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SUMMARY

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
Yttrium
Zirconium

The mining of certain metal-bearing ores, other than those commonly classified as gold, silver, copper, nickel, cobalt, lead and zinc, have been grouped, for statistical purposes, as a single industry by the Dominion Bureau of Statistics. Their production in some instances is confined to a few operators and the annual extraction of certain types of ores often fluctuates in an erratic manner according to demand and supply. Included in this report, with the statistics relating to the Canadian production of these ores or metals, are notes and statistical data pertaining to various rare or semi-rare metals of metalliferous ores produced in other countries. Metals and metal-bearing ores produced in Canada during 1966 and classified as miscellaneous include, antimony, bismuth, cadmium, calcium, columbium, indium, magnesium, molybdenum, selenium, tellurium, titanium ore, thorium, tungsten, uranium and yttrium. 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.

Data presented in this report under the heading of Miscellaneous Metal Mines (Tables 1-6) reflect the full implementation of the revised Standard Industrial Classification (S.I.C.) and the New Establishment Concept including an extension of the latter to cover total activities of mining establishments (see Explanatory Notes section of 1964 report). Commodity statistics reflecting total production from all sources, world figures on production, trade data, etc. are presented along the same general lines as in the earlier issues of this report.

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.

x confidential to meet secrecy requirements of the Statistics Act.

TABLE 1. Principal Statistics, Miscellaneous Metal Mines,[1] 1962 - 66

Basis: Revised Standard Industrial Classification and New Establishment Concept

Year	Establishments	Mining activity							Total activity				
		Production and related workers			Cost of fuel and electricity	Cost of materials and supplies	Value of production	Value added	Working owners and partners		Employees		Value added
		Number	Man-hours paid	Wages					Number	With drawals	Number	Salaries and wages	
	No.		'000	$'000						$'000		$'000	
1962	13	4,143	8,333	24,204	4,720	24,489	160,752	131,543	–	–	5,016	29,915	132,309
1963	14	3,564	7,670	21,889	4,638	21,324	142,177	116,215	–	–	4,410	27,718	117,031
1964	15	2,872	6,144	17,418	3,824	18,563	86,359	63,972	–	–	3,696	22,620	65,831
1965	14r	2,572	5,615	15,092	3,525	16,686	82,056	61,845	–	–	3,279	19,721	63,282
1966	18	2,850	6,199	18,309	4,147	20,215	102,628	78,266	–	–	3,694	24,046	78,859

[1] Refer to Explanatory Notes in the 1964 issue, of this report for explanation of concepts and definitions.

TABLE 2. Employment and Payroll, Miscellaneous Metal Mines,[1] 1962 - 66

Basis: Revised Standard Industrial Classification and New Establishment Concept

Year	Employees										Salaries and wages				
	Production and related workers		Other		Administrative and office		Sales and distribution		Total		Production and related workers	Other	Administrative and office	Sales and distribution	Total
	Mining														
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Mining				
	number										$'000				
1962	4,139	4	37	1	768	99	–	–	4,944	104	24,204	216	5,495	–	29,915
1963	3,562	2	45	1	720	80	–	–	4,327	83	21,889	266	5,562	–	27,718
1964	2,869	3	129	1	620	74	–	–	3,618	78	17,418	593	4,609	–	22,620
1965	2,570	2	73	1	565	68	–	–	3,208	71	15,092	372	4,257	–	19,721
1966	2,844	6	55	1	711	75	1	1	3,611	83	18,309	312	5,408	17	24,046

[1] See footnote Table 1.

TABLE 3. Production and Related Workers, Miscellaneous Metal Mines, 1965 and 1966

Basis: Revised Standard Industrial Classification and New Establishment Concept

	Mine			Mill	
	Surface		Underground	Male	Female
	Male	Female	Male		
	number				
1965					
January	551	–	1,152	442	1
February	514	–	1,161	433	1
March	561	–	1,166	418	1
April	651	–	1,187	421	1
May	774	–	1,213	441	1
June	988	–	1,281	545	1
July	1,005	–	1,288	566	1
August	1,006	–	1,305	576	3
September	938	–	1,308	571	3
October	916	–	1,328	571	3
November	910	–	1,316	569	3
December	882	–	1,330	568	3
Averages	808	–	1,253	509	2
1966					
January	818	–	1,325	548	6
February	776	–	1,336	532	6
March	816	–	1,342	528	6
April	884	–	1,345	545	6
May	994	–	1,359	571	6
June	1,061	–	1,360	600	7
July	1,078	–	1,369	621	7
August	852	–	1,400	588	7
September	783	–	1,397	557	7
October	800	–	1,410	555	7
November	973	–	1,449	571	7
December	671	–	1,441	573	7
Averages	900	–	1,378	565	7

TABLE 4. Purchased Fuel and Electricity Used, Miscellaneous Metal Mines, 1965 and 1966

