,700
Japan	203,942	228,593	214,286	180,155	209,634
Korea, Republic of	2,477	8,175	3,371	1,744	3,833
Malaya	215 ⁷	—	—	—	—
Philippines	24,629	22,737	23,703	10,354	13,131
Portuguese India	94,182	122,429	165,227	116,756	154,528 ⁷
Turkey	55,635	88,745	99,038	54,925	55,228
Total ^{3,1}	1,857,000	2,161,000	2,721,000	2,043,000	2,274,000
Africa:					
Angola	50,913	60,731	72,603	34,865	34,853
Belgian Congo	78,203	141,071	233,831	424,320	508,972
French Morocco	410,252	469,932	473,304	441,413	453,396
Gold Coast ⁸ (exports)	902,812	889,491	835,510	515,475	604,330
Northern Rhodesia	1,411	4,397	7,984	18,951	19,411
Southern Rhodesia	—	1,580	—	18	1,330
South West Africa	7,231	29,213	40,654	34,066	41,880
Spanish Morocco	1,237	4,007	1,131	856	1,252
Tunisia	—	—	—	—	—
Union of South Africa	836,510	954,121	912,333	772,862	649,171
Total	2,288,574	2,564,549	2,582,400	2,242,826	2,314,605
Oceania:					
Australia	8,924	7,917	35,897	31,587	53,039
Fiji	707	2,251	2,448	11,087	8,444
New Caledonia	22,195	18,450	5,163	—	—
New Zealand	450	357	324	268	275 ³
Papua	45	—	47	—	17
Total	32,321	28,975	45,879	42,942	61,775
World total (estimate)	7,800,000	8,800,000	10,900,000	10,250,000	10,600,000

1. In addition to countries listed, Bulgaria, China and North Korea have produced manganese ore; data of output are not available, but estimates for them are included in the totals. Czechoslovakia and Egypt report production of manganese ore, but because the manganese content, averages less than 30 per cent and these ores are essentially ferruginous manganese ores; the output is not included in this table. Egypt produced the following tonnages: 1951, 171,259; 1952, 230,564; 1953, 307,331; 1954, 195,694; and 1955, 235,036. Occasionally a small tonnage contains more than 35 per cent manganese.

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. The 1953, 1954 and 1955 production estimated for ore of 35 per cent or more manganese content.

6. Year ending March 20, of year following that stated.

7. Exports.

8. Dry weight.

Mercury

There was no production in 1956 but in 1945 a small quantity of mercury was produced in the Bridge River district of British Columbia. Previous production had been prior to September, 1944. 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 1956 the price of mercury on the New York market was quoted at \$273 per flask of 76 lb. in January; \$266 in April; \$255 in July; \$255 in October and \$255 at the end of the year.

TABLE 37. Production of Mercury, 1940-1956

Year	Pounds	\$	Year	Pounds	\$
1940	153,830	359,317	1944	735,908	1,210,375
1941	536,304	1,335,697	1945-1954	Nil	-
1942	1,035,914	2,943,307	1955	75	250
1943	1,690,240	4,559,200	1956	-	-

TABLE 38. Production of Mercury, Consumption, Imports and Exports, 1947-1956

Year	Production	Consumption	Imports	Exports
	Pounds			
1947	-	344,516	412,649	17,084
1948	-	552,215	803,878	175
1949	-	450,577	278,069	8
1950	-	156,716	614,005	8,100
1951	-	171,886	308,172	58,235
1952	-	159,215	144,439	1,500
1953	-	191,976	196,412	7,018
1954	-	193,894	244,783	6,310
1955	75	416,632	555,526	3,781
1956	-	212,300	450,006	5,953

TABLE 39. Consumption of Mercury by Principal Uses, 1952-1956

Industry	1952	1953	1954	1955	1956
	Pounds				
Pharmaceuticals and fine chemicals	25,864	46,487	45,269	26,372	35,720
Heavy chemicals	103,385	113,513	134,870	357,656	159,524
Electrical apparatus	13,967	11,598	5,383	29,184	13,680
Gold Mines ¹	6,000	6,000	3,000	3,000	3,000
Miscellaneous ¹	10,000	14,378	4,372	420	876
Total accounted for	159,216	191,976	193,894	416,632	212,800

1. Estimated.

TABLE 40. World Production of Mercury, by Countries¹
(Taken from the "Minerals Yearbook" published by the United States Bureau of Mines)

Country ¹	1947-51 (average)	1952	1953	1954	1955	1956
Flasks of 76 pounds ²						
North America:						
Honduras	2	—	—	—	—	—
Mexico	6,311	8,732	11,643	14,755	29,881	19,532
United States	11,878	12,547	14,337	18,543	18,955	24,177
South America:						
Bolivia (exports)	4	—	—	—	—	—
Chile	419	173	100	243	526	500 ³
Colombia	—	—	—	—	36	—
Peru	—	—	—	77	148	—
Europe:						
Austria	14	15	22	27	16	20 ³
Czechoslovakia ^{3,4}	766	725	725	725	725	725
Italy	48,768	55,869	51,373	54,477	53,520	61,932
Spain	41,374	39,135	43,541	43,135	36,231	40,000 ³
U.S.S.R. (estimate) ⁴	11,600	11,600	12,300	12,300	12,300	12,300
Yugoslavia	12,441	14,620	14,272	14,446	14,591	13,228
Asia:						
China	1,264	4,000 ³	5,000	5	5	5
Japan	1,786	3,083	6,406	10,264	4,990	8,383
Philippines	—	—	—	—	635	3,015
Taiwan (Formosa)	—	—	—	44	58	—
Turkey	25	—	—	261	841	562
Africa:						
Algeria	168	—	—	—	—	—
Tunisia	—	—	—	—	166	22
World total (estimate)	137,000	151,000	160,000	180,000	185,000	197,000

1. Rumania and a few other countries may also produce a negligible amount of mercury, but production data are not available.

2. This table incorporates a number of revisions of data published in previous mercury chapters. Data do not add to totals shown due to rounding where estimate included in total.

3. Estimate.

4. According to the 43rd annual issue of Metal Statistics (Metallgesellschaft), except 1956.

5. Data not available; estimates by authors included in totals.

Molybdenum

Although there are several deposits of molybdenite in Canada the only operating mine was in La Corne township, Quebec. The ore is milled by Molybdenite Corporation of Canada Limited to yield molybdenite concentrates which are treated to produce molybdic oxide. By-products are metallic bismuth and bismuth oxychloride.

