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CANADA

MISCELLANEOUS METAL MINES

1962

Formerly The Miscellaneous Metal Mining Industry

DOMINION BUREAU OF STATISTICS
Industry Division

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EXPLANATORY NOTES

Establishment

The reporting unit in the Census of Manufactures is the **establishment.** Beginning with the 1961 Census, the establishment is defined as follows:

The smallest unit which is a separate operating entity capable of reporting all the following:

Materials and supplies used,
Goods purchased for resale as such,
Fuel and power consumed,
Number of employees and their pay,
Inventories,
Shipments or sales.

The establishment is to be distinguished from smaller subdivisions or departments which do not have records which permit them to report all items required of an establishment. Prior to 1961, some establishments were required to submit two or more separate reports when they were engaged in operations which were classifiable to different industries. Beginning with 1961, separate reports for such operations will be required only in cases where accounting records can provide all the elements of principal statistics enumerated above. Special reporting arrangements were made with respondents when the acceptance of combined reports would have seriously affected the statistics for particular industries or areas. Where continuity of industry statistics was affected by this change in reporting procedures, adjustments to the data were made back to 1957 in order to maintain comparability of the series for recent years.

A mining establishment is typically a mine, mine/mill, quarry, pit or bog principally engaged in mining operations. Prior to 1961, the Census of Mines, Quarries and Oil Wells attempted to cover the mining activities of all establishments, whether or not they were principally engaged in mining operations. Beginning with the 1961 Census, establishments (accounting entities) which are not primarily engaged in mining are no longer included as mining establishments in the basic industry statistics. Again adjustments to the industry statistics were made to reflect the removal of such reporting units for the period 1957-1960. These reporting units are now listed as establishments in other Bureau industry surveys, such as Wholesale Trade, Construction, etc. In order, however, to maintain complete coverage of certain commodity items produced mainly in mining establishments, many non-mining establishments are now surveyed for commodity information only and the latter are included in the appropriate tables of industry reports.

SYMBOLS

The following standard symbols are used in Dominion Bureau of Statistics publications:

.. figures not available.

... figures not appropriate or not applicable.

— nil or zero.

-- amount too small to be expressed.

p preliminary figures.

r revised figures.

MISCELLANEOUS METAL MINES

1962

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

The mining of certain metal-bearing ores, other than those commonly classified as gold, silver, copper, nickel, cobalt, lead and zinc, have been grouped, for statistical purposes, as a single industry by the Dominion Bureau of Statistics. Their production in some instances is confined to a few operators and the annual extraction of certain types or ores often fluctuates in an erratic manner according to demand and supply. Included in this report, with the statistics relating to the Canadian production of these ores or metals, are notes and statistical data pertaining to various rare or semi-rare metals of metalliferous ores produced in other countries. Metals and metal-bearing ores produced in Canada during 1962 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 29 active establishments in the Miscellaneous Metal Mining Industry, there were 12 which made shipments of ore or metal-bearing concentrates.

The industry employed an average of 5,120 persons to whom $30,354,642 were distributed as salaries and wages. Fuel cost $2,636,932 and 337,460,151 kwh. of electricity were purchased for $2,352,236. Process supplies, containers, freight and treatment charges amounted to $23,339,432.

TABLE 1. Principal Statistics of the Miscellaneous Metal Mines, Significant Years, 1921-59

Basis: Standard Industrial Classification in use prior to 1960

Year	Establishments	Employees	Salaries and wages	Cost of fuel and electricity	Cost of process supplies and containers	Gross value of products	Net value added[1]
	number		dollars				
1921	4	44	68,606	45,376	..	230,164	..
1929	8	94	42,837	10,217	..	6,400	..
1931	7	32	25,694	576	..	13,434	..
1933	5	24	14,275	1,178	..	343	..
1937	15	121	155,191	15,668	17,466	86,040	52,655
1939	31	331	455,278	92,405	81,991	524,977	349,404
1941	47	725	1,141,244	359,005	217,494	3,428,886	2,618,483
1944	27	1,385	2,809,013	951,929	657,430	5,360,993	3,303,143
1946	21	1,037	2,338,442	739,531	670,648	7,187,445	3,708,109
1949	21	3,275	8,894,642	1,160,558	1,286,989	21,466,327	15,689,997
1951	31	3,891	12,251,755	1,864,309	3,299,651	31,474,736	21,765,843
1954[2]	180	6,494	24,603,658	3,553,358	10,174,222	83,379,952	66,136,130
1955[3]	223	2,826	12,663,195	1,844,436	4,355,385	35,103,488	28,305,111
1957	139	8,705	42,386,402	6,539,935	20,949,018	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

[1] Gross value of production, less the value of fuel, electricity, process supplies, containers, freight and treatment charges.

[2] Data for 1954 includes uranium which was not shown in preceding years.

[3] Iron ore data excluded since 1955, but included in preceding years.

TABLE 1 A. Principal Statistics of the Miscellaneous Metal Mines, 1957 - 62

Basis: Revised Standard Industrial Classification and New Establishment Concept

Year	Establishments	Employees	Salaries and wages	Cost of fuel and electricity	Cost of process supplies and containers	Gross value of products	Net value added[1]
	numbers		dollars				
1957	139	8,705	42,386,402	6,539,935	20,949,018	144,689,661	115,788,076
1958	91	14,375	78,320,507	9,293,152	50,827,573	284,367,777	223,484,942
1959	84	13,645	76,604,136	9,023,750	57,982,723	333,770,291	265,835,151
1960	68	9,380	54,453,208	7,570,803	40,059,514	273,409,628	224,482,268
1961	43	5,919	34,332,063	5,856,827	22,992,059	201,214,250	170,664,295
1962	29	5,120	30,354,642	4,989,168	22,129,854	164,135,270	135,816,670

[1] Gross value of production, less the value of fuel, electricity, process supplies, containers, freight and treatment charges.

TABLE 2. Employees and their Earnings in the Miscellaneous Metal Mines, 1958 - 62

Year	Employees					Man-hours worked (all employees)	Earnings		
	Office and administrative		Workmen		Total		Office and administrative	Workmen	Total
	Male	Female	Male	Female					
	number						dollars		
1958	2,314	225	11,818	18	14,375	33,664,766	13,222,817	65,097,690	78,320,507
1959	2,127	230	11,270	18	13,645	29,361,649	13,083,871	63,520,265	76,604,136
1960	1,568	171	7,616	25	9,380	19,037,034	9,795,299	44,657,909	54,453,208
1961	877	102	4,925	15	5,919	12,019,515	5,967,071	28,364,992	34,332,063
1962	737	91	4,287	5	5,120	10,435,396	5,241,755	25,112,887	30,354,642

TABLE 3. Average Number of Workmen, by Months, 1961 and 1962

Month	1961						1962					
	Surface		Underground	Mill		Total	Surface		Underground	Mill		Total
	Male	Female		Male	Female		Male	Female		Male	Female	
	number											
January	1,693	17	2,884	1,009	5	5,608	899	2	2,542	801	2	4,246
February	1,602	16	2,817	952	5	5,392	880	2	2,524	804	2	4,212
March	1,557	13	2,788	941	5	5,304	963	3	2,512	798	2	4,278
April	1,636	13	2,685	943	5	5,282	1,050	3	2,508	815	2	4,378
May	1,708	12	2,639	962	5	5,326	1,089	3	2,507	822	2	4,423
June	1,732	12	2,444	949	5	5,142	1,135	3	2,450	830	2	4,420
July	1,721	10	2,296	901	5	4,933	1,145	3	2,415	827	2	4,392
August	1,591	9	2,240	855	3	4,698	1,114	3	2,448	819	2	4,386
September	1,520	5	2,081	858	3	4,467	1,022	3	2,488	794	2	4,309
October	1,477	4	2,067	842	3	4,393	990	3	2,501	801	2	4,297
November	1,445	4	2,087	843	3	4,382	879	3	2,473	775	2	4,132
December	1,357	4	2,106	831	3	4,301	824	3	2,403	777	2	4,009
Averages	**1,588**	**10**	**2,429**	**908**	**5**	**4,940**	**999**	**3**	**2,480**	**808**	**2**	**4,292**
Man-hours worked					*10,073,332*						*10,435,396*	

TABLE 4. Fuel and Electricity Used in the Miscellaneous Metal Mines, 1962

Kind		Quantity	Cost at plant
			$
Bituminous coal (a) From Canadian mines	short ton	21	228
(b) Imported	"	72,418	1,069,124
Sub-bituminous coal (from Alberta mines only)		—	—
Anthracite coal		—	—
Lignite coal		—	—
Coke (for fuel only)		—	—
Gasoline, (includes gasoline used in cars and trucks)	Imp. gal.	315,882	127,464
Kerosene or coal oil	"	1,284	408
Fuel oil	"	7,787,513	1,421,895
Wood (cords of 128 cubic feet of piled wood)		—	—
Gas (a) Liquefied petroleum gases (propane, etc.)	Imp. gal.	88,103	16,622
(b) Other manufactured gas		—	—
(c) Natural gas		—	—
Other fuel		—	—
Electricity purchased for power and lighting	kwh.	337,460,151	2,352,236
Electricity purchased for other purposes		—	—
Steam purchased	pound	1,178,570	1,191
Total (cost only)		...	**4,989,168**
Electricity generated (a) For own use	kwh.	88,711,400	...
(b) For sale	"	2,338,200	15,167

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.

The output of aluminum ingots measured as molten metal amounted to 690,297 tons in 1962.

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. and cryolite from Greenland and the United States.

TABLE 5. Production, Consumption, Imports and Exports of Aluminum Ingots, 1953-62

Year	Production	Domestic consumption	Exports	Imports
	tons (2,000 pounds)			
1953	548,445	88,548	459,692	35
1954	557,897	80,355	468,494	115
1955	612,543	91,522	510,631	99
1956	620,321	91,869	508,994	1,405
1957	556,715	77,984	478,670	2,122
1958	634,102	101,886	482,927	11,257
1959	593,630	88,797	505,342	852
1960	762,012	120,831	552,155	501
1961	663,173	135,804	487,034	636
1962	690,297	140,803	576,206	3,855

TABLE 6. Imports of Aluminum and Bauxite, 1961 and 1962

Item	1961		1962	
	Tons	Value	Tons	Value
		$		$
Alumina and bauxite, n.o.p.	177,761	5,028,926	221,609	6,452,315
Bauxite ore	2,213,551	52,774,506	2,012,573	55,525,255
Cryolite	4,033	684,602	5,110	1,057,930
Aluminum:				
Pigs, ingots and block	636	484,412	3,855	2,269,600
Scrap	1,609	326,617	1,313	299,088
Angles, channels and beams	328	354,868	1,126	1,826,206
Bars, rods and wire	720	711,285	772	854,163
Leaf or foil	...	1,253,544	...	1,318,747
Pipes and tubes	347	580,273	683	1,007,851
Plates, sheets and strips	7,942	7,594,656	15,932	13,450,628
Powder and paste	67	65,400	122	146,610
Wire and cable	190	183,438	310	301,174
Household hollow-ware	...	1,337,879	...	1,106,941
Manufactures, n.o.p.	...	15,375,454	...	17,310,163

TABLE 7. Exports of Aluminum, 1961 and 1962

Item	1961		1962	
	Tons	Value	Tons	Value
		$		$
Aluminum ores, concentrates	18,876	1,200,639	3,873	397,341
Aluminum scrap	29,439	9,433,823	30,245	8,933,359
Aluminum in primary forms	..	..	..	..
Aluminum, pigs, ingots, slabs	487,030	221,526,728	576,206	266,228,435
Aluminum, bars, rods, plates	22,969	13,888,270	22,643	12,585,462
Aluminum, semi-fabricated	..	..	..	..
Aluminum foil	147	161,098	463	531,484
Aluminum kitchen utensils	..	..	..	..
Aluminum manufactures, n.o.p.	..	..	..	..
Aluminum fabricated materials, n.e.s.	11,637	6,248,968	7,887	5,208,319

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

Country[1]	1958	1959	1960	1961	1962
	in thousands long tons				
North America (dried equivalent of crude ore):					
Dominican Republic	—	759	678	739	706[2]
Haiti	280	255	268	263	370
Jamaica	5,722	5,125	5,745	6,663	7,495
United States	1,311	1,700	1,998	1,228	1,369
Totals	**7,313**	**7,839**	**8,689**	**8,893**	**9,940**
South America:					
Brazil	69	95	119	110	188
British Guiana	1,586	1,674	2,471	2,374	2,690[3]
Surinam	2,941	3,376	3,400	3,351	3,202
Totals	**4,596**	**5,145**	**5,990**	**5,835**	**6,080**
Europe:					
Austria	23	24	26	18	17
France	1,801	1,729	2,035	2,190	2,124
Germany West	4	4	4	4	5
Greece	843	904	870	1,100	1,300
Hungary	1,032	923	1,171	1,344	1,450
Italy	294	290	310	318	304
Rumania	72	70	87	68	30
Spain	8	8	3	6	6
U.S.S.R.[3]	2,750	3,000	3,500	4,000	1,200
Yugoslavia	721	802	1,009	1,213	1,311
Totals[3]	**7,548**	**7,754**	**9,015**	**10,261**	**10,747**

See footnotes at end of table.

