

CATALOGUE No.

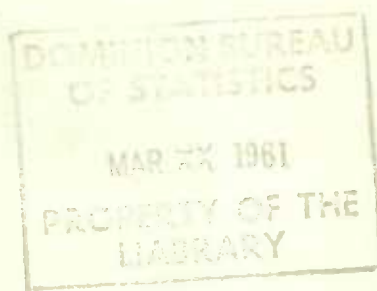
26-219

ANNUAL

c.2



# THE MISCELLANEOUS METAL MINING INDUSTRY 1959



DOMINION BUREAU OF STATISTICS

Industry and Merchandising Division



DOMINION BUREAU OF STATISTICS  
Industry and Merchandising Division

THE MISCELLANEOUS METAL INDUSTRY  
1959

*Published by Authority of*  
The Honourable George Hees, Minister of Trade and Commerce

March, 1961  
6514-528

Price 75 cents

# PUBLICATIONS ON MINERAL STATISTICS

Dominion Bureau of Statistics  
Ottawa, Canada

Catalogue number	Name of publication	Price
<b>Annual</b>		
26 - 201	A - General Review of the Mining Industry .....	\$ .75
26 - 209	B - The Gold Mining Industry .....	.75
26 - 216	C - The Silver-Lead-Zinc Mining Industry .....	.50
26 - 211	D - The Nickel-Copper Mining, Smelting and Refining Industry .....	.50
26 - 210	E - The Iron Mining Industry .....	.50
26 - 219	F - The Miscellaneous Metal Mining Industry .....	.75
41 - 214	G - The Smelting and Refining Industry .....	.50
26 - 206	H - The Coal Mining Industry .....	1.00
26 - 213	I - The Crude Petroleum and Natural Gas Industry .....	.50
26 - 205	J - The Asbestos Mining Industry .....	.50
26 - 208	K - The Feldspar and Quartz Mining Industry .....	.50
44 - 208	L - The Gypsum Industry .....	.50
26 - 212	M - The Peat Industry .....	.25
26 - 214	N - The Salt Industry .....	.50
26 - 218	O - The Talc and Soapstone Industry .....	.25
26 - 220	P - The Miscellaneous Non-metal Mining Industry .....	.75
44 - 204	Q - The Cement Manufacturing Industry .....	.50
44 - 206	R - The Clay and Clay Products Industry .....	.50
44 - 209	S - The Lime Industry .....	.50
26 - 215	T - The Sand and Gravel Industry .....	.50
26 - 217	U - The Stone Industry .....	.50
26 - 207	V - Contract Drilling in the Mining Industry .....	.50
26 - 202	- Preliminary Estimate of Canada's Mineral Production .....	.25
26 - 203	- Preliminary Report of Mineral Production .....	.75
26 - 204	- Principal Statistics of the Mineral Industry .....	.25

## Monthly

		Per copy	Per year
26 - 007	- Canada's Leading Minerals .....	.10	\$1.00
26 - 001	- Asbestos .....	.10	1.00
44 - 001	- Cement .....	.10	1.00
44 - 005	- Products Made from Canadian Clay .....	.10	1.00
26 - 002	- Preliminary Report on Coal .....	.10	1.00
45 - 002	- Coal and Coke Statistics .....	.25	2.00
26 - 003	- Copper and Nickel Production .....	.10	1.00
26 - 004	- Gold Production .....	.10	1.00
26 - 005	- Iron Ore .....	.10	1.00
26 - 006	- Crude Petroleum, Natural Gas .....	.10	1.00
26 - 009	- Salt .....	.10	1.00
26 - 008	- Silver, Lead and Zinc Production .....	.10	1.00

*A complete catalogue of publications of the Dominion Bureau of Statistics is available upon request.*

## 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 INDUSTRY

1959

Including

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

The mining of certain metal-bearing ores, other than those commonly classified as gold, silver, copper, nickel, cobalt, lead and zinc, have been grouped, for statistical purposes, as a single industry by the Dominion Bureau of Statistics. Their production in some instances is confined to a few operators and the annual extraction of certain types of ores often fluctuates in an erratic manner according to demand and supply. Included in this report, with the statistics relating to the Canadian production of these ores or metals, are notes and statistical data pertaining to various rare or semi-rare metals of metaliferous ores produced in other countries. Metals and metal-bearing ores produced in Canada during 1958 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 84 active establishments in the Miscellaneous Metal Mining Industry, there were 31 which made shipments of ore or metal-bearing concentrates.

The industry employed an average of 13,645 persons to whom \$76,604,136 were distributed as salaries and wages. Fuel cost \$5,234,286 and 594,705,609 kwh. of electricity were purchased for \$3,789,464. Process supplies, containers, freight and treatment charges amounted to \$67,935,140.

**TABLE 1. Principal Statistics of the Miscellaneous Metal Mining Industry, Significant Years, 1921 - 59**

Year	Establishments	Employees	Salaries and wages	Cost of fuel and electricity	Cost of process supplies and containers	Gross value of products	Net value added <sup>1</sup>
	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 <sup>2</sup> .....	180	6,494	24,603,658	3,553,358	10,174,222	83,379,952	66,138,130
1955 <sup>3</sup> .....	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

<sup>1</sup> Gross value of production, less the value of fuel, electricity, process supplies, containers, freight and treatment charges.

<sup>2</sup> Data for 1954 includes uranium mining which was not shown in preceding years.

<sup>3</sup> Iron ore data excluded since 1955, but included in preceding years.



TABLE 2. Employees and their Earnings in the Miscellaneous Metal Mining Industry, 1955-59

Year	Employees					Man-hours worked (all employees)	Earnings		
	Office and administrative		Workmen		Total		Office and adminis- trative	Workmen	Total
	Male	Female	Male	Female					
	number					dollars			
1955 <sup>1</sup> .....	542	55	2,215	14	2,826	6,787,269	2,720,159	9,943,036	12,663,195
1956 <sup>1</sup> .....	837	88	3,436	16	4,377	10,244,141	4,412,933	16,119,552	20,532,485
1957 <sup>1</sup> .....	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

<sup>1</sup> Iron ore mining data excluded in 1955-59.

TABLE 3. Average Number of Workmen, by Months, 1958 and 1959

Month	1958 <sup>1</sup>						1959					
	Surface		Under-ground	Mill		Total	Surface		Under-ground	Mill		Total
	Male	Female		Male	Female		Male	Female		Male	Female	
	number											
January .....	3,413	12	4,489	1,551	3	9,468	2,981	17	6,716	2,234	6	11,954
February .....	3,414	12	4,726	1,624	3	9,779	2,884	17	6,624	2,180	5	11,710
March .....	3,817	13	5,154	1,764	3	10,751	2,789	16	6,713	2,129	5	11,652
April .....	3,783	12	5,457	1,931	3	11,186	2,821	13	6,762	2,102	6	11,704
May .....	4,108	13	6,104	2,038	4	12,267	3,028	12	6,662	2,154	6	11,862
June .....	4,178	13	6,261	2,093	5	12,550	3,024	11	6,387	2,228	6	11,656
July .....	4,074	15	6,762	2,055	5	12,911	3,060	11	6,193	2,252	7	11,523
August .....	3,945	16	6,816	1,960	5	12,742	2,904	9	6,220	2,145	7	11,285
September .....	3,698	17	6,873	1,923	5	12,516	2,752	8	6,204	2,098	7	11,069
October .....	3,719	18	7,082	1,888	5	12,712	2,742	8	6,248	2,053	8	11,059
November .....	3,513	17	7,250	1,862	5	12,647	2,673	8	5,981	2,004	8	10,674
December .....	3,477	18	7,025	1,800	5	12,325	2,527	8	5,767	1,952	7	10,261
Average .....	3,775	14	6,167	1,876	4	11,836	2,849	11	6,291	2,130	7	11,288
Man-hours worked .....	28,200,110						24,431,352					

<sup>1</sup> Iron ore mining data excluded in 1958.

TABLE 4. Fuel and Electricity Used in the Miscellaneous Metal Mining Industry, 1959

Kind	Quantity	Cost at plant
		\$
Bituminous coal (a) From Canadian mines	short ton	35,369
(b) Imported	"	90,442
Sub-bituminous coal (from Alberta mines only)		—
Anthracite coal	short ton	12,000
Lignite coal		—
Coke (for fuel only)		—
Gasoline, (includes gasoline used in cars and trucks)	Imp. gal.	639,827
Kerosene or coal oil	"	1,193
Fuel oil	"	14,310,947
Wood (cords of 128 cubic feet of piled wood)	cord	4,303
Gas (a) Liquefied petroleum gases (propane, etc.)	Imp. gal.	156,832
(b) Other manufactured gas	M cu. ft.	760
(c) Natural gas		—
Other fuel		—
Electricity purchased for power and lighting	kwh.	594,705,609
Electricity purchased for other purposes		—
Total (cost only)		9,023,750
Electricity generated (a) For own use	kwh.	118,327,316
(b) For sale	"	2,458,200
		28,986

## 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 1959 amounted to 593,630 tons compared with 634,102 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.

During most of the year the price of aluminum ingots in Canada was 22.5 cents per pound. The price increased to 23.25 cents per pound in December 1959. In United States price quotations for aluminum was 26.8 cents per pound for eleven months of the year. The price was increased by 0.5 cents per pound in December. The monetary exchange rate and import duties cause a price difference between the Canadian and United States markets.

TABLE 5. Production, Consumption, Imports and Exports of Aluminum Ingots, 1950-59

Year	Producers' shipments	Consumption	Exports	Imports
tons (2,000 pounds)				
1950	396,882	65,185	335,726	63
1951	447,095	86,241	354,414	270
1952	499,758	90,287	412,589	13
1953	548,445	88,548	459,692	35
1954	557,897	80,355	468,494	115
1955	612,543	91,522	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

TABLE 6. Imports of Aluminum and Bauxite, 1958 and 1959

Item	1958		1959	
	Tons	Value	Tons	Value
		\$		\$
Alumina	150,769	3,476,201	185,500	4,612,683
Bauxite ore	2,166,496	30,284,138	2,071,998	31,344,845
Cryolite	6,835	1,327,641	6,014	1,017,444
Aluminum:				
Plgs, ingots and blocks	11,257	5,374,027	852	468,294
Scrap	251	65,668	618	159,494
Angles, channels and beams	1,187	1,374,406	581	806,611
Bars, rods and wire	924	846,909	412	399,713
Leaf or foil	...	1,005,597	...	902,847
Pipes and tubes	526	812,996	507	502,399
Plates, sheets and strips	4,648	4,552,976	6,338	5,760,123
Powder and paste	152	120,355	164	152,337
Wire and cable	1,350	978,725	373	330,418
Household hollow-ware	...	1,598,846	...	1,501,440
Manufactures, n.o.p.	...	12,936,782	...	14,311,528

TABLE 7. Exports of Aluminum, 1958 and 1959

Item	1958		1959	
	Tons	Value \$	Tons	Value \$
Aluminum scrap .....	12,613	3,287,786	16,178	4,880,265
Aluminum in primary forms .....	482,927	208,841,586	505,342	212,287,703
Aluminum manufactures, n.o.p. ....	...	935,984	...	1,544,966
Aluminum, semi-fabricated .....	17,390	10,313,075	25,158	13,515,512
Aluminum kitchen utensils .....	...	27,576	...	29,286
Aluminum foil .....	172	213,614	148	167,777

TABLE 8. World Production of Bauxite, by Countries<sup>1</sup>

Country	1954	1955	1956	1957	1958
in thousand long tons <sup>1</sup>					
North America (dried equivalent of crude ore):					
Haiti .....	—	—	—	263	280
Jamaica <sup>2</sup> .....	2,044	2,645	3,141	4,643	5,722
United States .....	1,995	1,788	1,744	1,416	1,311
<b>Totals</b> .....	<b>4,039</b>	<b>4,433</b>	<b>4,885</b>	<b>6,322</b>	<b>7,313</b>
South America:					
Brazil .....	27	44	69	63	41 <sup>3</sup>
British Guiana .....	2,310	2,435	2,481	2,202	1,586
Surinam .....	3,309	3,074	3,430	3,324	2,941
<b>Totals</b> .....	<b>5,646</b>	<b>5,553</b>	<b>5,980</b>	<b>5,589</b>	<b>4,568</b>
Europe:					
Austria .....	17	19	22	22	23
France .....	1,267	1,470	1,443	1,657	1,788
Germany West .....	4	4	5	5	5 <sup>3</sup>
Greece .....	348	492	687	820	787
Hungary .....	1,240	1,221	879	903	1,036
Italy .....	289	322	271	257	294
Rumania <sup>3</sup> .....	15	16	16	16	20
Spain .....	6	6	7	8	6
U.S.S.R. <sup>3</sup> .....	1,390	2,030	2,190	2,410	2,710
Yugoslavia .....	676	779	868	874	721
<b>Totals<sup>3</sup></b> .....	<b>5,252</b>	<b>6,359</b>	<b>6,338</b>	<b>6,972</b>	<b>7,390</b>
Asia:					
India .....	75	81	91	97	115
Indonesia .....	171	260	299	238	338
Malaya .....	166	222	264	326	262
Pakistan .....	—	1	3	3	2
Sarawak .....	—	—	—	—	136
Taiwan (Quemoy) .....	—	—	—	—	—
<b>Totals</b> .....	<b>412</b>	<b>564</b>	<b>657</b>	<b>664</b>	<b>853</b>
Africa:					
French Guinea .....	424	485	444	360	325
Ghana (exports) .....	164	116	138	185	207
Mozambique .....	2	3	4	5	5 <sup>3</sup>
<b>Totals</b> .....	<b>590</b>	<b>604</b>	<b>586</b>	<b>550</b>	<b>537</b>
Oceania: Australia .....	5	8	10	8	5 <sup>3</sup>
<b>World totals (estimate)</b> .....	<b>15,900</b>	<b>17,500</b>	<b>18,500</b>	<b>20,100</b>	<b>20,700</b>

<sup>1</sup> 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.

<sup>2</sup> Exports.

<sup>3</sup> Estimate.