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 aeroplanes. 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 41. Production of Molybdenite, 1947-1956

Year	Ores milled	Ores and concentrates shipped or used		Total MoS ₂ contents of shipments
	Tons	Tons	\$	Pounds
1947	83,665	396.0	309,048	759,795
1948	—	173.5	137,143	304,762
1949	—	—	—	—
1950	—	108.9 ¹	60,059	103,550
1951	40,139	241	228,958	381,596
1952	82,294	331	409,831	505,964
1953	41,379	184	215,527	323,907
1954	105,924	411	457,912	752,417
1955	157,014	762	823,954	1,389,177
1956	165,026	705	955,828	1,403,772

1. Shipped from stockpile.

TABLE 42. World Production of Molybdenum in Ores and Concentrates, by Countries
(Taken from the "Minerals Yearbook" of the United States Bureau of Mines)

Country ¹	1951	1952	1953	1954	1955
	Thousands of pounds ²				
Australia	2	3	2	2	2
Austria	42	40	—	—	4
Canada	229	304	194	452	774
Chile	3,803	3,624	3,031	2,663	2,817
Finland	—	—	—	—	—
French Morocco	—	—	—	—	—
Hong Kong	3	3	2	3	3
Japan	119	196	397	450	439
Korea, Republic of	11	15	20	22	24
Mexico	—	—	3	159	55
Norway	276	282	317	335	379
Peru	7	7	11	2	2
Sweden	—	—	—	—	—
United States	38,855	43,259	57,243	58,668	61,781
Yugoslavia	679	1,453	1,920	441	4
Total (estimate)¹	44,700	49,800	63,800	63,900	67,200

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

2. This table incorporates revisions of data published in previous molybdenum chapters.

3. Less than 0.5 ton.

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

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, and Gaspé, 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. 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 \$10.50 to \$15.50 per pound during 1956.

TABLE 43. Production¹ of Selenium, 1947-1956

Year	Pounds	\$	Year	Pounds	\$
1947	501,090	937,038	1952	242,030	786,599
1948	390,394	781,788	1953	262,346	1,101,854
1949	318,225	652,361	1954	323,529	1,617,645
1950	261,973	633,975	1955	427,109	3,203,319
1951	382,603	1,239,633	1956	330,309	4,460,252

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

TABLE 44. Refinery Output of Selenium From Primary and Scrap Materials, 1947-1956

Year	Pounds	Year	Pounds
1947	496,765	1952	254,478
1948	378,316	1953	307,903
1949	288,166	1954	297,479
1950	289,714	1955	422,588
1951	371,060	1956	355,024

Tantalum-Columbium

The refinery of Boreal Rare Metals Limited at Cap-de-la Madeleine, Quebec which formerly treated tantalite-columbite concentrates from the Northwest Territories was not in operation. Development work on mining properties and treatment processes was carried on by other firms. Columbium, tantalum and uranium occur in the deposits at Oka, Quebec and at

Nipissing, Ontario. The E. & M. Journal price quotations in December, 1956 were: Columbite-per lb. of pentoxide, basis 65% Cb_2O_5 and Ta_2O_5 , columbium-tantalum ratio 10 to 1, \$1.25-\$1.35. Ratio 8½ to 1, \$1.05 to \$1.15 columbium metal-no quotation. Tantalum metals per kilo, base price \$128 for rod; sheet, \$100.

TABLE 45. World Production of Columbium and Tantalum Mineral Concentrates, by Countries¹

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

Country ¹	1952		1953		1954		1955	
	Columbium	Tantalum	Columbium	Tantalum	Columbium	Tantalum	Columbium	Tantalum
	pounds							
Argentina	—	—	—	—	11,023 ²	—	10,800 ²	6,614 ²
Australia	16,108	—	18,124	—	117,767	—	125,000 ³	—
Belgian Congo ⁴	231,042	—	623,902	—	967,819	—	947,978	—
Bolivia (exports)	—	—	3,366	—	—	—	2,350	—
Brazil	4,480 ⁵	53,760 ⁵	676,200 ⁵	40,320 ⁵	124,460 ²	255,533 ²	233,012 ²	221,834 ²
British Guiana	2,000	—	11,200	—	4,480	—	6,720	—
Canada	—	—	—	—	90	77	42	390
French Equatorial Africa	3,527	—	3,514	—	6,261	—	2,672	—
French Guiana	—	—	13,228	—	28,250	—	—	23,085 ²
Germany, West	—	—	—	—	267,957 ²	62,865 ²	849,310 ²	594,030 ²
Madagascar	5,732	—	8,377	—	36,596	—	38,801	—
Malaya	105,280	—	116,480	—	248,640	—	52,910	—
Mozambique	32,652	—	58,133 ⁶	—	94,031	—	82,884	—
Nigeria	2,896,320	2,240	4,388,160	—	6,527,360	22,400	7,047,040	35,840
Norway	—	—	40,367 ²	—	392,419	—	675,930	—
Portugal	—	35,428 ²	68,121 ²	154,323 ²	148,732 ²	86,279 ²	168,362 ²	6,614 ²
Northern Rhodesia	—	—	—	—	—	1,252	—	—
Southern Rhodesia	1,120	10,360	5,100	27,060	18,060	14,300	12,240	4,660
Sierra Leone	—	—	—	—	8,960	—	8,960	—
South West Africa	4,400	—	17,634	—	22,439	3,868	8,299	2,924
Spain ²	—	741	4,410	—	—	—	2,525	11,276
Sweden	—	—	16,713	4,242	—	19,251	—	—
Uganda ⁷	9,094 ⁵	—	23,542	—	23,117	—	34,003	—
Union of South Africa	—	8,000	—	38,000	—	46,000	—	22,000
United States	5,385	—	14,867	—	32,829	—	12,440	—
World total (estimate)	3,430,000	—	5,770,000	—	9,590,000	—	11,250,000	—

1. Frequently the composition (Cb_2O_5 - Ta_2O_5) of these mineral concentrates lies in an intermediate position, neither Cb_2O_5 nor Ta_2O_5 being strongly predominant. In such cases the production figure has been centered.

2. United States imports.

3. Estimate.

4. In addition, tin-columbium-tantalum were produced as follows: 1952, 2,813,070 pounds; 1953, 3,575,861 pounds; 1954, 5,970,057 pounds; 1955, 3,941,825 pounds; columbium-tantalum content averaging about 10 per cent.

5. Exports.

6. In addition to figure shown, 132 pounds of samarskite were produced in 1953.

7. In addition, tin-columbium-tantalum concentrates were produced as follows: 1952, 3,248 pounds; 1953, 4,480 pounds; 1954, 6,720 pounds.

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, and Gaspé, 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 \$1.50 to \$1.75 a pound in New York during 1956.