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

Country	1958	1959	1960	1961	1962
	in thousand long tons				
Asia:					
China (diasporic)[3]	150	300	350	400	400
India	166	215	381	468	564
Indonesia	338	381	389	413	484
Malaya	262	382	452	410	349
Pakistan	2	2	1	–	–
Sarawak	136	207	285	253	225
Taiwan (Quemoy)	–	–	–	–	–
Totals	**1,054**	**1,487**	**1,858**	**1,944**	**2,022**
Africa:					
Ghana (exports)	207	148	224	196	287
Guinea, Republic of	343	296	1,171	1,739	1,420[3]
Mozambique	5	4	5	5	6
Sierra Leone	–	–	–	–	1
Totals	**555**	**448**	**1,400**	**1,940**	**1,714[3]**
Oceania: Australia	7	15	69	16	30
World totals (estimate)	**21,030**	**22,690**	**27,020**	**28,890**	**30,535**

[1] This table incorporates a number of revisions of data published in previous bauxite chapters. Data do not add to tables shown due to rounding where estimated figures are included in the detail.
[2] United States imports.
[3] Estimate.

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

TABLE 9. World Production of Aluminum

Country[1]	1958	1959	1960	1961	1962
	short tons				
North America:					
Canada	643,102	593,630	762,012	663,173	690,297
United States	1,565,557	1,954,112	2,014,498	1,903,711	2,117,952
Totals	**2,199,659**	**2,547,742**	**2,776,510**	**2,566,884**	**2,808,249**
South America: Brazil	13,102	19,950	20,034	22,078	22,202
Europe:					
Austria	62,716	72,271	74,924	74,578	81,668
Czechoslovakia	29,100	28,700	44,100	55,100	55,100
France	186,107	190,712	262,890	308,047	324,630
Germany, East[2]	37,500	38,600	44,000	60,000	65,000
West	150,759	166,631	186,221	190,212	196,017
Hungary	43,560	50,340	54,602	56,386	58,127
Italy	70,603	82,658	92,206	91,881	89,549
Norway	133,777	160,881	181,662	189,109	226,966
Poland	24,738	25,143	28,640	52,488	53,007
Spain	17,769	24,959	31,680	41,500	45,953
Sweden, including alloys	15,113	17,100	17,619	18,023	18,629
Switzerland	34,723	37,886	43,795	46,530	54,640
U.S.S.R.[2]	605,000	690,000	745,000	990,000	1,000,000
United Kingdom	29,517	27,462	32,390	36,169	38,113
Yugoslavia	23,899	21,214	27,635	30,211	30,843
Totals[2]	**1,465,000**	**1,635,000**	**1,865,000**	**2,240,000**	**2,340,000**
Asia:					
China (Manchuria)[2]	30,000	77,600	88,100	110,000	110,000
India	9,167	19,131	20,123	20,263	39,025
Japan[2]	93,231	110,385	146,853	169,424	188,991
Taiwan	9,455	8,251	9,106	9,938	12,135
Totals[2]	**141,900**	**215,400**	**264,200**	**309,600**	**350,200**
Africa: Cameroon, Republic of	35,121	46,644	48,436	52,446	57,596
Oceania: Australia	12,173	12,734	13,054	14,789	18,144
World totals[1,2]	**3,865,000**	**4,480,000**	**4,985,000**	**5,205,000**	**5,595,000**

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

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

ANTIMONY

Antimony production consists of the antimony content of antimonial lead alloys, varying from 5 to 25 per cent antimony, made by the Consolidated Mining and Smelting Co. of Canada, Limited, at Trail, British Columbia; and antimony in flue dust and Doré slag shipped from that smelter.

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

The New York price quotations on antimony were 36.25 cents per pound in December, 1962. This price was for grade 99½% in lots of 10,000 pounds or more.

TABLE 10. Production of Antimony, 1953-62

Year	In ores and slags exported		In antimonial lead produced		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
		$		$		$
1953	814,678	40,677	673,418	251,185	1,488,105	291,862
1954	271,350	19,334	1,030,983	329,915	1,302,333	349,249
1955	455,732	38,737	1,565,994	524,608	2,021,726	563,345
1956	331,790	27,373	1,808,642	660,154	2,140,432	687,527
1957	452,184	37,934	908,547	332,508	1,360,731	370,442
1958	—	—	858,633	284,208	858,633	284,208
1959	—	—	1,657,797	540,276	1,657,797	540,276
1960	—	—	1,651,786	538,482	1,651,786	538,482
1961	—	—	1,331,297	469,948	1,331,297	469,948
1962	—	—	1,931,397	748,223	1,931,397	748,223

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

Country	1961		1962	
	Pounds	Value	Pounds	Value
		$		$
United Kingdom	69,058	14,327	164,536	35,312
Belgium-Luxembourg	33,600	8,918	44,800	12,171
China	550,534	106,938	842,229	135,401
Yugoslavia	88,506	23,235	—	—
Netherlands	61,151	12,992	—	—
U.S.S.R.	24,698	2,651	—	—
United States	5,000	1,129	4,122	1,428
Germany, West	—	—	110,000	23,605
Czechoslovakia	—	—	110,230	23,670
Totals	**832,547**	**170,190**	**1,275,927**	**231,587**

TABLE 12. Consumption of Antimony Metal, 1960-62

	1960	1961	1962
	pounds		
Used in production of:			
Antimonial lead alloys	576,996	500,877	749,850
Babbitt	113,311	121,417	101,056
Solder	10,518	22,674	14,698
Type metal	100,849	132,667	180,751
Other commodities	150,042	251,284	164,301
Totals accounted for	**951,716**	**1,028,919**	**1,210,656**

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

Country	1958	1959	1960	1961	1962
	short tons				
North America:					
Canada[2]	430	829	826	666	966
Guatemala (U.S. Imports)	47	97	119	71	32
Mexico[3]	3,029	3,622	4,664	3,978	5,257
United States	705	678	635	689	631
Totals	**4,211**	**5,226**	**6,244**	**5,404**	**6,886**
South America:					
Argentina	11	4	—	—	—
Bolivia (exports)[3]	5,818	6,065	5,872	7,430	7,331
Peru[3]	964	793	901	790	440
Totals	**6,793**	**6,862**	**6,773**	**8,220**	**7,771**
Europe:					
Austria	514	631	676	668	767
Czechoslovakia[4]	1,800	1,800	1,800	1,800	1,800
France	42	—	—	—	—
Italy	188	231	236	277	369
Portugal	7	7	—	—	—
Spain	220	180	243	190	175
U.S.S.R.[5]	6,600	6,100	6,300	6,300	6,600
Yugoslavia (metal)	1,835	2,514	2,657	2,715	2,966
Totals[5]	**11,200**	**11,500**	**11,900**	**12,000**	**12,700**
Asia:					
Burma[3]	90	240	180	175	138
China[5]	16,500	16,500	16,500	16,500	16,500
Iran[6]	160	160[5]	55[5]	—	—
Japan	298	340	299	215	190
Pakistan	—	119	69	15	85
Ryukyu Islands	—	26	159	112	—
Thailand	—	11	—	36	49
Turkey	1,687[7]	1,380[7]	1,507	1,502	1,962
Totals[5]	**18,700**	**18,800**	**18,800**	**18,600**	**18,900**
Africa:					
Algeria	1,106	1,658	886	720	149
Morocco: Northern Zone	203	252	358	406	449
Rhodesia and Nyasaland, Fed. of:					
Southern Rhodesia	151	104	100	68	61
South Africa, Republic of	7,904	13,619	13,538	11,804	11,697
Totals	**9,364**	**15,633**	**14,882**	**12,998**	**12,356**
Oceania: Australia	775	703	172	132	74
World totals (estimate)[1]	**51,000**	**58,700**	**58,800**	**57,400**	**58,700**

[1] This table incorporates some revisions. Data do not add exactly to totals shown because of rounding where estimated figures are included in the detail.
[2] Antimony content of smelter products exclusively from mixed ores.
[3] Includes antimony content of smelter products derived from mixed ores.
[4] Estimate according to annual issues of *Minerais et Métaux (France)*, except 1961.
[5] Estimates.
[6] Year ended March 20 of year following that stated.
[7] Exports.

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

TABLE 14. Imports of Antimony Oxide, by Principal Countries of Supply, 1958-62

Country	1958	1959	1960	1961	1962
	pounds				
United Kingdom	184,000	300,000	253,375	170,560	332,280
United States	71,200	80,254	139,476	100,150	128,055
Belgium-Luxembourg	67,781	42,714	44,000	44,007	67,354
Germany, West	—	88,184	—	—	—
France	—	—	—	44,000	—
China (Communist)	—	—	—	—	99,900
Totals	**322,981**	**511,152**	**436,851**	**358,717**	**627,589**

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 1950-62.

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

BERYLLIUM

No beryllium ore has been mined since 1941 when some was produced in Renfrew county and stockpiled. In 1950, a carload of this material was shipped to the United States. No shipments were made in 1960.

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

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

In Quebec scattered occurrences of beryl are known in the Lacorne 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[1]

Country	1958	1959	1960	1961	1962
	short tons				
North America:					
United States (mine shipments):					
Cobbed beryl	463	328	244	317	218
Low grade beryllium ore	42	97	265	805	760
Totals	**505**	**425**	**509**	**1,122**	**978**
South America:					
Argentina	1,004	3,336[2]	1,157[2]	1,488[2]	996[3]
Brazil	1,314	2,927	3,827	3,503	3,319
Totals	**2,318**	**6,263**	**4,984**	**4,991**	**4,315**
Europe:[1]					
Norway (United States imports)	3	4	—	—	—
Portugal	52	41	32	39	19
Sweden	28	41[3]	—	—	—
U.S.S.R.[4,5]	330	550	750	900	1,000
Totals[4]	**410**	**640**	**780**	**940**	**1,020**
Asia:					
Afghanistan	—	—	11	—	—
India (United States imports)	600	—	1,000	885	150
Korea Republic of	—	—	—	6	—
Totals	**600**	**—**	**1,011**	**891**	**150**
Africa:					
Congo, Republic of the (formerly Belgian)	1,063	280	369	184	304
Kenya	4	2	1	1	—
Malagasy Republic (Madagascar)	181	474	701	836	743
Mozambique	1,161	1,559	1,649	1,073	627

See footnotes at end of table.

TABLE 15. World Productions of Beryl, by Countries[1] – Concluded

Country	1958	1959	1960	1961	1962
	short tons				
Africa – Concluded:					
Rhodesia and Nyasaland, Federation of:					
Northern Rhodesia	13	2	2	–	–
Southern Rhodesia	332	440	539	396	559
Ruanda-Urundi	51	187	310	525	394
Somali Republic	–	–	–	–	–
South Africa, Republic of	464	203	326	192	360
South-West Africa	247	170	413	252	159
Swaziland	–	3	6	7	–
Uganda	86	235	470	1,136	1,015
Totals	**3,603**	**3,554**	**4,786**	**4,602**	**4,161**
Oceania: Australia	278	355	213	343	250
World totals (estimate)[1]	**7,700**	**11,200**	**12,300**	**12,900**	**10,900**

[1] This table incorporates some revisions. Data do not add exactly to totals shown because of rounding where estimated figures are included in the detail.
[2] Exports.
[3] United States imports.
[4] Estimates.
[5] Cobbed concentrates at about 11 per cent BeO.

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 silver-cobalt ores of Cobalt, Ontario contain bismuth, which is recovered by Cobalt Refinery. Bismuth metal is a by-product in the smelting of the copper ores at Gaspé, Québec. 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 solder, 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, 1962 was $2.25 per pound, in ton lots.

TABLE 16. Production of Primary Bismuth in all Forms,[1] 1953-62

Year	Pounds	Value	Year	Pounds	Value
		$			$
1953	117,366	209,557	1958	412,792	771,267
1954	258,675	572,183	1959	334,736	590,212
1955	265,896	572,362	1960	423,827	762,048
1956	285,861	544,900	1961	478,118	957,625
1957	319,941	584,917	1962	425,102	839,912

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

TABLE 17. Imports of Bismuth Metal, Residues and Salts, 1961 and 1962

Country	1961		1962	
	Pounds	Value	Pounds	Value
		$		$
Metallic bismuth:				
Netherlands	1,425	2,712	—	—
Yugoslavia	4,409	8,992	—	—
United States	2,000	4,670	1,116	2,799
Bolivia	10,149	8,193	55,947	35,695
Totals	**17,983**	**24,567**	**57,063**	**38,494**
Bismuth salts:				
United Kingdom	12,856	32,644	10,855	27,988
United States	1,551	7,217	320	1,378
Totals	**14,407**	**39,861**	**11,175**	**29,366**

TABLE 18. Consumption of Bismuth Metal, in Canada, 1961 and 1962

	1961	1962
	pounds	
Used in:		
Fusible alloys and solders	34,484	29,130
Other[1]	8,144	8,120
Totals	**42,628**	**37,250**

[1] Pharmaceuticals, chemicals and malleable iron.