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



TABLE 9. World Production of Aluminum

Country <sup>1</sup>	1955	1956	1957	1958	1959
	short tons <sup>2</sup>				
North America:					
Canada .....	612,543	620,321	556,715	634,102	598,500
United States .....	1,565,721	1,678,954	1,647,709	1,565,557	1,973,175
<b>Totals</b> .....	<b>2,178,264</b>	<b>2,299,275</b>	<b>2,204,424</b>	<b>2,199,659</b>	<b>2,551,675</b>
South America: Brazil .....	1,834	6,920	9,794	13,102	13,200 <sup>3</sup>
Europe:					
Austria .....	63,051	65,490	62,125	62,716	72,271
Czechoslovakia .....	26,900	23,400	18,400	29,100	33,000 <sup>3</sup>
France .....	142,191	165,125	176,603	186,415	190,744
Germany, East .....	29,100	37,800	38,100 <sup>3</sup>	37,500 <sup>3</sup>	38,600 <sup>3</sup>
West .....	151,089	162,439	169,576	150,756	166,631
Hungary .....	40,740	38,375	27,650	43,560	50,400
Italy .....	68,010	70,225	72,981	70,603	82,658
Norway .....	79,102	101,349	105,430	139,201	159,671
Poland .....	22,500	24,000	22,500	24,700	25,100
Rumania <sup>3</sup> .....	6,200	8,800	11,000	11,000	11,000
Spain .....	3,466	14,283	16,721	17,269	23,300 <sup>3</sup>
Sweden, including alloys .....	11,063	13,734	14,958	15,113	15,102
Switzerland .....	33,312	33,180	34,238	34,723	37,886
U.S.S.R. <sup>3</sup> .....	475,000	505,000	550,000	605,000	715,000
United Kingdom .....	27,378	30,892	32,933	29,517	27,381
Yugoslavia .....	12,675	16,162	19,989	23,899	21,214
<b>Totals<sup>3</sup></b> .....	<b>1,190,000</b>	<b>1,305,000</b>	<b>1,375,000</b>	<b>1,480,000</b>	<b>1,670,000</b>
Asia:					
China (Manchuria) <sup>3</sup> .....	11,000	11,000	22,000	29,800	77,600
India .....	8,091	7,281	8,718	9,167	19,131
Japan .....	63,392	72,754	74,934	93,231	109,394
Taiwan .....	7,717	9,655	9,104	9,455	8,251
<b>Totals<sup>1,3</sup></b> .....	<b>90,200</b>	<b>100,700</b>	<b>114,800</b>	<b>141,700</b>	<b>214,400</b>
Africa: Cameroon, Republic of .....	—	—	8,300	35,121	46,644
Oceania: Australia .....	1,398	10,240	11,899	12,196	14,392
<b>World totals<sup>2,1</sup></b> .....	<b>3,460,000</b>	<b>3,720,000</b>	<b>3,725,000</b>	<b>3,880,000</b>	<b>4,510,000</b>

<sup>1</sup> In addition to countries listed, North Korea produced a negligible quantity of aluminum.

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

<sup>3</sup> Estimate.

Source: "Minerals Statistics" 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 babbitt bearings and

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

The New York price quotations on antimony were 32.59 cents per pound in December 1959. This price was for grade 99½% in lots of 10,000 pounds or more.

TABLE 10. Production of Antimony, 1950-59

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

<sup>1</sup> Includes antimony in flue dust and Doré slag produced in 1949 and 1950 but not previously recorded.

TABLE 11. Production of Antimony Metal, Consumption and Imports, 1950-59

Year	Production in Canada	Consumption in Canada <sup>1</sup>	Imports
	tons (2,000 pounds)		
1950 .....	—	997	1,606
1951 .....	—	740	681
1952 .....	—	667	861
1953 .....	—	803	865
1954 .....	—	805	1,022
1955 .....	—	794	679
1956 .....	—	787	902
1957 .....	—	735	897
1958 .....	—	409	404
1959 .....	—	567	585

<sup>1</sup> Not including antimony in antimonial lead produced at the Trail smelter.  
Note: Export data are not available from customs records.

TABLE 12. Consumption of Antimony Metal, by Industries, 1954-58

Industry	1954	1955	1956	1957	1958
	tons (2,000 pounds)				
White metal foundries .....	704	750	759	715	461
Electrical apparatus plants .....	—	5	—	1	...
Brass foundries .....	9	14	23	14	6
Jewellery and electroplate .....	92	25	5	5	2
Total accounted for .....	805	794	787	735	469

TABLE 13. World Production of Antimony (Content of Ore), by Countries<sup>1</sup>

Country <sup>1</sup>	1955	1956	1957	1958	1959
	short tons <sup>2</sup>				
North America:					
Canada <sup>3</sup> .....	1,011	1,070	680	430	807
Guatemala .....	—	—	13	47	97
Mexico <sup>4</sup> .....	4,209	5,022	5,734	3,029	3,621
United States .....	—	630	709	705	678
Totals .....	5,853	6,722	7,136	4,211	5,203

See footnotes at end of table.

TABLE 13. World Production of Antimony (Content of Ore), by Countries<sup>1</sup> - Concluded

Country <sup>1</sup>	1955	1956	1957	1958	1959
	short tons <sup>2</sup>				
South America:					
Argentina.....	7	2		11	—
Bolivia (exports) <sup>4</sup> .....	5,907	5,635	7,026	5,818	6,065
Peru <sup>4</sup> .....	960	1,068	920	964	902
<b>Totals</b> .....	<b>6,874</b>	<b>6,705</b>	<b>7,953</b>	<b>6,793</b>	<b>6,967</b>
Europe:					
Austria.....	493	489	430	514	631
Czechoslovakia <sup>5</sup> .....	1,800	1,800	1,800	1,800	1,800
France.....	103	258	—	—	—
Greece.....	—	—	—	—	—
Italy.....	402	309	138	130	175
Portugal.....	—	—	11	7	7 <sup>5</sup>
Spain.....	210	250	220	220	180 <sup>5</sup>
Yugoslavia (metal).....	1,769	1,767	1,950	1,835	2,514
<b>Totals<sup>1,5</sup></b> .....	<b>4,800</b>	<b>4,900</b>	<b>4,500</b>	<b>4,500</b>	<b>5,300</b>
Asia:					
Burma <sup>4</sup> .....	65	90	70	90	240
China <sup>5</sup> .....	13,000	14,300	15,400	16,500	16,500
Iran <sup>6</sup> .....	63	44	110 <sup>5</sup>	160	160 <sup>5</sup>
Japan.....	357	619	474	298	390
Thailand.....	28	41	2	—	10
Turkey.....	1,841	1,063	1,232	1,687 <sup>7</sup>	1,380 <sup>7</sup>
<b>Totals<sup>5</sup></b> .....	<b>15,400</b>	<b>16,200</b>	<b>17,300</b>	<b>18,700</b>	<b>18,700</b>
Africa:					
Algeria.....	1,328	2,641	1,547	1,106	1,135
Morocco: Northern Zone.....	397	330	360	203	254
Southern Zone.....	327	—	—	—	—
Rhodesia and Nyasaland, Fed. of:					
Southern Rhodesia.....	223	72	83	151	104
Union of South Africa.....	15,640	15,689	11,021	7,904	13,619
<b>Totals</b> .....	<b>17,915</b>	<b>18,732</b>	<b>13,011</b>	<b>9,364</b>	<b>15,112</b>
Oceania: Australia.....	344	322	543	775	800
<b>World totals (estimate)<sup>1</sup></b> .....	<b>51,000</b>	<b>54,000</b>	<b>50,000</b>	<b>44,000</b>	<b>52,000</b>

<sup>1</sup> Antimony is also produced in Hungary and U.S.S.R., but production data are not available. No estimates are included in total.

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

<sup>3</sup> Antimony content of smelter products exclusively from mixed ores.

<sup>4</sup> Includes antimony content of smelter products derived from mixed ores.

<sup>5</sup> Estimates.

<sup>6</sup> Year ended March 20 of year following that stated.

<sup>7</sup> Exports.

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

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

	1955	1956	1957	1958	1959
	pounds				
United Kingdom.....	130,000	198,880	246,760	184,000	300,000
United States.....	90,969	56,230	54,937	71,200	80,254
Belgium.....	2,240	6,721	20,160	67,781	42,714
Germany, West.....	63,000	—	44,090	—	88,184
<b>Totals</b> .....	<b>286,209</b>	<b>261,831</b>	<b>365,947</b>	<b>322,981</b>	<b>511,152</b>



## 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 1950-59.

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 1959.

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, Abitibi county, often associated with molybdenite.

None of these, however, is believed to be of economic importance.

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

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

New York price quotations, at the end of the year, for beryllium ore, f.o.b. mine, were \$46 to \$48 per unit of BeO, basis 10 to 12 per cent BeO.

TABLE 15. World Production of Beryl, by Countries<sup>1</sup>

Country <sup>1</sup>	1954	1955	1956	1957	1958
	short tons <sup>2</sup>				
North America:					
United States (mine shipments) .....	669	500	460	521	463
South America:					
Argentina .....	705	1,488	1,722	1,571	1,100 <sup>3</sup>
Brazil .....	1,581	1,954	2,321	2,136 <sup>4</sup>	888 <sup>5</sup>
Surinam .....	10	—	—	—	—
Totals .....	2,296	3,442	4,043	3,707	1,988
Europe: <sup>1</sup>					
Portugal .....	368	337	244	191	45 <sup>3</sup>
Asia:					
Afghanistan .....	30	33	30	15	—
India .....	392	845	3,360	1,256	600
Korea, Republic of .....	4	6	—	—	—
Totals .....	426	884	3,390	1,271	600
Africa:					
Belgian Congo (including Ruanda-Urundi) ...	50	362	1,905	1,771	1,100 <sup>3</sup>
British Somaliland .....	—	19	17	—	—
Kenya .....	—	—	—	6	4
Madagascar .....	648	316	169	297	80 <sup>3</sup>
Morocco, Southern Zone .....	17	2	—	—	—
Mozambique .....	1,002	960	944	1,871	1,134
Rhodesia and Nyasaland, Federation of:					
Northern Rhodesia .....	1	2 <sup>1</sup>	13	5	13
Southern Rhodesia .....	1,077	963	606	572	332

See footnotes at end of table.



TABLE 15. World Production of Beryl, by Countries<sup>1</sup> - Concluded

Country <sup>1</sup>	1954	1955	1956	1957	1958
short tons <sup>2</sup>					
Africa - Concluded:					
South West Africa .....	564	472	454	385	246
Uganda .....	77	110	98	78	83 <sup>4</sup>
Union of South Africa .....	203	137	133	711	462
<b>Totals</b> .....	<b>3,639</b>	<b>3,362</b>	<b>4,339</b>	<b>5,696</b>	<b>3,454</b>
Oceania: Australia .....	166	230	356	442	300 <sup>3</sup>
<b>World totals (estimate)<sup>1</sup></b> .....	<b>7,700</b>	<b>8,900</b>	<b>12,900</b>	<b>11,900</b>	<b>7,000</b>

<sup>1</sup> In addition to the countries listed, beryl has been produced in U.S.S.R. for which no production data are available; An estimate for U.S.S.R. is included in the world total.

<sup>2</sup> This table incorporates a number of revisions of data published in previous beryl chapters.

<sup>3</sup> Estimates.

<sup>4</sup> Exports.

<sup>5</sup> United States imports.

<sup>6</sup> 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, 1959 was \$2.25 per pound, in ton lots.

TABLE 16. Production of Primary Bismuth in all Forms,<sup>1</sup> 1950-59

Year	Pounds	Value	Year	Pounds	Value
		\$			\$
1950.....	191,621	431,147	1955.....	265,896	572,362
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

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

TABLE 17. Production of Bismuth Metal, Consumption, Imports and Exports, 1950-59

Year	Production <sup>1</sup>	Domestic consumption	Exports <sup>2</sup>	Imports <sup>3</sup>
tons (2,000 pounds)				
1950.....	97	33	57	—
1951.....	104	54	45	—
1952.....	71	53	17	1
1953.....	36	34	—	—
1954.....	113	37	67	—
1955.....	80	46	28	3
1956.....	78	45	67	12
1957.....	160	27	68	5
1958.....	206	10	54	6
1959.....	167	20	154	6

<sup>1</sup> Includes bismuth from foreign ores.

<sup>2</sup> Shipped for export by Canadian producers. Includes impure metal in 1959.

<sup>3</sup> Includes bismuth residues.

TABLE 18. Consumption of Bismuth Metal, by Industries, 1954-58

Industry	1954	1955	1956	1957	1958
	tons (2,000 pounds)				
Medicinals and pharmaceuticals .....	10	21	41	4	7
White metal foundries .....	18	18	19	17	12
Miscellaneous .....	9	7	5	6	5
<b>Total accounted for .....</b>	<b>37</b>	<b>46</b>	<b>65</b>	<b>27</b>	<b>24</b>

TABLE 19. World Production of Bismuth, by Countries<sup>1</sup>

Country <sup>1</sup>	1954	1955	1956	1957	1958
	pounds <sup>2</sup>				
<b>North America:</b>					
Canada (metal) <sup>3</sup> .....	258,675	265,896	285,861	319,941	457,088
Mexico <sup>3</sup> .....	795,900	773,800	1,391,100	780,200	417,700
United States .....	4	4	4	4	4
<b>South America:</b>					
Argentina: Metal .....	—	16,300	—	—	—
In ore <sup>3</sup> .....	10,140	20,700	20,000	47,800	59,300
Bolivia <sup>4</sup> .....	101,467	113,000	74,800	90,600	106,200
Peru <sup>3</sup> .....	691,731	734,714	634,757	804,800	895,200
<b>Europe:</b>					
France (in ore) .....	24,300	69,500	142,200	119,000	110,000 <sup>4</sup>
Spain (metal) .....	32,985	48,234	71,650	190,500	110,000 <sup>7</sup>
Sweden <sup>5</sup> .....	110,000	145,500	88,000	120,000	110,000
Yugoslavia (metal) .....	241,842	229,516	245,039	219,805	169,650
<b>Asia:</b>					
China (in ore) .....	—	—	—	—	—
Japan (metal) .....	118,610	142,364	156,859	144,800	143,000 <sup>5</sup>
Korea, Republic of .....	254,000	287,000	401,000	240,000	198,000
<b>Africa:</b>					
Belgian Congo (in ore) .....	2,000	70	—	—	—
Mozambique .....	1,905	4,145	785	6,975	2,141
South West Africa (in ore) .....	2,500	2,360	310	670	680
Uganda .....	400	3,100	660	2,700	2,600 <sup>5</sup>
Union of South Africa (in ore) .....	1,080	228	360	145	2,500 <sup>5</sup>
<b>Oceania: Australia (in ore) .....</b>	<b>1,345</b>	<b>3,000</b>	<b>5,150</b>	<b>1,340</b>	<b>1,000</b>
<b>Totals (estimate)<sup>1, 2</sup> .....</b>	<b>3,700,000</b>	<b>4,400,000</b>	<b>5,700,000</b>	<b>5,500,000</b>	<b>4,900,000</b>

<sup>1</sup> 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.