TABLE 46. Production¹ of Tellurium, 1947- 1956

Year	Pounds	\$	Year	Pounds	\$
1947	9, 194	16, 090	1952	6, 035	10, 259
1948	11, 425	19, 994	1953	4, 694	8, 215
1949	11, 692	21, 046	1954	8, 171	14, 300
1950	10, 075	19, 143	1955	9, 014	15, 774
1951	8, 913	16, 400	1956	7, 867	13, 767

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

TABLE 47. Refinery Output of Tellurium, 1934- 1956

Year	Pounds	Year	Pounds	Year	Pounds
1934	5, 130	1942	9, 500	1950	6, 010
1935	16, 425	1943	8, 600	1951	6, 301
1936	35, 618	1944	9, 900	1952	5, 710
1937	40, 913	1945 .....	..	1953	17, 295
1938	51, 254	1946	14, 200	1954	7, 990
1939	3, 554	1947	6, 169	1955	6, 516
1940	3, 491	1948	8, 739	1956	15, 915
1941	11, 453	1949	8, 726		

TABLE 48. Consumption of Tellurium Metal in Steel and White Metal Foundries, 1946- 1955

Year	White metal foundries Pounds	Year	White metal foundries Pounds
1946	1, 372	1951	672
1947	974	1952	1, 237
1948	947	1953	510
1949	310	1954	794
1950	962	1955	740

Thallium

No production was reported in 1956 but in 1955 there were 275 pounds of thallium contained in the compounds shipped, which were valued at \$378. This was the first shipment since 1944 when 128 pounds valued at \$1,690 were contained in residues

produced by Hudson Bay Mining and Smelting Company, Limited, at the Flin Flon smelter, Manitoba. These residues were exported for treatment in foreign plants. Thallium metal was quoted in the United States at \$12.50 per pound nominal, December, 1956.

Tin

No economic deposits of tin have been found in Canada up to the present. Minor occurrences, principally of cassiterite (SnO₂), 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 1956 most of the tin concentrates were exported for treatment. Some tin was used to alloy with lead at the Canadian plant.

The New York quotations showed the monthly average price for tin was: January, \$1.05; April, \$0.99; July, \$0.96; October, \$1.06; December, \$1.04 per pound.

TABLE 49. Production of Tin, 1947-1956

Year	Pounds	\$	Year	Pounds	\$
1947	714,198	517,794	1952	212,113	253,581
1948	691,332	688,567	1953	643,254 ¹	581,746
1949	619,117	633,047	1954	333,788 ¹	263,359
1950	796,403	828,259	1955	492,781 ¹	408,030
1951	346,718	494,073	1956	756,934 ¹	670,441

1. Tin content of concentrates and lead-tin alloy.

TABLE 50. Production of New Tin, Domestic Consumption and Imports, 1947-1956

Year	Production	Domestic consumption	Imports	Stocks at end of period
	Tons of 2,000 pounds			
1947	357	4,063	2,601	3,152
1948	346	4,531	4,029	2,944
1949	310	4,835	4,117	939
1950	398	5,059	5,395	1
1951	173	5,299	6,872	1
1952	106	4,693	4,423	1
1953	322 ²	4,444	4,146	1
1954	167 ²	4,036	4,296	1
1955	246 ²	4,500	4,836	1
1956	378 ²	4,575	4,227	1

1. Not available.
2. Tin content of concentrates and lead-tin alloy.

TABLE 51. Consumption of Tin (Ingots or Bars), by Principal Industries, 1952-1956

	1952	1953	1954	1955	1956
	Tons of 2,000 pounds				
In white metal foundries (solder, babbitt, etc.)	1,447	1,870	1,743	1,991	1,909
In steel plants (chiefly for tinplate)	2,819	2,054	2,025	2,152	2,263
In brass and bronze foundries	252	250 ¹	147	174	249
In other industries	175	270	120	173	154
Total	4,693	4,444¹	4,036	4,500	4,575

1. Revised figure.

TABLE 52. World Mine Production of Tin (Content of Ore), by Countries

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

Country	1951	1952	1953	1954	1955
	Long tons ¹				
North America:					
Canada	155	95	488	174	177
Mexico	356	413	476	349	605
United States	88	99	56	200	100
Total North America	609	607	1,020	723	882
South America:					
Argentina	237	251	153	94	89
Bolivia (exports)	33,132	31,959	34,825	28,824	27,921
Brazil	197	229	209	180 ²	300 ²
Peru ³	86	31	—	—	—
Total South America	33,652	32,480	35,187	29,098	28,310
Europe:					
France	93	285	493	531	483
Germany, East	257	395	553	669	669
Italy	—	—	—	—	—
Portugal ⁴	933	1,146	1,168	993	1,033
Spain	940	733	795	654	673
United Kingdom	841	903	1,103	940	1,034
Total Europe ⁵	3,064	3,462	4,122	3,787	3,897
Africa:					
Belgian Congo ⁶	13,669	13,795	15,293	15,084	15,303
French Cameroon	72	87	86	82	85
French Morocco	13	15	9	5	15
French West Africa	65	110	118	72	46
Mozambique	8	3	—	—	—
Nigeria	8,529	8,318	8,228	7,923	7,315
Northern Rhodesia	2	11	7	1	—
Southern Rhodesia	40	30	30	14	208
South West Africa	76	106	210	446	377
Swaziland	32	36	36	34	27
Tanganyika (exports)	67	47	45	39	41
Uganda (exports)	118	110	92	86	58
Union of South Africa	761	935	1,360	1,315	1,233
Total Africa	23,452	23,603	25,514	25,104	24,758
Asia:					
Burma	1,400	1,600	1,400	950	1,127
China ²	7,500	8,500	9,600	10,000	11,500
Indochina	92	156	264	110	253
Indonesia	30,986	35,003	33,822	35,861	33,368
Japan	426	638	732	715	897
Malaya	57,167	56,833	56,254	60,690	61,244
Thailand	9,502	9,479	10,126	9,776	11,057
Total Asia	107,073	112,314	112,198	118,102	119,456
Australia	1,559	1,611	1,553	1,979	2,077
World Total (estimate) ⁵	169,400	174,100	179,600	178,800	179,400

1. This 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. Excluding production of U.S.S.R.

6. 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. There were 627,600 tons of ore received at the smelter. About 520,400 tons were treated to yield about 159,874 tons of iron (remelt) and over 218,575 tons of slag. The slag, having a titanium dioxide content of about 72 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 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. Research work on titanium

was carried on by Shawinigan Water and Power Company Limited, Quebec Metallurgical Industries Limited, Thompson Products Limited and Atlas Steels Limited.

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

Titanium is used in many other forms. Ferrotitanium and ferrocobalt-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 1956 were: Ilmenite, 59.5% TiO_2 , \$26.25 to \$30 per gross ton. The nominal quotation for titanium metal, 99.3 per cent, was \$2.75 per pound.