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

Country	1958	1959	1960	1961	1962
	pounds[2]				
North America:					
Canada (metal)[3]	412,792	334,736	423,827	478,118	425,102
Mexico[3]	417,700	527,600	599,400	140,000[4]	780,000
South America:					
Argentina: In ore	59,000[5]	40,000[5]	14,900[5]	8,600[5]	7,100
Bolivia[6]	244,700	487,400	403,700	465,300	652,300
Peru[3]	851,560	737,617	908,438	1,031,795	1,084,227
Europe:					
France (in ore)	112,400	101,400	112,400	116,800	116,800[6]
Spain (metal)	116,229	53,168	29,875	21,427	18,799
Sweden[5]	110,000	66,000	79,000	79,000	154,000
Yugoslavia (metal)	169,670	200,026	231,582	216,348[4]	199,765
Asia:					
China (in ore)	[7]	[7]	[7]	[7]	[7]
Japan (metal)	168,751	223,187	261,089	422,326	572,841
Korea, Republic of (in ore)	198,000	227,000	317,000	333,000	353,000
Africa:					
Mozambique	2,436	22,900	30,000	38,800	13,900
South Africa, Republic of (in ore)	2,023	527	511	168	130
South-West Africa (in ore)	680	530	310	485	155
Uganda	15,030	19,140	3,640	1,430	110
Oceania: Australia (in ore)	2,352	925	265	900	97
World totals (estimate)[1,2]	**4,600,000**	**5,000,000**	**5,300,000**	**5,100,000**	**6,700,000**

[1] United States figure withheld to avoid disclosing individual company confidential data; included in world total. Bismuth is believed to be produced also in Brazil, Germany and U.S.S.R. Production figures are not available for these countries, but estimates are included in the total.

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

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

[4] In addition, approximately 2,000,000 pounds of Bismuth in impure bars are excluded from the world total.

[5] Estimate.

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

[7] 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 of the Consolidated Mining & Smelting Company of Canada, Limited, at Trail. Cadmium is found in the copper-gold-zinc ores of the Flin Flon deposit on the Saskatchewan-Manitoba boundary.

Cadmium is used mainly in electroplating and in the manufacture of alloys and compounds, the most common use being as a protective coating for steel. To a much lesser extent, it is used in copper alloys. The use of cadmium alloys in motor vehicle bearings and for solders has created a strong demand for the metal. Cadmium is used also in the arts, paints, cermics 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, 1962 was $1.75 per pound.

TABLE 20. Production of Cadmium in all Forms, 1953-62

Year	British Columbia and Yukon		Manitoba and Saskatchewan		Canada	
	pounds	$	pounds	$	pounds	$
1953	960,288	1,920,576	157,997	315,994	1,118,285	2,236,570
1954	932,184	1,584,713	154,596	262,813	1,086,780	1,847,526
1955	1,727,390	2,936,564	191,691	325,875	1,919,081	3,262,439
1956	2,182,435	3,710,140	156,986	266,876	2,339,421	3,977,016
1957	2,141,782	4,025,821	226,348	384,791	2,368,130	4,025,821
1958	1,413,463	2,148,463	342,587	520,732	1,756,050	2,669,195
1959	1,837,571	2,352,091	322,792	413,174	2,160,363	2,765,265
1960	1,924,362	2,732,594	366,636	520,623	2,357,497	3,347,646[1]
1961	1,050,117	1,680,187	307,757	492,411	1,357,874	2,172,598
1962	2,221,185	4,070,841	317,495	546,092	2,604,973	4,730,957[1]

[1] Includes production from Quebec ores.

TABLE 21. Exports of Cadmium Metal, 1961 and 1962

Destination	1961		1962	
	Pounds	Value	Pounds	Value
		$		$
Argentina	—	—	3,306	5,552
United Kingdom	1,374,009	1,616,849	1,467,650	2,274,901
France	5	104	2	59
Sweden	1	56	—	—
Czechoslovakia	7	140	—	—
India	4,047	5,876	2,997	4,869
Australia	—	—	10	212
Brazil	6,439	9,048	13,820	25,730
Netherlands	—	—	22,400	33,152
United States	517,450	707,414	829,664	1,270,233
Hungary	—	—	—	—
Japan	4	119	—	—
Colombia	—	—	440	727
Totals	**1,901,962**	**2,339,606**	**2,340,289**	**3,615,435**

TABLE 22. Consumption of Cadmium, 1961 and 1962

	1961	1962
	pounds	
Used for:		
Plating	147,326	195,654
Solders	18,574	14,694
Other products	5,076	6,488
Totals accounted for	**170,976**	**216,836**

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

Country	1958	1959	1960	1961	1962
	thousands of pounds[2]				
North America:					
Canada	1,756	2,160	2,357	1,358	2,605
Mexico (refined metal)[3]	14	133[4]	179	104[4]	63[4]
United States (primary and secondary metal)	9,673[5]	8,710	10,445	10,466	11,137
South America: Peru (refined metal)[3]	141	141	185	232	235
Europe:					
Austria	25	43	32	42	49
Belgium	1,488[5]	1,512[4]	1,583[4]	1,988[4]	1,854[4]
France	386	539	560	560	540
Germany, West	703	926	902	952	560
Italy	413	552	648	765	546
Netherlands[5]	88	88	88	88	88
Norway	240	284	243	231	254
Poland[5]	573	860	860	880	880
Spain	14	14	26	76	133
U.S.S.R.[5]	2,866	3,310	3,750	4,410	4,410
United Kingdom[6]	278	310	236	217	237
Yugoslavia	55	72	84	88[4]	88
Asia: Japan	964	1,082	1,252	1,596	1,940
Africa:					
Congo, republic of the (formerly Belgian)	1,080	1,047	1,115	1,168	650
Rhodesia and Nyasaland, Federation of:					
Northern Rhodesia	38	—	58	43	37
Oceania: Australia	791	764	672	676	791
World totals (estimate)[1,2]	**21,600**	**22,500**	**25,300**	**25,900**	**27,100**
Exports:					
Guatemala[3,7]	52	—	123	94	27[5]
Mexico[3]	1,992	2,074	1,201	2,557	2,422
Peru[3]	50	29	56	57	47
South-West Africa[3]	2,688	1,294	1,732	1,747	1,219

[1] Data derived in part from bulletins of the World Non-ferrous Metal Statistics and annual issues of Metal Statistics (Metallgesellschaft).
[2] This table incorporates some revisions. Data do not add exactly because of rounding.
[3] In addition to metal refined within the country, cadmium is exported in zinc concentrates, flue dust, etc., for treatment elsewhere and accounted for in country where smelted. To avoid duplicating figures, these export data are not included in the world total, but are shown separately at end of table.
[4] Exports.
[5] Estimate.
[6] Including secondary.
[7] Recoverable.

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

CALCIUM

The commercial production of calcium in Canada started in 1945 when the metal was recovered from lime by Dominion Magnesium Limited, at its plant located at Haley, Ontario. From 1950 to 1955 the value of output was included in the data on magnesium.

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

TABLE 24. Production (Shipments) on Calcium Metal, 1945-62

Year	Pounds	Value
		$
1945	22,720	19,312
1946	53,548	68,720
1947	602,665	642,607
1948	895,203	1,723,266
1949	520,069	1,040,138
1950-55	[1]	[1]
1956[2]	394,900	515,305
1957[2]	221,225	282,378
1958	25,227	31,256
1959	67,429	76,409
1960	134,801	159,241
1961	99,355	100,881
1962	123,511	124,412

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

TABLE 25. Exports of Calcium, by Countries to which Shipped, 1960-62

Country	1960	1961	1962
		dollars	
United Kingdom	19,201	10,803	44,059
Belgium-Luxembourg	8,980	31,525	5,100
Sweden	54	—	—
United States	14,918	30,439	54,002
France	155	—	—
Germany, West	21,415	10,890	23,362
India	15,870	28,171	22,345
Italy	661	3,055	2,318
South Africa, Republic of	5,850	—	5,900
Australia	53	—	—
Japan	—	1,958	—
Norway	—	—	136
Totals	**87,157**	**116,841**	**157,222**

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 1956-61.

Cerium is obtained from monazite, a monoclinic phosphate of cerium metals containing about 32 per cent cerium oxide (Ce_2O_3) and up to 18 per cent thoria (THO_2). Monazite is distributed widely in igneous rocks throughout the world, especially in gneisses that have been intruded by pegmatites, but usually it forms only a small fraction of one per cent of the containing rock, and only the natural concentrations in stream gravels and beach sands have paid for exploration. The chief commercial sources of monazite sand are beach deposits in Brazil and India. There are a few occurrences of monazite in Nova Scotia, Quebec and British Columbia, none of which is of commercial interest. It is usually found as small crystals in granites and pegmatites in the Canadian Shield, and small quantities occur in association with the black sands of the Quesnel river, Lillooet district, British Columbia. In the United States there are commercial deposits in Carolina, Florida and Idaho, and known occurrences in many other states.

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

CHROMITE

There was no Canadian production of chromite in 1962. This mineral was mined for several years in the Black Lake area in Quebec.

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

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

The United States price, December, 1962 for chrome ore, 48 per cent Cr_2O_3, was $32 to $36 per long ton, f.o.b. Atlantic ports.

TABLE 26. Production of Chromite, 1946-62

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	1954-62	—	—
1950	—	—			

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

Country	1958	1959	1960	1961	1962
			short tons[2]		
North America:					
Cuba	82,800[4]	43,732[3]	32,774[3]	27,600[3]	39,000[3]
Guatemala	1,168	452	200	110	22
United States	143,795	105,000[5]	107,000[5]	82,000[5]	—
Totals	**227,763**	**149,184**	**139,974**	**109,710**	**39,000**
South America:					
Brazil	5,832	6,861	6,246	17,037	27,380
Colombia	—	55	77	204	154
Totals	**5,832**	**6,916**	**6,323**	**17,241**	**27,534**
Europe:					
Albania	221,800	273,373	318,650	256,241	283,000[3]
Greece (marketable)	72,217	22,803	38,451	34,324	26,633
Portugal	—	—	—	—	—
U.S.S.R.[3,6]	880,000	940,000	1,010,000	1,015,000	1,270,000
Yugoslavia	125,188	117,965	110,873	119,188	106,974
Totals[1,3]	**1,320,000**	**1,380,000**	**1,510,000**	**1,450,000**	**1,720,000**
Asia:					
Cyprus (exports)	13,260	13,637	15,702	21,078	10,669
India	70,500	105,376	110,354	50,625	64,390
Iran[7]	38,600[3]	60,627	74,957	81,268	121,254
Japan	46,155	63,578	74,394	77,350	64,024
Pakistan	26,619	17,946	20,265	28,116	31,747
Philippines	458,903	720,345	809,579	705,811	585,574
Tukrey	631,403	427,324	530,676	443,932	580,964
Viet-Nam North[3]	—	7,300	21,400	32,500	36,000
Totals	**1,285,440**	**1,416,133**	**1,657,327**	**1,440,680**	**1,494,622**
Africa:					
Malagasy (Madagascar)	—	—	—	11,600	20,342
Rhodesia and Nyasaland, Federation of:					
Southern Rhodesia	618,841	543,104	668,401	590,888	507,635
Sierra Leone	15,944	19,974	6,023	10,080[8]	10,527[8]
South Africa, Republic of	696,057	749,878	850,921	989,725	1,006,173
United Arab Republic (Egypt region)	—	276	331	1,532	—
Totals	**1,330,842**	**1,313,232**	**1,525,676**	**1,603,825**	**1,544,727**
Oceania:					
Australia	869	134	592	—	413
New Caledonia	52,300	48,463	43,166	40,413	17,036
Totals	**53,169**	**48,597**	**43,758**	**40,413**	**17,449**
World totals (estimate)[1]	**4,225,000**	**4,315,000**	**4,885,000**	**4,660,000**	**4,840,000**

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

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

[3] Estimate.

[4] United States imports.

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

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

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

[8] Exports.

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

TABLE 28. Imports of Chrome Ores, 1953-62

Year	Tons	Value	Year	Tons	Value
		$			$
1953	118,092	3,006,549	1958	38,136	812,286
1954	37,566	571,984	1959	48,678	1,525,438
1955	51,854	971,522	1960	59,023	1,521,812
1956	64,965	1,529,411	1961	71,267	1,908,920
1957	111,453	2,751,372	1962	71,969	2,122,407

TABLE 29. Imports of Chrome Ores, by Principal Countries of Supply, 1961 and 1962

Imported from	1961		1962	
	Tons	Value	Tons	Value
		$		$
Cyprus	3,920	153,556	2,800	121,850
Rhodesia and Nyasaland	5,455	173,004	14,313	466,471
U.S.S.R.	—	—	—	—
United States	22,341	702,159	27,402	929,934
South Africa, Republic of	4,690	79,633	5,219	63,576
Philippines	34,861	790,568	19,040	453,301
Cuba	—	—	3,196	87,275
Malta	—	—	—	—
Totals	**71,267**	**1,908,920**	**71,969**	**2,122,407**

COLUMBIUM, TANTALUM

The St. Lawrence Columbium and Metals Corporation operated a mine at Oka, Quebec, about 30 miles west of Montreal. The large pyrochlore deposit has been estimated at 62 million tons with an average content of 0.4 per cent columbium pentoxide, Cb_2O_5. The ore is milled to produce a concentrate containing about 52 per cent Cb_2O_5. The shipments of columbium concentrates in 1962 contained 1,016,514 pounds of Cb_2O_5 valued at $1,006,349. In the preceding year the shipments were 62,229 pounds of Cb_2O_5 valued at $65,619.