Basis: Revised Standard Industrial Classification and New Establishment Concept

Description		1965		1966	
		Quantity	Cost	Quantity	Cost
			$'000		$'000
Bituminous coal:					
(a) From Canadian mines		–	–	–	–
(b) Imported	ton	33,646	511	34,563	523
Sub-bitumous coal (from Alberta mines only)		–	–	–	–
Anthracite coal	ton	–	–	20	..
Lignite coal		–	–	–	–
Coke		–	–	–	–
Gasoline (including gasoline used in cars and trucks)	Imp. gal.	273,934	109	305,533	100
Fuel oil including kerosene or coal oil	"	6,158,532	1,048	6,662,694	1,267
Wood		–	–	–	–
Gas:					
(a) Liquefied petroleum gases	Imp. gal.	3,573	2	38,505	16
(b) Other manufactured gas		–	–	–	–
(c) Natural gas		–	–	–	–
Other fuel		...	–	...	2
Electricity purchased	kwh.	250,516,201	1,853	323,542,613	2,239
Steam purchased		...	1	...	–
Total fuel and electricity used		...	3,525	...	4,147
Electricity generated:					
(a) For own use	kwh.	82,042,213	..	80,596,987	..
(b) For sale	"	3,546,000	..	4,080,700	..

TABLE 5. Materials and Supplies, Miscellaneous Metal Mines,[1] 1965 and 1966

Basis: Revised Standard Industrial Classification and New Establishment Concept

Description	Cost	
	1965	1966
	$'000	
Ore or other semi-processed materials purchased and used in mine/mill operations	13	19
Containers, shipping materials and supplies used	338	639
Operating, maintenance and repair supplies used (excluding fuel)	14,895	17,958
Amount paid out to others for work done on materials owned by establishments	1,440	1,599
Totals	**16,686**	**20,215**

[1] Refer to Explanatory Notes, in 1964 issue, of this report for explanation of concepts and definitions.

TABLE 6. Value of Production, Miscellaneous Metal Mines,[1] 1965 and 1966

Basis: Revised Standard Industrial Classification and New Establishment Concept

Description	1965	1966
	$'000	
Value of production	81,959	102,628
Amount received in payment for work done on materials and products owned by others	–	–
Subsidies received	97	–
Total value of production and work done	**82,056**	**102,628**

[1] See footnote Table 5.

TABLE 7. Drilling Completed,[1] Miscellaneous Metal Deposits, 1966

	Footage drilled
Diamond drilling for exploration and testing:	
By mining companies with their own personnel and equipment	72,309
By diamond drilling contractors	221,139
Other diamond drilling:	
Blast hole diamond drilling:	
By mining companies with their own personnel and equipment	–
By diamond drilling contractors	64,669
Drilling by percussion or other machines[2]	14,231,787

[1] Data are not comparable to those published in earlier years when non-producing mines were included.
[2] Not complete as records are unobtainable at certain mines.

TABLE 8. Specified Taxes Paid by Companies Engaged in Miscellaneous Metal Mines Operations,[1] 1966

Nature of taxes	Amount
	$'000
Dominion income taxes	22
Provincial taxes	1,346
Municipal taxes	585

[1] (a) Data are not comparable to those published in earlier years when non-producing mines were included.
(b) Includes related corporate activities associated with operations of Miscellaneous Metal Mines.

TABLE 9. Miscellaneous Expenditures Made by Companies Engaged in Miscellaneous Metal Mines Operations,[1] 1966

Description	Amount
	$'000
(a) Workmen's compensation	791
(b) Silicosis assessment	92
(c) Unemployment insurance	319
(d) Aggregate cost of structures, roads, machinery, equipment, etc., built by or purchased from outside contractors or suppliers and chargeable to Fixed Assets Account	9,072
(e) Book value of fixed assets (new structures, roads, machinery, equipment, etc., including major repairs and alterations) produced by own employees and chargeable to Fixed Assets Account	485
(f) Other capital expenditures not reported in (d) and (e)	709
(g) Cost of materials and supplies used in the production of machinery and equipment and in the construction of roads and new structures (including major repairs and alterations by own employees and chargeable to Fixed Assets Account)	375
(h) Cost of office supplies used during the year, not chargeable to Fixed Assets Account. Excludes cost of stamps and meter expenses	171

[1] Includes related corporate activities associated with Canadian operations of Miscellaneous Metal Mines not allocable separately elsewhere.

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 889,915 tons in 1966.

The Aluminum Company of Canada, Limited, operated its alumina plant at Arvida and the reduction plants at Arvida, Île Maligne, Shawinigan Falls and Île 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 10. Production, Consumption, Imports and Exports of Aluminum Ingots, 1957 - 66

Year	Production	Domestic consumption	Exports	Imports
	tons (2,000 pounds)			
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	854
1960	762,012	120,831	552,155	500
1961	663,173	135,575	487,034	636
1962	690,297	151,893	576,206	3,855
1963	719,390	161,833	635,187	1,954
1964	842,640	172,443	627,992	3,996
1965	830,505	186,425[r]	707,512	6,945
1966	889,915	209,286	716,382	16,923

Note: The above and subsequent tables contain data on commodities in various forms and origins. These series of data are not directly comparable to the industry fiscal data contained in Tables 1 to 9.