TABLE 53. Producers' Shipments of Titanium Ore¹ to Outside Customers, 1947-1956

Year	Short tons	\$	Year	Short tons	\$
1947	7.104	38.036	1952	51	459
1948	4.441	21.091	1953	9.292	80.085
1949	540	2.892	1954	1.541	9.462
1950	1.253	7.706	1955	1.464	10.634
1951	1.674	9.790	1956	2.310	16.561

1. All from Quebec.

TABLE 54. Imports of "Titanium Oxide and White Pigments Containing Not Less Than 14 Per Cent by Weight of Titanium", 1951-1956

Year	From the United Kingdom		From the United States		Total imports	
	Pounds	\$	Pounds	\$	Pounds	\$
1951	7,192,312	1,623,779	52,103,681	6,838,500	59,295,993	8,462,279
1952	5,471,764	1,090,786	42,938,755	5,365,582	48,410,519	6,456,368
1953	15,860,430	2,819,931	47,939,283	5,646,914	63,799,713	8,466,845
1954	18,784,144	3,381,482	45,428,077	5,747,907	64,212,221	9,129,389
1955	20,967,494	3,968,607	50,629,850	6,536,335	71,597,344	10,504,942
1956	19,430,833	3,884,323	56,070,259	8,637,934	75,744,730	12,598,033

TABLE 35. Consumption of Titanium Oxide, by Industries, 1954 and 1955

Industry	1954		1955	
	Pounds	Cost at works	Pounds	Cost at works
		\$		\$
Paints:				
Extended titanium dioxide pigments	26,309,370	2,528,698	27,871,290	2,752,536
Titanium dioxide	22,958,423	5,482,788	23,273,335	5,789,923
Polishes and dressings	280,281	65,655	293,444	66,721
Pulp and paper	2,494,000	543,598	3,280,000	687,712
Linoleum and oilcloth	4,032,210	620,542	4,094,882	698,472
Rubber goods	1,196,355	264,289	1,456,800	344,005
Miscellaneous non-metallic minerals	662,102	132,379	601,560	153,646
Total accounted for	57,932,741	9,638,449	60,871,311	10,493,015

TABLE 36. World Production of Titanium Concentrates (Ilmenite and Rutile), by Countries
(Taken from the "Minerals Yearbook" published by the United States Bureau of Mines)

Country	1952	1953	1954	1955	1956
	Short tons ¹				
Ilmenite					
Australia ² (sales)	52	—	526	600	4,787
Brazil	—	—	—	—	—
Canada ³	42,192	146,614	124,162	164,185	223,018
Egypt	2,202	2,787	2,900	2,694	551
Finland	—	3,465	55,765	93,668	113,538
Gambia (exports)	—	—	1,216	—	—
India	251,883	241,091	269,375	280,867	375,201
Japan ⁴	660 ⁵	3,199	2,638	5,097	9,634
Malaya (exports)	24,302	29,758	50,114	60,340	136,837
Norway	130,370	141,220	164,448	173,931	209,990
Portugal	476	746	563	866	588
Senegal	5,095	6,358	13,779	30,424	21,716
Spain	1,410	1,582	1,397	7,388	6,608
Thailand	—	—	—	—	386
Union of South Africa	—	10	—	1,017	1,540 ⁵
United States ⁶	528,588	513,696	547,711	583,044	684,956
World total, ilmenite (estimate)	987,200	1,090,500	1,234,600	1,405,100	1,789,400
Rutile					
Australia	42,576	42,604	50,018	66,767	107,886
Brazil ⁵	19	—	—	146	174
French Cameroon	324	58	—	110	168
French Equatorial Africa	—	—	—	—	—
India	164	117	117	166	606
Norway	47	3	—	10	26
Senegal	29	—	—	—	650
United States	7,125	6,825	7,411	8,513	11,997
World total, rutile (estimate)	50,300	49,600	57,500	75,700	121,500

1. This table incorporates a number of revisions of data published in previous titanium chapters. Data do not add to totals shown due to rounding where estimated figures are included in the detail.
2. Due to high chromium content in the ore, only sales are shown.
3. Includes titanium slag containing approximately 70 per cent TiO₂.
4. Represents titanium slag.
5. Estimate.
6. Includes a mixed product containing altered ilmenite, leucosine and rutile.

TABLE 57. Consumption of Ferrotitanium in the Manufacture of Steel, 1946-1955

Year	Tons	\$	Year	Tons	\$
1946	416	73,485	1951	164	50,641
1947	500	83,228	1952	229	97,827
1948	442	81,129	1953	213	50,433
1949	142	29,057	1954	171	50,166
1950	143	30,664	1955	156	48,074

Tungsten

The major portion of the tungsten concentrates produced originated in British Columbia. In New Brunswick the Burnt Hill Tungsten Mines Ltd., operated a mine at Cross Creek, York county. In earlier years some scheelite was shipped from the gold mines in northern Ontario. No recent shipments have been made by former producers in the Yukon territory.

As an alloying metal in steel, tungsten (usually as ferrotungsten, but sometimes as calciumtungstate or scheelite concentrate) is used essentially to impart hardness and toughness, which are maintained even when the steel is heated to a high temperature. Almost 80 per cent of the consumption of tungsten in the United States is used for the production of high-speed steels for cutting tools, in which the tungsten content is 15 to 20 per cent. Minor

amounts of tungsten are used in steels for dies, valves and valve seats for internal combustion engines and for permanent magnets. Stellite, the best known non-ferrous alloy, contains 10 to 15 per cent tungsten with higher percentages of chromium and cobalt. Tungsten carbide is widely used as an extra hard cutting tool and is now being used as inserts into detachable bits for rock-drilling. Pure tungsten is used in lamp filaments, in radio tubes, contact points, etc.

The E. & M. Journal price quotations for tungsten ore in December 1956 were: Per short ton unit of WO_3 , concentrates of known good analysis, basis 65%: Foreign ore per stu of WO_3 nearby arrival, c.i.f. U.S. ports duty extra; Wolfram \$28 to \$28.50, scheelite \$28 to \$28.50 depending on grade. U.S. mined tungsten concentrate, \$55 per stu, o.b. milling point, subject to penalties.

TABLE 58. Production (Commercial Shipments) of Tungsten Concentrate, 1947-1956

Year	Concentrate	WO_3 content	Value
	Pounds		\$
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	1,835,000 ¹	284,078	160,343
1951	4,145	2,833	7,098
1952	3,570,686	1,434,641	4,307,879
1953	6,307,717	2,446,028	5,589,160
1954	3,237,748	2,170,533	5,795,781
1955	3,255,100	1,942,770	5,508,437
1956	3,401,712	2,271,437	6,351,376

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

TABLE 59. Consumption of Ferrotungsten in Steel Furnaces, 1946-1955

Year	Short tons	Cost at works	Year	Short tons	Cost at works
		\$			\$
1946	260	402,174	1951	364	2,726,837
1947	366	888,904	1952	212	1,609,590
1948	197	590,584	1953	49	275,761
1949	190	428,535	1954	38	118,280
1950	117	302,872	1955	53	196,376

TABLE 60. World Production of Tungsten Ores, by Countries¹, of Concentrates Containing 60 per WO₃