Tantalum usually occurs with columbium minerals, but the content is too low in the ores at Oka for economical recovery. Columbium-tantalum occurrences have been reported in British Columbia, Northwest Territories and Ontario.

The E. & M. Journal price quotations in December, 1962 were: Columbite-per lb. of pentoxide, basis 65% Cb_2O_5 and Ta_2O_5 columbium-tantalum ratio 10 to 1, $.90-$1.00 ratio 8½ to 1, $.85 to $.90 columbium metal $36 to $50 per pound. Tantalum metal per lb. powder, $30 to $58; sheet, $50 to $59; rod, $73 to $80.

TABLE 30. World Production of Columbium and Tantalum Mineral Concentrates, by Countries[1]

Country	1959		1960		1961		1962	
	Columbium	Tantalum	Columbium	Tanlalum	Columbium	Tantalum	Columbium	Tantalum
	pounds[2]							
North America:								
Canada	14,000[3]	—	—		119,261[4]	—	1,909,433[4]	—
United States (mine shipments)	189,263		—		—			
South America:								
Argentina	3,591[3]	1,611[3]	—		—	4,444[3]	—	3,637[3]
Brazil (exports)	33,459	207,232	26,460	257,951	38,477	264,519	38,164	322,804
French Guiana	—		—		—			
Europe:								
Norway	639,114	—	762,792	—	708,118	—	656,971	—
Portugal (U.S. imports)	38,083	27,227	35,383	34,062	22,457	29,793	42,565	95,692
Spain (U.S. imports)	—		976	3,157	—	11,148	—	2,645
Sweden (U.S. imports)	—		—		—		—	

See footnotes at end of table.

TABLE 30. World Production of Columbium and Tantalum Mineral Concentrates, by Countries[1] — Concluded

Country[1]	1959		1960		1961		1962	
	Columbium	Tantalum	Columbium	Tantalum	Columbium	Tantalum	Columbium	Tantalum
	pounds[2]							
Asia:								
Malaya, Federation of	268,800	—	208,320	—	212,800	—	246,400	—
Africa:								
Congo, Republic of the (formerly Belgian) and Ruanda-Urundi[5]	522,490		227,724[3]	332,424[3]	113,085[4]	164,277[3]	55,846[3]	228,185[3]
Malagasy Republic (Madagascar)	22,700		22,300		46,750		20,720	
Mozambique	320,004		335,487		303,166		231,437	
Nigeria	3,559,875	31,114	4,587,520	24,640	5,257,280	26,230	5,066,880	38,013
Rhodesia and Nyasaland Federation of	—	116,820	—	108,080	—	138,380	—	159,820
Sierra Leone	—	—	—	—			—	—
South Africa, Republic of	—	11,500	—	14,000	—	20,000	—	8,000
South-West Africa	2,610	1,539	2,899	7,491	670	5,790	1,116	10,444
Uganda	5,264		5,226		16,240		28,851	
Oceania:								
Australia	18,950		23,677		31,808		43,098	
World totals (estimate)[2]	**6,040,000**		**7,020,000**		**7,540,000**		**9,210,000**	

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

[2] This table incorporates some revisions. Data do not add to totals shown due to rounding where estimated figures are included in the detail. The world total does not include U.S.S.R. for which country no production data are available.

[3] United States imports.

[4] Shipments.

[5] In addition, tin-columbium-tantalum were produced as follows: 1958, 3,196,670 pounds; 1959, 2,773,387 pounds; 1960 estimated 1,500,000 pounds; 1961, estimated 1,400,000 pounds; 1962 not available, columbium-tantalum content averaging about 10 percent.

[6] Estimate.

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

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 1962 the quoted price of indium at New York was $1.50 to $2.25 per troy ounce, for lots over 5,000 ounces.

TABLE 31. Production of Indium, 1949-62

Year	Troy ounces	Value	Year	Troy ounces	Value
		$			$
1949	689	1,550	1954	477	1,278
1950	4,952	12,083	1955	104,774	232,598
1951	582	1,368	1956	363,192	795,390
1952	404	909	1957	384,360	693,770
1953	6,752	9,588	1958-62	..	..

MAGNESIUM

Magnesium was produced from dolomite by the Dominion Magnesium Limited, Haley, Ontario, This firm uses the Pidgeon process.

Magnesium is a constituent of aluminum-base alloys that possess high strength and resistance to corrosion. In Canada, this use accounts for the largest quantity. Magnesium finds other applications in cathodic protection of steel structures by magnesium anodes, pyrotechnics, the production of nodular cast iron, and use as a reducing agent in the production of uranium, titanium, beryllium, gerconium and platinum.

Technical information on magnesium is shown in a review published by the Department of Mines and Technical Surveys, Ottawa.

TABLE 32. Production of Primary Magnesium Metal, 1944-62

Year	Quebec		Ontario		Canada	
	Pounds	Value	Pounds	Value	Pounds	Value
		$		$		$
1944	—	—	10,579,778	2,575,695	10,579,778	2,575,695
1945	—	—	7,358,545	1,607,264	7,358,545	1,607,264
1946	—	—	320,677	75,538	320,677	75,538
1947-55	[1]	[1]	[1]	[1]	[1]	[1]
1956	4,572,564	1,536,688	14,639,734	4,543,202	19,212,298	6,079,890
1957	1,585,998	487,853	15,184,373	4,767,043	16,770,371	5,254,896
1958	4,504,343	1,317,070	9,087,362	2,747,755	13,591,705	4,064,825
1959	4,059,508	977,123	8,144,940	2,202,392	12,204,448	3,179,515
1960	—	—	14,577,138	4,313,987	14,577,138	4,313,987
1961	—	—	15,270,618	4,307,570	15,270,618	4,307,570
1962	—	—	17,631,310	4,821,823	17,631,310	4,821,823

[1] Not available for publication.

TABLE 33. Exports of Magnesium Metal, 1960-62

Destination	1960	1961	1962
		dollars	
United Kingdom	2,290,382	3,188,691	2,796,590
South Africa, Republic of	3,975	—	2,950
India	5,540	4,640	4,302
Australia	1,475	86	13,454
Austria	—	—	—
Belgium-Luxembourg	21,192	1,866	39,382
Brazil	9,821	2,153	8,256
Chile	—	—	—
China	198,761	—	—
France	189,612	100,558	130,939
Germany W.	87,047	231	573,332
Mexico	320	1,160	—
Netherlands	—	—	—
Sweden	140	28,730	—
Switzerland	11,840	19,719	20,710
Yugoslavia	29,505	379	—
United States	264,716	84,121	253,260
Denmark	—	—	—
Dominican Republic	—	—	—
Greece	—	—	—
Italy	—	—	—
Isreal	1,135	14,325	18,155
Spain	6,172	6,590	—
Uruguay	2,303	5,992	1,893
Czechoslovakia	35,768	79,330	31,260
Hungary	70,425	26,742	—
Taiwan	607	—	4,892
Argentina	1,782	—	1,909
Jamaica	287	—	—
Poland	—	43,210	66,580
Cuba	—	—	68
Totals	**3,232,805**	**3,608,523**	**3,967,932**

TABLE 34. Consumption of Magnesium Metal, 1961 and 1962

	1961	1962
	tons (2,000 pounds)	
Used for:		
Castings	395	252
Extrusions (shapes and tubing)	251	556
Aluminum alloys	1,604	2,175
Other products	526	631
Totals accounted for	**2,776**	**3,614**

TABLE 35. World Production of Magnesium Metal, by Countries[1]

Country	1958	1959	1960	1961	1962
	short tons[1]				
Canada	6,796	6,102	7,289	7,635	8,816
China	1,100[2]	[3]	1,000	1,000	1,000
France	1,897	1,938	2,359	2,282	2,392
Germany, West	660	550	330[2]	440[2]	550[2]
Italy	4,607	4,960	6,003	6,192	6,288
Japan	1,106[4]	1,724[4]	2,363[5]	2,477[4]	2,301[4]
Norway	10,132	10,567	11,373	16,018	16,400
U.S.S.R.	19,400	22,000	27,600	34,000	35,000
United Kingdom[5]	2,691	2,387	4,119	5,600	4,200[2]
United States	30,096	31,033	40,070	40,745	68,955
Totals (estimate)[1]	**78,500**	**82,300**	**102,500**	**116,400**	**145,900**

[1] This table incorporates a number of revisions of data published in previous magnesium chapters. Data do not add to totals shown due to rounding where estimated figures are included in the detail.
[2] Estimate.
[3] Data not available; estimate included in total.
[4] In addition, the following amounts of remelted magnesium were produced: 1958, 2,567 short tons; 1959, 2,694 short tons; 1960, 3,327 short tons; 1961, 3,060 short tons and 1962, 2,130 short tons.
[5] Primary metal and remelt alloys.

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 of manganese bearing silica was exported from British Columbia. During recent years in New Brunswick extensive development work was done by Strategic Materials Corporation on the manganese-iron deposits. Test lots of ores were shipped to the firm's pilot plant where a process was developed for the production of ferro-manganese. Operations did not progress beyond the experimental basis, and eventually ceased.

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 $0.80 to $0.85 per long ton unit, c.i.f. U.S. ports.

TABLE 36. Production of Manganese Ore, 1943-62

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	1957-62	–	–

TABLE 37. Imports of Manganese Ore, 1953-62

Year	Tons	Value	Year	Tons	Value
		$			$
1953	66,682	2,719,863	1958	42,060	1,722,965
1954	48,962	2,277,043	1959	118,454	5,017,112
1955	175,282	7,338,269	1960	56,350	2,543,763
1956	207,977	9,137,278	1961	76,016	3,465,313
1957	131,318	7,519,746	1962	90,725	4,037,672

TABLE 38. Imports of Manganese Ore, by Principal Countries of Supply, 1958-62

	1958	1959	1960	1961	1962
	tons				
From					
China	10,312	–	–	–	–
Congo, Republic of (formerly Belgian)	2,379	5,777	17,032	–	–
Japan	–	3	4	83	61
Cuba	4,782	–	–	–	–
Ghana	2,362	66,246	22,399	25,484	49,632
India	6,702	12,314	–	13,291	893
France	2	1	4	13	7
United States	11,044	13,887	4,345	6,388	28,013
United Kingdom	112	111	44	44	65
Brazil	–	20,115	6,522	16,785	10,746
Mexico	1,344	–	512	–	–
Turkey	–	–	–	–	–
South Africa, Republic of	3,020	–	5,488	13,928	–
Greece	1	–	–	–	1,308
Total imports	**42,060**	**118,454**	**56,350**	**76,016**	**90,725**

TABLE 39. World Production of Manganese Ore, by Countries[1]

Country	Per cent Mn.	1958	1959	1960	1961	1962
		short tons				
North America:						
Cuba	36-50+	74,636[4]	58,806[4]	17,644[5]	46,000[3,4]	83,000[3]
Mexico[3]	30+	187,400[3]	181,900[3]	171,400[3]	155,900[3]	184,900
Panama	44+	4,489	—	—	—	—
United States (shipments)	35+	327,309	229,199	80,021	46,088	24,758
Totals		**593,834**	**469,905**	**269,100**	**248,000**	**292,700**
South America:						
Argentina	30-40	16,431	21,358	24,251	22,000[3]	11,253
Bolivia (exports)		—	—	—	53	291
Brazil	38-50	972,413	1,138,649	1,101,387	1,120,336	1,290,461
British Guiana	40	—	—	123,811	216,203	303,636
Chile	40-50	42,061	42,744	50,594	35,012	47,578
Peru	40+	3,242	2,803	1,655	3,879	7,403
Venezuela	38+	9,039	3,955	—	—	—
Totals		**1,043,186**	**1,209,509**	**1,301,698**	**1,397,483**	**1,660,622**
Europe:						
Bulgaria	30+	31,300	28,700	27,600	40,800	38,600
Greece	35+	22,046	38,581	34,410	31,195	33,100[3]
Hungary	30+	200,400	170,086	135,888	137,610	142,447
Italy	35+	48,588	57,520	54,561	54,196	49,053
Portugal	35+	5,484	7,703	8,197	12,492	12,666
Rumania	35	220,755	216,910	192,870	227,076	208,337
Spain	30+	40,267	44,924	24,586	17,092	14,101
U.S.S.R.[6]	—	5,915,000	6,080,300	6,472,800	6,583,000	7,057,000
Yugoslavia	30+	11,060	8,911	14,676	15,595	16,357
Totals[1]		**6,494,900**	**6,653,635**	**6,965,590**	**7,119,056**	7,571,661
Asia:						
Burma	35+	1,405	606	324	196	213
China[3]	—	935,000	1,100,000	1,320,000	880,000	880,000
Goa		86,078	83,584	118,195	109,790	96,732
India	35+	1,406,652	1,298,472	1,321,411	1,355,868	1,306,914
Indonesia	35-49	48,909	47,172	12,026	14,007	5,460
Iran[7]	36-46	661	2,425	8,488	2,315	2,205
Japan	32-40	326,269	383,699	357,131	335,236	340,162
Korea, Republic of	30-48	287	496	1,521	1,518	1,105
Malaya	60	—	—	3,222	7,130	341
Pakistan	42	—	32	327	386	15
Philippines	35-51	24,590	38,365	19,159	20,986	13,160
Tailand	40+	1,102	452	582	588	3,194
Turkey	30-50	24,920	39,341	31,112	33,069	23,422
Totals[3]		**2,856,000**	**2,995,000**	**3,193,000**	**2,761,000**	**2,673,000**
Africa:						
Angola	38-48	38,499	39,314	25,728	22,695	9,115
Bechuanaland	50+	14,213	20,138	25,032	31,737	26,458
Congo, Republic of the (formerly Belgian)	48+	372,741	425,694	420,671	350,208	329,568
Ethiopia	51	—	1,455	10,202	7,716	6,614
Gabon, Republic of		—	—	—	—	224,038
Ghana (exports)[8]	48	574,124	577,694	600,261	431,282	513,622
Ivory Coast	48	—	—	67,917	137,502	139,265
Morocco	35-50	452,041	518,711	532,508	629,512	517,377
Rhodesia and Nyasaland, Federation of:						
Northern Rhodesia	30+	49,383	60,297	59,299	56,901	51,501
Southern Rhodesia	48+	2,512	2,126	1,676	205	7,977
South Africa, Republic of		934,097	1,069,202	1,316,732	1,562,729	1,614,599
South West Africa	45+	103,049	49,442	67,439	50,295	—
Sudan[3]	36-44	6,600	440	—	—	—
United Arab Republic (Egypt region)[9]	57	48,730	67,318	22,046	2,272	42,577
Totals		**2,595,989**	**2,831,831**	**3,148,911**	**3,283,054**	**3,482,711**

See footnotes at end of table.