<sup>2</sup> 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.

<sup>3</sup> Refined metal, plus bismuth content of bullion exported.

<sup>4</sup> Production included in total; Bureau of Mines not at liberty to publish separately.

<sup>5</sup> Estimate.

<sup>6</sup> Excludes Bismuth content of tin concentrates exported.

<sup>7</sup> Estimated recoverable content of ore produced.

<sup>8</sup> Data not available; estimate included in total.

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, 1959 was \$1.30 per pound.

TABLE 20. Production of Cadmium in all Forms, 1950-59

Year	British Columbia and Yukon		Manitoba and Saskatchewan		Canada	
	pounds	\$	pounds	\$	pounds	\$
1950.....	706,950	1,640,124	141,456	328,176	848,406	1,968,302
1951.....	1,179,752	3,161,735	147,168	394,410	1,326,920	3,556,145
1952.....	834,235	1,835,317	114,352	251,574	948,587	2,086,891
1953.....	960,288	1,920,576	157,997	315,994	1,118,285	2,236,570
1954.....	932,184	1,584,713	154,596	262,813	1,086,780	1,847,526
1955.....	1,727,390	2,936,564	191,691	325,875	1,919,081	3,262,439
1956.....	2,182,435	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

TABLE 21. Consumption and Exports of Cadmium Metal, 1950-59

Year	Production	Domestic consumption	Exports
	tons (2,000 pounds)		
1950 .....	419 <sup>1</sup>	116	349
1951 .....	633 <sup>1</sup>	146	460
1952 .....	410 <sup>1</sup>	74	310
1953 .....	489 <sup>1</sup>	133	485
1954 .....	529 <sup>1</sup>	113	388
1955 .....	857 <sup>1</sup>	174	881
1956 .....	966 <sup>1</sup>	143	961
1957 .....	1,009 <sup>1</sup>	117	971
1958 .....	817 <sup>1</sup>	172	867
1959 .....	1,264	496	828

<sup>1</sup> Includes cadmium recovered from foreign ores.

Note: Statistics on imports are not available.

TABLE 22. World Production of Cadmium, by Countries<sup>1</sup>

Country	1955	1956	1957	1958	1959
	thousands of pounds <sup>2</sup>				
North America:					
Canada.....	1,919	2,339	2,368	1,756	2,200 <sup>3</sup>
Guatemala.....	—	107	84	52	—
Mexico.....	—	—	—	42	114 <sup>3</sup>
United States (primary):					
Metallic cadmium.....	9,754 <sup>4</sup>	10,604 <sup>4</sup>	10,549 <sup>4</sup>	9,673 <sup>4</sup>	8,602 <sup>4</sup>
Cadmium compounds (Cd content).....					
South America: Peru <sup>6</sup> .....	138	107	104	190	190 <sup>3</sup>
Europe:					
Austria.....	—	5	25	25	24 <sup>3</sup>
Belgium <sup>3</sup> .....	1,433	1,488	1,323	1,488	1,488
France.....	397	240	388	385	542
Germany, West.....	709	645	611	703	926
Italy.....	462	412	492	410	309 <sup>3</sup>
Netherlands <sup>3</sup> .....	34	36	77	88	88
Norway.....	255	278	244	240	284
Poland <sup>3</sup> .....	550	542	560	573	595
Spain.....	22	25	20	14	13 <sup>3</sup>
U.S.S.R. <sup>3,7</sup> .....	680	795	1,050	1,040	980
United Kingdom.....	337	251	228	278	310
Yugoslavia.....	—	18	57	55 <sup>3</sup>	55 <sup>3</sup>

See footnote at end of table.



TABLE 22. World Production of Cadmium, by Countries<sup>1</sup> — Concluded

Country	1955	1956	1957	1958	1959
	thousands of pounds <sup>2</sup>				
Asia: Japan.....	757	886	873	964	1,062
Africa:					
Belgian Congo .....	366	611	911	1,075	1,047
Rhodesia and Nyasaland:					
Federation of Northern Rhodesia .....	—	117	125	38	—
Oceania: Australia .....	674	618	880	791	752 <sup>3</sup>
<b>World totals (estimate)<sup>1, 2</sup></b> .....	<b>18,500</b>	<b>20,100</b>	<b>21,000</b>	<b>19,900</b>	<b>19,700</b>
Mexico <sup>4</sup> .....	2,855	1,892	1,673	1,665	1,151 <sup>5</sup>
South West Africa <sup>6</sup> .....	1,402	2,328	2,838	2,698	1,193

<sup>1</sup> Data derived in part from bulletins of the World Non-ferrous Metal Statistics and annual issues of Metal Statistics (Metallgesellschaft).

<sup>2</sup> This table incorporates a number of revisions of data published in previous chapters.

<sup>3</sup> Estimate.

<sup>4</sup> Includes secondary.

<sup>5</sup> Bureau of Mines not at liberty to publish figures.

<sup>6</sup> Includes refined metal, beginning in 1955.

<sup>7</sup> Estimates based on an assumed average cadmium content of 0.1 per cent in zinc concentrates.

<sup>8</sup> To avoid duplicating of figures, data are not included in the world total. The cadmium content of flue dust from Mexico is exported for treatment elsewhere, and represents in part shipments from stocks on hand. The cadmium content of concentrates from South West Africa also exported for treatment elsewhere.

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 23. Production (Shipments) of Calcium Metal, 1945 - 1959

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 <sup>2</sup> .....	394,900	515,305
1957 <sup>2</sup> .....	221,225	282,378
1958 .....	25,227	31,256
1959 .....	67,429	76,409

<sup>1</sup> Not available for publication.

<sup>2</sup> Output.

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

Country	1957	1958	1959
		dollars	
United Kingdom .....	7,887	13,488	36,250
Belgium .....	17,634	25,110	9,910
Sweden .....	6,795	—	—
United States .....	24,784	22,067	7,070
France .....	20,338	—	—
Germany, West .....	—	14,936	6,325
India .....	54	3,427	14,000
<b>Totals</b> .....	<b>77,492</b>	<b>79,028</b>	<b>73,555</b>



## 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 1956-59.

Cerium is obtained from monazite, a monoclinic phosphate of cerium metals containing about 32 per cent cerium oxide ( $\text{Ce}_2\text{O}_3$ ) and up to 18 per cent thorium ( $\text{ThO}_2$ ). Monazite is distributed widely in igneous rocks throughout the world, especially in gneisses that have been intruded by pegmatites, but usually it forms only a small fraction of one per cent of the containing rock, and only the natural concentrations in stream gravels and beach sands have paid for exploration. The chief commercial sources of monazite sand are beach deposits in Brazil and

India. There are a few occurrences of monazite in Nova Scotia, Quebec and British Columbia, none of which is of commercial interest. It is usually found as small crystals in granites and pegmatites in the Canadian Shield, and small quantities occur in association with the black sands of the Quesnel river, Lillooet district, British Columbia. In the United States there are commercial deposits in Carolina, Florida and Idaho, and known occurrences in many other states.

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

## CHROMITE

There was no Canadian production of chromite in 1959. This mineral was mined for several years in the Black Lake area in Quebec.

Chromite is one of the principal alloying elements in a great variety of steels, chief of which, in the amount of chromium used, are the stainless and the corrosion-resistant steels. It is used in high-speed tool steels, and as a hard, toughening element in vehicle axles and frames and in aeroplane parts. Chromium in high-temperature alloys is being used for gas turbines, jet-propulsion units and gas engine superchargers. For metallurgical uses chromite should contain a minimum of 48 per cent  $\text{Cr}_2\text{O}_3$  with a chrome-iron ratio of 3 to 1 or higher and the ore should be hard and lumpy.

Chrome ore is used for making refractory bricks or materials used in basic open-hearth furnaces, in arches of furnaces and in parts of combustion chambers of high-pressure steam boilers, etc. It is used with magnesia to make chrome-magnesia refractories, an important use in Canada being in the manufacture of brucite-magnesia bricks that contain up to 30 per cent  $\text{Cr}_2\text{O}_3$ . Refractory chromite should be fairly high in  $\text{Cr}_2\text{O}_3$  and alumina, and as low as possible in silica and iron. The ore should be hard and lumpy and not under 10-mesh, and the chromite should be present in an evenly and finely distributed form, not as coarse grains mixed with blobs of silicate. The  $\text{Cr}_2\text{O}_3$  content is usually over 40 per cent.

The United States price, December, 1959, for chrome ore, 48 per cent  $\text{Cr}_2\text{O}_3$ , was \$34 to \$35 per long ton, f.o.b. Atlantic ports.

TABLE 25. Production of Chromite, 1946-59

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	1954-58 .....	—	—
1950 .....	—	—	1959 .....	—	—

TABLE 26. World Production of Chromite, by Countries<sup>1</sup>

Country <sup>1</sup>	1955	1956	1957	1958	1959
	short tons <sup>2</sup>				
North America:					
Cuba .....	85,107	59,248	127,126	82,800 <sup>3</sup>	66,000 <sup>3</sup>
Guatemala .....	287	979	1,100 <sup>3</sup>	1,168	152
United States .....	153,253	207,662 <sup>4</sup>	166,157	143,795	100,000 <sup>5</sup>
Totals .....	238,647	267,889	294,383	227,763	171,452

See footnotes at end of table.

TABLE 26. World Production of Chromite, by Countries<sup>1</sup> - Concluded

Country <sup>1</sup>	1955	1956	1957	1958	1959
	short tons <sup>2</sup>				
South America:					
Brazil .....	4,546	4,536	8,748	6,336	6,177
Europe:					
Albania .....	135,000	154,000	184,000	221,800	220,000 <sup>3</sup>
Greece .....	27,902	86,902	82,700	72,217	71,600 <sup>3</sup>
Portugal .....	—	—	—	—	—
U.S.S.R. <sup>3,6</sup> .....	750,000	815,000	850,000	880,000	940,000
Yugoslavia .....	139,119	130,913	132,570	125,188	117,965
<b>Total<sup>1,3</sup></b> .....	<b>1,075,000</b>	<b>1,210,000</b>	<b>1,270,000</b>	<b>1,320,000</b>	<b>1,370,000</b>
Asia:					
Afghanistan .....	—	—	—	—	—
Cyprus (exports) .....	9,599	5,858	5,678	13,260	14,300 <sup>3</sup>
India .....	100,071	59,009	87,968	67,668	93,936
Iran <sup>7</sup> .....	38,504	36,156	42,549	38,600 <sup>3</sup>	38,600 <sup>3</sup>
Japan .....	29,269	43,947	51,216	46,155	62,900
Pakistan .....	31,808	25,487	18,114	26,935	17,662
Philippines .....	655,882	781,598	799,733	458,903	718,149
Turkey .....	715,557	918,305	1,052,665	574,194	395,957
<b>Totals<sup>6</sup></b> .....	<b>1,580,690</b>	<b>1,870,360</b>	<b>2,057,923</b>	<b>1,225,715</b>	<b>1,341,504</b>
Africa:					
Egypt .....	926	281	114	—	—
Rhodesia and Nyasaland:					
Federation of:					
Southern Rhodesia .....	449,202	449,965	645,072	618,841	543,104
Sierra Leone .....	23,231	21,929	17,602	15,944	22,400
Union of South Africa .....	597,368	690,851	733,612	696,057	749,873
<b>Totals</b> .....	<b>1,070,727</b>	<b>1,162,026</b>	<b>1,396,400</b>	<b>1,330,842</b>	<b>1,315,377</b>
Oceania:					
Australia .....	—	6,828	3,415	869	330 <sup>3</sup>
New Caledonia .....	50,790	53,932	70,768	52,249	48,463
<b>Totals</b> .....	<b>50,790</b>	<b>60,760</b>	<b>74,183</b>	<b>53,118</b>	<b>48,793</b>
<b>World totals (estimate)<sup>4</sup></b> .....	<b>4,020,000</b>	<b>4,575,000</b>	<b>5,110,000</b>	<b>4,165,000</b>	<b>4,255,000</b>

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

<sup>2</sup> 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.

<sup>3</sup> Estimate.

<sup>4</sup> 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.

<sup>5</sup> Produced for Federal Government only; excludes quantity consumed by American Chrome Company.

<sup>6</sup> Output from U.S.S.R. in Asia included with U.S.S.R. in Europe.

<sup>7</sup> Year ended March 20 of year following that stated.

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

TABLE 27. Imports of Chrome Ores, 1950-59

Year	Tons	Value	Year	Tons	Value
		\$			\$
1950 .....	119,325	2,192,555	1955 .....	51,854	971,522
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

TABLE 28. Imports of Chrome Ores, by Principal Countries of Supply, 1958 and 1959

Imported from	1958		1959	
	Tons	Value	Tons	Value
		\$		\$
Rhodesia and Nyasaland .....	1,128	32,776	8,687	313,395
U.S.S.R. ....	—	—	2,645	94,410
United States .....	3,889	149,575	22,245	778,268
Philippines .....	33,119	629,935	11,760	220,605
Cuba .....	—	—	1,090	28,956
Malta .....	—	—	2,251	89,804
<b>Totals</b> .....	<b>38,136</b>	<b>812,286</b>	<b>48,678</b>	<b>1,525,438</b>

## 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 1959 the quoted price of indium at New York was \$1.25 to \$2.25 per troy ounce, for lots over 5,000 ounces.