TABLE 11. Imports of Aluminum and Bauxite, 1965 and 1966

Item	1965		1966	
	Tons	Value	Tons	Value
		$'000		$'000
Bauxite ore	2,047,074	16,751	2,524,567	23,029
Alumina	799,977	51,672	807,838	52,341
Aluminum and aluminum alloy scrap	33,218	1,447	23,407	1,253
Aluminum:				
Paste and powder	904	571	893	588
Pigs, ingots, shot, slabs, etc.	6,945	4,253	16,923	9,581
Castings and forgings	1,565	3,646	2,449	6,377
Bars and rods	789	1,010	958	1,209
Plates	2,776	2,899	3,942	4,199
Sheets and strips	39,286	28,257	51,326	35,476
Foil or leaf	570	774	455	633
Structural shapes	1,409	3,165	1,355	3,416
Pipe and tubing	530	815	350	658
Wire and cable	349	321	622	579
Aluminum and alloy fabricated materials, n.e.s.	..	3,635	..	9,433
Cryolite, natural	2,420	496	3,651	794

Source: Trade of Canada, "Imports by Commodities", Catalogue No. 65-007.

TABLE 12. Exports of Aluminum, 1965 and 1966

Item	1965		1966	
	Tons	Value	Tons	Value
		$'000		$'000
Aluminum ores, concentrates	7,769	902	13,055	1,459
Aluminum scrap	38,916	10,627	45,771	13,290
Aluminum pigs, ingots, slabs	707,512	337,155	716,382	340,245
Aluminum bars, rods, plates, sheet, etc.	26,421	15,898	34,126	22,821
Aluminum foil	435	462	294	393
Aluminum fabricated materials, n.e.s.	11,622	7,451	12,338	8,810

Source: Trade of Canada, "Exports by Commodities", Catalogue No. 65-004.

TABLE 13. World Production of Bauxite, by Countries

Country	1962	1963	1964	1965	1966
	in thousand long tons				
North America (dried equivalent of crude ore):					
Dominican Republic	706	761	748	927	820
Haiti	435	378	430	377	356
Jamaica	7,495	6,903	7,811[1]	8,514[1]	8,929[1]
United States	1,369	1,525	1,601	1,654	1,796
South America:					
Brazil	188	167	130	154	246
Guyana	2,719	2,342	2,468	2,873	2,863
Surinam	3,245	3,384	3,930	4,258	4,513
Europe:					
Austria	17	18	4	..	..
France	2,160	1,997	2,394	2,620	2,766
Germany West	5	4	4	4	4[2]
Greece	1,267	1,256	1,030	1,250	1,300[2]
Hungary	1,450	1,341	1,454	1,455	1,406
Italy	305	264	248	241	238
Rumania	30	10	7	80[2]	200[2]
Spain	6	12	7	4	..
U.S.S.R.[2,3]	4,200	4,200	4,200	4,600	4,700
Yugoslavia	1,311	1,265	1,273	1,549	1,857
Africa:					
Ghana	239	309	246	314	318
Guinea, Republic of	1,445	1,638	1,652	1,840	1,583
Mozambique	6	6	6	6	5[2]
Rhodesia (formerly Southern)	1	2	2	2	..
Sierra Leone	–	30[2]	151	204	268

See footnotes at end of table.

TABLE 13. World Production of Bauxite, by Countries – Concluded

Country	1962	1963	1964	1965	1966
	in thousand long tons				
Asia:					
China (mainland) (diasporic)[2]	400	400	400	400	400
India	568	556	582	695	738
Indonesia	454	485	638	677	690
Malaysia:					
Malaya	349	444	464	843	940
Sarawak	225	155	158	135	–
Pakistan	–	–	–	–	–
Turkey	–	–	4	10	32
Oceania:					
Australia	30	354	784	1,168	1,798
World totals[2]	30,625	30,206	32,826	36,854	38,766

[1] Bone dry equivalent of bauxite shipments and bauxite converted into alumina.
[2] Estimate.
[3] Excludes nepheline concentrates and alunite ores.