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

Country	1951	1952	1953	1954	1955	1955
	Short tons					
North America:						
Canada.....	2	1,243	2,037	1,809	1,618	1,839
Mexico.....	358	433	752	759	626	628
United States (shipments).....	5,275	7,611	9,591	13,691	16,412	14,737
Total North America.....	6,635	9,342	12,380	16,259	18,656	17,204
South America:						
Argentina.....	157	474	631	873	1,225 ²	1,293
Bolivia (exports).....	2,996	4,086	4,216	4,900	5,935	5,255 ²
Brazil (exports).....	1,557	1,967	2,145	1,513	1,410	1,710 ²
Peru.....	517	544	1,001	849	893	1,177
Total South America.....	5,237	7,171	8,024	8,135	9,463	9,435
Europe:						
Finland.....	9	52	24	139	145	74
France.....	866	1,082	1,443	1,043	1,187	1,229
Italy.....	8	8	30	33	26	25
Norway.....	—	13	9	—	—	—
Portugal.....	5,075	5,824	5,581	5,075	5,122	5,255
Spain.....	2,814	6,040	3,252	2,827	1,451	1,584
Sweden.....	422	371	485	504	510	504
U.S.S.R. ²	3,300	8,300	8,300	3,300	8,300 ²	8,300 ²
United Kingdom.....	57	61	67	101 ²	80 ²	110 ²
Yugoslavia.....	—	—	132	110 ²	110 ²	110 ²
Total Europe (estimate).....	18,200	21,800	19,300	18,100	16,900	17,500
Asia:						
Burma.....	1,815	2,425	2,205	1,323	2,927	2,992
China ²	17,400	22,000	13,700	19,800	19,800	19,800
Hong Kong.....	25	115	165	33	28	29
India.....	17	11	17	1	—	—
Japan.....	183	531	805	860	990	791
Korea; Republic of.....	1,433	4,519	8,267	4,530	3,757	4,693
North Korea ²	1,300	1,300	1,650	1,650	1,650	1,650
Malaya, Federation of.....	60	87 ²	162	127	138	117
Thailand.....	1,500 ²	1,750 ²	1,929	1,323	1,367	1,411
Total Asia (estimate).....	23,700	32,700	33,900	29,700	30,700	31,500
Africa:						
Algeria.....	24	54	33	—	—	—
Belgian Congo ³	720	1,113	1,403	1,585	1,733	1,865
Egypt.....	8	23	15	4	21	—
French Morocco.....	42	20	13	14	—	3
Nigeria.....	25	25	20	1	3	4
Southern Rhodesia.....	255	463	419	281	270	287
South West Africa.....	36	130	155	115	133	162
Tanganyika (exports).....	17	15	13	6	10	7
Uganda (exports).....	176	157	197	204	180	193
Union of South Africa.....	207	290	425	675	708	330
Total Africa.....	1,510	2,290	2,703	2,985	3,058	2,851
Oceania:						
Australia.....	2,076	2,393	2,650	2,563	2,765 ²	2,890
New Zealand.....	39	69	44	33	33 ²	33
Total Oceania.....	2,115	2,462	2,704	2,596	2,798	2,923
World total (estimate).....	57,400	75,800	79,000	77,800	81,600	81,400

1. This table incorporates a number of revisions of data published in previous Minerals Yearbook tungsten chapters.
2. Estimate.
3. Including Ruanda-Urandi.

Uranium

Statistics on uranium were formerly shown under the title of pitchblende as it was from pitchblende ores in the Northwest Territories that radium was first extracted from Canadian ores. At that time, 1933 there was very little interest in the uranium contained in these ores. Since then uranium has been found in other minerals thus the title has been revised.

During 1956 the mines in the Blind River area and Bancroft area of Ontario shipped precipitates valued at \$9,361,867. The shipments from the Athabasca area of Saskatchewan were valued at

\$27,194,202 and the V_3O_8 contained in concentrates and precipitates shipped from the Northwest Territories were worth \$9,176,076.

In table 61 the values shown from 1934 to 1940 are for products from the refinery which include radium salts, uranium salts and compounds of silver, cobalt and nickel. The data for 1941-1953 are restricted. The figures for 1954-1955 are the value of the products of the refinery at Port Hope, Ontario. The value of the V_3O_8 contained in the precipitates or concentrates shipped from the mines is shown in 1956.

TABLE 61. Producers' shipments¹ of Uranium, Radium etc. 1934-1956

Year	\$	Year	\$
1934	159,400	1939	1,121,553
1935	413,700	1940	410,176
1936	505,500	1941-1953	2
1937	876,540	1954	26,373,052
1938	1,045,458	1955	26,031,504
		1956	45,732,145

1. Compilation method is shown in text above.
2. Not available for publication.

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, 1956, at 31 cents per pound contained V_2O_5 , f.o.b. shipping point, by "E & M J Metal and Mineral Markets", New York. Vanadium metal was quoted at \$3.45 per pound.

TABLE 62. World Production of Vanadium in Ores and Concentrates

(Source: "Minerals Yearbook" published by the United States Bureau of Mines)

Country	1952	1953	1954	1955	1956
	Short tons				
North America:					
United States (recoverable vanadium).....	2,571 ¹	3,057 ¹	3,025 ¹	3,286	3,858
South America:					
Argentina.....	3 ²	8 ²	8 ²	8 ²	8 ²
Peru (content of concentrate).....	482	349	195	78	—
Total	490	357	203	86	8²
Europe: Finland.....	—	—	—	—	42
Africa:					
Angola.....	—	—	—	—	11
Rhodesia, Nyasaland, Northern Rhodesia (recoverable vanadium).....	47	—	—	—	—
South West Africa (recoverable vanadium).....	588	596	533	632	307
Total	735	596	633	632	318
World total (estimate)³	3,796	4,010	3,862	4,004	4,236

1. Includes vanadium recovered as a by-product of phosphate-rock mining.

2. Estimate.

3. Total represents data only for countries shown in table and excludes vanadium in ores produced in French Morocco, Spain and U.S.S.R. for which figures are not available; the total also excludes quantities of vanadium recovered as by-products from other ores and raw materials.

Zirconium

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

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

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

Prices quoted in December, 1956, were: zircon ore, 65 per cent ZrO₂, \$64 to \$68 per long ton, at Atlantic seaboard; zirconium sponge, \$10 per pound.

