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THE MISCELLANEOUS METAL MINING INDUSTRY

1960

DOMINION BUREAU OF STATISTICS
Industry and Merchandising Division

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SYMBOLS

The interpretation of the symbols used in the tables throughout this publication is as follows:

.. figures not available.

... figures not appropriate or not applicable.

— nil or zero.

THE MISCELLANEOUS METAL MINING INDUSTRY

1960

Aluminum
Antimony
Barium
Beryllium
Bismuth
Cadmium
Calcium
Cerium
Chromium
Indium
Magnesium
Manganese
Mercury
Molybdenum
Selenium
Tantalum-Columbium
Tellurium
Thallium
Thorium
Tin
Titanium (ilmenite)
Tungsten
Uranium
Vanadium
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 metalliferous ores produced in other countries. Metals and metal-bearing ores produced in Canada during 1960 and classified as miscellaneous, include antimony, bismuth, cadmium, calcium, magnesium, molybdenum, selenium, tellurium, titanium ore, tin, tungsten, and uranium. In addition to particulars relating to these metals or minerals, the bulletin contains notes of summary nature on aluminum, beryllium, 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.

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

Of the 68 active establishments in the Miscellaneous Metal Mining Industry, there were 25 which made shipments of ore or metal-bearing concentrates.

The industry employed an average of 9,380 persons to whom $54,453,208 were distributed as salaries and wages. Fuel cost $3,913,033 and 579,145,418 kwh. of electricity were purchased for $3,657,770. Process supplies, containers, freight and treatment charges amounted to $41,341,911.

TABLE 1. Principal Statistics of the Miscellaneous Metal Mining Industry, Significant Years, 1921-60

Year	Establishments	Employees	Salaries and wages	Cost of fuel and electricity	Cost of process supplies and containers	Gross value of products	Net value added[1]
	number		dollars				
1921	4	44	68,606	45,376	..	230,164	..
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
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
1957	139	8,705	42,386,402	6,539,935	6,539,935	144,689,661	115,788,076
1958	91	14,375	78,320,507	9,293,152	50,827,573	284,367,777	223,484,942
1959	84	13,645	76,604,136	9,023,750	57,982,723	333,770,291	265,835,151
1960	68	9,380	54,453,208	7,570,803	40,059,514	273,409,628	224,482,268

[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, 1956-60

Year	Employees					Man-hours worked (all employees)	Earnings		
	Office and administrative		Workmen		Total		Office and administrative	Workmen	Total
	Male	Female	Male	Female					
	number						dollars		
1956[1]	837	88	3,436	16	4,377	10,244,141	4,412,933	16,119,552	20,532,485
1957[1]	1,534	142	6,992	37	8,705	20,072,591	7,145,593	35,240,809	42,386,402
1958	2,314	225	11,818	18	14,375	33,664,766	13,222,817	65,097,690	78,320,507
1959	2,127	230	11,270	18	13,645	29,361,649	13,083,871	63,520,265	76,604,136
1960	1,568	171	7,616	25	9,380	19,037,034	9,795,299	44,657,909	54,453,208

[1] Iron ore mining data excluded in 1955-60

TABLE 3. Average Number of Workmen, by Months, 1959 and 1960

Month	1959						1960					
	Surface		Underground	Mill		Total	Surface		Underground	Mill		Total
	Male	Female		Male	Female		Male	Female		Male	Female	
	number											
January	2,981	17	6,716	2,234	6	11,954	2,368	30	6,027	1,669	5	10,099
February	2,884	17	6,624	2,180	5	11,710	2,251	29	5,691	1,635	5	9,611
March	2,789	16	6,713	2,129	5	11,652	2,180	25	5,293	1,599	4	9,101
April	2,821	13	6,762	2,102	6	11,704	2,079	24	4,754	1,394	4	8,255
May	3,028	12	6,662	2,154	6	11,862	2,034	24	4,464	1,309	4	7,835
June	3,024	11	6,387	2,228	6	11,656	1,976	20	4,245	1,269	4	7,514
July	3,060	11	6,193	2,252	7	11,523	1,959	19	3,903	1,177	3	7,061
August	2,904	9	6,220	2,145	7	11,285	1,821	16	3,973	1,118	3	6,931
September	2,752	8	6,204	2,098	7	11,069	1,695	14	3,956	1,089	3	6,757
October	2,742	8	6,248	2,053	8	11,059	1,617	14	3,781	1,001	3	6,416
November	2,673	8	5,981	2,004	8	10,674	1,557	14	3,778	978	3	6,330
December	2,527	8	5,767	1,952	7	10,261	1,416	13	3,381	952	3	5,765
Average	**2,849**	**11**	**6,291**	**2,130**	**7**	**11,288**	**1,914**	**21**	**4,437**	**1,265**	**4**	**7,641**
Man-hours worked						24,431,352						15,845,819

TABLE 4. Fuel and Electricity Used in the Miscellaneous Metal Mining Industry, 1960

Kind		Quantity	Cost at plant
			$
Bituminous coal (a) From Canadian mines	short ton	12,262	145,640
(b) Imported	"	120,046	1,436,558
Sub-bituminous coal (from Alberta mines only)		—	—
Anthracite coal	short ton	3,012	50,950
Lignite coal		—	—
Coke (for fuel only)	short ton	5	44
Gasoline, (includes gasoline used in cars and trucks)	Imp. gal.	426,278	162,422
Kerosene or coal oil	"	571	209
Fuel oil	"	11,415,143	2,082,533
Wood (cords of 128 cubic feet of piled wood)	cord	210	4,098
Gas (a) Liquefied petroleum gases (propane, etc.)	Imp. gal.	124,765	25,961
(b) Other manufactured gas	M cu. ft.	—	—
(c) Natural gas		—	—
Other fuel		—	4,618
Electricity purchased for power and lighting	kwh.	579,145,418	3,657,770
Electricity purchased for other purposes		—	—
Total (cost only)		...	7,570,803
Electricity generated (a) For own use	kwh.	105,802,672	...
(b) For sale	"	3,097,297	693,823

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' output of aluminum ingots in 1960 amounted to 762,012 tons compared with 593,630 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. The Canadian British Aluminum Company Limited operated a reduction plant at Baie Comeau. All these plants are located in the province of Quebec.

In British Columbia the plant at Kitimat is supplied by power generated at Kemano which is about fifty miles distant. Alumina for the smelter is obtained 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 price of aluminum ingots was quoted at 23.25 cents per pound at Montreal. In United States the price of aluminum was 28.1 cents per pound from January to August when the price dropped to 26 cents per pound.

TABLE 5. Production, Consumption, Imports and Exports of Aluminum Ingots, 1951-60

Year	Producers' shipments	Consumption	Exports	Imports
	tons (2,000 pounds)			
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	510,631	99
1956	620,321	91,869	508,994	1,405
1957	556,715	77,984	478,670	2,122
1958	634,102	101,886	482,927	11,257
1959	593,630	88,797	505,342	852
1960	762,012	105,708	552,155	501

TABLE 6. Imports of Aluminum and Bauxite, 1959 and 1960

Item	1959		1960	
	Tons	Value	Tons	Value
		$		$
Alumina	185,500	4,612,683	218,512	5,512,030
Bauxite ore	2,071,998	31,344,845	2,764,355	39,529,272
Cryolite	6,014	1,017,444	8,339	1,387,134
Aluminum:				
Pigs, ingots and block	852	468,294	501	431,025
Scrap	618	159,494	1,002	213,940
Angles, channels and beams	581	806,611	350	440,560
Bars, rods and wire	412	399,713	673	641,482
Leaf or foil	...	902,847	...	1,219,924
Pipes and tubes	507	594,699	357	427,752
Plates, sheets and strips	6,338	5,738,123	5,819	5,556,006
Powder and paste	164	152,337	150	127,147
Wire and cable	373	330,418	177	165,668
Household hollow-ware	...	1,501,440	...	1,513,829
Manufactures, n.o.p.	...	14,311,528	...	14,948,213

TABLE 7. Exports of Aluminum, 1959 and 1960

Item	1959		1960	
	Tons	Value	Tons	Value
		$		$
Aluminum scrap	16,178	4,880,265	27,570	9,049,402
Aluminum in primary forms	505,342	212,287,703	552,155	243,034,000
Aluminum, semi-fabricated	25,158	13,515,512	30,123	16,070,731
Aluminum foil	148	167,777	131	144,826
Aluminum kitchen utensils	...	29,286	...	38,519
Aluminum manufactures, n.o.p.	...	1,544,966	...	1,082,024

TABLE 8. World Production of Bauxite, by Countries[1]

Country[1]	1956	1957	1958	1959	1960
	in thousand long tons[1]				
North America (dried equivalent of crude ore):					
Dominican Republic	—	—	—	759	678
Haiti	—	263	280	255	268
Jamaica	3,141	4,643	5,722	5,125	5,745
United States	1,744	1,416	1,311	1,700	1,998
Totals	**4,885**	**6,322**	**7,313**	**7,839**	**8,689**
South America:					
Brazil	69	63	69	95	98[2]
British Guiana	2,481	2,202	1,586	1,674	2,471
Surinam	3,430	3,324	2,941	3,376	3,400
Totals	**5,980**	**5,589**	**4,568**	**5,145**	**5,969**
Europe:					
Austria	22	22	23	24	26
France	1,439	1,663	1,788	1,717	2,006
Germany West	5	5	4	4	4[2]
Greece	687	820	843	886	935[2]
Hungary	879	893	1,032	923	1,170
Italy	271	257	294	287	313
Rumania	51	61	72	70	75[2]
Spain	7	8	8	8	4
U.S.S.R.[2]	2,190	2,410	2,710	2,950	3,445
Yugoslavia	868	874	721	802	1,009
Totals	**6,419**	**7,013**	**7,495**	**7,671**	**8,987**
Asia:					
China (diasporic)[2]	—	—	150	300	350
India	91	97	166	215	378
Indonesia	299	238	338	381	389
Malaya	264	326	262	382	452
Pakistan	3	3	2	2	1
Sarawak	—	—	136	207	285
Taiwan (Quemoy)	—	—	—	—	—
Totals	**657**	**664**	**1,054**	**1,487**	**1,855**
Africa:					
Ghana (exports)	138	185	207	148	188
Guinea, Republic of	444	360	343	296	1,356
Mozambique	4	5	5	4	4
Totals	**586**	**550**	**555**	**448**	**1,548**
Oceania: Australia	10	8	7	8	7[2]
World totals (estimate)	**18,540**	**20,150**	**21,020**	**22,600**	**27,060**

[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] Estimate.

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

TABLE 9. World Production of Aluminum

Country[1]	1956	1957	1958	1959	1960
	short tons[2]				
North America:					
Canada	620,321	556,715	634,102	593,630	761,357
United States	1,678,954	1,647,709	1,565,557	1,954,112	2,014,498
Totals	**2,299,275**	**2,204,424**	**2,199,659**	**2,547,742**	**2,775,855**
South America: Brazil	6,920	9,794	13,102	19,950	30,900[3]
Europe:					
Austria	65,490	62,125	62,716	72,271	74,924
Czechoslovakia	23,400	18,400	29,100	38,600[3]	44,000[3]
France	165,125	176,603	186,415	190,695	259,263
Germany, East	37,800	38,100[3]	37,500[3]	38,600[3]	44,000[3]
West	162,439	169,576	150,756	166,631	186,221
Hungary	38,375	27,650	43,560	50,400	54,564
Italy	70,225	72,981	70,603	82,658	92,206
Norway	101,349	105,430	139,201	160,881	182,304
Poland	24,000	22,500	24,700	25,143	28,640
Rumania[3]	8,800	11,000	11,000	11,000	11,000
Spain	14,283	16,721	17,269	24,959	32,268
Sweden, including alloys	13,734	14,958	15,113	17,086	19,000[3]
Switzerland	33,180	34,238	34,723	37,886	43,795
U.S.S.R.[3]	505,000	550,000	605,000	690,000	745,000
United Kingdom	30,892	32,933	29,517	27,381	32,390
Yugoslavia	16,162	19,989	23,899	21,214	27,635
Totals[3]	**1,305,000**	**1,375,000**	**1,475,000**	**1,655,000**	**1,880,000**
Asia:					
China (Manchuria)[3]	11,000	22,000	29,800	77,600	88,100
India	7,281	8,718	9,167	19,131	20,123
Japan	72,754	74,934	93,231	110,385	146,864
Taiwan	9,655	9,104	9,455	8,251	9,106
Totals[1, 3]	**100,700**	**114,800**	**141,700**	**215,400**	**264,200**
Africa: Cameroon, Republic of	—	8,300	35,121	46,644	47,000[3]
Oceania: Australia	10,240	11,899	12,196	14,392	13,054
World totals[2, 1]	**3,720,000**	**3,725,000**	**3,875,000**	**4,500,000**	**5,010,000**

[1] In addition to countries listed, North Korea produced a negligible quantity of aluminum.
[2] This table incorporates some revisions. Data do not add exactly to totals shown because of rounding where estimated figures are included in the detail.
[3] Estimate.

Source: "Minerals Yearbook" published by United States Bureau of Mines.

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 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 babbit 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 32.59 cents per pound in December, 1960. This price was for grade 99½% in lots of 10,000 pounds or more.