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

TABLE 14. World Production of Aluminum, by Countries

Country	1962	1963	1964	1965	1966
	short tons				
North America:					
Canada	690,297	719,390	842,640	830,505	890,600
Mexico	–	6,100	19,487	21,041	23,040
United States	2,117,929	2,312,528	2,552,747	2,754,478	2,968,366
South America:					
Brazil	22,202	19,412	29,366	33,518	42,000[1]
Surinam (exports)	–	–	–	1,381	28,330
Europe:					
Austria	81,668	84,287	85,646	86,880	87,002
Czechoslovakia	65,000[1]	65,000[1]	65,000[1]	68,000[1]	68,000[1]
France	325,288	328,891	348,319	375,367	400,701
Germany, East[1]	50,000	50,000	50,000	55,000	55,000
West	196,017	230,142	242,418	258,407	268,839
Greece	–	–	–	–	40,000
Hungary	58,127	61,174	62,693	64,043	66,685
Italy	91,390	100,782	127,422	136,660	140,704
Netherlands	–	–	–	–	22,422
Norway	226,941	248,400	287,724	303,804	356,809
Poland (includes secondary)	53,007	51,365	52,639	52,146	60,816
Rumania	–	–	–	25,127	51,644
Spain	45,953	50,142	54,723	57,217	66,914
Sweden (includes alloys)	17,580	18,812	33,589	34,959	32,500
Switzerland	54,640	66,260	70,805	74,010	75,756
U.S.S.R.[1]	990,000	840,000	900,000	930,000	980,000
United Kingdom	38,113	34,243	35,516	39,911	40,934
Yugoslavia	30,843	39,567	38,320	45,545	46,321
Africa:					
Cameroon, Republic of	57,596	58,327	56,777	55,652	53,681
Asia:					
China[1]	110,000	110,000	110,000	110,000	110,000
India	39,025	60,881	62,465	74,041	91,803
Japan[2]	188,991	246,854	292,950	323,972	371,778
Taiwan	12,135	13,148	21,354	20,847	18,978
Oceania:					
Australia	18,090	46,214	88,194	96,744	101,262
World totals[1]	5,580,000	5,861,919	6,530,794	6,929,265	7,560,885

[1] Estimate.
[2] Includes super purity: 1962, 1,969; 1963, 2,060; 1964, 2,136; 1965, 2,023; and 1966, 2,278 tons.

Source: "Minerals Yearbook" published by the 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 Cominco 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 45.75 cents per pound in December, 1966. This price was for grade 99½% in lots of 10,000 pounds or more.

TABLE 15. Production of Antimony, 1957 - 66

	In ores and slags exported		In antimonial lead produced		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
		$'000		$'000		$'000
1957	452,184	38	908,547	333	1,360,731	371
1958	–	–	858,633	284	858,633	284
1959	–	–	1,657,797	540	1,657,797	540
1960	–	–	1,651,786	538	1,651,786	538
1961	–	–	1,331,297	470	1,331,297	470
1962	–	–	1,931,397	748	1,931,397	748
1963	–	–	1,601,253	624	1,601,253	624
1964	–	–	1,591,523	700	1,591,523	700
1965	–	–	1,301,787	690	1,301,787	690
1966	–	–	1,405,681	745	1,405,681	745

TABLE 16. Available Data on Consumption of Antimony Metal,[1] 1964 - 66

	1964	1965	1966
	pounds		
Used in production of:			
Antimonial lead alloys	277,190	366,802	750,096
Babbitt	72,020	48,295	72,613
Solder	16,374	24,925	21,594
Type metal	141,484	181,499	176,572
Other commodities	51,023	38,116	77,287
Totals accounted for	558,091	659,637	1,098,162

[1] (a) Source: Special Survey, Manufacturing and Primary Industries Division, DBS.
(b) Does not represent total consumption as there is no complete record of usage by all establishments.

TABLE 17. World Production of Antimony (Content of Ore), by Countries

Country	1962	1963	1964	1965	1966
	short tons				
North America:					
Canada	966	801	796	651	703
Guatemala (U.S. imports)	32	31	–	–	15
Mexico	5,257	5,331	5,111	4,917	4,868
United States	631	645	632	945	927
South America:					
Bolivia (exports)	7,331	8,321	10,604	10,606	11,729
Peru	575	674	752	713	741
Europe:					
Austria (recoverable)	767	548	585	434	250
Czechoslovakia[3]	2,200	2,200	2,200	2,200	2,200
France	–	110	119	133	308
Italy	373	266	592	293	392
Portugal	–	7	13	12	4
Spain	175	65	60	95	100
U.S.S.R.[3]	6,600	6,700	6,700	6,800	6,900
Yugoslavia (metal)	2,966	2,932	3,008	3,051	3,316

See footnotes at end of table.

TABLE 17. World Production of Antimony (Content of Ore), by Countries – Concluded

Country	1962	1963	1964	1965	1966
	short tons				
Africa:					
Algeria	149	–	–	71	70[3]
Morocco	449	744	1,720	2,425	1,480
Rhodesia, southern	61	66	49	200[3]	..
South Africa, Republic of	11,697	12,410	14,200	13,901	12,534
Asia:					
Burma[2]	140	165	165	165	165
China (mainland)[3]	16,500	16,500	16,500	16,500	16,500
Iran	–	–	–	–	–
Japan	190	212	554	202	85
Pakistan	75	9	90	67	..
Ryukyu Islands	–	–	–	–	–
Sarawak	–	–	86	61	65
Thailand	19	676	1,399	1,246	1,177
Turkey	1,962	3,340	3,631	3,896	3,396
Oceania:					
Australia	74	1,128	1,250	1,057	1,088
World totals[3]	59,200	63,882	70,816	70,541	68,513

[1] Antimony content of smelter products exclusively from mixed ores.
[2] Includes antimony content of smelter products derived from mixed ores.
[3] Estimate.