TABLE 63. World Production of Zirconium Ores and Concentrates, by Countries

(Source: "Minerals Yearbook" published by the United States Bureau of Mines)

Country	1951	1952	1953	1954	1955
	Short tons ¹				
Australia ²	47,006	32,893	30,081	45,830	48,993
Brazil ^{3, 4}	3,354	4,378	3,409	4,173	4,000 ⁵
Egypt.....	4	133	263	109	126
French West Africa.....	32	—	1,047	1,012	6
India.....	6	6	6	6	6
Madagascar.....	—	5	—	—	—
United States ²	6	6	23,904	16,322	28,110

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

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

3. Chiefly baddeleyite.

4. Exports.

5. Estimate.

6. Not available for publication.

Directory of Firms in the Miscellaneous Metal Mining Industry, 1956 - Continued

Name of firm and product	Head office address	Location of mine or plant
Tantalum - Columbite - Concluded:		
Oka Uranium & Metals Ltd. ¹	159 ouest, rue Craig, Montreal, Quebec	Oka, Quebec
Ontario Nickel Mines Ltd. ²	100 Adelaide St. West, Toronto, Ontario	Oka, Quebec
Quebec Tantalum & Lithium Mining Co. Ltd. ²	44 King St. W., Toronto, Ontario	Figuary Twp., Quebec
Quebec Columblum Ltd. ²	507 Place D'Armes, Montreal, Quebec	L'Annonciation, Quebec
Sapphire Petroleum Ltd. ²	15 King St. E., Toronto, Ontario	Oka, Quebec
St. Lawrence River Mines Ltd.	159 ouest, rue Craig, Montreal, Quebec	Oka, Quebec
Trebort Mines Ltd. ²	100 Adelaide St. W., Toronto, Ontario	Ile Aux Tourtes
Twin Mountain Uranium Mines Ltd. ²	302 Bay St., Toronto, Ontario	Oka, Quebec
Beaucage Mines Ltd. ¹	170 Regina St., North Bay, Ontario	Nipissing, Ontario
Ontario Rare Metal Mines Ltd. ²	44 King St. W., Toronto, Ontario	Algoma, Ontario
Boreal Rare Metals Ltd. ²	144 St. James St., Montreal, Quebec	Hearn Channel, Yellowknife
Thallium:		
Hudson Bay Mining & Smelting Co. Ltd. ¹	500 Royal Bank Building, Winnipeg, Manitoba	Flin Flon, Manitoba
Tin:		
Consolidated Mining & Smelting Company of Canada Ltd.	215 St. James St., Montreal, Quebec	Trail, British Columbia
Mountain Crest Mines Ltd. ²	1445 MacKay St., Montreal, Quebec	Charlevoix, Quebec
Titanium Ore:		
American Titanic Iron Ore Co. ²	Bale St. Paul, Quebec	St. Urbain, Quebec
Bale St. Paul Titanic Iron Ore Co.	Bale St. Paul, Quebec	St. Urbain, Quebec
Bersimis Mining Co. ¹	10-16 Blvd. Des Capucins, Quebec	Saguenay Co., Quebec
Laurentian Titanium Mines Ltd. ¹	4462 St. Denis St., Montreal, Quebec	Wexford & Chertsey Twps., Quebec
Laurbec Mining Co.	203 Hope Chambers, Ottawa, Ontario	Hinks Twp., Quebec
Lyndvue Mines Ltd.	60 St. Jacques ouest., Montreal, Quebec	Roberval, Quebec
Quebec Iron and Titanium Corp.	Sorel, Quebec	Lac Tlo, Quebec
Continental Iron & Titanium Mining Ltd. ¹	4202 St. Urbain St., Montreal, Quebec	Chilton, Quebec
St. Lawrence Iron & Titanium Mines Ltd. ²	1200 St. Alexander St., Montreal, Quebec	St. Urbain, Quebec
Tungsten Concentrates:		
Burnt Hill Tungsten Mines Ltd.	510 McGill St., Montreal, Quebec	Cross Creek, New Brunswick
Hollinger Consolidated Gold Mines Ltd. ¹	Timmins, Ontario	Timmins, Ontario
Canadian Exploration Ltd.	Royal Bank Building, Vancouver, British Columbia	Salmo, British Columbia
Quebec Tungsten Ltd. ²	111 Côte-de-la-Montagne, Quebec, Quebec	Dalquier, Quebec
Tungsten Corporation of Canada ²	43 King St. W., Toronto, Ontario	
Uranium:		
New Brunswick:		
Aumacho River Mines Ltd. ¹	25 Adelaide St. W., Toronto, Ontario	Aumacho River, New Brunswick
New Brunswick Uranium Metals & Mining Ltd. ¹	44 King St. W., Toronto, Ontario	Harvey, New Brunswick
Quebec:		
Arnora Sulphur Mining Corp. ¹	1410 Stanley St., Montreal	Huddersfield
Bradhill Mines Ltd. ¹	553 Tecumseh Rd. Windsor, Ontario	Clapham Twp.
Calumet Uranium Mines Ltd. ¹	159 ouest, rue Craig Montreal	Isle Calumet
Chess Uranium Corp. ¹	5616 Park Ave., Montreal	St. Hilaire
Madison Mining Corp. ¹	100 Adelaide St. W., Toronto, Ontario	St. Andre
Marlowe Mines Ltd. ¹	1557 Mackay St., Montreal	Pled des Monts
Mogul Mining Corp. Ltd. ¹	25 Adelaide St. W., Toronto, Ontario	Figuary Twp.
Molybdenum Corp. of America ¹	500 Fifth Ave. New York, U.S.A.	Oka, Quebec
Nakada Radioactive Minerals Inc. ¹	202 Pobes Bldg., Syracuse N.Y., U.S.A.	Egan Twp.
Pool Mining Corp. ¹	985 Sherbrooke St., Montreal	Huddersfield Twp.
Quebec North Mines Ltd. ¹	1557 Mackay St., Montreal	Arrache Co.
Ridgefield Uranium Mining Corp. ¹	85 Richmond St. W., Toronto	Saussure Twp.
Rouville Uranium Lte. ¹	St. Jean Baptiste	Rougemont
Saguenay Mining & Smelting Co. Ltd. ¹	1557 Mackay St., Montreal	De Salles Twp.
Ontario:		
Alba Explorations Ltd. ¹	100 Adelaide St. W., Toronto	Thunder Bay
Algom Uranium Mines Ltd.	335 Day St., Toronto	Elliot Lake
Allstate Uranium Corp. ¹	100 Adelaide St. W., Toronto	Dryberry Lake
Anabar Mining & Development Co. Ltd. ¹	604 Queen St. E., Toronto	Algoma
Aumacho River Mine Ltd. ¹	25 Adelaide St. W., Toronto	Cardiff
Bancroft Uranium Mines Ltd. ¹	25 Melinda St., Toronto	Cardiff
Belfast Mines Ltd. ¹	314 Bathurst St., Toronto	Blind River
Beaucage Mines Ltd. ¹	170 Regina St., North Bay	Nipissing
Beaupas Mines Ltd. ¹	159 ouest rue Craig, Montreal, Quebec	Blind River
Bicroft Uranium Mines Ltd.	25 Adelaide St. W., Toronto	Cardiff Twp.
Blue Rock Cerium Mines Ltd. ¹	372 Bay St., Toronto	Tory Hill
Bracemac Mines Ltd. ¹	357 Bay St., Toronto	Blind River
Brewis Red Lake Mines Ltd. ¹	145 Yonge St., Toronto	Parter Twp.
Buckles Algoma Uranium Mines Ltd. ¹	44 King St. W., Toronto	Blind River
Bunker Hill Extension Mines Ltd. ¹	100 Adelaide St. W., Toronto	Striber Twp.
Burma Shore Mines Ltd. ¹	392 Bay St., Toronto	Wilberforce
Burnt River Uranium Ltd. ¹	26 Queen St., Toronto	Wilberforce
Canada Radium Corp. Ltd. ¹	85 Richmond St. W., Toronto	Cardiff Twp.
Canadian All Metals Exploration Ltd. ¹	199 Bay St., Toronto	Halliburton
Canadian Dyno Mines Ltd. ¹	67 Yonge St., Toronto	Cardiff Twp.
Can-Met Explorations ¹	360 Bay St., Toronto	Blind River
Canontia Mines Ltd. ¹	200 Bay St., Toronto	Blind River
Cardiff Uranium Mines Ltd. ¹	26 Queen St. E., Toronto	Wilberforce
Conecho Mines Ltd. ¹	44 King St. W., Toronto	Quirke Lake
Consolidated Denison Mines Ltd. ¹	360 Bay St., Toronto	Quirke Lake
Consolidated Thor Mines Ltd. ¹	80 King St. W., Toronto	Cardiff Twp.
Consolidated Tungsten Mining Corp. of Can. Ltd. ¹	80 King St. W., Toronto	Cardiff Twp.
Dominion Uranium Corp. ¹	1551 Bishop St., Montreal, Quebec	Mateninda
Delta Minerals Ltd. ¹	145 Yonge St., Toronto	Blind River