TABLE 10. Production of Antimony, 1951-60

Year	In ores and slags exported		In antimonial lead produced		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
		$		$		$
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
1957	452,184	37,934	908,547	332,508	1,360,731	370,442
1958	—	—	858,633	284,208	858,633	284,208
1959	—	—	1,657,797	540,276	1,657,797	540,276
1960	—	—	1,651,786	538,482	1,651,786	538,482

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

TABLE 11. Imports of Antimony Metal, by Principal Countries of Supply

Country	1959		1960	
	Pounds	Value	Pounds	Value
		$		$
United Kingdom	341,334	75,335	353,869	65,624
Hong Kong	25,000	9,310	—	—
Belgium, Luxembourg	89,600	18,360	232,195	50,539
China	57,305	12,942	229,642	36,826
Czechoslovakia	53,658	8,676	—	—
Germany W.	81,227	13,870	—	—
Mexico	89,594	19,184	—	—
Netherlands	433,078	73,218	—	—
U.S.S.R.	—	—	22,074	3,482
United States	—	—	6,014	1,795
Totals			**843,794**	**158,266**

TABLE 12. Consumption of Antimony Metal, 1959 and 1960

	1959	1960
	pounds	
Used in production of:		
Antimonial-lead alloys	650,282	576,996
Babbitt	112,090	113,311
Solder	21,136	10,518
Type metal	147,012	100,849
Other commodities	204,199	150,042
Total accounted for	**1,134,719**	**951,716**

TABLE 13. World Production of Antimony (Content of Ore), by Countries[1]

Country[1]	1956	1957	1958	1959	1960
	short tons[2]				
North America:					
Canada[3]	1,070	680	430	829	761
Guatemala (U.S. Imports)	—	13	47	97	119
Mexico[4]	5,022	5,734	3,029	3,621	4,662
United States	590	709	705	678	637
Totals	**6,682**	**7,136**	**4,211**	**5,225**	**6,179**

See footnotes at end of table.

TABLE 13. World Production of Antimony (Content of Ore), by Countries[1] — Concluded

Country[1]	1956	1957	1958	1959	1960
	short tons[2]				
South America:					
Argentina	2		11	—	—
Bolivia (exports)[4]	5,635	7,026	5,818	6,065	5,500[5]
Peru[4]	1,068	920	964	793	833
Totals	**6,705**	**7,953**	**6,793**	**6,858**	**6,333**
Europe:					
Austria	489	430	514	631	660[5]
Czechoslovakia[6]	1,800	1,800	1,800	1,800	1,800[5]
France	258	—	42	—	—
Italy	309	224	188	231	300[5]
Portugal	—	11	7	7[5]	7[5]
Spain	250	220	220	180[5]	220[5]
U.S.S.R.[6]	5,500	5,500	6,600	6,600	6,600[5]
Yugoslavia (metal)	1,767	1,950	1,835	2,514	2,657
Totals[1,2]	**10,400**	**10,100**	**11,200**	**12,000**	**12,200**
Asia:					
Burma[4]	90	70	90	240	220[5]
China[5]	14,300	15,400	16,500	16,500	19,000
Iran[7]	44	110[5]	160	160[5]	185[5]
Japan	619	474	298	340	280[5]
Ryukyu Islands	12	6	—	26	159
Thailand	41	2	—	10	10[5]
Turkey	1,063	1,232	1,687[8]	1,380[8]	1,650[5,8]
Totals[1]	**16,200**	**17,300**	**18,700**	**18,700**	**21,500**
Africa:					
Algeria	2,641	1,547	1,106	1,135	785
Morocco: Northern Zone	330	360	203	252	310
Rhodesia and Nyasaland, Fed. of:					
Southern Rhodesia	72	83	151	104	98
Union of South Africa	15,689	11,021	7,904	13,619	13,567
Totals	**18,732**	**13,011**	**9,364**	**15,110**	**14,760**
Oceania: Australia	322	543	775	703	220[5]
World totals (estimate)[1]	**59,000**	**56,000**	**51,000**	**59,000**	**61,000**

[1] Antimony is also produced in Hungary and U.S.S.R., but production data are not available. No estimates are included in total.
[2] This table incorporates some revisions. Data do not add exactly to totals shown because of rounding where estimated figures are included in the detail.
[3] Antimony content of smelter products exclusively from mixed ores.
[4] Includes antimony content of smelter products derived from mixed ores.
[5] Estimates.
[6] Estimate according to annual issues of Minerais et Metaux (France), except 1960.
[7] Year ended March 20 of year following that stated.
[8] Exports.

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

TABLE 14. Imports of Antimony Oxide, by Principal Countries of Supply, 1956-60

Country	1956	1957	1958	1959	1960
	pounds				
United Kingdom	198,880	246,760	184,000	300,000	253,375
United States	56,230	54,937	71,200	80,254	139,476
Belgium	6,721	20,160	67,781	42,714	44,000
Germany, West	—	44,090	—	88,184	—
Totals	**261,831**	**365,947**	**322,981**	**511,152**	**436,851**

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 1950-60.

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 1960.

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-colombite. Some of these are considered to be of possible economic interest.

In Quebec scattered occurrences of beryl are known in the La Corne and Preissac townships, Abittibi 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-alluminum 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 Countries[1]

Country[1]	1956	1957	1958	1959	1960
	short tons				
North America:					
United States (mine shipments):					
Cobbed beryl	445	521	463	328	244
Low grade beryllium ore			42	97	265
Totals	**445**	**521**	**505**	**425**	**509**
South America:					
Argentina	1,722	1,571	1,004	645	739
Brazil	2,321	1,452	1,295	2,961[2]	3,849
Totals	**4,043**	**3,023**	**2,299**	**3,606**	**4,588**
Europe:[1]					
Norway (United States imports)	—	—	3	4	—
Portugal	244	191	52	41	24
Sweden	—	—	28	41[3]	—
U.S.S.R.[4]	110	110	110	110	110
Totals[4]	**350**	**300**	**190**	**200**	**130**
Asia:					
Afghanistan	30	15	—	—	11
India (United States imports)	3,360	1,256	600	—	1,000
Korea, Republic of	—	—	—	—	—
Totals	**3,390**	**1,271**	**600**	**—**	**1,011**
Africa:					
Congo, Republic of the (Formerly Belgian)	1,860	1,666	1,063	280	340[4]
Kenya	—	6	4	2	2[4]
Malagasy Republic (Madagascar)	169	299	180	468	660[4]
Mozambique	944	1,870	1,161	1,559	1,650

See footnote at end of table.

TABLE 15. World Production of Beryl, by Countries[1]

Country[1]	1956	1957	1958	1959	1960
	short tons				
Africa—Concluded:					
Rhodesia and Nyasaland, Federation of:					
Northern Rhodesia	13	5	13	2	2
Southern Rhodesia	606	572	332	440	539
Ruanda—Urundi	45	106	51	187	190[4]
Somali Republic	17	—	—	—	—
South-West Africa	454	385	246	170	413
Uganda	98	78	86	234	427[4]
Union of South Africa	133	711	464	203	325
Totals	**4,339**	**5,698**	**3,600**	**3,545**	**4,548**
Oceania: Australia	356	442	278	355	300[4]
World totals (estimate)[1]	**12,900**	**11,300**	**7,500**	**8,100**	**11,100**

[1] This table incorporates a number of revisions. Data do not add exactly to totals shown because of rounding where estimated figures are included in the detail.
[2] Exports.
[3] United States imports.
[4] Estimates.
[5] Less than 0.5 tons.
Source: "Minerals Yearbook" published by the United States Bureau of Mines.

BISMUTH

Bismuth is recovered from the lead-zinc ores which are smelted at Trail by the Consolidated Mining and Smelting Company of Canada. The Deloro Smelting and Refining Company produces a bismuth-lead-silver bullion from treating silver-cobalt ores. Bismuth metal is a by-product in the smelting of the copper ores at Gaspe, Quebec. The Molybdenite Corporation of Canada produces bismuth metal and bismuth salts at Lacorne, Quebec.

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

According to the "E & M J Metal and Mineral Markets", the New York price of bismuth December, 1960 was $2.25 per pound, in ton lots.

TABLE 16. Production of Primary Bismuth in all Forms,[1] 1951-60

Year	Pounds	Value	Year	Pounds	Value
		$			$
1951	230,298	543,504	1956	285,861	544,900
1952	162,373	347,224	1957	319,941	584,917
1953	117,366	209,557	1958	412,792	771,267
1954	258,675	572,183	1959	334,736	590,212
1955	265,896	572,362	1960	423,827	762,048

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

TABLE 17. Imports of Bismuth Metal, Residues and Salts, 1959 and 1960

Country	1959		1960	
	Pounds	Value	Pounds	Value
		$		$
Metallic bismuth:				
Netherlands	1,100	2,129	6,598	12,723
Peru	9,859	20,210	—	—
United States	2,043	4,490	1,050	2,319
Totals	**13,002**	**26,829**	**7,648**	**15,042**
Bismuth salts:				
United Kingdom	9,557	23,930	8,164	19,119
United States	664	2,338	1,916	6,897
Totals	**10,221**	**26,268**	**10,080**	**26,016**

TABLE 18. Consumption of Bismuth Metal, by Industries, 1955-59

Industry	1955	1956	1957	1958	1959
	tons (2,000 pounds)				
Medicinals and pharmaceuticals	21	41	4	7	3
White metal foundries	18	19	17	12	15
Miscellaneous	7	5	6	5	1
Total accounted for	**46**	**65**	**27**	**24**	**19**

TABLE 19. World Production of Bismuth, by Countries[1]

Country[1]	1956	1957	1958	1959	1960
	pounds[2]				
North America:					
Canada (metal)[3]	285,861	319,941	412,792	334,736	464,440
Mexico[3]	1,391,100	780,200	417,700	524,700	440,000[4]
South America:					
Argentina: In ore[4]	20,000	47,800	59,000	114,000[5]	[6]
Bolivia[7]	74,800	90,600	244,700	487,400	403,000[4]
Peru[3]	634,757	804,800	851,560	775,323	921,814
Europe:					
France (in ore)	112,400	99,200	110,000[4]	110,000[4]	180,000[4]
Spain (metal)	71,650	190,500	116,229	53,168	25,000[8]
Sweden[4]	88,000	120,000	110,000	60,000	80,000
Yugoslavia (metal)	245,039	219,805	169,670	200,026	231,582
Asia:					
China (in ore)	[6]	[6]	[6]	[6]	[6]
Japan (metal)	156,859	144,800	168,751	223,187	243,000[4]
Korea, Republic of (in ore)	396,000	240,000	198,000	227,000	350,000[4]
Africa:					
Mozambique	785	6,975	2,167	21,980	25,000
South West Africa (in ore)	310	670	680	520	300[4]
Uganda	660	2,700	15,030	18,984	17,600[4]
Union of South Africa (in ore)	360	145	2,023	526	650[4]
Oceania: Australia (in ore)	5,150	1,340	2,352	—	[6]
World totals (estimate)[1,2]	**5,300,000**	**5,000,000**	**4,600,000**	**5,100,000**	**5,200,000**

[1] United States figure withheld to avoid disclosing individual company confedential data; included in world total. Bismuth is believed to be produced also in Brazil, Germany 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. Data do not add to totals shown due to rounding where estimated figures are included in the detail.

[3] Refined metal, plus bismuth content of bullion exported.

[4] Estimate.

[5] Exports.

[6] Data not available; estimate included in total.

[7] Content in ore and bullion exported, excluding that in tin concentrates.

[8] Estimated recoverable content of ore produced.

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

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 on 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, 1960 was $1.50 per pound.

TABLE 20. Production of Cadmium in all Forms, 1951-60

Year	British Columbia and Yukon		Manitoba and Saskatchewan		Canada	
	pounds	$	pounds	$	pounds	$
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	2,182,435	3,710,140	156,986	266,876	2,339,421	3,977,016
1957	2,141,782	4,025,821	226,348	384,791	2,368,130	4,025,821
1958	1,413,463	2,148,463	342,587	520,732	1,756,050	2,669,195
1959	1,837,571	2,352,091	322,792	413,174	2,160,363	2,765,265
1960	1,924,362	2,732,594	366,636	520,623	2,357,497	3,347,646[1]

[1] Includes production from Quebec ores.

TABLE 21. Exports of Cadmium Metal 1959 and 1960

Destination	1959		1960	
	Pounds	Value	Pounds	Value
		$		$
United Kingdom	821,506	998,776	1,030,116	1,371,545
India	2,670	3,991	16,653	21,929
Australia	3	61	—	—
Brazil	20,566	21,645	16,976	22,422
Netherland	89,400	92,373	—	—
United States	1,045,293	1,127,447	992,581	1,211,372
Hungary	—	—	5	109
Japan			2	54
Totals	**1,979,638**	**2,244,293**	**2,056,333**	**2,627,431**

TABLE 22. Consumption of Cadmium, 1959 and 1960

	1959	1960
	pounds	
Used for		
Plating	207,056	173,675
Solders	14,769	12,759
Other products	4,463	3,982
Total accounted for	**226,288**	**190,416**

TABLE 23. World Production of Cadmium, by Countries[1]

Country[1]	1956	1957	1958	1959	1960
	thousands of pounds[2]				
North America:					
Canada	2,339	2,368	1,756	2,160	2,245
Guatemala	107	84	52	—	123
Mexico (refined metal)[3]	—	—	42	114	132[4]
United States (primary and secondary metal)	10,614	10,549[4]	9,673[4]	8,602[4]	10,180
South America: Peru[6] (refined metal)[3]	25	58	141	141	186[4]
Europe:					
Austria	5	25	25	44	44[4]
Belgium	1,488[4]	1,323[4]	1,488[4]	1,512[5]	1,500[4,5]
France	240	388	385	539	564
Germany, West	645	611	703	926	902
Italy	412	492	410	552	587
Netherlands[4]	36	77	88	88	88
Norway	278	244	240	284	244
Poland[4]	542	560	573	595	595
Spain	25	20	14	14	31[4]
U.S.S.R.[4,6]	700	900	975	1,005	1,035
United Kingdom[7]	251	228	278	310	236
Yugoslavia	18	57	55[4]	55[4]	55[4]

See footnote at end of table.