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

TABLE 18. Imports of Antimony Oxide, by Principal Countries of Supply, 1962 - 66

Country	1962	1963	1964	1965	1966
	pounds				
United Kingdom	332,280	511,840	403,700	421,100	568,100
United States	128,055	82,200	122,200	65,700	89,400
Belgium - Luxembourg	67,354	11,200	28,600	7,000	58,000
Germany, West	–	–	45,000	–	–
France	–	–	–	–	–
China (Communist)	99,900	44,092	110,200	121,700	27,200
Totals	627,589	649,332	709,700	615,500	742,700

Source: Trade of Canada, "Imports by Commodities" Catalogue No. 65-007.

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 1950-66.

The raw material for making berium 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 1966.

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 occurences 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 occurences 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.

TABLE 19. World Production of Beryl, by Countries

Country	1962	1963	1964	1965	1966
	short tons				
Argentina[1]	998	416	208	248	276
Australia	250	123	125	44	64
Brazil[1]	3,319	2,170	1,566	1,227	778
Congo (Kinshasa)	304	235	136	21	..
India[2]	150	–	..	1,500	600
Kenya	–	–	–	–	–
Korea, South	–	–	..	–	..
Malagasy Republic	743	453	234	22	13
Mozambique	627	613	451	202	88
Portugal	19	2	20	44	15
Rhodesia, Southern	559	249	182	101[2]	80[3]
Rwanda	394	282	328	756	147
South Africa, Republic of	360	425	151	53	20
South-West Africa	159	61	8	57	24
Swaziland	–	–	–	–	–
Sweden[1]	26	–	–	–	–
Uganda	1,116	419	434	212	273
U.S.S.R.[3,4]	1,000	1,100	1,100	1,100	1,200
United States (mine shipments):					
Cobbed beryl	218	1	5	5	5
Other lower grade beryllium ore	760	750	–	–	–
World totals[3]	**11,000**	**7,299**	**4,943**	**5,587**	**3,578**

[1] Exports.
[2] United States imports.
[3] Estimate.
[4] Cobbed concentrates at about 11 per cent BeO.
[5] U.S. output very small not included in world total.

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 Cominco Limited. 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. Bismuth is recovered from the molybdenite ores of northwestern 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, 1966 was $4.00 per pound, in ton lots.

TABLE 20. Production of Bismuth in All Forms,[1] 1957 - 66

Year	Pounds	Value	Year	Pounds	Value
		$'000			$'000
1957	319,941	585	1962	425,102	840
1958	412,792	771	1963	359,125	704
1959	334,736	590	1964	399,958[r]	817
1960	423,827	762	1965	428,759	1,195
1961	478,118	958	1966	525,659	1,972

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

TABLE 21. Available Data on Consumption of Bismuth Metal, in Canada, 1965 and 1966

	1965	1966
	pounds	
Used in:		
Fusible alloys and solders	23,787	29,241
Other[1]	24,492	27,187
Totals	**48,279**	**56,428**

[1] Pharmaceuticals, chemicals and malleable iron.

TABLE 22. World Production of Bismuth, by Countries[1]

Country[1]	1962	1963	1964	1965	1966
	pounds				
Argentina (in concentrates)	7,100	• 1,345	9	..	..
Australia (in concentrates)	97	..	–	..	716
Bolivia	669,987	560,873	599,365	654,766[2]	822,316[2]
Canada (metal)[3]	425,102	395,125	399,958	428,759	525,659
China (in ore)[4]	660,000	660,000	660,000	660,000	660,000
France (in ore)	138,890	149,900	152,100	134,500	129,452
Italy (metal)	..	4,400	2,200	8,800	26,500
Japan (metal)	572,841	823,314	1,115,611	1,347,183	1,213,513
Korea, South (in ore)	353,000	349,000	330,000[4]	265,000[4]	220,000[4]
Mexico[3]	780,000	941,400	1,040,500	1,067,000	1,000,900
Mozambique	13,889	24,317	14,462	10,273	3,616
Peru[3]	1,084,227	1,244,367	1,628,514	1,780,503	1,674,261
South West Africa (in ore)	154	5,115	3,131	388	4
South Africa, Republic of (in concentrates)	130	2,619	161	240	328
Spain (metal)	18,799	25,836	4,184	309	..
Sweden[4]	155,000	155,000	150,000	77,200	77,200
Uganda	110	44	165	529	143
U.S.S.R. (metal)[4]	65,000	65,000	65,000	77,000	77,000
Yugoslavia (metal)	199,765	194,657	184,660	194,638	228,546
World totals[1,4]	**6,700,000**	**5,566,311**	**6,350,020**	**6,707,088**	**6,660,154**

[1] United States figure withheld to avoid disclosing individual company confidential data; included in world totals. Bismuth is believed to be produced also in Brazil and Germany. Production figures are not available for these countries, but estimates are included in the totals.
[2] Exports.
[3] Bismuth content of refined metal and bullion plus recoverable content of concentrates exported.
[4] Estimate.

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, Northwest Territories and Yukon to the smelter of Cominco Limited, at Trail, B.C. At the Canadian Electrolytic Zinc plant Valleyfield, Quebec, cadmium is recovered from the zinc concentrates received from Ontario and Quebec mines. Some of the exported concentrates from New Brunswick and Quebec contain bismuth.