TABLE 29. Production of Indium, 1943-59

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 .....	..	..

## 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 con-

verting 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 30. Production of Primary Magnesium Metal, 1944 - 59**

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 .....	<sup>1</sup>	<sup>1</sup>	<sup>1</sup>	<sup>1</sup>	<sup>1</sup>	<sup>1</sup>
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

<sup>1</sup> Not available for publication.**TABLE 31. Consumption of Magnesium Metal, 1954 - 58**

	1954	1955	1956	1957	1958
	pounds				
In white metal alloy foundries .....	1,743,198	605,658	841,238	681,477	423,025
In brass and bronze foundries .....	121,533	75,813	128,642	84,308	60,345
In aluminum products .....	751,089	984,068	1,036,402	913,417	938,213
<b>Total accounted for .....</b>	<b>2,615,820</b>	<b>1,665,539</b>	<b>2,006,282</b>	<b>1,679,202</b>	<b>1,421,583</b>

**TABLE 32. World Production of Magnesium Metal, by Countries<sup>1</sup>**

Country <sup>1</sup>	1955	1956	1957	1958	1959
	short tons <sup>1</sup>				
Canada .....	7,700 <sup>2</sup>	9,606	8,385	6,796	5,817
China, Manchuria .....	<sup>3</sup>	<sup>3</sup>	<sup>3</sup>	1,100 <sup>4</sup>	1,100 <sup>3</sup>
France .....	1,670	1,660	1,750	1,897	1,931
Germany, West <sup>4</sup> .....	144	194	260	208	214
Italy .....	3,161	4,097	4,162	4,607	4,630 <sup>3</sup>
Japan .....	148 <sup>5</sup>	86 <sup>5</sup>	472 <sup>5</sup>	1,106 <sup>5</sup>	1,655 <sup>3</sup>
Norway .....	7,433	8,185	9,504	10,226	10,250 <sup>3</sup>
Poland .....	103	158	150	165 <sup>2</sup>	165 <sup>3</sup>
Switzerland .....	—	—	—	—	—
U.S.S.R. <sup>2</sup> .....	45,000	45,000	45,000	45,000	45,000
United Kingdom <sup>4</sup> .....	6,054	4,009	3,831	2,691	2,458
United States .....	61,135	68,346	81,263	30,096	31,033
<b>Totals (estimate)<sup>1</sup> .....</b>	<b>132,800</b>	<b>141,600</b>	<b>155,000</b>	<b>103,900</b>	<b>104,300</b>

<sup>1</sup> 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.<sup>2</sup> Estimate.<sup>3</sup> Data not available; estimate included in total.<sup>4</sup> Primary metal and remelt alloys.<sup>5</sup> In addition, the following amounts of remelted magnesium were produced: 1955, 401 short tons; 1956, 897 short tons; 1957, 1,906 short tons; and 1958, 2,567 short tons.

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.

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 33. Production of Manganese Ore, 1943-59

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	1957-59 .....	—	—

TABLE 34. Imports of Manganese Ore, 1950-59

Year	Tons	Value	Year	Tons	Value
		\$			\$
1950 .....	135,697	4,993,912	1955 .....	175,282	7,338,269
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

TABLE 35. Imports of Manganese Ore, by Principal Countries of Supply, 1955-59

	1955	1956	1957	1958	1959
	tons				
From:					
China .....	—	—	—	10,312	—
Japan .....	—	—	—	—	3
Cuba .....	5,355	23,361	118	4,782	—
Ghana .....	56,011	30,688	62,916	2,362	66,246
India .....	42,199	26,199	19,634	6,702	12,314
France .....	—	—	2	2	1
United States .....	47,201	94,019	3,713	11,044	13,887
United Kingdom .....	95	171	118	112	111
Netherlands .....	35	—	—	—	—
Brazil .....	—	—	9,798	—	20,115
Mexico .....	3,506	2,561	—	1,344	—
Turkey .....	—	1,144	—	—	—
Union of South Africa .....	8,926	3,350	4,838	3,020	—
Belgian Congo .....	11,951	26,484	30,081	2,379	5,777
Greece .....	—	—	—	1	—
Total imports .....	175,282	207,977	131,318	42,060	118,454

TABLE 36. World Production of Manganese Ore, by Countries<sup>1</sup>

Country <sup>1</sup>	1954	1955	1956	1957	1958
	short tons <sup>2</sup>				
North America:					
Cuba .....	296,801	346,680	257,996 <sup>3</sup>	148,276 <sup>3</sup>	75,739 <sup>3</sup>
Mexico.....	277,996	97,326	171,000 <sup>4</sup>	220,000 <sup>3</sup>	187,400 <sup>5</sup>
Panama <sup>4</sup> .....	—	—	—	—	2,001
United States (shipments) .....	206,128	287,255	344,735	366,334	323,108
<b>Totals .....</b>	<b>780,925</b>	<b>731,261</b>	<b>773,731</b>	<b>734,610</b>	<b>588,248</b>
South America:					
Argentina .....	11,389	14,145	9,682	10,779	11,000 <sup>5</sup>
Brazil .....	179,157	234,249	342,645	1,011,939	766,153 <sup>3</sup>
Chile .....	58,422	58,400 <sup>5</sup>	51,878	59,724	42,061
Peru.....	4,960	6,008	11,826	16,917	3,229
Venezuela.....	—	—	10,318	32,939	9,039
<b>Totals .....</b>	<b>253,928</b>	<b>312,802</b>	<b>426,349</b>	<b>1,132,298</b>	<b>831,482</b>
Europe:					
Bulgaria .....	36,376	69,005	84,657	89,600	88,200 <sup>5</sup>
Greece.....	18,697	27,148	8,695	17,545	22,046
Hungary.....	120,412	105,208	94,000 <sup>5</sup>	132,000 <sup>5</sup>	132,000 <sup>5</sup>
Italy.....	54,902	62,684	50,627	51,286	47,810
Portugal .....	10,627	4,388	3,508	6,036	5,500 <sup>5</sup>
Rumania .....	191,112	429,814	259,054	292,402	220,500 <sup>5</sup>
Spain .....	39,511	48,375	36,100	45,622	41,784
U.S.S.R. <sup>6</sup> .....	5,058,500	5,228,300	5,443,200	5,674,700	5,915,000
Yugoslavia .....	4,960	4,850	6,000 <sup>5</sup>	4,400 <sup>5</sup>	4,400 <sup>5</sup>
<b>Totals<sup>1</sup> .....</b>	<b>5,535,097</b>	<b>5,979,772</b>	<b>5,985,841</b>	<b>6,313,591</b>	<b>6,477,000<sup>5</sup></b>
Asia:					
Burma .....	4,160	342	1,287	506	1,405
China <sup>5</sup> .....	190,000	305,000	580,000	600,000	600,000 <sup>7</sup>
India .....	1,582,639	1,773,566	1,889,005	1,852,484	1,377,602
Indonesia .....	22,309	38,810	90,568	59,257	48,340
Iran <sup>6</sup> .....	8,799	5,484	6,614	2,205	2,205
Japan.....	180,155	222,350	314,175	318,497	304,510
Korea, Republic of .....	1,744	3,838	2,158	3,533	287
Philippines.....	10,354	13,131	4,866	33,324	24,590
Portuguese India .....	116,756	149,523	215,836	257,904	138,446 <sup>3</sup>
Thailand .....	—	—	450	381	1,102
Turkey.....	54,925	55,228	65,962	62,522	33,242
<b>Totals<sup>1</sup> .....</b>	<b>2,172,000</b>	<b>2,567,000</b>	<b>3,171,000</b>	<b>3,191,000</b>	<b>2,532,000</b>
Africa:					
Angola.....	34,865	34,853	29,647	23,518	38,499
Bechuanaland.....	—	—	—	243	5,893
Belgian Congo .....	424,320	508,972	363,250	404,572	365,015
Egypt <sup>9</sup> .....	6,991	7,994	21,195	10,315	5,500 <sup>5</sup>
Ghana (exports) <sup>10</sup> .....	515,475	604,330	712,154	718,306	574,124
Morocco Northern Zone.....	856	1,262	1,795	732	—
Southern Zone.....	441,203	453,013	464,523	541,772	452,041
Rhodesia and Nyasaland, Federation of:					
Northern Rhodesia.....	17,562	19,717	44,171	41,294	49,946
Southern Rhodesia.....	18	1,330	816	1,785	2,512
South West Africa .....	34,066	41,880	57,262	89,661	103,049
Sudan .....	—	—	7,700	8,800	6,600
Union of South Africa .....	772,862	649,471	768,395	787,878	934,089
<b>Totals .....</b>	<b>2,248,218</b>	<b>2,322,822</b>	<b>2,467,497</b>	<b>2,628,876</b>	<b>2,537,276</b>

See footnotes at end of table.

TABLE 36. World Production of Manganese Ore, by Countries<sup>1</sup> - Concluded

Country <sup>1</sup>	1954	1955	1956	1957	1958
	short tons <sup>2</sup>				
Oceania:					
Australia .....	31,587	53,039	66,510	86,251	62,317
Fiji .....	10,773	19,803	25,067	38,858	20,850
New Zealand .....	268	179	175	41	116
Papua .....	—	22	14	—	—
Totals .....	42,628	73,043	91,766	125,150	83,283
World totals (estimate) <sup>1</sup> .....	11,033,000	11,987,000	12,916,000	14,126,000	13,049,000

<sup>1</sup> 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 15,000 tons of approximately 15 per cent manganese content.

<sup>2</sup> 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.

<sup>3</sup> Exports.

<sup>4</sup> United States imports (believed to be produced in 1957).

<sup>5</sup> Estimate.

<sup>6</sup> Grade unstated. Source: The Industry of the U.S.S.R. Central Statistical Administration, 1957.

<sup>7</sup> Data represents 1957 production, however 1958 production was probably much greater.

<sup>8</sup> Year ending March 20 of year following that stated.

<sup>9</sup> In addition to high-grade ore shown in the table, Egypt produced the following tonnages of less than 30 percent manganese content: 1955, 227,042; 1956, 200,075; 1957, 83,957 and 1958, not available.

<sup>10</sup> Dry weight.

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

### MERCURY

There was no production in 1959 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 1959 were \$218 per flask of 76 pounds in January; \$240 in April; \$236 in July and \$214 in December.

TABLE 37. Production of Mercury, 1940 - 59

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	1956-59 .....	—	—

TABLE 38. Production of Mercury, Consumption, Imports and Exports, 1950 - 59

Year	Production	Consumption	Imports	Exports
	pounds			
1950 .....	—	166,716	614,005	8,100
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



TABLE 39. Consumption of Mercury by Principal Uses, 1955-59

Industry	1955	1956	1957	1958	1959
	pounds				
Pharmaceuticals and fine chemicals .....	26,372	35,720	4,560	6,057	10,319
Heavy chemicals .....	357,656	159,524	194,636	137,161	116,011
Electrical apparatus .....	29,184	13,680	12,312	3,969	4,211
Gold mines <sup>1</sup> .....	3,000	3,000	3,000	3,000	3,628
Miscellaneous <sup>1</sup> .....	420	876	836	834	27,818
<b>Total accounted for .....</b>	<b>8,416,632</b>	<b>212,800</b>	<b>215,300</b>	<b>151,021</b>	<b>161,987</b>

<sup>1</sup> Estimated.TABLE 40. World Production of Mercury, by Countries<sup>1</sup>

Country <sup>1</sup>	1955	1956	1957	1958	1959
	flasks of (76 pounds) 34.5 kilograms <sup>2</sup>				
North America:					
Mexico .....	29,881	19,529	21,068	22,560	16,420
United States .....	18,955	24,177	34,625	38,067	31,256
South America:					
Bolivia (exports) .....	—	—	—	10	12
Chile .....	526	575	678	3,343	4,200 <sup>3</sup>
Colombia .....	36	—	99	203	300 <sup>3</sup>
Peru .....	148	335	411	1,983	2,727 <sup>4</sup>
Europe:					
Austria .....	16	6	6	—	6 <sup>3</sup>
Czechoslovakia <sup>5</sup> .....	725	725	725	725	725 <sup>3</sup>
Italy .....	53,520	62,309	63,237	58,712	45,833
Spain .....	36,231	48,269	54,750	55,382	47,863
U.S.S.R. <sup>3</sup> .....	12,300 <sup>5</sup>	22,000	25,000	25,000	25,000
Yugoslavia .....	14,591	13,228	12,328	12,270	13,344
Asia:					
China <sup>3</sup> .....	11,500 <sup>3</sup>	17,000	17,000	17,000	23,000
Japan .....	4,990	8,334	11,872	10,900	16,051
Philippines .....	635	3,015	3,363	3,321	3,613
Taiwan .....	58	—	—	—	—
Turkey .....	841	1,079	720	1,486	1,300 <sup>3</sup>
Africa:					
Tunisia .....	166	22	—	39	198
<b>World totals (estimate) .....</b>	<b>185,000</b>	<b>221,000</b>	<b>246,000</b>	<b>251,000</b>	<b>232,000</b>

<sup>1</sup> Rumania and a few other countries may also produce a negligible amount of mercury, but production data are not available.<sup>2</sup> This table incorporates a number of revisions of data published in previous mercury chapters. Data do not add to totals shown due to rounding where estimate included in total.<sup>3</sup> Estimate.<sup>4</sup> Exports.<sup>5</sup> According to the 43rd annual issue of Metal Statistics (Metallgesellschaft).