Directory of Firms in the Miscellaneous Metal Mining Industry, 1956 - Continued

Name of firm and product	Head office address	Location of mine or plant
Uranium - Continued:		
Ontario - Concluded:		
Duvel Oil & Mines Ltd. ¹	100 Adelaide St. W., Toronto	Blind River
Fab Metals Mines Ltd. ¹	25 Adelaide St. W., Toronto	Bancroft
Faraday Uranium Mines Ltd. ¹	100 Adelaide St. W., Toronto	Bancroft
Garland Mining & Development Co. Ltd. ¹	1211 Sherbrooke St. W., Montreal, Quebec	Anstruther
Geneva Lake Mines Ltd. ¹	357 Bay St., Toronto	Blind River
Greyhawk Uranium Mines Ltd. ¹	320 Bay St., Toronto	Faraday Twp.
Golyke Mines Ltd. ¹	302 Bay St., Toronto	Bagot Twp.
Halo Uranium Mines Ltd. ¹	372 Bay St., Toronto	Haliburton
Hattian Copper Corp. Ltd. ¹	38 King St. W., Toronto	Monmouth Twp.
Kemp Uranium Mines Ltd. ¹	507 Place d'Arnes, Montreal, Quebec	Wilberforce
Lexindin Gold Mines Ltd. ¹	25 Adelaide St. W., Toronto	Blind River
Macfie Explorations Ltd. ¹	145 Yonge St., Toronto	Red Lake
Magona Mines Ltd. ¹	347 Bay St., Toronto	Sault Ste. Marie
Madmeuda Uranium Mines Ltd. ¹	88 Richmond St. W., Toronto	Blind River
McMarnac Rec Lake ¹	405 Glencalm Ave., Toronto	Blind River
Milliken Lake Uranium Mines Ltd. ¹	4 Richmond St. E., Toronto	Blind River
Moon Lake Uranium Mines Ltd. ¹	44 King St. W., Toronto	Algoma
New Vinray Mines Ltd. ¹	100 Adelaide St. W., Toronto	Sault Ste. Marie
Nipirion Mines Ltd. ¹	302 Bay St., Toronto	Eldulph Twp.
Norgold Mines Ltd. ¹	100 Adelaide St. W., Toronto	Blind River
Northspan Uranium Mines Ltd. ¹	335 Bay St., Toronto	Elliot Lake
Nu-Cycle Uranium Mines Ltd. ¹	184 Bay St., Toronto	Glanorgan Twp.
Nu-World Uranium Mines Ltd. ¹	184 Bay St., Toronto	Glanorgan Twp.
Pardee Amalgamated Mines Ltd. ¹	111 Richmond St., Toronto	Blind River
Pater Uranium Mines Ltd. ¹	335 Bay St., Toronto	Spragge Twp.
Peach Uranium & Metal Mining Ltd. ¹	335 Bay St., Toronto	Blind River
Pebble Uranium Mines Ltd. ¹	62 Richmond St. W., Toronto	Blind River
Penfield Uranium Mines Ltd. ¹	2281 Yonge St., Toronto	Blind River
Pickering Metal Mines Ltd. ¹	7 King St. W., Toronto	Mack Twp.
Plum Uranium & Metal Mining Ltd. ¹	44 King St. W., Toronto	Blind River
Power Uranium Co. Ltd. ¹	400 St. James St. W., Montreal, Quebec	Blind River
Pronto Uranium Mines Ltd. ¹	44 King St. W., Toronto	Long Twp.
Quebec Developers & Smelters Ltd. ¹	1551 Bishop St., Montreal, Quebec	Spragge Twp.
Randex Uranium Mines Inc. ¹	220 W. 42nd St., New York, U.S.A.	Blind River
Rare Earth Mining Corp. of Can. ¹	372 Bay St., Toronto	Tory Hill
Roche Long Lac Gold Mines Ltd. ¹	372 Bay St., Toronto	Quirke Lake
Sand River Gold Mining Co. Ltd. ¹	302 Bay St., Toronto	Blind River
Schancan Uranium Corp. ¹	80 Richmond St. W., Toronto	Blind River
Standleigh Uranium Mining Corp. Ltd. ¹	372 Bay St., Toronto	Algoma
Stanrock Uranium Mines Ltd. ¹	80 Richmond St. W., Toronto	Elliot Lake
Stulvey Metal Mines Ltd. ¹	604 Queen St. E., Sault Ste. Marie	Mack Twp.
Stro Uranium Mines Ltd. ¹	360 Bay St., Toronto	Pary Sound
Triton Mines & Metals Corp. Ltd. ¹	67 Yonge St., Toronto	Cardiff Twp.
Vite Uranium Mines Ltd. ¹	80 King St. W., Toronto	Blind River
Zenmac Metal Mines ¹	200 Bay St., Toronto	Blind River
Saskatchewan:		
Abaska Uranium Mining Co. Ltd. ¹	67 Yonge St., Toronto, Ontario	Athabaska
Ad Astra Ltd. ¹	214 Baltzen Bldg., Edmonton, Alberta	Athabaska
Ameranium Mines Ltd. ¹	100 Adelaide St. W., Toronto, Ontario	Athabaska
Baska Uranium Mines Ltd. ¹	2230 Queen St., Regina	Beaverlodge
Big Jackpot Mines Ltd. ¹	82 Government Rd., Kirkland Lake, Ontario	Crackingstone
Bluegrass Uranium Mines Ltd. ¹	8 Colborne St., Toronto, Ontario	Beaverlodge
Black Bay Uranium Ltd. ¹	25 Adelaide St. W., Toronto, Ontario	Uranium City
Brunston Mining Co. Ltd. ¹	320 Bay St., Toronto, Ontario	Beaverlodge
Consolidated Nicholson Mines Ltd. ¹	532 Burrard St., Vancouver, British Columbia	Uranium City
Camdeck Mines Ltd. ¹	82 Government Rd., Kirkland Lake, Ontario	Fredette Lake
Gayzor Athabaska Mines Ltd. ¹	67 Yonge St., Toronto, Ontario	Uranium City
Chimo Gold Mines Ltd. ¹	25 Adelaide St. W., Toronto, Ontario	Uranium City
Clix Athabaska Mines Ltd. ¹	25 Adelaide St. W., Toronto, Ontario	Athabaska
Dee Explorations Ltd. ¹	104 Main St., Flin Flon, Manitoba	Athabaska
Destorada Mines Ltd. ¹	170 Bay St., Toronto, Ontario	Beaverlodge
Fidelity Uranium Mines Ltd. ¹	201 Wilkin Bldg., Edmonton, Alberta	Athabaska
Gaitwin Explorations Ltd. ¹	25 Adelaide St. W., Toronto, Ontario	Milliken Lake
Great Northern Uranium Exploration Co. ¹	540 Burrard St., Vancouver, British Columbia	Athabaska
Great West Uranium Mines Ltd. ¹	105 Ross Bldg., Saskatoon	Uranium City
Gulch Mines Ltd. ¹	217 Bay St., Toronto, Ontario	Uranium City
Gunnar Mines Ltd. ¹	25 Adelaide St. W., Toronto, Ontario	Athabaska
Hawker Uranium Mines Ltd. ¹	10076 Jasper Ave., Edmonton, Alberta	Beaverlodge
Imperial Mines & Metals Ltd. ¹	11751-124th St., Edmonton, Alberta	Beaverlodge
Iso Uranium Mines Ltd. ¹	100 Adelaide St. W., Toronto, Ontario	Athabaska
Jahala Lake Uranium Mines Ltd. ¹	11 King St. W., Toronto, Ontario	Lac La Ronge
Joburke Gold Mines ¹	357 Bay St., Toronto, Ontario	Beaverlodge
Lorado Uranium Mines Ltd. ¹	357 Bay St., Toronto, Ontario	Uranium City
Lake Clinch Mines Ltd. ¹	25 Adelaide St. W., Toronto, Ontario	Uranium City
Lake Lingman Gold Mining Co. Ltd. ¹	320 Bay St., Toronto, Ontario	Beaverlodge
La Ronge Uranium Mines Ltd. ¹	11 King St. W., Toronto, Ontario	Nistowiack Lake
Magma Mines Ltd. ¹	467 Western Trust Bldg., Regina	Burbidge Lake
Nesbitt Labine Uranium Mines Ltd. ¹	25 Adelaide St. W., Toronto, Ontario	Uranium City
Nisto Mines Ltd. ¹	532 Burrard St., Vancouver, British Columbia	Black Lake
Norart Uranium & Gold Mines Ltd. ¹	170 Bay St., Toronto, Ontario	Athabaska
North Country Uranium & Minerals Ltd. ¹	201 Wilkin Bldg., Edmonton, Alberta	Beaverlodge
Northwestern Uranium Ltd. ¹	504 Lancaster Bldg., Calgary, Alberta	Beaverlodge
Orbit Uranium Developments Ltd. ¹	357 Bay St., Toronto, Ontario	Beaverlodge
Orchan Uranium Mines Ltd. ¹	100 Adelaide St. W., Toronto, Ontario	Beaverlodge
Pitch Ore Uranium Mines Ltd. ¹	200 Bay St., Toronto, Ontario	Beaverlodge
Pitchevin Mines Ltd. ¹	82 Government Rd., Kirkland Lake, Ontario	Athabaska
Pluton Uranium Mines Ltd. ¹	11 King St. W., Toronto, Ontario	Beaverlodge