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

Cadmium is marketed in metallic form 99.5 per cent pure and better, and as a sulphide. The principal compounds are cadmium sulphide, cadmium oxide, cadmium lithopone and cadmium selenite.

The New York price for commercial sticks of cadmium in December, 1966 was $2.55 per pound.

TABLE 23. Production of Cadmium in All Forms, 1957 - 66

Year	New Brunswick, Quebec and Ontario		Manitoba and Saskatchewan		British Columbia, Yukon and Northwest Territories		Canada	
	pounds	$'000	pounds	$'000	pounds	$'000	pounds	$'000
1957	–	–	226,348	385	2,141,782	4,026	2,368,130	4,411
1958	–	–	342,587	521	1,413,463	2,148	1,756,050	2,669
1959	–	–	322,792	413	1,837,571	2,352	2,160,363	2,765
1960	66,499	94	366,636	521	1,924,362	2,733	2,357,497	3,348
1961	–	–	307,757	493	1,914,193[r]	3,062[r]	2,221,950[r]	3,555[r]
1962	66,293	114	317,495	546	2,221,185	4,071	2,604,973	4,731
1963	43,546	104	316,050	759	2,115,889	5,078	2,475,485	5,941
1964	446,955	1,448	329,552	1,068	1,996,477	6,469	2,772,984	8,985
1965	598,031	1,663	346,717	964	811,177	2,255	1,755,925	4,882
1966	541,123	1,396	334,034	862	2,361,705	6,093	3,236,862	8,351

TABLE 24. Exports of Cadmium, 1965 and 1966

Destination	1965		1966	
	Pounds	Value	Pounds	Value
		$'000		$'000
Argentina	1,761	4	2,644	6
Poland	31,120	89	–	–
Belgium - Luxembourg	–	–	–	–
United Kingdom	839,237	2,320	1,192,205	2,769
India	48,655	111	51,912	106
South Africa, Republic of	–	–	–	–
Netherlands	–	–	–	–
United States	442,870	1,126	765,125	1,729
Germany, West	–	–	–	–
Israel	1,000	4	400	1
Italy	–	–	–	–
Japan	2	--	–	–
Chile	–	–	–	–
Totals	**1,364,645**	**3,654**	**2,012,323**	**4,611**

Source: Trade of Canada, "Exports by Commodities", Catalogue No. 65-004.

TABLE 25. Available Data on Consumption of Cadmium, 1965 and 1966

	1965	1966
	pounds	
Used for:		
Plating	135,595	134,437
Solders	19,618	14,429
Other products[1]	16,345	21,739
Totals accounted for	171,558	170,605

[1] Chemicals, pigments and alloys, other than solder.

TABLE 26. World Production of Cadmium, by Countries[1,2]

Country	1962	1963	1964	1965	1966
	thousands of pounds				
North America:					
Canada (all forms)	2,605	2,354	2,220	1,086	2,314
Honduras	–	–	–	–	–
Mexico (exports)	63	359	348	152	243
United States	11,137	9,990	10,458	9,671	10,460
South America: Peru (refined metal)	235	382	435	473	442
Europe:					
Austria	49	41	43	46	46
Belgium (exports)	1,854	1,943	1,857	849	322
France	567	655	1,085	944	988
Germany:					
East[3]	7	11	22	22	22
West	560	492	705	723	785
Italy	536	622	611	619	540
Netherlands[3]	88	220	231	198	220
Norway	254	243	249	287	280[3]
Poland[3]	880	930	940	970	950
Spain	133	119	133	137	130[3]
U.S.S.R.[3]	3,500	3,700	3,900	4,200	4,500
United Kingdom	237	247	435	485	405
Yugoslavia[3]	88	88	90	90	90
Africa:					
Congo (Kinshasa)	214	254	363	278	329
Zambia	37	33	32	40	27
South-West Africa	–	–	–	73	582
Asia:					
Japan	1,948	2,231	2,678	3,242	3,872
Oceania:					
Australia	791	1,089	1,107	1,156	1,160
World totals[1,2,3]	**25,800**	**26,023**	**27,942**	**25,741**	**28,707**

[1] Data derived in part from bulletins of the World Non-ferrous Metal Statistics and annual issues of Metal Statistics (Metallgesellschaft).
[2] Data do not add exactly because of rounding. No estimate included for Bulgaria but it is reported to be producing cadmium.
[3] Estimate.

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 and uranium and zirconium.

TABLE 27. Production (Shipments) of Calcium, 1957 - 66

Year	Pounds	Value
		$'000
1957[1]	221,225	282
1958	25,227	31
1959	67,429	76
1960	134,801	159
1961	99,355	101
1962	123,511	124
1963	98,673	117
1964	138,357	152
1965	159,434	153
1966	249,179	245

[1] Output.

TABLE 28. Exports of Calcium, by Countries, 1964 - 66

Destination	1964	1965	1966
	thousand dollars		
United Kingdom	14	18	11
Belgium - Luxembourg	10	28	31
United States	59	52	153
Germany, West	14	15	24
Netherlands	15	–	–
Congo (Leopoldville)	–	–	–
India	20	–	1
Italy	–	–	–
Japan	6	2	7
Australia	–	2	1
Totals	**138**	**117**	**227**

Source: Trade of Canada, "Exports by Commodities", Catalogue No. 65-004.