TABLE 23. World Production of Cadmium, by Countries[1] — Concluded

Country[1]	1956	1957	1958	1959	1960
	thousands of pounds[2]				
Asia: Japan	886	873	964	1,082	1,180[4]
Africa:					
Congo, republic of the (formerly Belgian)	611	911	1,080	1,047	1,050[4]
Rhodesia and Nyasaland:					
Federation of Northern Rhodesia	117	125	38	—	58
Oceania: Australia	618	880	791	763	662
World totals (estimate)[1,2]	**20,000**	**20,800**	**19,800**	**19,800**	**21,700**
Exports:					
Mexico[3]	1,892	1,673	1,655	1,151	1,852[5]
Peru[3]	81	46	50	44	44[4]
South West Africa[3]	2,328	2,838	2,698	1,193	1,830[4]

[1] Data derived in part from bulletins of the World Non-ferrous Metal Statistics and annual issues of Metal Statistics (Metallgesellschaft).
[2] This table incorporates a number of revisions of data published in previous chapters.
[3] In addition to metal refined within the country, cadmium is exported in zinc concentrates, flue dusts, etc., for treatment elsewhere and accounted for in country where smelted. To avoid duplicating figures, these export data are not included in the world total.
[4] Estimate.
[5] Exports.
[6] Estimates based on an assumed average cadmium content of 0.1 per cent in zinc concentrates.
[7] Including secondary.
[8] United States imports.

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

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 24. Production (Shipments) of Calcium Metal, 1945 - 1960

Year	Pounds	Value
		$
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
1950-55	[1]	[1]
1956[2]	394,900	515,305
1957[2]	221,225	282,378
1958	25,227	31,256
1959	67,429	76,409
1960	134,801	159,241

[1] Not available for publication.
[2] Output.

TABLE 25. Exports of Calcium, by Countries to which Shipped, 1958-60

Country	1958	1959	1960
		dollars	
United Kingdom	13,488	36,250	19,201
Belgium, Luxembourg	25,110	9,910	8,980
Sweden	—	—	54
United States	22,067	7,070	14,918
France	—	—	155
Germany, West	14,936	6,325	21,415
India	3,427	14,000	15,870
Italy	—	—	661
Union of South Africa	—	—	5,850
Australia	—	—	53
Totals	**79,028**	**73,555**	**87,157**

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 1956-60.

Cerium is obtained from monazite, a monoclinic phosphate of cerium metals containing about 32 per cent cerium oxide (Ce_2O_3) and up to 18 per cent thoria (ThO_2). Monazite is distributed widely in igneous rocks throughout the world, especially in gneisses that have been intruded by pegmatites, but usually it forms only a small fraction of one per cent of the containing rock, and only the natural concentractions in stream gravels and beach sands have paid for exploration. The chief commercial sources of manazite 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 pegmatities 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 1960. 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 supercharges. For metallurgical uses chromite should contain a minimum of 48 per cent Cr_2O_3 with a chrome-iron ratio of 3 to 1 or higher, and the ore should be hard and lumpy.

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

The United States price, December, 1960 for chrome ore, 48 per cent Cr_2O_3, was $32 to $36 per long ton, f.o.b. Atlantic ports.

TABLE 26. Production of Chromite, 1946-60

Year	Short tons	Value	Year	Short tons	Value
		$			$
1946	3,110	61,123	1951	—	—
1947	2,162	42,159	1952	—	—
1948	1,715	33,568	1953	—	—
1949	361	7,148	1954-60	—	—
1950	—	—			

TABLE 27. World Production of Chromite, by Countries[1]

Country[1]	1956	1957	1958	1959	1960
	short tons[2]				
North America:					
Cuba	59,248	127,126	82,800[3]	43,732[4]	32,774[4]
Guatemala	979	1,100[3]	1,168	452	200
United States	207,662[5]	166,157	143,795	105,000[6]	107,000[6]
Totals	**267,889**	**294,383**	**227,763**	**149,184**	**139,974**
South America:					
Brazil	4,536	8,748	6,336	6,177	5,233
Europe:					
Albania	145,500	184,000	221,800	272,300	330,700[3]
Greece	86,920	80,020	72,217	88,185	110,200[3]
Portugal	—	—	—	—	—
U.S.S.R.[3,7]	815,000	850,000	880,000	940,000	1,010,000
Yugoslavia	130,913	132,570	125,188	117,965	111,170
Totals[1,3]	**1,200,000**	**1,270,000**	**1,320,000**	**1,440,000**	**1,590,000**
Asia:					
Cyprus (exports)	5,858	5,678	13,260	13,637	15,702
India	59,009	87,968	70,500	93,936	110,354
Iran[8]	36,156	42,549	38,600[3]	55,000[3]	55,000[3]
Japan	43,947	51,216	46,155	63,578	74,398
Pakistan	25,487	18,114	26,935	17,662	19,945
Philippines	781,598	799,733	458,903	720,345	809,579
Turkey	918,305	1,052,665	574,194	427,324	528,690
Totals[7]	**1,870,360**	**2,057,923**	**1,228,547**	**1,391,482**	**1,613,668**
Africa:					
Rhodesia and Nyasaland, Federation of: Southern Rhodesia	448,965	654,072	618,841	543,104	668,401
Sierra Leone	21,929	17,602	15,944	19,974	6,023
Union of South Africa	690,851	733,612	696,057	749,873	850,916
United Arab Republic (Egypt Region)	281	114	—	275	—
Totals	**1,162,026**	**1,405,400**	**1,330,842**	**1,313,226**	**1,525,340**
Oceania:					
Australia	6,828	3,415	869	134	—
New Caledonia	53,932	70,768	52,249	48,463	43,211
Totals	**60,760**	**74,183**	**53,118**	**48,597**	**43,211**
World totals (estimate)[1]	**4,565,000**	**5,110,000**	**4,165,000**	**4,350,000**	**4,920,000**

[1] In addition to countries listed, Bulgaria and Rumania 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. Data do not add to totals shown due to rounding where estimated figures are included in the detail.

[3] Estimate.

[4] United States imports.

[5] Includes 45,710 short tons of concentrates produced in 1955-56 from low-grade ores and concentrates stockpiled near Coquille, Oregon during World War II.

[6] Produced for Federal Government only; excludes quantity consumed by American Chrome Company.

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

[8] Year ended March 20 of year following that stated.

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

TABLE 28. Imports of Chrome Ores, 1951-60

Year	Tons	Value	Year	Tons	Value
		$			$
1951	146,998	3,762,874	1956	64,965	1,529,411
1952	148,343	5,146,860	1957	111,453	2,751,372
1953	118,092	3,006,549	1958	38,136	812,286
1954	37,566	571,984	1959	48,678	1,525,438
1955	51,854	971,522	1960	59,026	1,521,812

TABLE 29. Imports of Chrome Ores, by Principal Countries of Supply, 1959 and 1960

Imported from	1959		1960	
	Tons	Value	Tons	Value
		$		$
Cyprus	–	–	2,822	99,154
Rhodesia and Nyasaland	8,687	313,395	2,155	55,772
U.S.S.R.	2,645	94,410	–	–
United States	22,245	778,268	13,343	442,375
Union of South Africa	–	–	1,132	12,135
Philippines	11,760	220,605	38,912	892,684
Cuba	1,090	28,956	659	19,692
Malta	2,251	89,804	–	–
Totals	**48,678**	**1,525,438**	**59,023**	**1,521,812**

INDIUM

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 non-corrosive 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 used about 1927 was 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 1960 the quoted price of indium at New York was $1.35 to $2.25 per troy ounce, for lots over 5,000 ounces.

TABLE 30. Production of Indium, 1943-60

Year	Troy ounces	Value	Year	Troy ounces	Value
		$			$
1943-48	–	–	1954	477	1,278
1949	689	1,550	1955	104,774	232,598
1950	4,952	12,083	1956	363,192	795,390
1951	582	1,368	1957	384,360	693,770
1952	404	909	1958	..	..
1953	6,752	9,588	1959-1960	..	..

MAGNESIUM

Magnesium was 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, treated brucite, brought from Wakefield, Quebec, by converting it to magnesium chloride and thence to magnesium metal. Some magnesium metal was made from imported magnesium chloride. The Arvida plant ceased production in September 1959.

TABLE 31. Production of Primary Magnesium Metal, 1944-60

Year	Quebec		Ontario		Canada	
	Pounds	Value	Pounds	Value	Pounds	Value
		$		$		$
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
1947-55	[1]	[1]	[1]	[1]	[1]	[1]
1956	4,572,564	1,536,688	14,639,734	4,543,202	19,212,298	6,079,890
1957	1,585,998	487,853	15,184,373	4,767,043	16,770,371	5,254,896
1958	4,504,343	1,317,070	9,087,362	2,747,755	13,591,705	4,064,825
1959	4,059,508	977,123	8,144,940	2,202,392	12,204,448	3,179,515
1960	—	—	14,577,138	4,313,987	14,577,138	4,313,987

[1] Not available for publication.

TABLE 32. Exports of Magnesium Metal, 1958-60

Destination	1958	1959	1960
		dollars	
United Kingdom	1,297,697	1,779,079	2,290,382
Union South Africa	13,157	2,543	3,975
India	51,846	23,480	5,540
Australia	15,602	31,559	1,475
Austria	5,202	5,513	—
Belgium	38,986	67,397	21,192
Brazil	28,268	16,682	9,821
Chile	674	—	—
China	65,909	63,701	198,761
France	478,131	183,096	189,612
Germany W.	565,126	1,451,157	87,047
Mexico	149,861	22,420	320
Netherlands	10,951	20,998	—
Sweden	26,240	—	140
Switzerland	36,117	55,447	11,840
Yugoslavia	29,494	39,440	29,505
United States	58,730	86,155	264,716
Denmark	—	2,770	—
Dominican Republic	—	8,732	—
Greece	—	383	—
Italy	—	2,544	—
Israel	—	1,008	1,135
Spain	—	6,841	6,172
Uruguay	—	8,643	2,303
Czechoslovakia	—	—	35,768
Hungary	—	—	70,425
Taiwan	—	—	607
Argentina	—	—	1,782
Jamaica	—	—	287
Totals	**2,871,991**	**3,879,588**	**3,232,805**

TABLE 33. Consumption of Magnesium Metal, 1959-1960

	1959	1960
	tons (2000 pounds)	
Used for	86	158
Castings	50	230
Extrusions (shapes and tubing)	1,136	1,339
Aluminum alloys	396	472
Other products	1,668	2,199

TABLE 34. World Production of Magnesium Metal, by Countries[1]

Country[1]	1956	1957	1958	1959	1960
	short tons[1]				
Canada	9,606	8,385	6,796	6,102	7,373
China	[3]	[3]	1,100[2]	1,100[2]	1,100
France	1,660	1,753	1,897	1,938	2,300[2]
Germany, West[4]	110	330	660	550	330
Italy	4,116	4,170	4,607	4,960	5,500[2]
Japan	86[5]	472[5]	1,106[5]	1,724[5]	2,400[2]
Norway	8,185	9,504	10,132	10,633	13,200[2]
U.S.S.R.[6]	17,900	18,800	19,400	22,000	27,600
United Kingdom	4,064	3,831	2,691	2,458	4,200[2]
United States	68,346	81,263	30,096	31,033	40,070
Totals (estimate)[1]	**114,300**	**128,700**	**78,500**	**82,500**	**104,600**

[1] This table incorporates a number of revisions of data published in previous magnesium chapters. Data do not add to totals shown due to rounding where estimated figures are included in the detail.
[2] Estimate.
[3] Data not available; estimate included in total.
[4] Primary metal and remelt alloys.
[5] In addition, the following amounts of remelted magnesium were produced: 1956, 897 short tons; 1957, 1,906 short tons; and 1958, 2,567 short tons and 1959, 2,694 tons.
[6] Revised estimates based on more recent information.

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

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. During recent years 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. Operations have not progressed beyond the experimental basis.

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 $0.87 to $0.90 per long ton unit, c.i.f. U.S. ports.