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

## MOLYBDENUM

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

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

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



TABLE 41. Production of Molybdenum, 1950-59

Year	Ores milled	Ores and concentrates shipped or used		Total Mo contents of shipments
		tons	\$	
1950 .....	—	108.9 <sup>1</sup>	60,059	62,130
1951 .....	40,139	241	228,958	228,958
1952 .....	82,294	331	409,831	303,578
1953 .....	41,379	184	215,527	194,344
1954 .....	105,924	411	457,912	451,450
1955 .....	157,014	762	823,954	833,506
1956 .....	165,026	705	955,828	842,263
1957 .....	169,601	633	1,166,557	783,739
1958 .....	191,645	744	1,152,838	888,264
1959 .....	207,533	658	748,566	940,596

<sup>1</sup> Shipped from stockpile.TABLE 42. World Production of Molybdenum in Ores and Concentrates, by Countries<sup>1</sup>

Country <sup>1</sup>	1955	1956	1957	1958	1959
	thousands of pounds <sup>2</sup>				
Australia .....	2	<sup>3</sup>	2	4	<sup>3</sup>
Austria .....	18	2	—	—	—
Canada .....	833	842	785	888	851
Chile .....	2,817	3,122	2,998	2,972	3,785
China .....	<sup>4</sup>	<sup>4</sup>	<sup>4</sup>	2,200 <sup>5</sup>	3,300 <sup>5</sup>
Japan .....	439	527	600	683	793
Korea, Republic of.....	24	31	31	68	49
Mexico .....	55	33	29	57	57
Norway .....	379	366	390	481	480 <sup>5</sup>
Peru .....	—	—	—	<sup>3</sup>	—
Philippines .....	—	—	—	—	97
Portugal .....	11	11	18	—	—
Sweden .....	—	—	—	—	—
Union of South Africa .....	—	—	13	9	—
U.S.S.R. ....	<sup>4</sup>	<sup>4</sup>	9,300 <sup>5</sup>	9,300 <sup>5</sup>	9,900 <sup>5</sup>
United States .....	61,781	57,462	60,753	41,069	50,956
Yugoslavia .....	948	<sup>4</sup>	—	—	—
Totals (estimate) <sup>1</sup> .....	75,000	70,300	76,200	57,700	70,300

<sup>1</sup> Molybdenum is also produced in North Korea, Rumania and Spain, but production data are not available. Estimates are included in the total.<sup>2</sup> This table incorporates revisions of data published in previous molybdenum chapters. Data do not add to totals shown due to rounding where estimated figures are included in the detail.<sup>3</sup> Less than 500 pounds.<sup>4</sup> Data not yet available; estimate by author of chapter included in total.<sup>5</sup> Estimate.

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

In the manufacture of glass, selenium is used to neutralize the green colour caused by iron impurities. When sufficient selenium is added the glass turns a ruby colour highly suitable for signallenses. 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 1959 was \$7.00 per pound for commercial grade to \$9.50 per pound for high purity grade.

TABLE 43. Production<sup>1</sup> of Selenium, 1950-59

Year	Pounds	Value	Year	Pounds	Value
		\$			\$
1950 .....	261,973	633,975	1955 .....	427,109	3,203,319
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

<sup>1</sup> Includes some recoverable selenium in blister copper not necessarily recovered in the designated year.

TABLE 44. Refinery Output of Selenium from Primary and Scrap Materials, 1950-59

Year	Pounds	Year	Pounds
1950 .....	289,714	1955 .....	422,588
1951 .....	289,714	1956 .....	355,024
1952 .....	254,478	1957 .....	332,011
1953 .....	307,903	1958 .....	342,141
1954 .....	297,479	1959 .....	372,410

## TANTALUM-COLUMBIUM

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

Nipissing, Ontario. The E. & M. Journal price quotations in December, 1959 were: Columbium-per lb. of pentoxide, basis 65%  $\text{Cb}_2\text{O}_5$  and  $\text{Ta}_2\text{O}_5$ , columbium-tantalum ratio 10 to 1, \$1.10 - \$1.20 Ratio 8½ to 1, \$0.95 to \$1.05 columbium metal \$36 to \$50 per pound. Tantalum metal per lb. powder, \$40 to \$58; sheet, \$50 to \$59; rod, \$73 to \$80.

TABLE 45. World Production of Columbium and Tantalum Mineral Concentrates, by Countries<sup>1</sup>

Country <sup>1</sup>	1955		1956		1957		1958	
	Columbium	Tantalum	Columbium	Tantalum	Columbium	Tantalum	Columbium	Tantalum
	pounds <sup>2</sup>							
Argentina .....	728		3,968		688		2,262 <sup>3</sup>	11,635 <sup>3</sup>
Australia .....	27,139		159,655		50,038		18,000 <sup>4</sup>	
Belgian Congo including Ruanda-Urundi <sup>5</sup> .....	967,819		932,546		524,695		590,000 <sup>4</sup>	
Bolivia (exports) .....	2,350	—	—	—	—	—	—	—
Brazil .....	238,317	127,205	177,916	208,161	68,206	204,675	302,030	
British Guiana .....	6,720	—	—	—	—	—	—	—
Canada .....	42	390	—	—	—	—	—	—
French Equatorial Africa .....	2,672	—	—	—	—	—	—	—
French Guiana .....	20,452	—	14,916	—	2,976	—	—	—
Germany, West (U.S. Imports) .....	849,310	594,030	—	—	1,653	—	46,628	135,431
Madagascar .....	36,956	—	19,400	—	19,180	—	9,920 <sup>3</sup>	7,815 <sup>3</sup>
Malaya .....	529,104	—	619,136	—	317,462	—	356,160	—
Mozambique .....	82,884	—	56,580	—	288,582	—	375,997	—
Nigeria .....	7,047,040	35,840	5,832,960	33,600	4,307,520	40,320	1,803,200	49,930
Norway .....	675,930	—	573,196	—	489,421	—	609,792	—
Portugal (U.S. Imports) .....	168,362	6,614	31,024	7,054	72,953	5,966	65,461	32,513
Rhodesia and Nyasaland, Federation of .....	12,240	4,660	5,080	29,320	760	76,960	—	96,260
Sierra Leone .....	8,960	—	—	—	—	—	—	—
South West Africa .....	8,299	2,924	9,607	3,740	9,325	14,676	4,152	6,574
Spain <sup>6</sup> (U.S. Imports) .....	2,525	11,276	—	—	—	—	—	—
Swazi Land (Ytrotantalile) ..	—	—	—	—	—	32,920	—	—
Sweden (U.S. Imports) .....	—	—	—	—	—	—	—	992
Uganda <sup>6</sup> .....	34,003	—	10,080	—	4,032	—	5,824	—
Union of South Africa .....	—	24,000	—	2,900	—	1,981	37,920	—
United States .....	12,954	—	216,606	—	370,483	—	428,347	—
<b>World totals (estimate)<sup>2</sup> ..</b>	<b>11,540,000</b>		<b>8,950,000</b>		<b>6,910,000</b>		<b>5,000,000</b>	

<sup>1</sup> Frequently the composition ( $\text{Cb}_2\text{O}_5$  -  $\text{Ta}_2\text{O}_5$ ) of these mineral concentrates lies in an intermediate position, neither  $\text{Cb}_2\text{O}_5$  nor  $\text{Ta}_2\text{O}_5$  being strongly predominant. In such cases the production figure has been centered.

<sup>2</sup> 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.

<sup>3</sup> United States imports.

<sup>4</sup> Estimate.

<sup>5</sup> In addition, tin-columbium-tantalum were produced as follows: 1955, 5,456,385 pounds; 1956, 6,501,365 pounds; 1957, 4,360,699 pounds; 1958, not yet available; columbium-tantalum content averaging about 10 percent.

<sup>6</sup> In addition, tin-columbium-tantalum concentrates were produced as follows: 1955, 515 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.

Tellurium is recovered commercially in Canada at the Copper Cliff, Ontario, plant of the International Nickel Company of Canada, Limited, and at the Montreal East refinery of Canadian Copper Refiners, Limited. At Copper Cliff it is recovered from

the slimes formed in the process of refining copper produced from the Sudbury nickel-copper ores. At Montreal East it is obtained from the refining of copper anodes made from copper ores at Noranda, and Gaspé, Quebec, and from blister copper originating from the copper-zinc ores of Hudson Bay Mining and Smelting Co., Limited, at Flin Flon, on the Manitoba-Saskatchewan boundary.

The price of tellurium was quoted at \$1.75 to \$2.50 a pound in New York during 1959.

TABLE 46. Production<sup>1</sup> of Tellurium, 1950-59

Year	Pounds	Value	Year	Pounds	Value
		\$			\$
1950 .....	10,075	19,143	1955 .....	9,014	15,774
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

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

TABLE 47. Refinery Output of Tellurium, 1950-59

Year	Pounds	Year	Pounds
1950 .....	6,010	1955 .....	6,516
1951 .....	6,301	1956 .....	15,915
1952 .....	5,710	1957 .....	34,895
1953 .....	17,295	1958 .....	42,337
1954 .....	7,990	1959 .....	8,900

TABLE 48. Consumption of Tellurium Metal in White Metal Foundries, 1949-58

Year	White metal foundries	Year	White metal foundries
	pounds		pounds
1949 .....	310	1954 .....	794
1950 .....	962	1955 .....	740
1951 .....	672	1956 .....	1,202
1952 .....	1,237	1957 .....	1,653
1953 .....	510	1958 .....	1,016

## THALLIUM

No production was reported in 1959 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, 1959.

## 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. The thorium content of producers' shipments during 1959 amounted to 47,447 pounds valued at \$105,676.

## TIN

No economic deposits of tin have been found in Canada up to the present. Minor occurrences, principally of cassiterite ( $\text{SnO}_2$ ), the most important tin mineral, are found in the New Ross area, Lunenburg county, Nova Scotia; in the Sudbury mining division of Ontario; in the Lac du Bonnet district of south-eastern Manitoba; in southern British Columbia; in the Mayo district, Yukon, and in the Yellowknife area, Northwest Territories. Those in Nova Scotia, Ontario, Manitoba and the Northwest Territories are found largely in pegmatite dykes. In Yukon crystalline cassiterite is found in placer gravels along numerous creeks and in one small lode deposit. In British Columbia tin is found associated with base metal sulphide ores. The last mentioned type of occurrence is the only one that has been exploited

and is the source of the small Canadian production. The lead-zinc-silver orebody of the Sullivan mine, Kimberley, British Columbia, contains a very small percentage of tin. Since 1941 the Consolidated Mining and Smelting Company of Canada, Limited, has been recovering a portion of this tin as a by-product from the concentration of its lead-zinc ore. In 1959 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, \$0.99 April, \$1.02 July, \$1.02 October, \$1.02 December, \$0.99 per pound.

TABLE 49. Production of Tin, 1950-59

Year	Pounds	Value	Year	Pounds	Value
		\$			\$
1950 .....	796,403	828,259	1955 .....	492,781 <sup>1</sup>	408,030
1951 .....	346,718	494,073	1956 .....	756,934 <sup>1</sup>	670,441
1952 .....	212,113	253,581	1957 .....	709,102 <sup>1</sup>	580,342
1953 .....	643,254 <sup>1</sup>	581,746	1958 .....	795,496 <sup>1</sup>	625,260
1954 .....	333,788 <sup>1</sup>	263,359	1959 .....	747,443	630,094

<sup>1</sup> Tin content of concentrates and lead-tin alloy.

TABLE 50. Production of New Tin, Domestic Consumption and Imports, 1950-59

Year	Production	Domestic consumption	Imports
	tons (2,000 pounds)		
1950 .....	398	5,069	5,395
1951 .....	173	5,299	6,872
1952 .....	106	4,693	4,423
1953 .....	322 <sup>1</sup>	4,444	4,146
1954 .....	167 <sup>1</sup>	4,036	4,296
1955 .....	246 <sup>1</sup>	4,500	4,836
1956 .....	378 <sup>1</sup>	4,575	4,227
1957 .....	355 <sup>1</sup>	4,057	4,654
1958 .....	398 <sup>1</sup>	3,688	3,876
1959 .....	374	4,729	4,686

<sup>1</sup> Tin content of concentrates and lead-tin alloy.

TABLE 51. Consumption of Tin (Ingots or Bars), by Principal Industries, 1955-59

	1955	1956	1957	1958	1959
	tons (2,000 pounds)				
In white metal foundries (solder, babbitt, etc.)	1,991	1,909	1,698	1,571	1,711
In sheet plants (chiefly for tinplate)	2,162	2,263	2,054	1,873	2,564
In brass and bronze foundries	174	249	176	130	163
In other industries	173	154	129	114	291
<b>Totals</b>	<b>4,500</b>	<b>4,575</b>	<b>4,057</b>	<b>3,688</b>	<b>4,729</b>

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

Country	1955	1956	1957	1958	1959
	long tons <sup>1</sup>				
<b>North America:</b>					
Canada	220	338	317	355	400
Mexico	605	500	473	544	376
United States	99	—	—	—	<sup>2</sup>
<b>Totals</b>	<b>924</b>	<b>838</b>	<b>790</b>	<b>899</b>	<b><sup>2</sup></b>
<b>South America:</b>					
Argentina	89	85	182	205	207 <sup>3</sup>
Bolivia (exports)	27,921	26,843	27,794	17,731	23,813
Brazil	146	175	293	400 <sup>3</sup>	400 <sup>3</sup>
<b>Totals</b>	<b>28,156</b>	<b>27,103</b>	<b>28,269</b>	<b>18,336</b>	<b>24,420</b>
<b>Europe:</b>					
Czechoslovakia <sup>4</sup>	200	200	200	200	200
France	450	433	445	—	—
Germany, East	669	660 <sup>3</sup>	676 <sup>3</sup>	720 <sup>3</sup>	720 <sup>3</sup>
Portugal	1,445	1,169	1,127	1,249	991
Spain	822	550	491	467	485 <sup>3</sup>
U.S.S.R. <sup>5,6</sup>	10,300	11,800	13,000	13,500	15,000
United Kingdom	1,034	1,044	1,028	1,087	1,252
<b>Totals<sup>3,6</sup></b>	<b>14,900</b>	<b>15,900</b>	<b>17,000</b>	<b>17,000</b>	<b>19,000</b>
<b>Asia:</b>					
Burma	1,130	1,050	931	1,000	900
China <sup>5</sup>	18,000	20,000	23,000	23,000	26,000
Indonesia	33,368	30,053	27,723	23,201	21,616
Japan	896	926	949	1,108	993
Laos	253	254	275	301	294
Malaya	61,244	62,295	59,293	38,458	37,525
Thailand	11,023	12,481	13,531	7,728	9,527
<b>Totals<sup>2</sup></b>	<b>125,900</b>	<b>127,100</b>	<b>125,700</b>	<b>94,800</b>	<b>96,900</b>
<b>Africa:</b>					
Belgian Congo <sup>7</sup>	15,028	14,764	14,253	11,214	10,319
Cameroon Republic of	85	85	71	75	68
Niger, Republic of	47	56	50	61	57
Morocco: Southern Zone	14	5	8	6	9
Nigeria	8,158	9,067	9,534	6,200	5,541
Rhodesia and Nyasaland, Federation of	208	354	283	534	665
South West Africa	357	475	636	161	5
Swaziland	27	29	25	15	5
Tanganyika (exports)	41	15	14	19	65
Uganda (exports)	68	33	40	41	36
Union of South Africa	1,283	1,442	1,463	1,416	1,272
<b>Totals</b>	<b>25,316</b>	<b>26,300</b>	<b>26,377</b>	<b>19,765</b>	<b>18,055</b>
<b>Australia</b>	<b>2,017</b>	<b>2,078</b>	<b>1,952</b>	<b>2,237</b>	<b>2,163</b>
<b>World totals (estimate)</b>	<b>197,200</b>	<b>199,300</b>	<b>200,100</b>	<b>153,000</b>	<b>161,000</b>

<sup>1</sup> 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.