TABLE 39. World Production of Manganese Ore, by Countries[1] — Concluded

Country	Per cent Mn.	1958	1959	1960	1961	1962
		short tons[2]				
Oceania:						
Australia	45-48	66,845	100,768	67,923	97,901	77,851
Fiji	40+	20,503	14,566	13,073	3,869	1,202
New Caledonia		—	—	—	—	—
New Hebrides		—	—	—	5,060	21,859
New Zealand	48+	116	114	134	—	—
Papua	—	—	—	54	2	—
Totals	...	**87,464**	**115,448**	**81,184**	**106,832**	**100,912**
World totals (estimate)[1]	...	**13,671,000**	**14,275,000**	**14,959,000**	**14,915,000**	**15,782,000**

[1] In addition to countries listed, Czechoslovakia and Sweden report production of manganese ore, but because the manganese content averages less than 30 per cent, the output is not included in this table. Sweden averages annually 11,000 tons and Czechoslovakia approximately 165,000 tons.

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

[3] Estimate.

[4] Exports.

[5] United States imports.

[6] Grade unstated. Source: The Industry of the U.S.S.R. Central Statistical Administration.

[7] Year ending March 20 of year following that stated.

[8] Dry weight.

[9] In addition to high-grade ore shown in the table, Egypt produced the following tonnages of less than 30 per cent manganese content: 1958, 74,303; 1959, 72,752; 1960, 282,200; 1961, 304,663 and 1962, 162,102.

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

MERCURY

There was no production in 1962 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 1962 were $190 per flask of 76 pounds in January: $192 in April; $192 in July and $186 in December.

TABLE 40. Production of Mercury, 1940-62

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	1956-62	—	—

TABLE 41. Production of Mercury, Consumption, Imports and Exports, 1953-62

Year	Production	Consumption	Imports	Exports
	pounds			
1953	—	191,976	196,412	7,018
1954	—	193,894	244,783	6,310
1955	75	416,632	555,526	3,781
1956	—	212,800	450,006	5,953
1957	—	215,300	400,710	1,425
1958	—	151,021	197,073	2,830
1959	—	161,987	141,219	10,458
1960	—	139,627	243,091	1,918
1961	—	150,588	312,913	..
1962	—	135,291	245,059	..

TABLE 42. Imports of Mercury, from Countries of Supply, 1961 and 1962

From	1961		1962	
	Pounds	Value	Pounds	Value
		$		$
Mercury metal				
Colombia	6,840	15,291	—	—
United Kingdom	24	76	200	639
China (Communist)	—	—	7,590	17,230
Mexico	29,260	71,752	144,481	184,592
Netherlands	57	207	72	223
Yugoslavia	65,620	171,656	40,770	93,557
Spain	123,863	280,687	39,586	89,382
United States	87,249	233,495	8,560	24,404
Hong Kong	—	—	3,800	7,900
Totals	**312,913**	**773,164**	**245,059**	**417,927**
Mercury salts				
United Kingdom	...	1,845	...	1,719
United States	...	1,338	...	2,119
Germany West	...	581	—	—
Totals	...	**3,764**	...	**3,838**

TABLE 43. Consumption of Mercury by Principal Uses, 1958-62

Industry	1958	1959	1960	1961	1962
	pounds				
Pharmaceuticals and fine chemicals	6,057	10,319	11,888	18,258	5,806
Heavy chemicals	137,161	116,011	86,649	96,362	104,189
Electrical apparatus	3,969	4,211	2,962	3,129	4,405
Gold mines[1]	3,000	3,628	4,904	4,086	3,738
Miscellaneous[1]	834	27,818	33,224	28,753	17,153
Total accounted for	**151,021**	**161,987**	**139,627**	**150,588**	**135,291**

[1] Estimated.

TABLE 44. World Production of Mercury, by Countries[1]

Country	1958	1959	1960	1961	1962
	flasks of (76 pounds) 34.5 kilograms[2]				
North America:					
Mexico	22,556	16,420	20,114	18,101	18,855[3]
United States	38,067	31,256	33,223	31,662	26,277
South America:					
Chile	3,343	2,007	2,876	1,509	791
Colombia	203	95	149	191	—
Peru	1,983	2,526	3,034	3,001	3,483[4]
Europe:					
Austria	—	—	—	—	—
Czechoslovakia[5]	725	725	725	725	725
Italy	58,712	45,833	55,492	55,434	54,535
Rumania	535	387	413	350	222
Spain	55,382	51,680	53,369	51,202	52,798
U.S.S.R.[3]	25,000	25,000	25,000	25,000	35,000
Yugoslavia	12,270	13,344	14,069	15,954	16,273
Asia:					
China[3]	17,000	23,000	23,000	26,000	26,000
Japan	5,720	5,988	5,791	5,437	4,409
Philippines	3,321	3,539	3,041	3,167	2,767
Turkey	1,486	1,479	1,339	1,864	2,687
Africa:					
Tunisia	39	198	166	54	—
World totals (estimate)	**246,000**	**223,000**	**242,000**	**240,000**	**245,000**

[1] This table incorporates some revisions. Data do not add exactly to totals shown because of rounding where estimated figures are included in the detail.
[2] 76 pound flasks.
[3] Estimate.
[4] Exports.
[5] Estimate according to the 49 Annual issue of Metal Statistics. (Metallgesellschaft), except Czechoslovakia 1962.

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

MOLYBDENUM

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

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

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

TABLE 45. Production of Molybdenum, 1953-62

Year	Ores, concentrates, sulphides and oxides, shipped[1] or used		Molybdenum content of shipments
	tons	$	pounds
1953	184	215,527	194,344
1954	411	457,912	451,450
1955	762	823,954	833,506
1956	705	955,828	842,263
1957	633	1,166,557	783,739
1958	744	1,152,838	888,264
1959	658	748,566	940,596
1960	649	1,015,380	767,621
1961	640	1,092,201	771,358
1962	675	1,261,451	817,705

[1] Shipped from stockpile.

TABLE 46. World Production of Molybdenum in Ores and Concentrates, by Countries[1]

Country	1958	1959	1960	1961	1962
	thousands of pounds[2]				
Australia	4	[3]	—	2	2
Austria	—	—	—	—	—
Canada	888	749	767	771	818
Chile	2,972	5,064	4,083	4,037	5,256
China[4]	2,200	3,300	3,300	3,300	3,300
Japan	692	842	840	807	825
Korea, Republic of	82	49	97	71	163
Mexico	57	57	132	7[4]	128
Norway	483	498	542	531	575
Peru	2	—	—	—	11
Philippines	—	97	62	249	249
Portugal	—	—	—	—	—
South Africa, Republic of	9	—	—	—	—
U.S.S.R.[4]	9,300	9,900	11,000[5]	11,900	12,500
United States	41,069	50,956	68,237	66,563	51,244
Yugoslavia	4	4[4]	—	—	—
World totals (estimate)[1]	**57,800**	**71,500**	**89,100**	**88,200**	**75,100**

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

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 stop lights. In the manufacture of rubber, the addition of selenium, in concentrations of from 0.1 to 2.0 per cent, promotes resistance to heat, oxidation and abrasion. It is also used as an accelerator in the vulcanization of synthetic rubber.

The New York price for selenium in December 1962 was $5.75 per pound for commercial grade to $6.75 per pound for high purity grade.

TABLE 47. Production[1] of Selenium, 1953-62

Year	Pounds	Value	Year	Pounds	Value
		$			$
1953	262,346	1,101,854	1958	306,990	2,302,426
1954	323,529	1,617,645	1959	368,107	2,576,749
1955	427,109	3,203,319	1960	521,638	3,651,466
1956	330,389	4,460,252	1961	430,612	2,798,978
1957	321,392	3,535,312	1962	487,066	2,800,630

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

TABLE 48. Refinery Output of Selenium from Primary and Scrap Materials, 1953-62

Year	Pounds	Year	Pounds
1953	307,903	1958	342,141
1954	297,479	1959	372,410
1955	422,588	1960	524,659
1956	355,024	1961	422,955
1957	332,011	1962	480,479

TABLE 49. Exports of Selenium and Selenium salts, 1961 and 1962

Destination	1961		1962	
	Pounds	Value	Pounds	Value
		$		$
United Kingdom	212,500	1,413,520	161,100	1,009,056
South Africa, Republic of	3,800	23,588	–	–
Australia	1,100	8,400	1,200	8,442
Argentina	3,000	18,401	3,100	16,949
Brazil	2,000	12,149	5,200	30,924
France	7,100	53,156	3,200	23,420
Italy	1,500	9,885	1,600	11,300
United States	100,100	618,945	142,300	889,740
Hungary	7,000	46,080	–	–
India	300	402	1,700	7,364
China	–	–	–	–
Japan	100	138	–	–
Trinidad	–	–	–	–
Spain	100	664	1,700	11,294
Hong Kong	100	504	–	–
Malaya	400	2,241	–	–
China, (Communist)	6,100	39,651	–	–
Philippines	200	1,163	700	3,603
Chile	400	2,615	300	1,849
Germany, West	–	–	200	715
Switzerland	–	–	200	1,111
Israel	–	–	100	287
New Zealand	–	–	1,100	5,943
Colombia	–	–	700	3,969
Venezuela	–	–	1,200	8,012
Totals	**345,800**	**2,251,502**	**325,600**	**2,033,978**

TABLE 50. World Production of Selenium, by Countries[1]

Country	1958	1959	1960	1961	1962
	pounds				
North America:					
Canada	306,990	368,107	521,638	430,612	487,066
Mexico	107,576	8,891	6,944	5,642	6,953
United States	683,000	728,000	539,000	1,022,000	999,000
South America:					
Argentina	[2]	[2]	[2]	[2]	[2]
Peru	8,419	8,155	10,681	16,305	18,382
Europe:					
Belgium-Luxembourg (exports)	48,942	124,560	72,531	51,808	29,542
Finland	13,051	13,196	11,358	13,296	11,797
Sweden	84,135	133,158	176,809	213,471	225,000[3]
Asia: Japan	182,406	229,486	278,234	300,262	309,314
Africa: Norther Rhodesia, Federation of	24,388	33,448	50,119	38,292	40,526
Oceania: Australia	3,000[3]	3,000[3]	3,500[3]	3,000[3]	3,500[3]
World totals[1]	**1,462,000**	**1,650,000**	**1,671,000**	**2,095,000**	**2,131,000**

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

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

TELLURIUM

Tellurium, like its associated element selenium, is commonly found in small amounts in copper-sulphide and gold ores. The potential production as a by-product in the refining of copper is great, but its recovery is restricted to meet the relatively minor quantities required by industry. The development of thermoelectric devices for refrigeration has brought an increased demand for tellurium and the price of the metal has risen from $1.75 per pound to $6.00 per pound.

Tellurium is recovered commercially in Canada at the Copper Cliff, Ontario, plant of the International Nickel Company of Canada, Limited, and at the Montreal East refinery of Canadian Copper Refiners, Limited. At Copper Cliff it is recovered from the slimes formed in the process of refining copper produced from the Sudbury nickel-copper ores. At Montreal East it is obtained from the refining of copper anodes made from copper ores at Norands, 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 $6.00 a pound in New York in December, 1962.