TABLE 35. Production of Manganese Ore, 1943-60

Year	Tons	Value	Year	Tons	Value
		$			$
1943	48	985	1949	–	–
1944	–	–	1950	–	–
1945	–	–	1951	–	–
1946	–	–	1952-55	–	–
1947	225	7,875	1956	...	1,900
1948	3	88	1957-60	–	–

TABLE 36. Imports of Manganese Ore, 1951-60

Year	Tons	Value	Year	Tons	Value
		$			$
1951	222,082	9,078,011	1956	207,977	9,137,278
1952	194,405	8,273,722	1957	131,318	7,519,746
1953	66,682	2,719,863	1958	42,060	1,722,965
1954	48,962	2,277,043	1959	118,454	5,017,112
1955	175,282	7,338,269	1960	56,350	2,543,763

TABLE 37. Imports of Manganese Ore, by Principal Countries of Supply, 1956-60

	1956	1957	1958	1959	1960
			tons		
From:					
China	–	–	10,312	–	–
Congo, Republic of (formerly Belgian)	20,484	30,081	2,379	5,777	17,032
Japan	–	–	–	3	4
Cuba	23,361	118	4,782	–	–
Ghana	30,688	62,916	2,362	66,246	22,399
India	26,199	19,634	6,702	12,314	–
France	–	2	2	1	4
United States	94,019	3,713	11,044	13,887	4,345
United Kingdom	171	118	112	111	44
Brazil	–	9,798	–	20,115	6,522
Mexico	2,561	–	1,344	–	512
Turkey	1,144	–	–	–	–
Union of South Africa	3,350	4,838	3,020	–	5,488
Greece	–	–	1	–	–
Total imports	**207,977**	**131,318**	**42,060**	**118,454**	**56,350**

TABLE 38. World Production of Manganese Ore, by Countries[1]

Country[1]	Per cent Mn.	1956	1957	1958	1959	1960
		short tons[2]				
North America:						
Cuba	36-50+	268,810[4]	160,967[4]	74,636[4]	58,806[4]	17,644[5]
Mexico	30+	171,000[3]	220,000[3]	187,400[3]	181,900[3]	171,400[3]
Panama[4]	44+	—	2,154	4,489	—	—
United States (shipments)	35+	344,735	366,334	327,309	229,199	80,021
Totals		**784,545**	**749,455**	**593,834**	**469,905**	**269,065**
South America:						
Argentina	30-40	9,682	11,154	14,628	17,494	16,500[3]
Brazil	38-50	342,645	1,011,939	972,413	1,068,415	942,205[4]
British Guiana	40	—	—	—	—	137,454
Chile	40-50	51,878	59,724	42,061	42,744	66,100[3]
Peru	40+	11,826	16,917	3,242	1,262	1,905
Venezuela	38+	10,318	32,930	9,039	3,955	—
Totals		**426,349**	**1,132,664**	**1,041,383**	**1,133,870**	**1,164,164**
Europe:						
Bulgaria	30+	84,657	89,600	88,200[3]	88,200[3]	88,200[3]
Greece	35+	8,695	17,545	22,046	33,069	38,581
Hungary	30+	94,000[3]	132,000[3]	132,000[3]	132,000[3]	132,000[3]
Italy	30–	51,697	51,976	48,588	57,138	51,738
Portugal	35+	3,508	6,035	5,485	7,703	7,700[3]
Rumania	35	259,054	292,402	220,755	216,910	209,400[3]
Spain	30+	36,100	45,622	40,267	44,924	24,828
U.S.S.R.[6]	—	5,443,200	5,674,700	5,915,000	6,080,300	6,393,400[3]
Yugoslavia	30+	5,500[3]	4,400[3]	11,060	8,900	14,700
Totals[1]		**5,986,411**	**6,314,280**	**6,483,401**	**6,669,144**	**6,960,600**[3]
Asia:						
Burma	35+	1,287	506	1,405	606	324
China[3]	—	580,000	770,000	935,000	1,100,000	1,380,000
India	35+	1,946,126	1,852,701	1,406,652	1,308,919	1,267,657
Indonesia	35-49	118,858	59,388	48,909	40,515	12,066
Iran[7]	36-46	6,614	2,205	660	2,425	2,400[3]
Japan	32-40	314,175	318,497	326,269	383,699	355,696
Korea, Republic of	30-48	2,158	3,533	287	495	1,521
Malaya	60	—	—	—	—	3,222
Philippines	35-51	4,866	33,324	24,590	38,365	19,159
Portuguese India	32-50	222,686	161,347	86,078	76,376	56,263
Thailand	40+	450	381	1,100	452	582
Turkey	30-50	66,966	62,522	24,920	39,341	31,112
Totals[3]		**3,264,000**	**3,264,000**	**2,856,000**	**2,991,000**	**3,130,000**
Africa:						
Angola	38-48	29,647	23,518	38,499	39,314	25,728
Bechuanaland	50+	—	243	14,213	20,507	13,912
Congo, Republic of the (formerly Belgian)	48+	363,250	404,572	372,741	425,694	429,900[3]
Ethiopia	51	—	—	—	1,500[3]	1,683
Ghana (exports)[8]	48	712,154	718,306	74,612	589,853	600,261
Ivory Coast	48	—	—	—	—	68,343
Morocco Northern Zone	50	1,795	732	—	—	—
Southern Zone	35-50	461,470	541,772	452,041	518,711	532,508
Rhodesia and Nyasaland, Federation of:						
Northern Rhodesia	30+	40,760	39,703	49,383	63,070	64,298
Southern Rhodesia	48+	816	1,785	2,512	2,126	1,676
South West Africa	45+	57,262	89,661	103,049	49,442	67,439
Sudan[3]	36-44	7,700	8,800	6,600	440	—
Union of South Africa	40+	768,395	787,878	934,097	1,069,196	1,316,124
United Arab Republic (Egypt region)[9]	57	5,087	10,315	48,730	67,318	104,700[3]
Totals		**2,448,336**	**2,627,285**	**2,596,537**	**2,847,171**	**3,226,000**

See footnotes at end of table.

TABLE 38. World Production of Manganese Ore, by Countries[1] — Concluded

Country[1]	Per cent Mn.	1956	1957	1958	1959	1960
		short tons[2]				
Oceania:						
Australia	45-48	66,510	86,153	66,845	100,241	68,300[3]
Fiji	40+	25,067	38,858	20,503	14,566	13,073
New Zealand	48+	175	41	116	114	110[3]
Papua	—	14	—	—	—	54
Totals		**91,766**	**125,052**	**87,464**	**114,921**	**81,500**
World totals (estimate)[4]		**13,001,000**	**14,213,000**	**13,659,000**	**14,226,000**	**14,832,000**

[1] In addition to countries listed, Czechoslovakia and Sweden report production of manganese ore, but because the manganese content averages less than 30 per cent, the output is not included in this table. Sweden averages annually 16,500 tons of approximately 15 per cent manganese content and Czechoslovakia approximately 220,000 tons.
[2] This table incorporates a number of revisions of data published in previous Minerals Yearbook manganese chapters. Data do not add to totals shown due to rounding where estimated figures are included in the detail.
[3] Estimate.
[4] Exports.
[5] United States imports.
[6] Grade unstated. Source: The Industry of the U.S.S.R. Central Statistical Administration.
[7] Year ending March 20 of year following that stated.
[8] Dry weight
[9] In addition to high-grade ore shown in the table, Egypt produced the following tonnages of less than 30 percent manganese content: 1956, 215,761; 1957, 83,957 and 1958, 74,303; 1959, 72,752 and 1960, 159,800 (estimated).

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

MERCURY

There was no production in 1960 but in 1955 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.

The New York price quotations on mercury during 1960 were $211 per flask of 76 pounds in January; $213 in April; $210 in July and $209 in December.

TABLE 39. Production of Mercury, 1940-60

Year	Pounds	Value	Year	Pounds	Value
		$			$
1940	153,830	369,317	1944	735,908	1,210,375
1941	536,304	1,335,697	1945-54	—	—
1942	1,035,914	2,943,807	1955	75	250
1943	1,690,240	4,559,200	1956-60	—	—

TABLE 40. Production of Mercury, Consumption, Imports and Exports, 1951-60

Year	Production	Consumption	Imports	Exports
		pounds		
1951	—	171,886	308,172	58,235
1952	—	159,216	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	—	212,800	450,006	5,953
1957	—	215,300	400,710	1,425
1958	—	151,021	197,073	2,830
1959	—	161,987	141,219	10,458
1960	—	139,627	243,091	1,918

TABLE 41. Imports of Mercury, from Countries of supply, 1959 and 1960

From	1959		1960	
	Pounds	Value	Pounds	Value
		$		$
Mercury metal				
United Kingdom	3,800	10,328	1,610	4,000
Chile	6,605	17,799	17,404	46,271
Mexico	11,089	29,975	33,382	79,724
Netherlands	20,520	50,018	—	—
Peru	39,984	97,587	—	—
Spain	38,000	95,390	121,600	285,114
United States	21,221	62,581	32,429	90,233
Italy	—	—	36,666	88,105
Totals	**141,219**	**363,678**	**243,091**	**593,447**
Mercury salts				
United Kingdom	...	3,564	...	6,316
United States	...	2,573	...	599
Totals	...	**6,137**	...	**6,915**

TABLE 42. Consumption of Mercury by Principal Uses, 1956-60

Industry	1956	1957	1958	1959	1960
	pounds				
Pharmaceuticals and fine chemicals	35,720	4,560	6,057	10,319	11,888
Heavy chemicals	159,524	194,636	137,161	116,011	86,649
Electrical apparatus	13,680	12,312	3,969	4,211	2,962
Gold mines[1]	3,000	3,000	3,000	3,628	4,904
Miscellaneous[1]	876	836	834	27,818	33,224
Total accounted for	**212,800**	**215,300**	**151,021**	**161,987**	**139,627**

[1] Estimated.

TABLE 43. World Production of Mercury, by Countries[1]

Country[1]	1956	1957	1958	1959	1960
	flasks of (76 pounds) 34.5 kilograms[2]				
North America:					
Mexico	19,529	21,068	22,556	16,420	20,103
United States	24,177	34,625	38,067	31,256	33,223
South America:					
Bolivia (exports)	—	—	10	12	—
Chile	575	678	3,343	2,007	2,000[3]
Columbia	—	99	203	95	89
Peru	335	411	1,983	2,526	3,034
Europe:					
Austria	6	6	—	—	—
Czechoslovakia[4]	725	725	725	725[5]	725[5]
Italy	62,309	63,237	58,712	45,833	55,492
Rumania	419	394	353	387	400[3]
Spain	48,269	54,750	55,382	51,680	56,000[3]
U.S.S.R.[3]	22,000	25,000	25,000	25,000	25,000
Yugoslavia	13,228	12,328	12,270	13,344	14,069
Asia:					
China[3]	17,000	17,000	17,000	23,000	23,000[3]
Japan	8,334	11,872	10,900	16,131	16,500[3]
Philippines	3,015	3,363	3,321	3,520	3,000[3]
Turkey	1,079	720	1,486	1,321[6]	1,300[3]
Africa:					
Tunisia	22	—	39	198	166
World totals (estimate)	**221,000**	**246,000**	**251,000**	**233,000**	**254,000**

[1] This table incorporates some revisions. Data do not add exactly to totals shown because of rounding where estimated figures are included in the detail.
[2] 76 pound flasks
[3] Estimate
[4] Estimate according to the 47 Annual issue of Metal Statistics. (Metallgesellschaft), except Czechoslovakia 1960
[5] Data represents estimate of 1959 production; 1960 production may be larger.
[6] Exports

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

MOLYBDENUM

The principal producer in Canada was the Molybdenite Corporation of Canada Limited at Lacorne, Quebec. The ore is molybdenum disulphide containing some bismuth minerals which are recovered as by-products. The roasting plant at Lacorne produces molybdic oxide. The firm also produces lubricant-grade molybdenum disulphide. There was some molybdenite recovered by the Kerimeos mines at Olalla, British Columbia.

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 considerable higher. For high-speed tool steels as much as 9 per cent is added.

Molybdenum alloys are used widely for the hard-wearing and other important parts of aeroplanes. They are used in the automobile industry; 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 44. Production of Molybdenum, 1951-60

Year	Ores, concentrates, sulphides and oxides, shipped or used		Total Mo. contents of shipments
	tons	$	pounds
1951	241	228,958	228,958
1952	331	409,831	303,578
1953	184	215,527	194,344
1954	411	457,912	451,450
1955	762	823,954	833,506
1956	705	955,828	842,263
1957	633	1,166,557	783,739
1958	744	1,152,838	888,264
1959	658	748,566	940,596
1960	649	1,015,380	767,621

Shipped from stockpile.

TABLE 43. World Production of Molybdenum in Ores and Concentrates, by Countries[1]

Country[1]	1956	1957	1958	1959	1960
	thousands of pounds[2]				
Australia	[3]	2	4	[3]	[3]
Austria	2	—	—	—	—
Canada	842	785	888	747	758
Chile	[4] 3,122	[4] 2,998	2,972	3,785	4,440
China	[4]	[4]	2,200[5]	3,300[5]	3,300[6]
Japan	534	600	683	793	842
Korea, Republic of	31	31	68	49	97
Mexico	33	29	57	57	132
Norway	366	397	481	498	498[5]
Philippines	—	—	—	97	95
Portugal	11	18	—	—	—
Union of South Africa	—	13	9	—	—
U.S.S.R.	[4]	9,300[5]	9,300[5]	9,900[5]	11,000[5]
United States	57,462	60,753	41,069	50,956	68,237
Yugoslavia	4	4	4	4[5]	—
World total estimate[1]	**70,300**	**76,200**	**57,700**	**70,200**	**89,400**

[1] Molybdenum is also produced in North Korea, Rumania and Spain, but production is negligible.
[2] This table incorporates some revisions. Data do not add to totals shown due to rounding where estimated figures are included in the detail.
[3] Less than 500 pounds.
[4] Data not yet available; estimate by author of chapter included in total.
[5] Estimate.
[6] Data represents estimated 1959 production; 1960 production may be larger.