<sup>2</sup> Figures withheld to avoid disclosing individual company data.

<sup>3</sup> 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.

<sup>4</sup> Estimate, according to 46th annual issue of Metal Statistics (Metallgesellschaft) through 1958.

<sup>5</sup> Estimated smelter production.

<sup>6</sup> Output from U.S.S.R. in Asia included with U.S.S.R. in Europe.

<sup>7</sup> Including Ruanda-Urundi.

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

Prices (nominal) f.o.b. U.S. Atlantic ports at the end of 1958 were: Ilmenite, 59.5%  $\text{TiO}_2$ , \$23 to \$26 per gross ton. The nominal quotation for titanium metal, 99.3 per cent, was \$1.60 per pound.

TABLE 53. Producers' Shipments of Titanium Ore to Outside Customers, 1950-59

Year	Short tons	Value	Year	Short tons	Value
		\$			\$
1950 .....	1,253	7,706	1955 .....	1,464	10,634
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

TABLE 54. Imports of Titanium Oxide and White Pigments Containing not Less than 14 Per Cent by Weight of Titanium, 1955-59

Year	From the United Kingdom		From the United States		Total imports	
	Pounds	Value	Pounds	Value	Pounds	Value
		\$		\$		\$
1955 .....	20,967,494	3,968,607	50,629,850	6,536,335	71,597,344	10,504,942
1956 .....	19,430,833	3,884,323	56,070,259	8,637,934	75,744,730	12,598,033
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

TABLE 55. 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
<b>Total accounted for.....</b>	<b>65,411,255</b>	<b>12,495,273</b>	<b>71,593,203</b>	<b>13,662,601</b>

TABLE 56. World Production of Titanium Concentrates (Ilmenite and Rutile), by Countries

Country	1954	1955	1956	1957	1958
	short tons <sup>1</sup>				
Ilmenite					
Australia <sup>2</sup> (sales).....	526	600	4,787	79,694	70,700 <sup>3</sup>
Brazil.....	—	—	—	—	5,691
Canada <sup>4</sup> .....	124,502	164,249	220,885	269,690	166,728
Egypt.....	2,900	2,694	4,547	3,700 <sup>3</sup>	3,700 <sup>3</sup>
Finland.....	55,765	93,668	113,444	116,568	117,384
Gambia.....	1,216	—	—	15,297	31,851
India.....	269,375	280,867	375,861	331,520	346,080
Japan <sup>5</sup> .....	2,638	5,097	9,634	9,055	3,837
Malaya.....	50,114	60,340	136,837	102,742	83,806
Mexico.....	—	12	—	—	166
Norway.....	164,448	173,981	209,990	231,693	233,585
Portugal.....	563	866	679	388	100
Senegal.....	13,779	30,424	21,716	39,573	36,128
Spain.....	1,397	7,388	5,962	9,796	17,100 <sup>3</sup>
Thailand.....	—	—	386	2,039	1,100 <sup>3</sup>
Union of South Africa.....	—	1,917	1,855	3,118	29,611
United States <sup>6</sup> .....	547,711	583,044	684,956	757,180	563,338
World totals (estimate) <sup>1</sup> .....	1,234,900	1,405,100	1,791,550	1,972,050	1,710,900
Rutile					
Australia.....	50,018	66,767	108,434	144,372	92,900 <sup>3</sup>
Brazil.....	120	174	338	220	220 <sup>3</sup>
French Cameroon.....	—	110	168	44	—
India.....	117	166	606	530	504
Norway.....	—	10	26	28	—
Senegal.....	—	—	650	243	1,157
Union of South Africa.....	—	—	—	32	552
United States.....	7,411	8,513	11,997	10,702	7,406
World totals (estimate) <sup>1</sup> .....	57,700	75,740	122,200	156,200	102,750

<sup>1</sup> This table incorporates a number of revisions of data published in previous titanium chapters. Data do not add to totals shown due to rounding where estimated figures are included in the detail.

<sup>2</sup> Due to high chromium content in the ore, only sales are shown.

<sup>3</sup> Estimate.

<sup>4</sup> Includes titanium slag containing approximately 70 per cent TiO<sub>2</sub>.

<sup>5</sup> Represents titanium slag.

<sup>6</sup> Includes a mixed product containing altered ilmenite, leucroxine and rutile.

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

**TABLE 57. Consumption of Ferrotitanium in the Manufacture of Steel, 1949-58**

Year	Tons	Value	Year	Tons	Value
		\$			\$
1949 .....	142	29,067	1954 .....	171	50,166
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

**TUNGSTEN**

Tungsten concentrates were not produced in 1959. Mining of tungsten ores in British Columbia ceased in the preceding year. Tungsten bearing deposits occur in British Columbia, Yukon, Northwest 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 en-

gines 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 1959 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 58. Production (Commercial Shipments) of Tungsten Concentrate, 1950-59**

Year	Concentrate	$WO_3$ content	Value
	pounds		\$
1950 .....	1,886,000 <sup>1</sup>	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 .....	—	—	—

<sup>1</sup> Includes export of considerable low-grade material to United States.

**TABLE 59. Consumption of Ferrotungsten in Steel Furnaces, 1949-58**

Year	Short tons	Cost at works	Year	Short tons	Cost at works
		\$			\$
1949 .....	190	428,535	1954 .....	38	118,280
1950 .....	117	302,872	1955 .....	53	196,376
1951 .....	364	2,726,887	1956 .....	37	160,436
1952 .....	212	1,609,590	1957 .....	34	100,357
1953 .....	49	275,761	1958 .....	38	81,061



**TABLE 60. World Production of Tungsten Ores, by Countries<sup>1</sup>, of Concentrates Containing 60 per WO<sub>3</sub>**

Country	1955	1956	1957	1958	1959
short tons <sup>1</sup>					
<b>North America:</b>					
Canada .....	1,618	1,893	1,602	575	—
Mexico .....	626	628	294	8	138
United States (shipments) .....	16,412	14,737	5,520	3,788	3,649
<b>Totals .....</b>	<b>18,656</b>	<b>17,258</b>	<b>7,416</b>	<b>4,371</b>	<b>3,787</b>
<b>South America:</b>					
Argentina .....	1,213	1,293	1,441	1,127	830 <sup>2</sup>
Bolivia (exports) .....	5,935	5,255	4,809	2,457	2,671
Brazil (exports) .....	1,410	2,017	2,304	2,596	1,609
Peru .....	893	1,242	1,215	922	610
<b>Totals .....</b>	<b>9,451</b>	<b>9,807</b>	<b>9,769</b>	<b>7,102</b>	<b>5,720</b>
<b>Europe:</b>					
Austria .....	—	—	140	146	148
Finland .....	146	74	—	163	42
France .....	1,520	1,348	1,091	1,082	924
Italy .....	30	30	20	10	7
Portugal .....	5,122	5,506	4,756	2,109	2,610
Spain .....	1,728	1,354	1,319	1,301	896
Sweden .....	510	504	557	660	860 <sup>2</sup>
U.S.S.R. <sup>2</sup> .....	8,300	8,300	8,300	8,300	8,300
United Kingdom .....	80	88	55	2	—
Yugoslavia .....	120 <sup>2</sup>	83	90	99	108
<b>Total<sup>2</sup> .....</b>	<b>17,600</b>	<b>17,300</b>	<b>16,300</b>	<b>13,900</b>	<b>13,700</b>
<b>Asia:</b>					
Burma <sup>3</sup> .....	2,927	2,982	2,873	1,667	1,182
China <sup>2</sup> .....	19,800	19,800	16,500	16,500	19,800
Hong Kong .....	28	30	42	46	47
India .....	—	2	2	—	1
Japan .....	990	1,200	1,144	881	1,446
Korea: Republic of .....	3,757	4,472	4,567	3,597	3,761
North Korea <sup>3</sup> .....	2,055	2,190	2,865	3,300	4,400
Malaya, Federation of .....	138	117	63	57	24
Thailand .....	1,367	1,411	1,080	725	553
<b>Totals<sup>2</sup> .....</b>	<b>31,100</b>	<b>32,200</b>	<b>28,950</b>	<b>26,800</b>	<b>31,210</b>
<b>Africa:</b>					
Algeria .....	—	—	—	—	—
Belgian Congo <sup>3,4</sup> .....	1,733	2,142	1,914	1,479	1,209
Morocco: Southern Zone .....	—	3	—	—	—
Nigeria .....	3	4	—	—	—
Rhodesia and Nyasaland, Federation of:					
Southern Rhodesia .....	245	287	180	103	41
South West Africa <sup>3</sup> .....	283	388	278	64	2
Tanganyika (exports) .....	10	7	—	—	—
Uganda (exports) .....	187	193	224	31	14
Union of South Africa .....	708	330	290	61	42
United Arab Republic (Egypt region) .....	21	—	—	—	—
<b>Totals .....</b>	<b>3,190</b>	<b>3,354</b>	<b>2,886</b>	<b>1,738</b>	<b>1,308</b>
<b>Oceania:</b>					
Australia .....	2,785	2,954	2,629	1,587	1,125 <sup>2</sup>
New Zealand .....	33	33	38	3	—
<b>Totals .....</b>	<b>2,798</b>	<b>2,987</b>	<b>2,665</b>	<b>1,590</b>	<b>1,125<sup>2</sup></b>
<b>Worlds total (estimate) .....</b>	<b>82,800</b>	<b>82,900</b>	<b>68,000</b>	<b>55,500</b>	<b>56,850</b>

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

<sup>2</sup> Estimate.

<sup>3</sup> Including WO<sub>3</sub> in tin-tungsten concentrates.

<sup>4</sup> Including Ruanda-Urundi.

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

## URANIUM

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

In 1959 the output of uranium precipitates from the mines in Ontario were valued at \$268,529,993. The Beaverlodge area in Saskatchewan shipped \$54,457,321 worth of  $U_3O_8$ . From the Northwest Territories the shipments were valued at \$8,155,729.

Detailed technical data on the uranium industry appears in "Uranium in Canada 1959" Review 24 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 1956-59.

TABLE 61. Producers' Shipments<sup>1</sup> of Uranium, Radium etc., 1935-59

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 .....	...	..			

<sup>1</sup> Compilation method is shown in text above.

TABLE 62. World Production of Uranium Oxide  $U_3O_8$ , by Countries<sup>1</sup>

Country	1956	1957	1958	1959
	short tons <sup>2</sup>			
North America:				
Canada .....	2,280	6,635	13,400	15,910
United States .....	6,000	8,640	12,560	16,390
South America:				
Argentina <sup>3</sup> .....	20	20	25	25
Colombia <sup>3</sup> .....	—	—	—	3
Europe:				
Finland <sup>4</sup> .....	—	—	—	20
France <sup>3</sup> .....	—	465	865	1,000
Germany, West <sup>3</sup> .....	—	—	—	3
Sweden .....	6	10	10	10 <sup>3</sup>
Africa:				
Belgian Congo <sup>3</sup> .....	1,300	1,300	2,300	2,300
Madagascar <sup>3</sup> .....	—	70	95	100
Rhodesia and Nyasaland .....	—	25	50	35 <sup>3</sup>
Union of South Africa .....	4,365	5,700	6,245	6,445
Oceania:				
Australia <sup>3</sup> .....	300	400	700	1,000
World <sup>4</sup> totals (estimate) <sup>1,2</sup> .....	14,470	23,470	36,450	43,450

<sup>1</sup> In addition to the countries listed, uranium is also known to have been produced in 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. Colombia, Finland, West Germany, Belgian Congo and Rhodesia do not produce concentrates: figures are calculated based on ore production. Statistics for France are converted from metal production data.

<sup>2</sup> 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 total.

<sup>3</sup> Estimate.

<sup>4</sup> Data for U.S.S.R. is not available.

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

## VANADIUM

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

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

The metal is employed chiefly in the manufacture of alloy steels and irons. It is also used in the

form of ammonia meta-vanadate as a catalyst in the manufacture of sulphuric acid, and in the non-ferrous, glass, ceramic and colour industries.