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 1956-66.

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.

CHROMITE

There was no Canadian production of chromite in 1966. 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.

TABLE 29. Production of Chromite, 1946 - 66

Year	Short tons	Value	Year	Short tons	Value
		$'000			$'000
1946	3,110	61	1951	–	–
1947	2,162	42	1952	–	–
1948	1,715	34	1953	–	–
1949	361	7	1954 - 66	–	–
1950	–	–			

TABLE 30. World Production of Chromite, by Countries[1]

Country	1962	1963	1964	1965	1966
	short tons				
North America:					
Cuba[2]	39,000	62,422	36,213	33,000[2]	33,000[2]
Guatemala	22	–	–	–	–
South America:					
Brazil	27,380	18,798[3]	10,406[3]	18,695[3]	16,495[3]
Colombia	154	121	441	287	–
Europe:					
Albania	277,007	323,657	338,213	342,000	345,000
Finland (crude-ore)	–	–	–	–	77,161
Greece	62,002	56,415	44,200	46,700	44,000[2]
U.S.S.R.[2,4]	1,270,000	1,355,000	1,435,000	1,565,000	1,653,000
Yugoslavia	106,974	103,364	97,398	88,021	59,757
Africa:					
Malagasy Republic	20,342	12,346	12,974	2,628	–
Rhodesia, Southern	507,685	412,394	493,371	645,501	- -
Sierra Leone	12,621	3,067	–	–	–
South Africa, Republic of	1,006,173	873,212	936,468	1,038,498	1,169,488
Sudan[2]	8,800	18,700	18,700	33,000	19,000
United Arab Republic (Egypt)	–	–	–	–	–
Asia:					
Cyprus (exports)	7,207	5,411	3,300	5,501	11,532
India	73,467	76,073	38,547	65,791	85,601
Iran[5]	99,000[2]	110,000[2]	132,000[2]	165,000[2]	193,000
Japan	64,024	48,205	48,452	46,114	36,192
Pakistan	23,671	16,023	14,884	15,972	29,924
Phillippines	585,643	506,094	515,969	611,288	617,426
Turkey	580,964	312,817	454,907	625,078	583,232
Viet-Nam, North[2]	–	–	–	–	–
Oceania:					
Australia	413	180	80	25	–
New Caledonia	17,036	–	–	–	–
World totals[2]	4,860,000	4,314,299	4,631,523	4,973,808	4,973,808

[1] In addition to countries listed, Bulgaria and Rumania produce chromite, but data on output are not available; estimates are included in total.
[2] Estimate.
[3] Bahia only.
[4] Output from U.S.S.R. in Asia included with U.S.S.R. in Europe.
[5] Year ended March 20 of year following that stated.

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

TABLE 31. Imports of Chrome Ores, 1957 - 66

Year	Tons	Value	Year	Tons	Value
		$'000			$'000
1957	111,453	2,751	1962	71,969	2,122
1958	38,136	812	1963	49,654	1,689
1959	48,678	1,525	1964	20,794	1,587
1960	59,023	1,522	1965	35,408	2,500
1961	71,267	1,909	1966	20,880	1,598

Source: Trade of Canada, "Imports by Commodities", Catalogue No. 65-007.

TABLE 32. Imports of Chrome Ores, by Principal Countries of Supply, 1965 and 1966

Imported from	1965		1966	
	Tons	Value	Tons	Value
		$'000		$'000
Iran	–	–	1,142	68
Rhodesia, Southern	7,973	453	3,063	125
United States	11,442	895	8,448	843
South Africa, Republic of	3,020	116	1,256	54
Philippines	10,645	836	6,445	441
Cyprus	1,898	147	–	–
Ireland	430	53	526	66
Totals	**35,408**	**2,500**	**20,880**	**1,598**

Source: Trade of Canada, "Imports by Commodities", Catalogue No. 65-007.

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.

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, 1966 were: Columbite-per lb. of pentoxide, basis 65% Cb_2O_5 and Ta_2O_5 columbium-tantalum ratio 10 to 1, $1.05 to $1.15; ratio 8½ to 1, $1.00 to $1.05 columbium metal $16 to $27 per pound. Tantalum metal per lb. powder, $30 to $49 sheet, $47 to $60 rod, $52 to $65.