TABLE 51. Production[1] of Tellurium, 1953-62

Year	Pounds	Value	Year	Pounds	Value
		$			$
1953	4,694	8,215	1958	38,250	65,025
1954	8,171	14,300	1959	13,023	27,999
1955	9,014	15,774	1960	44,682	156,388
1956	7,867	13,767	1961	77,609	376,404
1957	31,524	55,167	1962	58,725	352,350

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

TABLE 52. Refinery Output of Tellurium, 1953-62

Year	Pounds	Year	Pounds
1953	17,295	1958	42,337
1954	7,990	1959	8,900
1955	6,516	1960	41,756
1956	15,915	1961	81,050
1957	34,895	1962	57,630

TABLE 53. Consumption of Tellurium in Canada, 1961 and 1962

	1961	1962
	pounds	
By end-use:		
Metal alloys	1,875	1,563
Other (rubber, electronics)	2,968	2,743
Totals	**4,843**	**4,306**
By type:		
Metal pellets	1,259	986
Other (lump, powder, compounds)	3,584	3,320
Totals	**4,843**	**4,306**

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

Country	1958	1959	1960	1961	1962
	pounds				
North America:					
Canada	38,250	13,023	44,682	77,609	58,725
United States	123,000	177,000	271,000	205,000	264,000
South America: Peru	14,868	62,600	59,343	76,279	50,472
Asia: Japan	110	2,761	13,671	16,486	23,168
World Totals	**176,200**	**255,400**	**388,700**	**375,400**	**396,400**

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

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

THALLIUM

No production was reported in 1962 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 esported for treatment in foreign plants. Thallium metal was quoted in the United States at $7.50 per pound nominal, December, 1962.

THORIUM

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

TIN

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 1962 most of the tin concentrates were exported for treatment. Some tin was recovered as a lead-tin alloy during the processing of indium residues at the Canadian plant. Exploration work was done by Mount Pleasant Mines Limited on a tin-molybdenum, tungsten-copper-zinc prospect in Charlotte County, New Brunswick.

The New York quotations showed the monthly average price for tin was: January, $1,20 April, $1.22 July, $1.11 October, $1.09 December, $1.10 per pound.

TABLE 55. Production of Tin,[1] 1953-62

Year	Pounds	Value	Year	Pounds	Value
		$			$
1953	643,254	581,746	1958	795,496	625,260
1954	333,788	263,359	1959	747,443	630,094
1955	492,781	408,030	1960	621,718	522,243
1956	756,934	670,441	1961	1,119,350	727,578
1957	709,102	580,342	1962	650,941	442,640

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

TABLE 56. Production of New Tin, Domestic Consumption and Imports, 1953-62

Year	Production	Domestic consumption	Imports
	tons (2,000 pounds)		
1953	322[1]	4,444	4,146
1954	167[1]	4,036	4,296
1955	246[1]	4,500	4,836
1956	378[1]	4,575	4,227
1957	355[1]	4,057	4,654
1958	398[1]	3,688	3,876
1959	374[1]	4,729	4,685
1960	311[1]	4,346	4,220
1961	560[1]	4,428	3,948
1962	325[1]	5,048	2,547

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

TABLE 57. Imports of Tin, from Countries of Supply, 1961 and 1962

Country	1961		1962	
	Tons	Value	Tons	Value
		$		$
Tin blocks, pigs or bars				
United Kingdom	713	1,670,950	207	522,218
Malaya	1,793	4,009,328	1,670	4,029,800
Belgium-Luxembourg	694	1,625,349	427	1,041,455
Germany, West	143	325,100	—	—
Netherlands	—	—	—	—
United States	464	968,777	187	467,977
Bolivia	141	293,904	56	142,258
Totals	**3,948**	**8,893,408**	**2,547**	**6,203,708**
	pounds		pounds	
Tinfoil				
Germany, West	—	—	—	—
United Kingdom	175	145	—	—
United States	26,445	36,971	13,633	18,567
Kenya	—	—	—	—
Totals	**26,620**	**37,116**	**13,633**	**18,567**
Babbitt metal				
United Kingdom	24,400	4,263	11,200	1,186
United States	52,700	24,831	38,600	35,495
Totals	**77,100**	**29,094**	**49,800**	**36,681**

TABLE 58. Consumption of Tin (Ingots or Bars), 1961 and 1962

Used in production of	1961	1962
	tons (2,000 pounds)	
Babbitt	335	214
Bronze	262	232
Galvanizing	8	8
Solder	1,301	1,276
Tin plate and tinning	2,361	2,756
Other used (collapsible tubes, foil, etc.)	161	562
Totals accounted for	**4,428**	**5,048**

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

Country	1958	1959	1960	1961	1962
	long tons				
North America:					
Canada	355	334	278	500	291
Mexico	544	378	372	530	576
United States	—	50	10	[2]	[2]
Totals	**899**	**762**	**660**	[2]	[2]
South America:					
Argentina	205	225	238	515	571
Bolivia (exports)	17,731	23,811	19,407	20,409	21,492
Brazil[3]	409	567	1,556	582	732
Peru	30	43	6	14	11
Totals	**18,375**	**24,446**	**21,207**	**21,519**	**22,806**
Europe:					
Czechoslovakia[4]	200	200	200	200	200
France	—	—	21	156	281
Germany, East[3]	720	720	720	720	720
Portugal[5]	1,249	1,129	772	729	679
Spain	467	326	196	230	231
U.S.S.R.[6,7]	13,500	15,000	16,000	17,000	17,000
United Kingdom	1,087	1,252	1,199	1,210	1,181
Totals[3,7]	**17,200**	**18,600**	**19,100**	**20,200**	**20,300**
Asia:					
Burma[5]	1,300	1,200	1,200	1,130	1,041
China[6]	23,000	26,000	28,000	30,000	28,000
Indonesia	23,201	21,613	22,596	18,574	17,310
Japan	1,108	998	842	853	859
Laos	301	294	383	335	367
Malaya, Federation of	38,458	37,525	51,979	56,028	58,603
Thailand	7,742	9,684	12,080	13,270	14,679
Totals[3,7]	**95,100**	**97,300**	**117,100**	**120,200**	**120,900**
Africa:					
Cameroon, Republic of	75	62	65	65	21
Congo, Republic of the (formerly Belgian)	9,689	9,194	8,636	6,314	6,875
Congo, Rupublic of	27	32	34	46	46
Morocco	6	9	10	11	10
Niger, Republic of	61	57	53	47	41
Nigeria	6,200	5,541	7,675	7,779	8,210
Rhodesia and Nyasaland, Federation of	532	605	642	716	677
Ruanda-Urundi	1,490	1,124	1,277	1,474	1,440[3]
South Africa, Republic of	1,417	1,273	1,276	1,430	1,408
South-West Africa	164	4	261	302	369
Swaziland	15	5	6	5	5
Tanganyika (exports)	19	65	138	163	206
Uganda	41	36	32	33	67
Totals	**19,736**	**18,007**	**20,105**	**18,385**	**19,375**
Oceania:					
Australia	2,237	2,351	2,202	2,745	2,714
World totals (estimate)	**153,500**	**161,500**	**180,400**	**184,100**	**187,000**

[1] This table incorporates some revisions of data published in previous tin chapters. Data do not add to totals shown due to rounding where estimated figures are included in the detail.
[2] Figure withheld to avoid disclosing individual company confidential data: included in world total.
[3] 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.
[4] Estimate, according to 43rd annual issue of Metal Statistics (Metallgesellschaft) through 1960.
[5] Includes tin content of mixed concentrates.
[6] Estimated smelter production.
[7] Output from U.S.S.R. in Asia included with U.S.S.R. in Europe.

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

TITANIUM

At Lac Tio, Quebec, the Quebec Iron and Titanium Corporation mined ilmenite and shipped the ore by rail to Havre St. Pierre on the St. Lawrence and thence by boat to the smelter at Sorel, Quebec. There the ore was treated to produce iron (remelt) and slag.

The smelter slag, having a titanium dioxide content of about 72 per cent, was exported for further treatment. General statistics on the mining of ilmenite are included in the Miscellaneous Metals Industry but the statistics on smelting are included in The Smelting and Refining Industry.

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

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

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

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

Prices (nominal) f.o.b. U.S. Atlantic ports at the end of 1962 were: Ilmenite, 59.5% TiO_2, $23 to $26 per gross ton. The nominal quotation for titanium metal, 99.3 per cent, was $1,32 per pound.

TABLE 60. Producers' Shipments of Titanium Ore to Outside Customers, 1952-62

Year	Short tons	Value	Year	Short tons	Value
		$			$
1952	51	459	1957	10,770	97,075
1953	9,292	80,085	1958	–	–
1954	1 541	9,462	1959	26,777	129,565
1955	1,464	10,634	1960	2,947	16,265
1956	2,310	16,561	1961-62	–	–

TABLE 61. Imports of Titanium Oxide and White Pigments Containing not Less than 14 Per Cent by Weight of Titanium, 1958-62

Year	From the United Kingdom		From the United States		Total imports	
	Pounds	Value	Pounds	Value	Pounds	Value
		$		$		$
1958	21,775,393	4,649,207	37,100,353	3,814,991	58,878,496	8,464,690
1959	23,793,207	4,958,593	35,363,989	3,545,123	61,195,519	8,877,007
1960	19,350,694	4,052,615	33,348,008	3,386,029	53,792,895	7,648,278
1961	20,763,628	4,460,194	31,849,083	3,503,991	52,612,711	7,964,185
1962	23,557,187	5,263,425	26,285,469	2,819,218	49,887,795	8,090,102

TABLE 62. Consumption of Titanium Oxide, by Industries, 1960-62

Industry	1960		1961		1962	
	Pounds	Cost at works	Pounds	Cost at works	Pounds	Cost at works
		$		$		$
Paints:						
Extended titanium dioxide pigments	27,972,318	3,121,796	26,207,395	2,953,377	21,869,760	2,513,447
Titanium dioxide	32,667,796	8,458,330	34,582,672	8,692,323	36,586,830	9,149,571
Miscellaneous chemicals	...	...	...	...	...	...
Pulp and paper	4,921,318	1,184,056	4,888,742	1,187,788	6,536,557	1,553,825
Linoleum coated fabrics industry	3,720,504	917,151	4,655,561[1]	1,110,929[1]	5,215,182	1,255,049
Rubber goods	1,532,501	387,226	1,869,110	465,436	1,901,147	483,422
Miscellaneous non-metallic minerals	1,235,340	333,482	1,143,366	305,912	1,208,697	304,415
Toilet preparations	28,605	8,896	48,937	15,199	57,010	18,210
Industrial chemicals	14,285	3,759	46,457	11,990	165,392	40,983
Synthetic textiles	91,850	27,125	64,650	19,875	..	..
Other chemical industries, n.e.s.	604,730	145,328	689,561	165,724	886,884	211,445
Totals accounted for	**72,789,247**	**14,587,149**	**74,196,451**	**14,928,553**	**74,427,459**	**15,530,367**

[1] Includes "Asphalt Roofing Manufacturers".

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

Country	1958	1959	1960	1961	1962
	short tons[1,2]				
Ilmenite					
Australia (shipments)	78,342	93,606	119,377	186,369	204,000
Canada[3]	161,312	270,477	389,586	463,362	301,449
Ceylon	—	—	7,000	3,071	4,652
Finland	117,384	94,966	92,219	21,272	96,110
Gambia	31,851	14,553	—	—	—
India	346,260	334,024	275,303	192,018	152,241
Japan (titanium slag)	3,932	3,445	1,444	1,774	578
Malagasy Republic (Madagascar)	1,151	659	3,008	3,640	3,510
Malaya (Exports)	83,806	81,593	132,255	119,695	113,856
Mexico	166	—	—	—	—
Moxambique	—	11,400	784	—	—
Norway	233,585	250,206	258,542	342,723	276,790
Portugal	506	2,113	1,002	109	75
Senegal	36,900	32,941	24,159	19,286	24,727
South Africa, Republic of	29,611	87,233	90,432	99,010	87,096
Spain	18,161	8,113	12,267	33,184	45,935
Thailand	922	550	—	—	—
United Arab Republic (Egypt)	3,000[4]	17,100	13,200	38,004	49,210
United States[5]	563,338	634,886	786,372	782,412	807,725
World totals ilmenite (estimate)[1,2]	**1,710,200**	**1,937,900**	**2,207,000**	**2,305,900**	**2,168,000**
Rutile					
Australia	93,327	91,734	99,274	113,603	133,497
Brazil	269	231	238	245	144
Cameroon, Republic of	—	—	—	—	—
India	503	429	1,082	898	1,770
Norway	—	—	—	—	—
Senegal	1,157	—	—	187	811
South Africa, Republic of	552	3,381	3,695	3,483	3,575
United Arab Republic (Egypt)	—	1,157	1,100[4]	1,100[4]	198
United States	7,406	9,466	8,808	9,045	9,981
World totals rutile (estimate)[1,2]	**103,200**	**106,400**	**114,200**	**128,600**	**150,000**

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

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

[3] Represents Ti. slag containing approximately 70 per cent TiO_2 and small quantities of "titanium ore".

[4] Estimate.

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

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

TABLE 64. Consumption of Ferrotitanium in the Manufacture of Steel, 1953-62

Year	Tons	Value	Year	Tons	Value
		$			$
1953	213	50,433	1958	210	76,689
1954	171	50,166	1959	252	84,683
1955	156	48,074	1960	418	207,489
1956	277	84,393	1961	236	109,615
1957	252	82,258	1962	123	78,613

TUNGSTEN

Tungsten concentrates were not produced in 1961. Mining of tungsten ores in British Columbia ceased in 1958. Tungsten bearing deposits occur in British Columbia, Yukon, North-west Territories, Ontario and New Brunswick.

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

The E. & M. Journal price quotations for tungsten ore in December 1962 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 $8.00 to $8.75 scheelite $8.00 to $8.75 U.S. mined tungsten concentrate, $18 per stu f.o.b. milling point, subject to penalties.