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

Vanadium ore was quoted December, 1959, at 31 cents per pound, ( $V_2O_5$  content) 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 63. World Production of Vanadium in Ores and Concentrates

Country	1954	1955	1956	1957	1958
	short tons <sup>1</sup>				
North America:					
United States (recoverable vanadium) .....	3,026 <sup>2</sup>	3,286	3,868	3,691	3,030
South America:					
Argentina .....	<sup>3</sup>	—	<sup>3</sup>	<sup>3</sup>	<sup>3</sup>
Peru (content of concentrate) .....	209	78	—	—	—
Europe:					
Finland .....	—	—	43	290	430
Africa:					
Angola .....	—	—	11	1	20
Rhodesia, Nyasaland, Northern Rhodesia (recoverable vanadium) .....	—	—	—	—	—
South West Africa (recoverable vanadium) ....	633	632	308	305	435
Union of South Africa: Transvaal .....	—	—	—	8	316
World totals (estimate) <sup>4</sup> .....	3,868	3,996	4,230	4,295	4,231

<sup>1</sup> This table incorporates a number of revisions of data published in previous chapters.

<sup>2</sup> Includes vanadium recovered as a by-product of phosphate-rock mining.

<sup>3</sup> Negligible.

<sup>4</sup> Total represents data only for countries shown in table and excludes vanadium in ores produced in Belgian Congo, Mexico, 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, 1959 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 64. World Production of Zirconium Ores and Concentrates, by Countries<sup>1</sup>

Country <sup>1</sup>	1955	1956	1957	1958	1959
	short tons <sup>1</sup>				
Australia .....	54,514	81,153	99,188	66,382	110,000 <sup>2</sup>
Brazil <sup>3</sup> .....	3,312	2,829	1,799	2,939	<sup>4</sup>
Egypt .....	126	402	45	45 <sup>2</sup>	<sup>4</sup>
India .....	3	3	10	10	10 <sup>2</sup>
Madagascar .....	—	—	1	58	<sup>4</sup>
Malaya .....	91	51	47	28	100 <sup>2</sup>
Nigeria (U.S. imports) .....	—	—	—	50	868
Senegal .....	—	1,268	3,197	6,057	9,557
Union of South Africa .....	—	—	—	1,129	5,924
United States <sup>5</sup> .....	28,110	44,174	56,802 <sup>5</sup>	30,443 <sup>6</sup>	<sup>7</sup>

<sup>1</sup> This table incorporates a number of revisions of data published in previous tables.

<sup>2</sup> Estimate.

<sup>3</sup> Chiefly baddeleyite.

<sup>4</sup> Data not available.

<sup>5</sup> Includes Florida only.

<sup>6</sup> Excludes Idaho.

<sup>7</sup> 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, 1959

Name of firm and product	Head office address	Location of mine or plant
<b>Aluminum:</b>		
Aluminum Company of Canada Limited .....	1700 Sun Life Building, Montreal, Quebec .....	Arvida, Quebec; Shawinigan Falls, Quebec; Ile Maligne, Quebec; Beauharnois, Quebec; Kitimat, British Columbia
Canadian British Aluminum Co. Ltd. ....	Bale Comeau, Quebec .....	Bale Comeau, Quebec
<b>Antimony:</b>		
Consolidated Mining & Smelting Company of Canada Ltd. ....	215 St. James St., Montreal, Quebec .....	Trail, British Columbia
<b>Barium:</b>		
Dominion Magnesium Ltd. ....	Haley, Ontario .....	Haley, Ontario
<b>Beryl:</b>		
Canadian Beryllium Mines & Alloys Ltd. <sup>1</sup> .....	100 Adelaide St. W., Toronto, Ontario .....	Renfrew County, Ontario
Dalhart Beryllium Mines & Metals Corp. <sup>1</sup> .....	217 Bay St., Toronto, Ontario .....	Dalhart, Manitoba
<b>Bismuth:</b>		
Deloro Smelting & Refining Co. Ltd. ....	900 Victoria Building, Ottawa, Ontario .....	Deloro, Ontario
Consolidated Mining & Smelting Company of Canada Ltd. ....	215 St. James St., Montreal, Quebec .....	Trail, British Columbia
Molybdenite Corp. of Canada Ltd. ....	59 St. James St. W., Montreal, Quebec .....	La Corne Twp., Quebec
Gaspé Copper Mines Ltd. ....	44 King St. W., Toronto, Ontario .....	
<b>Cadmium:</b>		
Consolidated Mining & Smelting Company of Canada Ltd. ....	215 St. James St., Montreal, Quebec .....	Trail, British Columbia
Hudson Bay Mining & Smelting Co. Ltd. ....	500 Royal Bank Building, Winnipeg, Manitoba .....	Flin Flon, Manitoba
Britannia Mining & Smelting Co. Ltd. ....	Britannia Beach, British Columbia .....	Britannia Beach, British Columbia
Canadian Exploration Ltd. ....	Royal Bank Bldg., Vancouver, British Columbia .....	Salmo, British Columbia
Caledonia Mine, c/o G.E. McCready .....	Kaslo .....	Alnsworth
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
Reeves Macdonald Mines Ltd. ....	413 Granville St., Vancouver, B.C. ....	Remac
Sheep Creek 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
Western Exploration Co. Ltd. ....	Silverton, British Columbia .....	Silverton, British Columbia
United Keno Hill Mines Ltd. ....	85 Richmond St. W., Toronto, Ontario .....	Edsa, Yukon
<b>Cerium:</b>		
Atlin-Ruffner Mines (B.C.) Ltd. <sup>1</sup> .....	510 W. Hastings St., Vancouver British Columbia .....	Perry Sound, Ontario
<b>Chromite:</b>		
Colonial Chrome Co. Ltd. <sup>1</sup> .....	420 Lexington Ave., New York, N.Y., U.S.A. ....	Black Lake, Quebec
Gunnar Gold Mines Ltd. <sup>1</sup> .....	80 King St., Toronto, Ontario .....	Bird River, Manitoba
Strannar Mines Ltd. <sup>1</sup> .....	25 Adelaide St. W., Toronto, Ontario .....	Lac du Bonnet, Manitoba
<b>Germanium:</b>		
Talga Mines Ltd. <sup>2</sup> .....	837 W. Hastings St., Vancouver, B.C. ....	Powell River
<b>Indium:</b>		
Consolidated Mining & Smelting Company of Canada Ltd. ....	215 St. James St., Montreal, Quebec .....	Trail, British Columbia
<b>Manganese:</b>		
Quebec Manganese Mines Ltd. <sup>1</sup> .....	231 St. James St. W., Montreal, Quebec .....	Magdalen Islands, Quebec
Stratmat Ltd. <sup>2</sup> .....	620 Cathcart St., Montreal, Quebec .....	Woodstock, New Brunswick
St. Maurice Minerals Corp. <sup>1</sup> .....	1434 Ste-Catherine St., Montreal, Quebec .....	St. Denis Twp., Quebec
<b>Magnesium:</b>		
Dominion Magnesium Ltd. ....	67 Yonge St., Toronto, Ontario .....	Haley, Ontario
Aluminum Co. of Canada Ltd. ....	1700 Sun Life Building, Montreal, Quebec .....	Arvida, Quebec
<b>Mercury:</b>		
Bralorne Mines Ltd. <sup>1</sup> .....	555 Burrard St., Vancouver, British Columbia .....	Onineca district, British Columbia
Consolidated Mining & Smelting Company of Canada Ltd. <sup>1</sup> ..	215 St. James St., Montreal, Quebec .....	Pinchi Lake, British Columbia
Sevrens, Wm. <sup>1</sup> .....	Bridge River .....	Tyax Lake
<b>Molybdenite:</b>		
Anglo-American Molybdenite Mining Corp. <sup>2</sup> .....	Box 577 Val D'Or, Quebec .....	Preissac Twp., Quebec
Franti Mining Corp. <sup>2</sup> .....	82 Thibeau, Cap de la Madeleine, Québec .....	Mekinac, Quebec
Frontenac Mining Corp. <sup>2</sup> .....	5083 St. Denis, Montreal, Quebec .....	Frontenac County, Quebec
Lavandin Mining Co. <sup>2</sup> .....	152 Notre Dame St. E., Montreal, Quebec .....	Malartic, Quebec
Molybdenite Corp. of Can. Ltd. ....	485 rue McGill, Montreal, Quebec .....	La Corne, Quebec
McDougall-Lusk Mineral Exploration <sup>2</sup> .....	4204 St. Catherine St. W., Montreal, Quebec .....	Eardley Twp., Quebec
Portneuf Mineral Corp. <sup>2</sup> .....	437 St. James St. W., Montreal, Quebec .....	Portneuf, Quebec
Preissac Molybdenite Mines Ltd. <sup>1</sup> .....	485 McGill St., Montreal, Quebec .....	Preissac, Quebec
Provincial Molybdenum Corp. Ltd. <sup>2</sup> .....	132 Main St., Maniwaki, Quebec .....	Kinsington Twp., Quebec
Nortoba Mines Ltd. <sup>2</sup> .....	199 Bay St., Toronto, Ontario .....	Sturgeon River, Ontario
Huestis Molybdenum Corp Ltd. <sup>2</sup> .....	402 W. Pender St., Vancouver, B.C. ....	Cariboo area, British Columbia
Canol Metal Mines Ltd. <sup>1</sup> .....	25 Adelaide St. W., Toronto, Ontario .....	Quiet Lake, Yukon
Stormy Mines Ltd. ....	25 Adelaide St. W., Toronto, Ontario .....	Quiet Lake, Yukon

See footnotes at end of Directory.

## Directory of Firms in the Miscellaneous Metal Mining Industry, 1959 - Continued

Name of firm and product	Head office address	Location of mine or plant
<b>Selenium-Tellurium:</b>		
International Nickel Co. of Canada Ltd. ....	Copper Cliff, Ontario .....	Copper Cliff, Ontario
Canadian Copper Refiners Ltd. ....	1600 Royal Bank Building, Toronto, Ontario .....	Montreal East, Quebec
<b>Tantalum-Columbite:</b>		
Advance Red Lake Gold Mines Ltd. <sup>1</sup> .....	347 Bay St. Toronto, Ontario .....	St. Joseph, Quebec
Barymin Explorations Ltd. <sup>1</sup> .....	25 Adelaide St. W., Toronto .....	Oka, Quebec
Bouscadillac Gold Mines Ltd. <sup>1</sup> .....	85 Richmond St. W., Toronto, Ontario .....	L'Annonciation, Quebec
Consolidated Pershcourt Mining Ltd. <sup>1</sup> .....	159 Ouest, rue Craig, Montreal, Quebec .....	Oka, Quebec
Coulee Lead & Zinc Mines Ltd. <sup>2</sup> .....	55 Yonge St. Toronto, Ontario .....	Oka, Quebec
Delmico Mines Ltd. <sup>1</sup> .....	25 Adelaide St. W., Toronto, Ontario .....	Oka, Quebec
Headway Red Lake Gold Mines Ltd. <sup>2</sup> .....	67 Yonge St., Toronto, Ontario .....	Oka, Quebec
Main Oka Mining Corp. <sup>2</sup> .....	159, Ouest, rue Craig, Montreal, Quebec .....	Oka, Quebec
New Alger Mines Ltd. <sup>1</sup> .....	80 Richmond St. W., Toronto, Ontario .....	Oka, Quebec
Oka Rare Metals Mining Co. Ltd. <sup>2</sup> .....	320 Bay St., Toronto, Ontario .....	Oka, Quebec
Columbium Mining Products Ltd. <sup>2</sup> .....	55 Yonge St., Toronto, Ontario .....	Oka, Quebec
Gulf Lead Mines Ltd. <sup>2</sup> .....	25 Adelaide St. W., Toronto, Ontario .....	Oka, Quebec
Oka Uranium & Metals Ltd. <sup>2</sup> .....	159 Ouest, rue Craig, Montreal, Quebec .....	Oka, Quebec
Ontario Nickel Mines Ltd. <sup>1</sup> .....	100 Adelaide St. West, Toronto, Ontario .....	Oka, Quebec
Quebec Columblum Ltd. ....	507 Place D'Armes, Montreal, Quebec .....	L'Annonciation, Quebec
St. Lawrence River Mines Ltd. ....	159 Ouest, rue Craig, Montreal, Quebec .....	Oka, Quebec
Trebor Mines Ltd. <sup>1</sup> .....	100 Adelaide St. W., Toronto, Ontario .....	Ile Aux Tourtes
Twin Mountain Uranium Mines Ltd. <sup>1</sup> .....	302 Bay St., Toronto, Ontario .....	Oka, Quebec
Nova Beaucage Mines Ltd. <sup>2</sup> .....	170 Regina St., North Bay, Ontario .....	Nipissing, Ontario
Ontario Rare Metal Mines Ltd. <sup>1</sup> .....	44 King St. W., Toronto, Ontario .....	Algoma, Ontario
Quebec Metallurgical Industries Ltd. <sup>1</sup> .....	88 Metcalfe St., Ottawa, Ontario .....	Bugaboo Creek, B.C.
<b>Thallium:</b>		
Hudson Bay Mining & Smelting Co. Ltd. <sup>2</sup> .....	500 Royal Bank Building, Winnipeg, Manitoba ....	Flin Flon, Manitoba
<b>Thorium:</b>		
Rio Tinto-Dow Ltd. ....	Box 190, Elliot Lake, Ontario .....	Elliot Lake, Ontario
<b>Tin:</b>		
Consolidated Mining & Smelting Company of Canada Ltd. ....	215 St. James St., Montreal, Quebec .....	Trail, British Columbia
Mountain Crest Mines Ltd. <sup>1</sup> .....	1445 MacKay St., Montreal, Quebec .....	Charlevoix, Quebec
<b>Titanium ore:</b>		
Continental Iron & Titanium Mining Ltd. <sup>2</sup> .....	4593 Jeanne Mance St. Montreal, Quebec .....	St. Urgan Co., Quebec
Canadian Javelin Ltd. <sup>2</sup> .....	St. John's, Newfoundland .....	Chicoutimi Co., Quebec
Kelley Mining Corp. <sup>2</sup> .....	260 St. John St., Quebec, Quebec .....	St. Urbain Co., Quebec
Les Minéraux Laurentiens Ltd. <sup>2</sup> .....	St. Joseph de Beauce, Quebec .....	St. Urbain Co., Quebec
Quebec Iron and Titanium Corp. ....	Box 40, Sorel, Quebec .....	Parker Twp., Sorel, Quebec
Tamara Mining Ltd. ....	400 St. James St., Montreal, Quebec .....	Barford Twp., Quebec
<b>Tungsten concentrates:</b>		
Burnt Hill Tungsten Mines Ltd. <sup>1</sup> .....	510 McGill St., Montreal Quebec .....	Cross Creek, New Brunswick
Hollinger Consolidated Gold Mines Ltd. <sup>1</sup> .....	Timmins, Ontario .....	Timmins, Ontario
Canadian Exploration Ltd. <sup>2</sup> .....	Royal Bank Building, Vancouver, British Columbia	Salmo, British Columbia
Quebec Tungsten Ltd. <sup>1</sup> .....	111 Côte-de-la-Montagne, Quebec, Quebec .....	Calquier, Quebec
<b>Uranium:</b>		
<b>New Brunswick:</b>		
Aumacho River Mines Ltd. <sup>2</sup> .....	25 Adelaide St. W., Toronto, Ontario .....	Aumacho River, New Brunswick
New Brunswick Uranium Metals & Mining Ltd. <sup>2</sup> .....	44 King St. W., Toronto, Ontario .....	Harvey, New Brunswick
<b>Quebec:</b>		
Arnora Sulphur Mining Corp. <sup>1</sup> .....	1410 Stanley St., Montreal .....	Huddersfield
Calumet Uranium Mines Ltd. <sup>1</sup> .....	159 Ouest, rue Craig Montreal .....	Isle Calumet
Chess Uranium Corp. <sup>1</sup> .....	5616 Park Ave., Montreal .....	St. Hilaire
Marlowe Mines Ltd. <sup>1</sup> .....	1557 Mackay St., Montreal .....	Pied des Monts
Mogul Mining Corp. Ltd. <sup>1</sup> .....	25 Adelaide St. W., Toronto, Ontario .....	Figueray Twp.
Molybdenum Corp. Of America <sup>2</sup> .....	500 Fifth Ave. New York, U.S.A. ....	Oka, Quebec
Nakada Radioactive Minerals Inc. <sup>2</sup> .....	202 Forbes Bldg., Syracuse N.Y., U.S.A. ....	Egan Twp.
Pond Mining Corp. <sup>1</sup> .....	985 Sherbrooke St., Montreal .....	Huddersfield Twp.
Quebec North Mines Ltd. <sup>1</sup> .....	1557 Mackay St., Montreal .....	Arrache Co.
Saguenay Mining & Smelting Co. Ltd. <sup>1</sup> .....	1557 Mackay St., Montreal .....	De Salles Twp.
<b>Ontario:</b>		
Alba Explorations Ltd. <sup>2</sup> .....	100 Adelaide St. W., Toronto .....	Thunder Bay
Algoma Uranium Mines Ltd. ....	335 Bay St., Toronto .....	Elliot Lake
Aumacho River Mine Ltd. <sup>2</sup> .....	25 Adelaide St. W., Toronto .....	Cardiff
Bancroft Uranium Mines Ltd. <sup>1</sup> .....	25 Melinda St., Toronto .....	Cardiff
Beaupas Mines Ltd. <sup>2</sup> .....	159 Ouest rue Craig, Montreal, Quebec .....	Blind River
Bicroft Uranium Mines Ltd. ....	25 Adelaide St. W., Toronto .....	Cardiff Twp.
Blue Rock Cerium Mines Ltd. <sup>2</sup> .....	372 Bay St., Toronto .....	Tory Hill
Bracemac Mines Ltd. <sup>2</sup> .....	357 Bay St., Toronto .....	Blind River
Brewis Red Lake Mines Ltd. <sup>2</sup> .....	145 Yonge St., Toronto .....	Parter Twp.