Directory of Firms in the Miscellaneous Metal Mining Industry, 1956 - Continued

Name of firm and product	Head office address	Location of mine or plant
Uranium - Concluded:		
Saskatchewan - Concluded:		
Randex Uranium Mines Ltd. ¹	220 W. 42nd St., New York, U.S.A.	Athabaska
Reward Uranium Ltd. ¹	405 Royal Trust Bldg., Edmonton, Alberta	Beaverlodge
Rlx Athabaska Uranium Mines Ltd.	170 Bay St., Toronto, Ontario	Uranium City
Rock Hill Uranium Ltd. ¹	11751-124th St., Edmonton, Alberta	Athabaska
Scintilore Mines Ltd. ¹	80 Richmond St. W., Toronto, Ontario	Beaverlodge
St. Michael Uranium Mines Ltd. ¹	85 Richmond St. W., Toronto, Ontario	Athabaska
St. Mary's Uranium Mines Ltd. ¹	4 Richmond St. W., Toronto, Ontario	Uranium City
Sudbury Contact Mines Ltd. ¹	100 Adelaide St. W., Toronto, Ontario	Beaverlodge
Uranium Ridge Mines Ltd. ¹	25 Adelaide St. W., Toronto, Ontario	Uranium City
British Columbia:		
Quebec Metallurgical Industries Ltd. ¹	88 Metcalfe St., Ottawa, Ontario	Golden
Rexspar Uranium & Metals Mining Co. Ltd. ¹	170 Bay St., Toronto, Ontario	Birch Island
Northwest Territories:		
Consolidated Northland Mines Ltd. ¹	25 Adelaide St. W., Toronto, Ontario	Marian River
Eldorado Mining & Refining Ltd.	Box 379, Ottawa, Ontario	Port Radium, N.W.T.; Eldorado, Saskatchewan; Port Hope, Ontario
Femco Mines Ltd. ¹	184 Bay St., Toronto, Ontario	Yellowknife
Rayrock Mines Ltd. ¹	25 Adelaide St. W., Toronto, Ontario	Sherman Lake
Riverridge Mines Ltd. ¹	10920-88 Ave., Edmonton, Alberta	Marian River
Tarbell Mines Ltd. ¹	25 Adelaide St. W., Toronto, Ontario	Yellowknife
Traverse Longlac Mines Ltd. ¹	202 Imperial Bank Bldg., Edmonton, Alberta	Cormac
Zirconium:		
Dominion Magnesium Ltd.	67 Yonge St., Toronto, Ontario	Haley, Ontario

1. Active but not producing.
2. Holds dormant property.



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