TABLE 65. Production (Commercial Shipments) of Tungsten Concentrate, 1950-62

Year	Concentrate	WO_3 content	Value
	pounds		$
1950	1,886,000[1]	284,078	160,343
1951	4,145	2,833	7,098
1952	3,670,686	1,493,111	4,488,237
1953	6,307,717	2,446,028	5,689,160
1954	3,237,748	2,170,633	5,795,781
1955	3,255,100	1,942,770	5,508,437
1956	3,401,712	2,271,437	6,351,376
1957	2,994,000	1,921,483	5,279,275
1958	1,022,000	690,976	1,898,455
1959-61	—	—	—
1962	..	3,580	1,611

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

TABLE 66. Imports of Tungsten Ores, from Countries of Supply, 1961 and 1962

Country	1961		1962	
	Pounds	Value	Pounds	Value
		$		$
Portugal	—	—	22,000	9,084
Congo, Republic of the (formerly Belgian)	—	—	—	—
Bolivia	91,600	48,338	191,900	75,432
Korea	50,000	42,088	80,000	31,239
Peru	—	—	132,800	60,403
China (communist)	—	—	51,000	31,050
United States	250,000	247,775	60,000	37,315
Thailand	—	—	—	—
Argentina	55,100	29,095	2,316,600	613,874
Brazil	55,100	36,031	—	—
Totals	**501,800**	**403,327**	**2,854,300**	**858,397**

TABLE 67. World Production of Tungsten Ores, by Countries,[1] of Concentrates Containing 60 per WO_3

Country	1958	1959	1960	1961	1962
	short tons				
North America:					
Canada	575	—	—	—	3
Mexico	8	138	198	193	88
United States (shipments)	3,788	3,649	7,325	8,245	8,429
Totals	**4,371**	**3,787**	**7,523**	**8,438**	**8,520**
South America:					
Argentina	1,127	827	893	892	635
Bolivia (exports)	2,457	2,671	2,370	3,104	2,798
Brazil (exports)	2,596	2,302	1,867	1,361	1,368
Peru	992	542	538	428	435
Totals	**7,172**	**6,342**	**5,668**	**5,785**	**5,236**
Europe:					
Austria	146	152	243	317	320
Finland	163	42	—	58	—
France	1,152	959	753	806	757
Italy	10	6	8	2	1
Portugal	2,109	2,478	3,189	3,274	2,754
Spain	1,301	854	1,030	1,192	777
Sweden	660	268	311	345	386
U.S.S.R.[2]	9,400	9,900	10,500	11,000	11,600
United Kingdom	2	—	—	—	—
Yugoslavia	99	86	86	9	9
Totals[2]	**15,050**	**14,750**	**16,100**	**17,000**	**16,600**
Asia:					
Burma[3]	1,100	1,269	1,041	1,102	882
China[2]	16,500	22,500	24,900	24,900	24,900
Hong Kong	46	47	40	20	18
India	—	1	3	11	12
Japan	881	1,194	1,082	1,033	1,160
Korea: North[2]	3,300	4,400	5,500	5,500	4,400
Republic of	3,597	3,760	6,321	8,107	8,219
Malaya, Federation of	57	24	46	41	11
Thailand	725	553	486	565	463
Totals[2]	**26,200**	**33,750**	**39,400**	**41,300**	**40,100**
Africa:					
Congo, Republic of the (formerly Belgian)[3]	1,200	1,038	634	642	408
Rhodesia and Nyasaland, Federation of:					
Southern Rhodesia	103	36	11	55	24
Ruanda Urondi	279	171	504	734	165
South Africa, Republic of	61	42	37	30	28
South-West Africa[3]	64	2	154	190	184
Tanganyika (exports)	—	—	—	3	—
Uganda (exports)	31	14	84	243	105
United Arab Republic (Egypt)	—	—	—	91	—
Totals	**1,738**	**1,303**	**1,424**	**1,988**	**914**
Oceania:					
Australia	1,587	1,218	2,075	2,866	1,946
New Zealand	3	11	10	6	10
Totals	**1,590**	**1,229**	**2,085**	**2,872**	**1,956**
World totals (estimate)	**56,100**	**61,200**	**72,200**	**77,400**	**73,300**

[1] This table incorporates some revisions. Data do not add exactly to totals shown because of rounding where estimated figures are included in the detail.
[2] Estimate.
[3] Including WO_3 in tin-tungsten concentrates.

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

URANIUM

In 1962 the output of uranium precipitates from the mines in Ontario were valued at $118,283,081 The Beaverlodge area in Saskatchewan shipped $39,900,588 worth of U_3O_8. The mines in the Northwest Territories ceased production in 1960.

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

In the table below 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 1956-62.

TABLE 68. Producers' Shipments[1] of Uranium, Radium, etc., 1935-62

Year	U_3O_8	Value	Year	U_3O_8	Value
	pounds	$		pounds	$
1935	...	413,700	1955	...	26,031,604
1936	...	605,500	1956	4,581,060	45,732,145
1937	...	876,540	1957	13,271,414	136,304,364
1938	...	1,045,458	1958	26,805,232	279,538,471
1939	...	1,121,553	1959	31,784,189	331,143,043
1940	...	410,176	1960	25,495,369	269,938,192
1941-53	...	..	1961	19,281,465	195,691,624
1954	...	26,373,052	1962	16,859,169	158,183,669

[1] Compilation method is shown in text above.

TABLE 69. World Production of Uranium Oxide U_3O_8, by Countries[1,2,3]

Country	1958	1959	1960	1961	1962
	short tons[2]				
North America:					
Canada	13,403	15,892	12,748	9,641	8,430
United States[4]	12,570[4]	16,420[4]	17,760[4]	17,399[4]	17,010
South America:					
Argentina[5]	19	13	7	5	4
Europe:					
Finland[5]	—	—	40	20	—
France	660	950	1,379	2,078	2,601
Spain[5]	—	—	60	55	55
Sweden[5]	10	10	10	10	10
Africa:					
Congo, Republic of the (formerly Belgian)	2,300	2,300	1,200	—	—
Malagasy Republic (Madagascar)[6]	95	115	[6]	[7]	[7]
Rhodesia and Nyasaland, Federation of	50	38	—	—	—
South Africa, Republic of	6,245	6,445	6,409	5,468	5,024
Oceania:					
Australia[5]	700	1,100	1,300	1,600	1,400
World totals (estimate)[1,2]	**36,250**	**43,350**	**41,130**	**36,490**	**34,600**

[1] In addition to the countries listed, uranium is also known to have been produced in Colombia, India, Italy, Japan, West Germany and Portugal, but production data are not available. An estimate for these countries has been included in the world total.

[2] Uranium is also believed to be produced in Czechoslovakia, East Germany, Hungary and U.S.S.R. but production data are not available; for these countries no estimate has been included in the world total. Estimates of production for these countries range from 10,000 to 20,000 tons per year.

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

[4] Data represent deliveries to A.E.C. Includes uranium production from phosphate rock in eastern United States.

[5] Estimate.

[6] Malagasy included with France.

[7] Malagasy and Gabon included with France.

[8] Derived from uranothorianite.

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

TABLE 70. Exports of Uranium Ores and Concentrates, 1960-62

Destination	1960	1961	1962
	dollars		
United Kingdom	25,904,553	18,255,934	16,597,910
Germany, West	293,971	512,658	206,032
Japan	147,011	39,733	39,689
United States	236,594,407	173,914,072	149,165,248
India	570,480	—	—
Austria	—	—	—
Denmark	—	—	—
Sweden	27,720	—	—
Switzerland	1,000	—	—
France	250	—	—
Italy	230	—	—
Netherlands	1,310	—	—
Totals	**263,540,932**	**192,722,397**	**166,008,879**

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, 1962 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 71. World Production of Vanadium in Ores and Concentrates

Country	1958	1959	1960	1961	1962
			short tons[1]		
North America:					
United States (recoverable vanadium)	3,030	3,719	4,971	5,343	5,233
South America:					
Argentina	4	4	[2]	4[3]	9
Europe:					
Finland	430	556	625	701	629
Africa:					
Angola	20	3	—	—	—
Rhodesia and Nyasaland, federation of:					
Northern Rhodesia (recovered Vanadium)	—	—	146	112	3
South Africa, Union of	316	320	656	1,422	1,393
South-West Africa (recoverable vanadium)	435	719	838	1,145	1,019
World totals (estimate)[1,4]	**4,235**	**5,321**	**7,236**	**8,727**	**8,286**

[1] This table incorporates some revisions.
[2] Data not available.
[3] Estimate.
[4] Total represents data only for countries shown in table and excludes vanadium in ores produced in countries 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, 1962 were: zircon ore, 65 per cent ZrO_2, $48 to $50 per long ton, at Atlantic seaboard; zirconium sponge, $5 to $10 per pound for commercial grade.

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

Country	1958	1959	1960	1961	1962
	short tons				
Australia	66,381	125,834	114,645	152,859	149,869
Brazil[2]	10,471	10,846	6,358	74,405	2,642
India	10[3]	10[3]	10[3]	10[3]	[4]
Malagasy Republic (Madagascar)	26	50	145	353	390
Malaya, Federation of	28[5]	130	63	63[5]	67[5]
Nigeria	101	1,250	1,968	832	544[6]
Senegal, Republic of	7,606	9,557	11,408	5,939	2,573
South Africa, Republic of	1,129	5,924	7,366	7,607	7,581
United Arab Republic (Egypt)	45	65[3]	408	—	188
United States	30,443	[7]	[7]	[7]	[7]

[1] This table incorporates some revisions.
[2] Chiefly baddeleyite.
[3] Estimate.
[4] Data not available.
[5] Exports.
[6] U.S. Imports.
[7] Figure withheld to avoid disclosing individual company confidential data.

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

List of Operators of Miscellaneous Metal Mines, 1962

Name of firm and product	Head office address	Location of mine or plant
Aluminum:		
Aluminum Company of Canada Limited	1700 Sun Life Building, Montreal, Quebec	Arvida, Quebec; Shawinigan Falls, Quebec; Île Maligne, Quebec; Beauharnois, Quebec; Kitimat, British Columbia
Canadian British Aluminum Co. Ltd.	Baie Comeau, Quebec	Baie Comeau, Quebec
Antimony:		
Consolidated Mining & Smelting Company of Canada Ltd.	215 St. James St., Montreal, Quebec	Trail, British Columbia
Barium:		
Dominion Magnesium Ltd.	Haley, Ontario	Haley, Ontario
Beryl:		
Canadian Beryllium Mines & Alloys Ltd.[1]	100 Adelaide St. W., Toronto, Ontario	Renfrew County; Ontario
Dalhart Beryllium Mines & Metals Corp.[1]	217 Bay St., Toronto, Ontario	Dalhart, Manitoba
Gill Mining Corp.[1]	4352 Beaubien Est., Montreal, Quebec	Temiscamingue, Quebec
Bismuth:		
Cobalt Refinery Ltd.	Cobalt, Ontario	Cobalt, Ontario
Consolidated Mining & Smelting Company of Canada Ltd.	215 St. James St., Montreal, Quebec	Trail, British Columbia
Molybdenite Corp. of Canada Ltd.	59 St. James St. W., Montreal, Quebec	La Corne Twp., Quebec
Gaspé Copper Mines Ltd.	44 King St. W., Toronto, Ontario	Murdockville, Quebec
Cadmium:		
Salbec Copper Mines Ltd.	507 Place d'Armes, Montreal, Quebec	Stratford Twp., Quebec
East Sullivan Mines Ltd.	1403 Alfred Bldg., Montreal, Quebec	Bourlamaque, Quebec
Consolidated Mining & Smelting Company of Canada Ltd.	215 St. James St., Montreal, Quebec	Trail, British Columbia
Hudson Bay Mining & Smelting Co. Ltd.	500 Royal Bank Building, Winnipeg, Manitoba	Flin Flon, Manitoba
Canadian Exploration Ltd.	Royal Bank Bldg., Vancouver, British Columbia	Salmo, British Columbia
Highland Bell Ltd.	789 W. Pender St., Vancouver, B.C.	Greenwood, British Columbia
Howe Sound Company, Britannia Division	500 Fith Ave., New York 36, U.S.A.	Britannia Beach, British Columbia
Mastodon Highland Bell Mines Ltd.	1200 West Pender St., Vancouver	Revelstoke, British Columbia
Reeves Macdonald Mines Ltd.	413 Granville St., Vancouver, B.C.	Remac, British Columbia
Sheep Creek Gold Mines Ltd.	413 Granville St., Vancouver, British Columbia	Zincton, British Columbia
United Keno Hill Mines Ltd.	85 Richmond St. W., Toronto, Ontario	Elsa, Yukon
Cerium:		
Atlin-Ruffner Mines (B.C.) Ltd.[1]	510 W. Hastings St., Vancouver, British Columbia	Parry Sound, Ontario
Chromite:		
Colonial Chrome Co. Ltd.[1]	420 Lexington Ave., New York, N.Y., U.S.A.	Black Lake, Quebec
Gunnar Gold Mines Ltd.[1]	80 King St., Toronto, Ontario	Bird River, Manitoba
Strannar Mines Ltd.[1]	25 Adelaide St. W., Toronto, Ontario	Lac du Bonnet, Manitoba
Columbium, Tantalum:		
Coulee Lead & Zinc Mines Ltd.[2]	55 Yonge St., Toronto, Ontario	Oka, Quebec
Headway Red Lake Gold Mines Ltd.[2]	55 Yonge St., Totonto, Ontario	Oka, Quebec
Main Oka Mining Corp.[2]	159, Ouest, rue Craig, Montreal, Quebec	Oka, Quebec
Manoka Minning & Smelting Co. Ltd.[1]	44 King St. W., Toronto, Ontario	Oka, Quebec
Columbium Mining Products Ltd.	55 Yonge St., Toronto, Ontario	Oka, Quebec
General Managers Inc.[1]	159 Ouest, rue Craig, Montreal, Quebec	Oka, Quebec
Quebec Columbium Ltd.[1]	630 Dorchester Blvd., Montreal, Quebec	L'Annonciation, Quebec
St. Lawrence Columbium & Metals Corp.	159 Ouest, rue Craig, Montreal, Quebec	Oka, Quebec
Germanium:		
Taiga Mines Ltd.[1]	837 W. Hastings St., Vancouver, B.C.	Powell River, B.C.
Indium:		
Consolidated Mining & Smelting Company of Canada Ltd.	215 St. James St., Montreal, Quebec	Trail, British Columbia
Manganese:		
Stratmat Ltd.[1]	620 Cathcart St., Montreal, Quebec	Woodstock, New Brunswick
Joburke Gold Mines Ltd.[1]	357 Bay St., Toronto, Ontario	Nastapoka Islands, N.W.T.
Magnesium:		
Dominion Magnesium Ltd.	67 Yonge St., Toronto, Ontario	Haley, Ontario
Mercury:		
Bralorne Mines Ltd.[1]	555 Burrard St., Vancouver, British Columbia	Omineca district, British Columbia
Consolidated Mining & Smelting Company of Canada Ltd.[1]	215 St. James St., Montreal, Quebec	Pinchi Lake, British Columbia

[1] See footnotes at end of list.