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

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 produced selenium dioxide, sodium selenate and sodium selenite.

Selenium is generally marketed as amorpnous 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 stop lights 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 in December 1960 was $6.50-$7.00 per pound for commercial grade to $9.50 per pound for high purity grade.

TABLE 46. Production[1] of Selenium, 1951-60

Year	Pounds	Value	Year	Pounds	Value
		$			$
1951	382,603	1,239,633	1956	330,389	4,460,252
1952	242,030	786,599	1957	321,392	3,535,312
1953	262,346	1,101,854	1958	306,990	2,302,426
1954	323,529	1,617,645	1959	368,107	2,576,749
1955	427,109	3,203,319	1960	521,638	3,651,466

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

TABLE 47. Refinery Output of Selenium from Primary and Scrap Materials, 1951-60

Year	Pounds	Year	Pounds
1951	289,714	1956	355,024
1952	254,478	1957	332,011
1953	307,903	1958	342,141
1954	297,479	1959	372,410
1955	422,588	1960	524,659

TABLE 48. Exports of Selenium and Selenium salts, 1959 and 1960

Destination	1959		1960	
	Pounds	Value	Pounds	Value
		$		$
United Kingdom	146,359	1,114,171	213,532	1,601,638
Union South Africa	3,400	23,630	3,400	25,330
Australia	1,220	11,229	3,710	34,398
Argentina	2,477	13,005	3,590	22,767
Brazil	1,478	9,343	3,137	23,872
France	112	660	110	1,040
Italy	1,102	9,450	3,527	33,111
United States	169,564	664,996	125,912	744,322
Hungary	—	—	1,135	8,118
India	—	—	278	1,967
China	—	—	30,547	196,592
Japan	—	—	15,432	102,622
Trinidad	—	—	100	630
Totals	**325,712**	**1,846,484**	**404,410**	**2,796,407**

TABLE 49. World Production of Selenium, by Countries[1]

Country[1]	1956	1957	1958	1959	1960
			pounds		
North America:					
Canada	330,389	321,392	306,990	368,107	562,272
Mexico	201,864	175,475	107,576	8,891	6,944
United States	928,400	1,077,000	727,400	799,100	620,000
South America:					
Argentina	2,205	[2]	[2]	[2]	[2]
Peru	3,944	6,865	8,419	8,155	10,681
Europe:					
Belgium-Luxembourg (exports)	81,571	24,471	48,942	124,560	72,531
Finland	8,390	9,219	13,051	13,196	11,358
Sweden	168,532	143,300	84,135	132,276	165,345[3]
Asia: Japan	162,916	154,335	182,406	229,486	278,234
Africa: Northern Rhodisia	32,055	25,137	24,805	32,587	46,827
Oceania: Australia	2,581	3,002	3,000[4]	3,000[4]	3,000[4]
World totals[1]	**1,923,000**	**1,940,000**	**1,507,000**	**1,719,000**	**1,777,000**

[1] This table incorporates a number of revisions of data published in previous selenium chapters. Data do not add to exact totals shown because of rounding.
[2] Data not available, no estimate included in world total.
[3] Exports.
[4] Estimate.

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

TANTALUM-COLUMBIUM

There was renewed interest in the columbium deposits at Oka, Quebec. The St Lawrence Columbium and Metals Corporation began construction of a concentrator which will treat prochlore at the rate of 500 tons per day. It has been indicated that there are 62 million tons of pyrochlore ore containing 500 million pounds of Cb_2O_5 located on this property. Columbium-tantalum occurrences have been reported in British Columbia, Northwest Territories and Ontario.

The E. & M. Journal price quotations in December, 1960 were: Columbite-per lb. of pentoxide, basis 65% Cb_2O_5 and Ta_2O_5 columbium-tantalum ratio 10 to 1, $1.18-$1.25 Ratio 8½ to 1, $1.25 to $1.10 columbium metal $36 to $50 per pound. Tantalum metal per lb. powder, $30 to $58; sheet, $50 to $59; rod, $73 to $80.

TABLE 50. World Production of Columbium and Tantalum Mineral Concentrates, by Countries[1]

Country[1]	1957		1958		1959		1960	
	Columbium	Tantalum	Columbium	Tantalum	Columbium	Tantalum	Columbium	Tantalum
	pounds[2]							
North America:								
Canada	—		—		14,000[3]	—	—	
United States	370,483		428,347		189,263		—	
South America:								
Argentina		688	2,262[3]	11,635[3]	3,591[3]	1,611[3]	—	
Brazil (Exports)	68,206	204,675	158,513	213,114	33,459	207,232	324,076	
French Guiana	—	2,976	—		—		—	
Europe:								
Norway	425,488	—	630,516	—	639,334	—	600,000	—
Portugal (U.S. Imports)	72,953	5,966	65,461	32,513	38,083	27,227	35,383	34,062
Spain (U.S. Imports)	—		—		—		976	3,157
Sweden (U.S. Imports)	—		—	992	—		—	
Asia:								
Malaya, Federation of	318,080	—	356,160	—	268,800	—	208,320	—
Africa:								
Congo, Republic of The (Formerly Belgian) and Ruanda-Urundi[4]	524,695		553,355		535,718		227,724[3]	332,424[3]
Malagasy Republic (Madagascar)	19,180		28,880		26,455		25,000[5]	
Mozambique	288,503		378,916		320,004		330,690	
Nigeria	4,307,520	40,320	1,803,200	49,930	3,559,875	31,114	4,071,115[3]	7,698[3]
Rhodesia and Nyasaland, Federation of	760	76,960	—	96,260	—	116,820	—	108,080
South West Africa	9,325	14,676	4,152	6,574	2,610	1,539	10,390	
Swaziland (Yttrotantalite)	—	32,920		—		—		—
Uganda[6]	4,054		6,384		5,264		5,040	
Union of South Africa	—	1,981	—	37,920	—	11,500	—	14,000
Oceania:								
Australia	50,038		13,507		18,950		10,000[5]	
World totals (estimate)[2]	**6,840,000**		**4,880,000**		**6,050,000**		**6,350,000**	

[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] This table incorporates a number of revisions of data published in previous chapters. Data do not add to totals shown due to rounding where estimated figures are included in this table.
[3] United States imports.
[4] In addition, tin-columbium-tantalum were produced as follows: 1957, 4,360,699 pounds; 1958, 3,196,670 pounds; 1959, 2,773,387 pounds; 1960 estimated 1,500,000 pounds; columbium-tantalum content averaging about 10 percent.
[5] Estimate.
[6] In addition, tin-columbium-tantalum concentrates were produced as follows: 1951-55 (average) 3,060 pounds; no further production recorded.

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

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. The development of thermoelectric devices for refrigeration has brought an increased demand for tellurium and the price of the metal has risen from $1.75 per pound to $4.00 per pound.

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 $4.00 a pound in New York in December, 1960.

TABLE 51. Production[1] of Tellurium, 1951-60

Year	Pounds	Value	Year	Pounds	Value
		$			$
1951	8,913	16,400	1956	7,867	13,767
1952	6,035	10,259	1957	31,524	55,167
1953	4,694	8,215	1958	38,250	65,025
1954	8,171	14,300	1959	13,023	27,999
1955	9,014	15,774	1960	44,682	156,388

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

TABLE 52. Refinery Output of Tellurium, 1951-60

Year	Pounds	Year	Pounds
1951	6,301	1956	15,915
1952	5,710	1957	34,895
1953	17,295	1958	42,337
1954	7,990	1959	8,900
1955	6,516	1960	41,756

TABLE 53. Consumption of Tellurium in Canada, 1959

	Form				Total
	Metal		Oxide	Other Tellurium	
	Pellets	Powder			
Use	pounds of contained tellurium				
Rubber	—	100		7,130	7,230
Other uses	2,347			100	2,447
Totals	**2,347**	**100**		**7,230**	**9,677**

TABLE 54. World Production of Tellurium by Countries[1]

Country[1]	1956	1957	1958	1959	1960
	pounds				
North America:					
Canada	7,867	31,524	38,250	13,023	56,352
United States	232,600	254,900	170,500	196,000	260,000
South America: Peru	88	—	14,868	62,600	59,343
Asia: Japan	331	716	110	2,761	13,825
World totals	**240,900**	**286,600**	**223,700**	**356,900**	**389,500**

[1] This table incorporates a number of revisions of data published in previous tellurium chapters. Data do not add to exact world total shown because of rounding.

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

THALLIUM

No production was reported in 1960 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 $7.50 per pound nominal, December, 1960.

THORIUM

Thorium oxide and other thorium salts were produced at Elliot Lake, Ontario by Rio Tinto Dow Limited. The waste liquor from the uranium plant is treated to recover the thorium contents. Calcined thorium oxide was shipped to Dominion Magnesium Limited for further processing. Thorium salts were exported for treatment. Data on the quantity and value of production are not available for publication

TIN

No economic deposits of tin have been found in Canada up to the present. Minor occurrences, principally of cassiterite (SnO_2), the most important tin mineral, are found in the New Ross area, Lunenburg county, Nova Scotia; in the Sudbury mining division of Ontario; in the Lac du Bonnet district of southeastern Manitoba; in southern British Columbia; in the Mayo district, Yukon, and in the Yellowknife area, Northwest Territories. Those in Nova Scotia Ontario, Manitoba and the Northwest Territories are found largely in pegmatite dykes. In Yukon crystalline cassiterite is found in placer gravels along numerous creeks and in one small lode deposit. In British Columbia tin is found associated with base metal sulphide ores. The last mentioned type of occurrence is the only one that has been exploited and is the source of the small Canadian production The lead-zinc-silver orebody of the Sullivan mine, Kimberley, British Columbia, contains a very small percentage of tin. Since 1941 the Consolidated Mining and Smelting Company of Canada, Limited, has been recovering a portion of this tin as a by-product from the concentration of its lead-zinc ore. In 1960 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, $1.00 April, $0.99 July, $1.03 October, $1.03 December, $1.01 per pound.

TABLE 55. Production of Tin, 1951-60

Year	Pounds	Value	Year	Pounds	Value
		$			$
1951	346,718	494,073	1956	756,934[1]	670,441
1952	212,113	253,581	1957	709,102[1]	580,342
1953	643,254[1]	581,746	1958	795,496[1]	625,260
1954	333,788[1]	263,359	1959	747,443[1]	630,094
1955	492,781[1]	408,030	1960	621,718[1]	522,243

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

TABLE 56. Production of New Tin, Domestic Consumption and Imports, 1951-60

Year	Production	Domestic consumption	Imports
	tons (2,000 pounds)		
1951	173	5,299	6,872
1952	106	4,693	4,423
1953	322[1]	4,444	4,146
1954	167[1]	4,036	4,296
1955	246[1]	4,500	4,836
1956	378[1]	4,575	4,227
1957	355[1]	4,057	4,654
1958	398[1]	3,688	3,876
1959	374[1]	4,729	4,685
1960	311[1]	4,346	4,220

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

TABLE 57. Imports of Tin, from Countries of Supply, 1959 and 1960

Country	1959		1960	
	Tons	Value	Tons	Value
		$		$
Tin blocks, pigs or bars				
United Kingdom	792	1,535,256	112	220,962
Malaya	1,066	2,121,381	2,196	4,326,843
Belgium-Luxembourg	1,109	2,146,403	1,333	2,587,092
Germany, West	164	312,215	125	243,534
Netherlands	442	877,249	22	42,108
United States	1,112	2,189,168	400	776,309
Bolivia	–	–	32	60,777
Totals	**4,685**	**9,181,672**	**4,220**	**8,257,625**
Tinfoil	pounds		pounds	
Germany, West	310	272	440	375
Switzerland	208	1,797	–	–
United States	17,428	19,333	20,584	21,411
Kenya	–	–	208	229
Totals	**17,946**	**21,372**	**21,232**	**22,015**
Babbitt metal	pounds		pounds	
United Kingdom	38,000	5,689	35,800	3,953
United States	27,700	24,587	29,500	24,565
Totals	**65,700**	**30,276**	**65,300**	**28,518**

TABLE 58. Consumption of Tin (Ingots or Bars), 1959 and 1960

Used in production of	1959	1960
	tons (2,000 pounds)	
Babbitt	307	286
Bronze	163	177
Galvanizing	13	10
Solder	1,404	1,320
Tin plate and tinning	2,551	2,366
Other used (collapsible tubes, foil, etc.)	291	187
Total accounted for	**4,729**	**4,346**

TABLE 59. World Mine Production of Tin (Content of Ore), by Countries[1]