## Directory of Firms in the Miscellaneous Metal Mining Industry, 1959 - Continued

Name of firm and product	Head office address	Location of mine or plant
<b>Uranium - Continued:</b>		
<b>Ontario - Concluded:</b>		
Buckles Algoma Uranium Mines Ltd. <sup>2</sup>	44 King St. W., Toronto	Blind River
Bunker Hill Extension Mines Ltd. <sup>1</sup>	100 Adelaide St. W., Toronto	Striker Twp.
Burma Shore Mines Ltd. <sup>2</sup>	392 Bay St., Toronto	Wilberforce
Canadian Dyno Mines Ltd.	25 Adelaide St. W., Toronto	Cardiff Twp.
Can-Met Explorations	360 Bay St., Toronto	Blind River
Conecho Mines Ltd. <sup>2</sup>	44 King St. W., Toronto	Quirke Lake
Consolidated Denison Mines Ltd.	360 Bay St., Toronto	Quirke Lake
Nealon Mines Ltd.	80 King St. W., Toronto	Cardiff Twp.
Consolidated Tungsten Mining Corp. of Can. Ltd. <sup>1</sup>	80 King St. W., Toronto	Cardiff Twp.
Detta Minerals Ltd. <sup>2</sup>	145 Yonge St., Toronto	Blind River
Duvel Oil & Mines Ltd. <sup>2</sup>	100 Adelaide St. W., Toronto	Blind River
Fab Metals Mines Ltd. <sup>2</sup>	25 Adelaide St. W., Toronto	Bancroft
Faraday Uranium Mines Ltd.	100 Adelaide St. W., Toronto	Bancroft
Geneva Lake Mines Ltd.	357 Bay St., Toronto	Blind River
Greyhawk Uranium Mines Ltd.	320 Bay St., Toronto	Faraday Twp.
Halo Uranium Mines Ltd. <sup>2</sup>	372 Bay St., Toronto	Haliburton
Lexindin Gold Mines Ltd. <sup>1</sup>	25 Adelaide St. W., Toronto	Blind River
Macfie Explorations Ltd. <sup>2</sup>	145 Yonge St., Toronto	Red Lake
Magoma Mines Ltd. <sup>2</sup>	347 Bay St., Toronto	Sault Ste. Marie
McMarnac Red Lake <sup>2</sup>	405 Glencairn Ave., Toronto	Blind River
Milliken Lake Uranium Mines Ltd.	335 Bay St., Toronto	Blind River
Moon Lake Uranium Mines Ltd. <sup>2</sup>	44 King St. W., Toronto	Algoma
Nipirion Mines Ltd. <sup>1</sup>	302 Bay St., Toronto	Biddulph Twp.
Northspan Uranium Mines Ltd.	335 Bay St., Toronto	Elliot Lake
Pardee Amalgamated Mines Ltd. <sup>2</sup>	111 Richmond St., Toronto	Blind River
Peach Uranium & Metal Mining Ltd. <sup>2</sup>	335 Bay St., Toronto	Blind River
Pebble Uranium Mines Ltd. <sup>2</sup>	62 Richmond St. W., Toronto	Blind River
Plum Uranium & Metal Mining Ltd. <sup>2</sup>	44 King St. W., Toronto	Blind River
Power Uranium Co. Ltd. <sup>2</sup>	400 St. James St. W., Montreal, Quebec	Blind River
Pronto Uranium Mines Ltd.	335 Bay St., Toronto	Long Twp.
Quebec Developers & Smelters Ltd. <sup>2</sup>	1551 Bishop St., Montreal, Quebec	Spragge Twp.
Randex Uranium Mines Inc. <sup>2</sup>	220 W. 42nd St., New York, U.S.A.	Blind River
Rare Earth Mining Corp. of Can. <sup>1</sup>	372 Bay St., Toronto	Tory Hill
Roche Mines Ltd. <sup>2</sup>	372 Bay St., Toronto	Quirke Lake
Sand River Gold Mining Co. Ltd. <sup>2</sup>	302 Bay St., Toronto	Blind River
Stancan Uranium Corp. <sup>2</sup>	80 Richmond St. W., Toronto	Blind River
Stanleigh Uranium Mining Corp. Ltd.	55 Richmond St. W., Toronto	Algoma
Stanrock Uranium Mines Ltd.	121 Richmond St. W., Toronto	Elliot Lake
Trio Uranium Mines Ltd. <sup>1</sup>	360 Bay St., Toronto	Parry Sound
Triton Mines & Metals Corp. Ltd. <sup>1</sup>	67 Yonge St., Toronto	Cardiff Twp.
Vite Uranium Mines Ltd. <sup>1</sup>	80 King St. W., Toronto	Blind River
Zenmac Metal Mines <sup>1</sup>	200 Bay St., Toronto	Blind River
<b>Saskatchewan:</b>		
Atlas Uranium Corp. Ltd.	526 Northern Hardware Bldg. Edmonton	Athabaska
Ameranium Mines Ltd. <sup>2</sup>	100 Adelaide St. W., Toronto, Ontario	Athabaska
Baska Uranium Mines Ltd.	2230 Queen St., Regina	Beaverlodge
Black Bay Uranium Ltd. <sup>2</sup>	25 Adelaide St. W., Toronto, Ontario	Uranium City
Consolidated Nickolson Mines Ltd. <sup>1</sup>	532 Burrard St., Vancouver, British Columbia	Uranium City
Camdeck Mines Ltd. <sup>2</sup>	82 Government Rd., Kirkland Lake, Ontario	Fredette Lake
Gayzor Athabaska Mines Ltd. <sup>2</sup>	67 Yonge St., Toronto, Ontario	Uranium City
Chimo Gold Mines Ltd. <sup>2</sup>	25 Adelaide St. W., Toronto, Ontario	Uranium City
Clix Athabaska Mines Ltd. <sup>2</sup>	25 Adelaide St. W., Toronto, Ontario	Athabaska
Dee Explorations Ltd. <sup>2</sup>	104 Main St., Flin Flon, Manitoba	Athabaska
Destorada Mines Ltd. <sup>2</sup>	170 Bay St., Toronto, Ontario	Beaverlodge
Gaitwin Explorations Ltd. <sup>2</sup>	25 Adelaide St. W., Toronto, Ontario	Milliken Lake
Great West Uranium Mines Ltd.	105 Ross Bldg., Saskatoon	Uranium City
Guich Mines Ltd. <sup>2</sup>	217 Bay St., Toronto, Ontario	Uranium City
Gunnar Mines Ltd.	25 Adelaide St. W., Toronto, Ontario	Athabaska
Iso Mines Ltd. <sup>2</sup>	100 Adelaide St. W., Toronto, Ontario	Athabaska
Lavant Mines Ltd. <sup>2</sup>	600 Bay St. Toronto, Ontario	Beaverlodge
Joburke Gold Mines <sup>1</sup>	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
Lake Lingman Gold Mining Co. Ltd. <sup>2</sup>	320 Bay St., Toronto, Ontario	Beaverlodge
Magma Mines Ltd. <sup>2</sup>	467 Western Trust Bldg., Regina	Burbidge Lake
National Explorations Ltd.	789 W. Pender St., Vancouver, B.C.	Athabaska
Nesblitt Labine Uranium Mines Ltd. <sup>2</sup>	25 Adelaide St. W., Toronto, Ontario	Uranium City
Nisto Mines Ltd. <sup>2</sup>	532 Burrard St., Vancouver, British Columbia	Black Lake
Northwestern Uranium Ltd. <sup>2</sup>	504 Lancaster Bldg., Calgary, Alberta	Beaverlodge
Orchan Uranium Mines Ltd. <sup>2</sup>	100 Adelaide St. W., Toronto, Ontario	Beaverlodge
Pitch Ore Uranium Mines Ltd. <sup>2</sup>	200 Bay St., Toronto, Ontario	Beaverlodge
Pitchvein Mines Ltd. <sup>1</sup>	82 Government Rd., Kirkland Lake, Ontario	Athabaska
Pluton Uranium Mines Ltd. <sup>1</sup>	11 King St. W., Toronto, Ontario	Beaverlodge
Rix Athabaska Uranium Mines Ltd.	335 Bay St., Toronto, Ontario	Uranium City
St. Michael Uranium Mines Ltd. <sup>2</sup>	85 Richmond St. W., Toronto, Ontario	Athabaska
St. Mary's Uranium Mines Ltd. <sup>2</sup>	4 Richmond St. W., Toronto, Ontario	Uranium City
Sudbury Contact Mines Ltd. <sup>2</sup>	100 Adelaide St. W., Toronto, Ontario	Beaverlodge
Uranium Ridge Mines Ltd. <sup>2</sup>	25 Adelaide St. W., Toronto, Ontario	Uranium City
<b>British Columbia:</b>		
Quebec Metallurgical Industries Ltd. <sup>2</sup>	88 Metcalfe St., Ottawa, Ontario	Golden
Rexspar Uranium & Metals Mining Co. Ltd. <sup>2</sup>	170 Bay St., Toronto, Ontario	Birch Island

See footnotes at end of Directory.

## Directory of Firms in the Miscellaneous Metal Mining Industry, 1959 — Concluded

Name of firm and product	Head office address	Location of mine or plant
<b>Uranium — Concluded:</b>		
<b>Northwest Territories:</b>		
Consolidated Northland Mines Ltd. <sup>1</sup> .....	25 Adelaide St. W., Toronto, Ontario .....	Marian River
Eldorado Mining & Refining Ltd. ....	Box 379, Ottawa, Ontario .....	Port Radium, N.W.T.; Eldorado, Saskatchewan; Port Hope, Ontario
Femco Mines Ltd. <sup>2</sup> .....	184 Bay St., Toronto, Ontario .....	Yellowknife
Rayrock Mines Ltd. ....	25 Adelaide St. W., Toronto, Ontario .....	Sherman Lake
Riverridge Mines Ltd. <sup>2</sup> .....	10920-88th Ave., Edmonton, Alberta .....	Marian River
Tarbell Mines Ltd. <sup>2</sup> .....	25 Adelaide St. W., Toronto, Ontario .....	Yellowknife
<b>Zirconium:</b>		
Dominion Magnesium Ltd. ....	67 Yonge St., Toronto, Ontario .....	Haley, Ontario

<sup>1</sup> Holds dormant property.<sup>2</sup> Active but not producing.







STATISTICS CANADA LIBRARY  
BIBLIOTHÈQUE STATISTIQUE CANADA



1010739447