List of Operators of Miscellaneous Metal Mines, 1962 — Continued

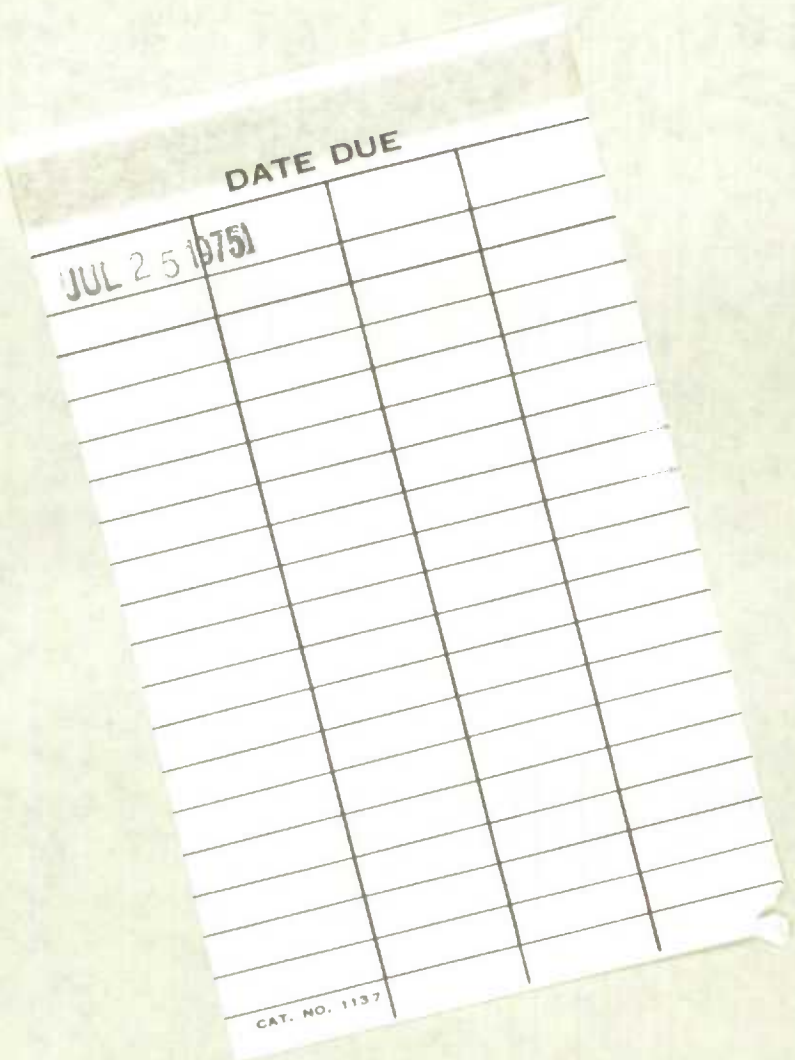
Name of firm and product	Head office address	Location of mine or plant
Molybdenite:		
Anglo-American Molybdenite Mining Corp.[2]	Box 577 Val D'Or, Quebec	Preissac Twp., Quebec
Copperstream-Frontenac Mines Ltd.	266 Notre Dame Ouest, Montreal, Quebec	Frontenac County, Quebec
Molybdenite Corp. of Can. Ltd.	485 rue McGill, Montreal, Quebec	La Corne, Quebec
Portneuf Mineral Corp.[2]	437 St. James St. W., Montreal, Quebec	Portneuf, Quebec
Preissac Molybdenite Mines Ltd.[2]	485 McGill St., Mortreal, Quebec	Preissac, Quebec
Provincial Molybdenum Corp. Ltd.[2]	132 Main St., Maniwaki, Quebec	Kinsington Twp., Quebec
Nortoba Mines Ltd.[2]	199 Bay St., Toronto, Ontario	Sturgeon River, Ontario
Huestis Molybdenum Corp. Ltd.[2]	402 W. Pender St., Vancouver, B.C.	Cariboo area, British Columbia
Canol Metal Mines Ltd.[2]	25 Adelaide St. W., Toronto, Ontario	Quiet Lake, Yukon
Noranda Exploration Co. Ltd.[2]	2256 West 12th Ave., Vancouver, B.C.	Boss Mountain, B.C.
Endako Mines Ltd.[2]	1030 Georgia St., Vancouver 5, B.C.	Omineca, B.C.
Selenium-Tellurium:		
International Nickel Co. of Canada Ltd.	Copper Cliff, Ontario	Copper Cliff, Ontario
Canadian Copper Refiners Ltd.	1600 Royal Bank Building, Toronto, Ontario	Montreal East, Quebec
Thallium:		
Hudson Bay Mining & Smelting Co. Ltd.[2]	500 Royal Bank Building, Winnipeg, Manitoba	Flin Flon, Manitoba
Thorium:		
Rio Tinto-Dow Ltd.	Box 190, Elliot Lake, Ontario	Elliot Lake, Ontario
Tin:		
Consolidated Mining & Smelting Company of Canada Ltd.	215 St. James St., Montreal, Quebec	Trail, British Columbia
Mount Pleasant Mines Ltd.[2]	30 The Driveway, Ottawa, Ontario	St. Andrews, New Brunswick
Titanium ore:		
Bersimis Mining Co.[2]	16 Blvd. des Capucins, Quebec	[illegible] Co., Quebec
Continental Tilanium Corp.	5165 Sherbrooke St. W., Montreal, Quebec	St. Urbain Co., Quebec
Laurentian Titanium Mines Ltd.[2]	4462 St. Denis St., Montreal, Quebec	Wexford Twp., Quebec
Les Mineraux Laurentiens Ltd.[1]	St. Joseph de Beauce, Quebec	St. Urbain Co., Quebec
Quebec Iron and Titanium Corp.	Box 40, Sorel, Quebec	Parker Twp., Sorel, Quebec
Saguenay Exploration & Mining Inc.	753 avenue Wilder, Outremont 8, Quebec	Jonquière, Quebec
Tungsten concentrates:		
Burnt Hill Tungsten & Metallurgical Ltd.[1]	510 McGill St., Montreal, Quebec	Cross Creek, New Brunswick
Canada Tungsten Mining Corp, Ltd.[2]	12 Richmond St. East, Toronto, Ontario	Flat River, N.W.T.
Canadian Exploration Ltd.[2]	Royal Bank Building, Vancouver, British Columbia	Salmo, British Columbia
Consolidated Mining & Smelting Company of Canada Ltd.[1]	Trail, British Columbia	Kimberley, British Columbia
Piermond Mining Co. Ltd.[1]	12323 rue Notre Dame des Anges, Montreal	Risborough, Quebec
Taylor, F.	Mayo, Yukon	Dublin Gulch, Yukon
Uranium:		
New Brunswick:		
Aumacho River Mines Ltd.[1]	25 Adelaide St. W., Toronto, Ontario	Aumacho River, New Brunswick
New Brunswick Uranium Metals & Mining Ltd.[1]	80 Richmond St. W., Toronto, Ontario	Harvey, New Brunswick
Quebec:		
Calumet Uranium Mines Ltd.[1]	159 Ouest, rue Craig, Montreal	Isle Calumet
Marlowe Mines Ltd.[1]	2157 Mackay St., Montreal	Pied des Monts
Consolidated Mogul Mines Ltd.[2]	25 Adelaide St. W., Toronto, Ontario	Figuery Twp.
Molybdenum Corp. of America[1]	500 Fifth Ave., New York, U.S.A.	Oka, Quebec
Quebec North Mines Ltd.[1]	2144 Mackay St., Montreal	Arrache Co.
Ontario:		
Canadian Dyno Mines Ltd.[2]	25 Adelaide St. W., Toronto	Cardiff Twp.
Denison Mines Ltd.	4 King St. W., Toronto	Quirke Lake
Duvex Oil & Mines Ltd.[2]	67 Yonge St., Toronto	Blind River
Faraday Uranium Mines Ltd.	100 Adelaide St. W., Toronto	Bancroft
Lexindin Gold Mines Ltd.[1]	25 Adelaide St. W., Toronto	Blind River
Macassa Gold Mines Ltd. (Bicroft Division)	85 Richmond St. W., Toronto	Bancroft
Milliken Lake Uranium Mines Ltd.[3]	335 Bay St., Toronto	Blind River
Northspan Uranium Mines Ltd.[3]	335 Bay St., Toronto	Elliot Lake
Pardee Amalgamated Mines Ltd.[3]	111 Richmond St., Toronto	Blind River
Pronto Uranium Mines Ltd.[3]	335 Bay St., Toronto	Long Twp.
Preston Mines Ltd.[1]	335 Bay St., Toronto	Elliot Lake
Rio Algom Mines Ltd.	335 Bay St., Toronto	Elliot Lake, Quirke Lake
Stanrock Uranium Mines Ltd.	15 Wellington St. W., Toronto	Elliot Lake
Zenmac Metal Mines[1]	200 Bay St., Toronto	Blind River

See footnotes at end of table.

List of Operators of Miscellaneous Metal Mines, 1962 – Concluded

Name of firm and product	Head office address	Location of mine or plant
Uranium – Concluded:		
Saskatchewan:		
Baska Uranium Mines Ltd.[1]	2,108 Montagne St., Regina, Sask.	Beaverlodge
Cayzor Athabaska Mines Ltd.[1]	73 Adelaide St. W., Toronto, Ontario	Uranium City
Eldorado Mining & Refining Ltd.	Box 379 Ottawa, Ontario	Beaverlodge
Gaitwin Explorations Ltd.[1]	25 Adelaide St. W., Toronto, Ontario	Milliken Lake
Gulch Mines Ltd.[1]	217 Bay St., Toronto, Ontario	Uranium City
Gunnar Mines Ltd.	25 Adelaide St. W., Toronto, Ontario	Athabaska
Iso Mines Ltd.[1]	100 Adelaide St. W., Toronto, Ontario	Athabaska
Lavant Mines Ltd.[1]	627 Bay St., Toronto, Ontario	Beaverlodge
Joburke Gold Mines[2]	357 Bay St., Toronto, Ontario	Beaverlodge
Lorado Uranium Mines Ltd.[1]	25 Adelaide St. W., Toronto, Ontario	Uranium City
National Explorations Ltd.[1]	789 W. Pender St., Vancouver, B.C.	Athabaska
Nisio Mines Ltd.[1]	532 Burrard St., Vancouver, British Columbia	Black Lake
Pitch Ore Uranium Mines Ltd.[1]	200 Bay St., Toronto, Ontario	Beaverlodge
Rix Athabaska Uranium Mines Ltd.[1]	335 Bay St., Toronto, Ontario	Uranium City
Radiore Uranium Mines Ltd.[1]	25 Adelaide St. W., Toronto, Ontario	Uranium City
British Columbia:		
Quebec Metallurgical Industries Ltd.[2]	88 Metcalfe St., Ottawa, Ontario	Golden
Rexspar Uranium & Metals Mining Co. Ltd.[3]	170 Bay St., Toronto, Ontario	Birch Island
Northwest Territories:		
Consolidated Northland Mines Ltd.[1]	25 Adelaide St. W., Toronto, Ontario	Marian River
Eldorado Mining & Refining Ltd.[3]	Box 379, Ottawa, Ontario	Port Radium, N.W.T.; Port Hope, Ontario
Rayrock Mines Ltd.[1]	25 Adelaide St. W., Toronto, Ontario	Sherman Lake
Zirconium:		
Dominion Magnesium Ltd.	67 Yonge St., Toronto, Ontario	Haley, Ontario

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