Country[1]	1956	1957	1958	1959	1960
	long tons[1]				
North America:					
Canada	338	317	355	334	230
Mexico	500	473	544	377	365
United States	—	—	—	50	10
Totals	**838**	**790**	**899**	**761**	**605**
South America:					
Argentina	85	182	205	225	225[2]
Bolivia (exports)	26,843	27,794	17,731	23,811	19,406
Brazil	175	293	409	462	500[2]
Peru	3	14	30	42	40[2]
Totals	**27,106**	**28,283**	**18,375**	**24,540**	**20,171**
Europe:					
Czechoslovakia[3]	200	200	200	200	200
France	433	445	—	—	—
Germany, East	660[2]	670[2]	720[2]	720[2]	720[2]
Portugal	1,169	1,127	1,249	1,129	663
Spain	550	491	467	326	190
U.S.S.R.[4,5]	11,800	13,000	13,500	15,000	16,500
United Kingdom	1,044	1,028	1,087	1,252	1,199
Totals[2,5]	**15,900**	**17,000**	**17,200**	**18,600**	**19,500**
Asia:					
Burma	1,300	1,100	1,300	1,300	1,100[2]
China[4]	20,000	23,000	23,000	26,000	28,000
Indonesia	30,053	27,723	23,201	21,616	22,607
Japan	926	949	1,108	998	854
Laos	254	274	301	294	360[2]
Malaya, Federation of	62,295	59,293	38,458	37,525	51,979
Thailand	12,481	13,528	7,720	9,526	12,080
Totals[2,5]	**127,300**	**125,900**	**95,100**	**97,300**	**117,000**
Africa:					
Congo, Republic of the (formerly Belgian) and Ruanda Urundi	14,764	14,253	11,214	10,319	10,109[2]
Cameroon, Republic of	85	71	75	65	69
Congo, Republic of			26	32	40[2]
Morocco: Southern Zone	5	8	6	9	10
Niger, Republic of	56	50	61	57	60[2]
Nigeria	9,067	9,534	6,200	5,541	7,675
Rhodesia and Nyasaland, Federation of	354	283	534	665	705
South West Africa	475	636	161	5	255
Swaziland	29	25	15	5	6
Tanganyika (exports)	15	14	19	65	138
Uganda	33	40	41	36	32
Union of South Africa	1,442	1,463	1,416	1,272	1,276
Totals	**26,300**	**26,377**	**19,768**	**18,071**	**20,375**
Oceania:					
Austrilia	2,078	1,952	2,237	2,350	2,200[2]
World total (estimate)	**199,500**	**200,300**	**153,600**	**161,600**	**179,700**

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

[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 Council, London, England.

[3] Estimate, according to 46th annual issue of Metal Statistics (Metallgesellschaft) through 1958.

[4] Estimated smelter production.

[5] Output from U.S.S.R. in Asia included with U.S.S.R. in Europe.

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

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 the ore was treated to produce iron (remelt) and slag.

The smelter 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.

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

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

Prices (nominal) f.o.b. U.S. Atlantic ports at the end of 1960 were: Ilmenite, 59.5% TiO_2, $23 to $26 per gross ton. The nominal quotation for titanium metal, 99.3 per cent, was $1.60 per pound.

TABLE 60. Producers' Shipments of Titanium Ore to Outside Customers, 1951-60

Year	Short tons	Value	Year	Short tons	Value
		$			$
1951	1,674	9,790	1956	2,310	16,561
1952	51	459	1957	10,770	97,075
1953	9,292	80,085	1958	—	—
1954	1,541	9,462	1959	26,777	129,565
1955	1,464	10,634	1960	2,947	16,265

TABLE 61. Imports of Titanium Oxide and White Pigments Containing not Less than 14 Per Cent by Weight of Titanium, 1956-60

Year	From the United Kingdom		From the United States		Total imports	
	Pounds	Value	Pounds	Value	Pounds	Value
		$		$		$
1956	19,430,833	3,884,323	56,070,259	8,637,934	75,744,730	12,598,033
1957	22,718,385	4,711,732	45,750,639	6,070,811	68,469,888	10,782,839
1958	21,775,393	4,649,207	37,100,353	3,814,991	58,878,496	8,464,690
1959	23,793,207	4,958,593	35,363,989	3,545,123	61,195,519	8,877,007
1960	19,350,694	4,052,615	33,348,008	3,386,029	53,792,895	7,648,278

TABLE 62. Consumption of Titanium Oxide, by Industries, 1957 and 1958

Industry	1957		1958	
	Pounds	Cost at works	Pounds	Cost at works
		$		$
Paints:				
Extended titanium dioxide pigments	29,299,514	3,117,678	31,030,933	3,352,758
Titanium dioxide	25,116,214	6,869,018	28,799,216	7,568,123
Polishes and dressings	222,531	56,963	122,150	38,630
Pulp and paper	3,610,338	885,046	4,136,022	999,460
Linoleum and oilcloth	4,904,534	984,004	5,022,830	1,048,257
Rubber goods	1,440,418	371,696	1,542,813	387,137
Miscellaneous non-metallic minerals	817,706	210,868	910,618	258,603
Toilet preparations	—	—	28,621	9,633
Total accounted for	**65,411,255**	**12,495,273**	**71,593,203**	**13,662,601**

TABLE 63. World Production of Titanium Concentrates (Ilmenite and Rutile), by Countries[1,2]

Country[1]	1956	1957	1958	1959	1960
	short tons[1,2]				
Ilmenite					
Australia[3] (sales)	4,787	79,694	78,342	93,864	137,800[4]
Canada[5]	220,885	269,690	161,312	270,477	388,339
Ceylon	—	—	—	—	6,720
Finland	113,444	116,568	117,384	94,966	92,219
Gambia	—	15,297	31,851	14,553	—
India	375,861	331,768	346,260	334,000	275,575
Japan[6]	9,634	8,998	3,932	3,445	1,444
Malagasy Republic (Madagascar)	—	—	1,150	659	660[4]
Malaya (Exports)	136,837	102,742	83,806	81,593	132,432
Mexico	—	—	166	—	—
Mozambique	—	—	7,751[7]	11,400	3,781
Norway	209,990	231,693	233,585	249,274	258,283
Portugal	679	388	506	2,113	1,600[4]
Senegal	22,156	39,573	36,927	32,941	24,159
Spain	5,962	9,796	18,161	8,113	8,300[4]
Thailand	386	2,039	922	550	550[4]
Union of South Africa	1,855	3,118	29,611	87,232	90,431
United Arab Republic (Egypt Region)	4,547	3,700[4]	3,000[4]	17,100	17,100[4]
United States[8]	684,956	757,180	563,338	634,886	786,372
World totals[1,2] Ilmenite (Estimate)	**1,792,000**	**1,972,200**	**1,718,000**	**1,937,200**	**2,225,800**
Rutile					
Australia	108,434	144,372	93,327	91,734	100,300[4]
Brazil	338	270	269	220	—
Cameroon, Republic of	168	44	—	—	—
India	606	530	503	429	1,082
Norway	26	22	—	—	—
Senegal	650	243	1,157	—	—
Union of South Africa	—	32	552	3,381	3,695
United Arab Republic	—	—	—	1,157	1,100[4]
United States	11,997	10,702	7,406	9,466	8,809
World totals rutile (estimate)[1,2]	**122,200**	**156,200**	**103,200**	**106,400**	**115,000**

[1] In addition to the countries listed titanium concentrates are produced in U.S.S.R., and Brazil produces ilmenite but no reliable information is available; no estimates are included in the total.

[2] This table incorporates some revisions. Data do not add exactly to totals shown because of rounding where estimated figures are included in the detail.

[3] Due to high chromium content in the ore, sales are shown..

[4] Estimate.

[5] Beginning 1951, represents Ti. slag containing approximately 70 per cent TiO_2 and small quantities of "titanium ore".

[6] Represents titanium slag.

[7] Exports.

[8] Includes a mixed product containing ilmenite, leucoxene and rutile

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

TABLE 64. Consumption of Ferrotitanium in the Manufacture of Steel, 1950-59

Year	Tons	Value	Year	Tons	Value
		$			$
1950	143	30,664	1955	156	48,074
1951	164	50,641	1956	277	84,393
1952	229	97,827	1957	252	82,258
1953	213	50,433	1958	210	76,689
1954	171	50,166	1959	252	84,683

TUNGSTEN

Tungsten concentrates were not produced in 1960. Mining of tungsten ores in British Columbia ceased in 1958. Tungsten bearing deposits occur in British Columbia, Yukon, North-west Territories, Ontario and New Brunswick.

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

The E. & M. Journal price quotations for tungsten ore in December 1960 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 $18 to $19; scheelite $18 to $19 depending on grade. U.S. mined tungsten concentrate, $22 per stu f.o.b. milling point, subject to penalties.

TABLE 65. Production (Commercial Shipments) of Tungsten Concentrate, 1950-60

Year	Concentrate	WO_3 content	Value
	pounds		$
1950	1,886,000[1]	284,078	160,343
1951	4,145	2,833	7,098
1952	3,670,686	1,493,111	4,488,237
1953	6,307,717	2,446,028	5,689,160
1954	3,237,748	2,170,633	5,795,781
1955	3,255,100	1,942,770	5,508,437
1956	3,401,712	2,271,437	6,351,376
1957	2,994,000	1,921,483	5,279,275
1958	1,022,000	690,976	1,898,455
1959-1960	—	—	—

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

TABLE 66. Imports of Tungsten Ores, from Countries of Supply, 1959 and 1960

Country	1959		1960	
	Pounds	Value	Pounds	Value
		$		$
Australia	22,400	8,434	—	—
Belgian Congo	110,000	30,724	—	—
Bolivia	18,600	8,677	107,700	68,794
Korea	415,600	234,997	454,000	400,901
Peru	110,100	42,137	134,900	101,490
Spain	57,300	22,133	—	—
United States	106,000	58,406	200,000	214,967
Thailand	—	—	110,800	82,385
Argentina	—	—	94,400	57,777
Brazil	—	—	55,100	36,694
Totals	**840,000**	**405,508**	**1,156,900**	**963,008**

TABLE 67. World Production of Tungsten Ores, by Countries[1], of Concentrates Containing 60 per WO₃

Country	1956	1957	1958	1959	1960
	short tons[1]				
North America:					
Canada	1,893	1,602	575	—	—
Mexico	628	294	8	138	198
United States (shipments)	14,737	5,520	3,788	3,649	7,325
Totals	**17,258**	**7,416**	**4,371**	**3,787**	**7,523**
South America:					
Argentina	1,293	1,441	1,127	827	840[2]
Bolivia (exports)	5,255	4,809	2,457	2,671	2,370
Brazil (exports)	2,017	2,304	2,596	1,609	2,205
Peru	1,242	1,215	992	542	573
Totals	**9,807**	**9,769**	**7,172**	**5,649**	**5,988**
Europe:					
Austria	—	140	146	152	243
Finland	74	—	163	42	—
France	1,348	1,091	1,108	973	825
Italy	30	20	10	6	9
Portugal	5,506	4,756	2,109	2,478	3,203
Spain	1,354	1,319	1,301	854	830
Sweden	504	557	660	375	391
U.S.S.R.[2]	8,300	8,800	9,400	9,900	10,500
United Kingdom	68	55	2	—	—
Yugoslavia	83	90	99	86	110[2]
Total[2]	**17,300**	**16,800**	**15,000**	**14,900**	**16,100**
Asia:					
Burma[3]	2,982	2,873	1,667	2,122	1,755
China[2]	19,800	16,500	16,500	19,800	22,000
Hong Kong	30	42	46	47	39
India	2	2	—	1	3
Japan	1,200	1,144	881	1,446	1,091
Korea: North[2]	2,190	2,665	3,300	4,400	5,500
Republic of	4,472	4,567	3,597	3,492	5,870
Malaya, Federation of	117	63	57	24	46
Thailand	1,411	1,080	725	553	486
Totals[3]	**32,200**	**28,950**	**26,800**	**31,900**	**36,800**
Africa:					
Congo, Republic of (Formerly Belgian) and Ruanda Urundi[3]	2,142	1,914	1,479	1,209	1,138
Morocco: Southern Zone	3	—	—	—	—
Nigeria	4	—	—	—	—
Rhodesia and Nuasaland, Federation of:					
Southern Rhodesia	287	180	103	36	11
South West Africa[3]	388	278	64	2	154
Tanganyika (exports)	7	—	—	—	—
Uganda (exports)	193	224	31	14	84
Union of South Africa	330	290	61	42	37
Totals	**3,354**	**2,886**	**1,738**	**1,303**	**1,424**
Oceania:					
Australia	2,954	2,629	1,587	1,218	1,760[2]
New Zealand	33	36	3	11	11[2]
Totals	**2,987**	**2,665**	**1,590**	**1,229**	**1,770[2]**
Worlds total (estimate)	**82,900**	**68,500**	**56,700**	**58,800**	**69,600**

[1] This table incorporates some revisions. Data do not add exactly to totals shown because of rounding where estimated figures are included in the detail.

[2] Estimate.

[3] Including WO_3 in tin-tungsten concentrates.

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

URANIUM

In 1960 the output of uranium precipitates from the mines in Ontario were valued at $211,983,533. The Beaverlodge area in Saskatchewan shipped $48,722,961 worth of U_3O_8. From the Northwest Territories the shipments were valued at $9,231,698.

Detailed technical data on the uranium industry appears in "Uranium in Canada 1960" Review 26 issued by the Department of Mines and Technical Surveys, Ottawa.

In table 61 the values shown from 1935 to 1940 are for products from the refinery which include radium salts, uranium salts and compounds of silver, cobalt and nickel. The data for 1941-53 are restricted. The figures for 1954 and 1955 are the value of the products of the refinery at Port Hope, Ontario. The value of the U_3O_8 contained in the precipitates or concentrates shipped from the mines is shown in 1956-60.

TABLE 68. Producers' Shipments[1] of Uranium, Radium, etc., 1935-60

Year	U_3O_8	Value	Year	U_3O_8	Value
	pounds	$		pounds	$
1935	...	413,700	1954	...	26,373,052
1936	...	605,500	1955	...	26,031,604
1937	...	876,540	1956	4,581,060	45,732,145
1938	...	1,045,458	1957	13,271,414	136,304,364
1939	...	1,121,553	1958	26,805,232	279,538,471
1940	...	410,176	1959	31,784,189	331,143,043
1941-53	...	..	1960	25,495,369	269,938,192

[1] Compilation method is shown in text above.

TABLE 69. World Production of Uranium Oxide U_3O_8, by Countries[1]

Country[1]	1956	1957	1958	1959	1960
	short tons[2]				
North America:					
Canada	2,280	6,635	13,400	15,892	12,714
United States	6,000	8,640	12,560	16,390	17,646
South America:					
Argentina[3]	20	20	20	13	100
Colombia[3]	—	—	—	3	—
Europe:					
Finland[3]	—	—	—	30	40
France[3]	—	465	865	1,000	1,500
Germany West[3]	—	—	—	3	12
Sweden	6	10	10	10[3]	10[3]
Africa:					
Congo, Republic of the (formerly Belgian)	1,300	1,300	2,300	2,300	1,200
Malagasy Republic (Madagascar[3])	—	70	95	100	100
Rhodesia and Nyasaland (Federation of)	—	25	50	38	—
Union of South Africa	4,365	5,700	6,245	6,445	6,409
Oceania:					
Australia[3]	300	400	700	1,000	1,000
World totals (estimate)[1,2]	**14,470**	**23,470**	**36,450**	**43,440**	**41,000**

[1] In addition to the countries listed, uranium is also known to have been produced in India, Italy, Japan, Morocco, Mozambique, Portugal and Spain, but production data are not available. An estimate for these countries has been included in the world total. Uranium is also believed to be produced in Czechoslovakia, East Germany, Hungary and U.S.S.R. but production data are not available; for these countries no estimate has been included in the world total.

[2] This table incorporates a number of revisions of data published in previous uranium chapters. Data do not add to exact total shown because of rounding where estimated figures are included in the detail.

[3] Estimate. Colombia, Finland, West Germany, Congo, Republic of (formerly Belgian) and Rhodesia do not produce concentrates; figures are calculated, based on ore production. Statistics for France are converted from metal production data.

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

TABLE 70. Exports of Uranium Ores and Concentrates, 1958-60

Destination	1958	1959	1960
		dollars	
United Kingdom	13,502,809	32,602,978	25,904,553
Germany, West	314,065	129,262	293,971
Japan	14,443	106,831	147,011
United States	262,674,640	278,912,726	236,594,407
India	–	20,000	570,480
Austria	–	1,591	–
Denmark	–	284	–
Sweden	–	8,711	27,720
Switzerland	–	121,760	1,000
France	–	–	250
Italy	–	–	230
Netherlands	–	–	1,310
Totals	**276,505,957**	**311,904,143**	**263,540,932**

VANADIUM

Some of the magnetites of the Rainy River district in Ontario are known to contain relatively small quantities of vandaium, 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, 1960, at 31 cents per pound, (V_2O_5 centent) 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 71. World Production of Vanadium in Ores and Concentrates

Country	1956	1957	1958	1959	1960
			short tons[1]		
North America:					
United States (recoverable vanadium)	3,868	3,691	3,030	3,719	4,971
South America:					
Argentina	[2]	[2]	4	7	[3]
Peru (content of concentrate)	–	–	–	–	–
Europe:					
Finland	43	290	430	557	550[4]
Africa:					
Angola	11	1	20	3	–
South West Africa (recoverable vanadium)	308	305	435	719	839
Union of South Africa: Transvaal	–	8	316	319	620[4]
World totals (estimate)[1,5]	**4,230**	**4,295**	**4,235**	**5,324**	**6,980**

[1] This table incorporates a number of revisions of data published in previous chapters.
[2] Less than one ton.
[3] Data not available.
[4] Estimate.
[5] Total represents data only for countries shown in table and excludes vanadium in ores produced in Republic of the Congo (formerly Belgian) Mecixo, Morocco (Southern Zone), Norway, 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.

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

ZIRCONIUM

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

Zirconium is important in certain steel making, ordinarily being added in the form of zirconium-ferrosilicon alloy; its function is that of a powerful deoxidizer, degasifier and grain refiner; zirconium-treated steel being particularly suitable for tools subject to violent stresses, such as stock drills.

Prices quoted in December, 1960 were: zircon ore, 65 per cent ZrO_2, $48 to $50 per long ton, at Atlantic seaboard; zirconium sponge, $5 to $10 per pound for commercial grade.

TABLE 72. World Production of Zirconium Ores and Concentrates, by Countries[1]

Country[1]	1956	1957	1958	1959	1960
	short tons[1]				
Australia	81,153	99,188	66,381	127,015	114,000[2]
Brazil[3]	2,863	1,799	10,741	50[4]	[5]
Egypt	402	45	45[2]	3,000	[5]
India	3	10	10	10[2]	10[2]
Malagasy Republic (Madagascar)	—	1	58	50	100[2]
Malaya, Federation of	51[4]	47[4]	28[4]	130	63
Nigeria (U.S. imports)	—	—	50	868	1,850
Senegal, Republic of	1,268	3,197	6,057	9,557	11,408
Union of South Africa	—	—	1,129	5,924	7,000[2]
United States[2]	44,174	56,802[6]	30,443[7]	[8]	[8]

[1] This table incorporates a number of revisions of data published in previous tables.
[2] Estimate.
[3] Chiefly baddeleyite.
[4] Exports.
[5] Data not available.
[6] Includes Florida only.
[7] Excludes Idaho.
[8] Figure withheld to avoid disclosing individual company confidential data.

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

Directory of Firms in the Miscellaneous Metal Mining Industry, 1960

Name of firm and product	Head office address	Location of mine or plant
Aluminum		
Aluminum Company of Canada Limited	1700 Sun Life Building, Montreal, Quebec	Arvida, Quebec; Shawinigan Falls, Quebec; Ile Maligne, Quebec; Beauharnois, Quebec; Kitimat, British Columbia
Canadian British Aluminum Co. Ltd.	Baie Comeau, Quebec	Baie Comeau, Quebec
Antimony:		
Consolidated Mining & Smelting Company of Canada Ltd.	215 St. James St., Montreal, Quebec	Trail, British Columbia
Barium:		
Dominion Magnesium Ltd.	Haley, Ontario	Haley, Ontario
Beryl:		
Canadian Beryllium Mines & Alloys Ltd.[1]	100 Adelaide St. W., Toronto, Ontario	Renfrew County, Ontario
Dalhart Beryllium Mines & Metals Corp.[1]	217 Bay St., Toronto, Ontario	Dalhart, Manitoba
Gill Mining Corp.	4352 Beaubien Est, Montreal, Quebec	Temiscamingue, Quebec
Bismuth:		
Deloro Smelting & Refining Co. Ltd.	900 Victoria Building, Ottawa, Ontario	Deloro, Ontario
Consolidated Mining & Smelting Company of Canada Ltd.	215 St. James St., Montreal, Quebec	Trail, British Columbia
Molybdenite Corp. of Canada Ltd.	59 St. James St. W., Montreal, Quebec	La Corne Twp., Quebec
Gaspé Copper Mines Ltd.	44 King St. W., Toronto, Ontario	Murdockville, Quebec
Cadmium:		
East Sullivan Mines Ltd.	1403 Aldred Bldg., Montreal, Quebec	Bourlamaque, Quebec
Consolidated Mining & Smelting Company of Canada Ltd.	215 St. James St., Montreal, Quebec	Trail, British Columbia
Hudson Bay Mining & Smelting Co. Ltd.	500 Royal Bank Building, Winnipeg, Manitoba	Flin Flon, Manitoba
Canadian Exploration Ltd.	Royal Bank Bldg., Vancouver, British Columbia	Salmo, British Columbia
Carnegie Mines of British Columbia Ltd.	1126 Sherbrooke St. W., Montreal, Quebec	Slocan, British Columbia
Highland Bell Ltd.	789 W. Pender St., Vancouver, B.C.	Greenwood, British Columbia
Howe Sound Company, Britannia Division	500 Fifth Ave, New York 36, U.S.A.	Britannia Beach, British Columbia
Mastodon Highland Bell Mines Ltd.	1200 West Pender St., Vancouver	Revelstoke, British Columbia
New Cronin Babine Mines Ltd.	644 West Hastings St., Vancouver	Smithers, British Columbia
Reeves Macdonald Mines Ltd.	413 Granville St., Vancouver, B.C.	Remac, British Columbia
Sheep Greek Gold Mines Ltd.	413 Granville St., Vancouver, British Columbia	Zincton, British Columbia
Violamac Mines (B.C.) Ltd.	New Denver, British Columbia	New Denver, British Columbia
United Keno Hill Mines Ltd.	85 Richmond St. W., Toronto, Ontario	Elsa, Yukon
Cerium:		
Atlin-Ruffner Mines (B.C.) Ltd.[1]	510 W. Hastings St., Vancouver British Columbia	Parry Sound, Ontario
Chromite:		
Colonial Chrome Co. Ltd.[1]	420 Lexington Ave., New York, N.Y., U.S.A.	Black Lake, Quebec
Gunnar Gold Mines Ltd.[1]	80 King St., Toronto, Ontario	Bird River, Manitoba
Strannar Mines Ltd.[1]	25 Adelaide St. W., Toronto, Ontario	Lac du Bonnet, Manitoba
Germanium:		
Taiga Mines Ltd.[2]	837 W. Hastings St., Vancouver, B.C.	Powell River
Indium:		
Consolidated Mining & Smelting Company of Canada Ltd.	215 St. James St., Montreal, Quebec	Trail, British Columbia
Manganese:		
Quebec Manganese Mines Ltd.[1]	231 St. James St. W., Montreal, Quebec	Magdalen Islands, Quebec
Stratmat Ltd.[2]	620 Cathcart St., Montreal, Quebec	Woodstock, New Brunswick
St. Maurice Minerals Corp.[1]	1434 Ste-Catherine St., Montreal, Quebec	St. Denis Twp., Quebec
Joburke Gold Mines Ltd.[1]	357 Bay St., Toronto, Ontario	Nastapoka Islands, N.W.T.
Magnesium:		
Dominion Magnesium Ltd.	67 Yonge St., Toronto, Ontario	Haley, Ontario
Mercury:		
Bralorne Mines Ltd.[1]	555 Burrard St., Vancouver, British Columbia	Omineca district, British Columbia
Consolidated Mining & Smelting Company of Canada Ltd.[1]	215 St. James St., Montreal, Quebec	Pinchi Lake, British Columbia
Sevrens, Wm.[1]	Bridge River	Tyax Lake

See footnotes at end of Directory.

Directory of Firms in the Miscellaneous Metal Mining Industry, 1960 – Continued

Name of firm and product	Head office address	Location of mine or plant
Molybdenite:		
Anglo-American Molybdenite Mining Corp.[2]	Box 577 Val D'Or, Quebec	Preissac Twp., Quebec
Frandi Mining Corp.[2]	82 Thibeau, Cap de-la-Madeleine, Québec	Mekinac, Quebec
Frontenac Mining Corp.[2]	5083 St. Denis, Montreal, Quebec	Frontenac County, Quebec
Carlmand Mines Ltd.[2]	25 Adelaide St. W., Toronto, Ontario	Guerin Twp., Quebec
Molybdenite Corp. of Can. Ltd.	485 rue McGill, Montreal, Quebec	La Corne, Quebec
McDougall-Lusk Mineral Exploration[2]	4204 St. Catherine St. W., Montreal, Quebec	Eardley Twp., Quebec
Portneuf Mineral Corp.[2]	437 St. James St. W., Montreal, Quebec	Portneuf, Quebec
Preissac Molybdenite Mines Ltd.[2]	485 McGill St., Montreal, Quebec	Preissac, Quebec
Provincial Molybdenum Corp. Ltd.[2]	132 Main St., Maniwaki, Quebec	Kinsington Twp., Quebec
Nortoba Mines Ltd.[2]	199 Bay St., Toronto, Ontario	Sturgeon River, Ontario
Huestis Molybdenum Corp Ltd.[2]	402 W. Pender St., Vancouver, B.C.	Cariboo area, British Columbia
Canol Metal Mines Ltd.[2]	25 Adelaide St. W., Toronto, Ontario	Quiet Lake, Yukon
Stormy Mines Ltd.[1]	25 Adelaide St. W., Toronto, Ontario	Quiet Lake, Yukon
Selenium-Tellurium:		
International Nickel Co. of Canada Ltd.	Copper Cliff, Ontario	Copper Cliff, Ontario
Canadian Copper Refiners Ltd.	1600 Royal Bank Building, Toronto, Ontario	Montreal East, Quebec
Tantalum-Columbite:		
Barymin Explorations Ltd.[1]	25 Adelaide St. W., Toronto	Oka, Quebec
Bouscadillac Gold Mines Ltd.[1]	85 Richmond St. W., Toronto, Ontario	L'Annonciation, Quebec
Consolidated Pershcourt Mining Ltd.[1]	159 Ouest, rue Craig, Montreal, Quebec	Oka, Quebec
Coulee Lead & Zinc Mines Ltd.[2]	55 Yonge St. Toronto, Ontario	Oka, Quebec
Headway Red Lake Gold Mines Ltd.[2]	67 Yonge St., Toronto, Ontario	Oka, Quebec
Main Oka Mining Corp.[2]	159, Ouest, rue Craig, Montreal, Quebec	Oka, Quebec
Oka Rare Metals Mining Co. Ltd.[2]	320 Bay St., Toronto, Ontario	Oka, Quebec
Columbium Mining Products Ltd.[2]	55 Yonge St., Toronto, Ontario	Oka, Quebec
Gulf Lead Mines Ltd.[2]	25 Adelaide St. W., Toronto, Ontario	Oka, Quebec
Oka Uranium & Metals Ltd.[2]	159 Ouest, rue Craig, Montreal, Quebec	Oka, Quebec
Ontario Nickel Mines Ltd.[1]	100 Adelaide St. West, Toronto, Ontario	Oka, Quebec
Quebec Columbium Ltd.	507 Place D'Armes, Montreal, Quebec	L'Annonciation, Quebec
St. Lawrence River Mines Ltd.[2]	159 Ouest, rue Craig, Montreal, Quebec	Oka, Quebec
Trebor Mines Ltd.[1]	100 Adelaide St. W., Toronto, Ontario	Ile Aux Tourtes
Twin Mountain Uranium Mines Ltd.[1]	302 Bay St., Toronto, Ontario	Oka, Quebec
Nova Beaucage Mines Ltd.[1]	170 Regina St., North Bay, Ontario	Nipissing, Ontario
Ontario Rare Metal Mines Ltd.[1]	44 King St. W., Toronto, Ontario	Algoma, Ontario
Quebec Metallurgical Industries Ltd.[1]	88 Metcalfe St., Ottawa, Ontario	Bugaboo Creek, B.C.
Thallium:		
Hudson Bay Mining & Smelting Co. Ltd.[2]	500 Royal Bank Building, Winnipeg, Manitoba	Flin Flon, Manitoba
Thorium:		
Rio Tinto-Dow Ltd.	Box 190, Elliot Lake, Ontario	Elliot Lake, Ontario
Tin:		
Consolidated Mining & Smelting Company of Canada Ltd.	215 St. James St., Montreal, Quebec	Trail, British Columbia
Mountain Crest Mines Ltd.[1]	1445 MacKay St., Montreal, Quebec	Charlevoix, Quebec
Mount Pleasant Mines Ltd.[2]	35 Lambton Road, Ottawa, Ontario	St. Andrews, New Brunswick
Titanium ore:		
Continental Titanium Corp.	5165 Sherbrooke St. W., Montreal, Quebec	St. Urgain Co., Quebec
Canadian Javelin Ltd.[2]	St. John's Newfoundland	Chicoutimi Co., Quebec
Kelley Mining Corp.[2]	1026 rue St. Jean, Quebec, Quebec	St. Urbain Co., Quebec
Laurentian Titanium Mines Ltd.	4462 St. Denis St., Montreal, Quebec	Wexford Twp., Quebec
Les Mineraux Laurentiens Ltd.[2]	St. Joseph de Beauce, Quebec	St. Urbain Co., Quebec
Quebec Iron and Titanium Corp.	Box 40, Sorel, Quebec	Parker Twp., Sorel, Quebec
Saguenay Exploration & Mining Inc.	753 avenue Wilder, Outremont 8, Quebec	Jonquière, Quebec
Stratmat Ltd.	620 Cathcart St., Montreal, Quebec	Saguenay, Quebec
Tamara Mining Ltd.	400 St. James St., Montreal, Quebec	Barford Twp., Quebec
Tungsten concentrates:		
Burnt Hill Tungsten Mines Ltd.[1]	510 McGill St., Montreal, Quebec	Cross Creek, New Brunswick
Canada Tungsten Mining Corp. Ltd.[2]	12 Richmond St. East, Toronto, Ontario	Flat River, N.W.T.
Canadian Exploration Ltd.[2]	Royal Bank Building, Vancouver, British Columbia	Salmo, British Columbia
Consolidated Mining & Smelting Co. of Canada Ltd.[1]	Trail British Columbia	Kimberley, British Columbia
Piermond Mining Co. Ltd.[1]	12323 rue Notre Dame des Anges, Montreal	Risborough
Risborough Mining Corp.	1449 St. Alexander St., Montreal	Frontenac Co.
Hollinger Consolidated Gold Mines Ltd.[1]	Timmins, Ontario	Timmins, Ontario
Quebec Tungsten Ltd.[1]	111 Côte-de-la-Montagne, Quebec, Quebec	Dalquier, Quebec
Uranium:		
New Brunswick:		
Aumacho River Mines Ltd.[2]	25 Adelaide St. W., Toronto, Ontario	Aumacho River, New Brunswick
New Brunswick Uranium Metals & Mining Ltd.[2]	335 Bay St., Toronto, Ontario	Harvey, New Brunswick

See footnotes at end of Directory.

Directory of Firms in the Miscellaneous Metal Mining Industry, 1960 — Continued

Name of firm and product	Head office address	Location of mine or plant
Uranium — Continued		
Quebec:		
Auf der Maur Corp.[1]	2157 Mackay St., Montreal	De Salles Twp.
Arnora Sulphur Mining Corp.[1]	1410 Stanley St., Montreal	Huddersfield
Calumet Uranium Mines Ltd.[1]	159 Ouest, rue Craig, Montreal	Isle Calumet
Chess Uranium Corp.[1]	5616 Park Ave., Montreal	St. Hilaire
Marlowe Mines Ltd.[1]	2157 Mackay St., Montreal	Pied des Monts
Mogul Mining Corp. Ltd.[1]	25 Adelaide St. W., Toronto, Ontario	Figuery Twp.
Molybdenum Corp. Of America[2]	500 Fifth Ave., New York, U.S.A.	Oka, Quebec
Nakada Radioactive Minerals Inc.[1]	202 Fobes 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.
Saguenay Mining & Smelting Co. Ltd.[1]	1557 Mackay St., Montreal	De Salles Twp.
Ontario:		
Algoma Uranium Mines Ltd.[3]	335 Bay St., Toronto	Elliot Lake
Bancroft Uranium Mines Ltd.[1]	25 Melinda St., Toronto	Cardiff
Beaupas Mines Ltd.[2]	159 Ouest rue Craig, Montreal, Quebec	Blind River
Bicroft Uranium Mines Ltd.	25 Adelaide St. W., Toronto	Cardiff Twp.
Bracemac Mines Ltd.[2]	347 Bay St., Toronto	Blind River
Buckles Algoma Uranium Mines Ltd.[2]	44 King St. W., Toronto	Blind River
Bunker Hill Extension Mines Ltd.[1]	100 Adelaide St. W., Toronto	Striker Twp.
Canadian Dyno Mines Ltd.	25 Adelaide St. W., Toronto	Cardiff Twp.
Can-Met Explorations	4 King St. W., Toronto	Blind River
Conecho Mines Ltd.[2]	44 King St. W., Toronto	Quirke Lake
Denison Mines Ltd.	4 King St. W., Toronto	Quirke Lake
Detta Minerals Ltd.[3]	145 Yonge St., Toronto	Blind River
Duvex Oil & Mines Ltd.[2]	100 Adelaide St. W., Toronto	Blind River
Faraday Uranium Mines Ltd.	100 Adelaide St. W., Toronto	Bancroft
Geneva Lake Mines Ltd.	357 Bay St., Toronto	Blind River
Lexindin Gold Mines Ltd.[1]	25 Adelaide St. W., Toronto	Blind River
Macfie Explorations Ltd.[2]	145 Yonge St., Toronto	Red Lake
Magoma Mines Ltd.[2]	347 Bay St., Toronto	Sault Ste. Marie
Milliken Lake Uranium Mines Ltd.[3]	335 Bay St., Toronto	Blind River
Nipirion Mines Ltd.[3]	302 Bay St., Toronto	Biddulph Twp.
Northspan Uranium Mines Ltd.[3]	335 Bay St., Toronto	Elliot Lake
Pardee Amalgamated Mines Ltd.[2]	111 Richmond St., Toronto	Blind River
Peach Uranium & Metal Mining Ltd.[2]	335 Bay St., Toronto	Blind River
Pebble Uranium Mines Ltd.[2]	62 Richmond St. W., Toronto	Blind River
Plum Uranium & Metal Mining Ltd.[2]	44 King St. W., Toronto	Blind River
Pronto Uranium Mines Ltd.[3]	335 Bay St., Toronto	Long Twp.
Preston Mines Ltd.	335 Bay St., Toronto	Elliot Lake
Randex Uranium Mines Inc.[2]	220 W. 42nd St., New York, U.S.A.	Blind River
Rare Earth Mining Corp. of Can.[1]	372 Bay St., Toronto	Tory Hill
Rio Algom Mines Ltd.	335 Bay St., Toronto	Elliot Lake, Quirke Lake
Roche Mines Ltd.[2]	372 Bay St., Toronto	Quirke Lake
Stancan Uranium Corp.[2]	80 Richmond St. W., Toronto	Blind River
Stanrock Uranium Mines Ltd.	80 Richmond St. W., Toronto	Elliot Lake
Trio Uranium Mines Ltd.[1]	360 Bay St., Toronto	Parry Sound
Zenmac Metal Mines[1]	200 Bay St., Toronto	Blind River
Saskatchewan:		
Atlas Uranium Corp. Ltd.	526 Northern Hardware Bldg., Edmonton	Athabaska
Baska Uranium Mines Ltd.[3]	2230 Queen St., Regina	Beaverlodge
Black Bay Uranium Ltd.[2]	25 Adelaide St. W., Toronto, Ontario	Uranium City
Consolidated Nickolson Mines Ltd.[1]	532 Burrard St., Vancouver, British Columbia	Uranium City
Gayzor Athabaska Mines Ltd.	67 Yonge St., Toronto, Ontario	Uranium City
Clix Athabaska Mines Ltd.[3]	25 Adelaide St. W., Toronto, Ontario	Athabaska
Dee Explorations Ltd.[2]	104 Main St., Flin Flon, Manitoba	Athabaska
Galtwin Explorations Ltd.[2]	25 Adelaide St. W., Toronto, Ontario	Milliken Lake
Gulch Mines Ltd.[3]	217 Bay St., Toronto, Ontario	Uranium City
Gunnar Mines Ltd.	25 Adelaide St. W., Toronto, Ontario	Athabaska
Iso Mines Ltd.[2]	100 Adelaide St. W., Toronto, Ontario	Athabaska
Lavant Mines Ltd.[2]	627 Bay St. Toronto, Ontario	Beaverlodge
Joburke Gold Mines[3]	357 Bay St., Toronto, Ontario	Beaverlodge
Lorado Uranium Mines Ltd.	80 Richmond St. W., Toronto, Ontario	Uranium City
Lake Cinch Mines Ltd.	25 Adelaide St. W., Toronto, Ontario	Uranium City
National Explorations Ltd.[2]	789 W. Pender St., Vancouver, B.C.	Athabaska
Nesbitt Labine Uranium Mines Ltd.[3]	25 Adelaide St. W., Toronto, Ontario	Uranium City
Nisto Mines Ltd.[2]	532 Burrard St., Vancouver, British Columbia	Black Lake
Orchan Uranium Mines Ltd.[3]	100 Adelaide St. W., Toronto, Ontario	Beaverlodge
Pitch Ore Uranium Mines Ltd.[3]	200 Bay St., Toronto, Ontario	Beaverlodge
Pitchvein Mines Ltd.[2]	82 Government Rd., Kirkland Lake, Ontario	Athabaska
Pluton Uranium Mines Ltd.[2]	11 King St. W., Toronto, Ontario	Beaverlodge
Rix Athabaska Uranium Mines Ltd.	335 Bay St., Toronto, Ontario	Uranium City
British Columbia:		
Quebec Metallurgical Industries Ltd.[2]	88 Metcalfe St., Ottawa, Ontario	Golden
Rexspar Uranium & Metals Mining Co. Ltd.[2]	170 Bay St., Toronto, Ontario	Birch Island

See footnotes at end of Directory.

Directory of Firms in the Miscellaneous Metal Mining Industry, 1960 — Concluded

Name of firm and product	Head office address	Location of mine or plant
Uranium — Concluded:		
Northwest Territories:		
Consolidated Northland Mines Ltd.[2]	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
Rayrock Mines Ltd.[2]	25 Adelaide St. W., Toronto, Ontario	Sherman Lake
Zirconium:		
Dominion Magnesium Ltd.	67 Yonge St., Toronto, Ontario	Haley, Ontario

[1] Holds dormant property.
[2] Active but not producing.
[3] Amalgamated with Rio Algom Mines Ltd.