TABLE 33. Producers' Shipments of Columbium, 1957 - 66

Year	Cb_2O_5 content	Value
	pounds	$'000
1957 - 60	–	–
1961	62,229	66
1962	1,016,514	1,006
1963	1,393,444	1,300
1964	2,163,359	2,283
1965	2,333,967	2,528
1966	2,637,997	3,182

TABLE 34. Free World Production of Columbium and Tantalum Concentrates, by Countries[1]

Country	1963		1964		1965		1966	
	Columbium	Tantalum	Columbium	Tantalum	Columbium	Tantalum	Columbium	Tantalum
	pounds							
North America:								
Canada[2]	2,941,303	–	4,150,388	–	4,541,745	–	5,073,000	–
South America:								
Argentina[3]	–	4,520	–	–	–	–	–	2,013
Brazil:								
Columbium - tantalum[4]	42,763	231,000	24,643	180,777	88,317	364,466	130,611	351,796
Pyrochlore concentrates	–	–	712,081	–	2,636,686	–	10,527,000	–
French Guiana	5,031		2,000		1,850		2,000	
Europe:								
Norway	783,000	–	408,000	–	330,689	–	–	–
Portugal (U.S. imports)	4,464	72,711	21,526	32,280	–	47,772	27,000	66,998
Spain (U.S. imports)	–	–	14,610	–	–	13,483	10,000	13,000
Africa:								
Burundi	4,000		..		..		..	
Congo, Republic of the (Kinshasa)[3]	163,435	147,255	–	101,159	44,000	160,000	128,000	993,000
Malagasy Republic	38,000		7,900		9,000		–	990[5]
Mozambique[6]	337,924		415,697		302,637		313,700	
Nigeria	4,506,850	33,600	5,239,324	22,400	5,707,486	29,000	4,986,211	26,900
Rhodesia, Southern	–	151,016	–	141,318	–	77,000	–	88,000[5]
Rwanda	70,000		64,421		109,239		54,756	
South Africa, Republic of	–	64,000	–	14,000	–	6,000	–	4,000
South-West Africa, Territory of	419	4,142	448	1,027	1,080	1,135	1,892	
Uganda	20,000		12,857		17,924		24,648	
Asia:								
Malaysia	197,120	–	125,400	–	103,000	–	152,400	–
Thailand	–	–	–	–	–	–	–	–
Oceania:								
Australia	30,889		33,600		25,580		10,549	
World totals (estimate)[2]	9,853,422		11,725,856		14,618,089		22,988,464	

[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] Shipments.
[3] United States imports.
[4] Exports.
[5] Estimate.
[6] Includes microlite as follows: 1963, 160,000; 1964, 312,200; 1965, 187,550; 1966, 174,500.

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

INDIUM

Indium is recovered by Cominco 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 use, about 1927, was as a non-tarnish coating on silverware. Low-melting point alloys also have been manufactured recently. Indium foil was used as a neutron indicator in the atomic bomb projecturanium-graphite piles. Low-energy neutrons, about 1.5 electron-volt, are particularly effective in inducing artificial radioactivity in indium.

At the close of 1966 the quoted price of indium at New York was $2.75 per troy ounce.

TABLE 35. Production of Indium, 1954 - 66

	Troy ounces	Value
		$'000
1954	477	1
1955	104,774	233
1956	363,192	795
1957	384,360	694
1958 - 66	..	..

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, zirconium and platium.

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

TABLE 36. Producers' Shipments of Magnesium Metal, 1957 - 66

Year	Quebec		Ontario		Canada	
	Pounds	Value	Pounds	Value	Pounds	Value
		$'000		$'000		$'000
1957	1,585,998	488	15,184,373	4,767	16,770,371	5,255
1958	4,504,343	1,317	9,087,362	2,748	13,591,705	4,065
1959	4,059,508	977	8,144,940	2,203	12,204,448	3,180
1960	–	–	14,577,138	4,314	14,577,138	4,314
1961	–	–	15,270,618	4,308	15,270,618	4,308
1962	–	–	17,631,310	4,822	17,631,310	4,822
1963	–	–	17,810,348	5,358	17,810,348	5,358
1964	–	–	18,706,020	5,588	18,706,020	5,588
1965	–	–	20,216,369	6,067	20,216,369	6,067
1966	–	–	15,445,701	4,179	15,445,701	4,179

TABLE 37. Exports of Magnesium Metal, 1964 - 66

Destination	1964	1965	1966
		$'000	
United Kingdom	1,333	1,834	951
South Africa, Republic of	35	6	3
India	26	26	5
Australia	78	79	82
Portugal	–	–	–
Belgium-Luxembourg	130	14	8
Brazil	6	1	3
Chile	–	–	1
Japan	–	–	–
France	399	290	286
Germany, West	1,374	1,477	893
Mexico	126	31	–
Philippines	1	3	–
Sweden	21	29	9
Switzerland	7	8	15
Yugoslavia	..	–	–
United States	255	594	1,134
New Zealand	2	–	1
Colombia	12	–	19
Greece	–	–	–
Italy	3	6	–
Israel	39	26	30
Spain	12	–	–
Uruguay	10	4	5
Hungary	–	–	–
Taiwan	17	1	2
Argentina	15	22	1
Venezuela	–	3	–
Bermuda	–	–	–
Denmark	12	3	–
Netherlands	12	–	–
Rumania	27	–	–
Rhodesia, Northern	..	–	..
Hong Kong	1	1	1
Totals	3,951	4,456	3,452

Source: Trade of Canada, "Exports by Commodities", Catalogue No. 65-004.

TABLE 38. Available Data on Consumption of Magnesium Metal, 1965 and 1966

	1965	1966
	short tons	
Used for:		
Castings	512	554
Extrusions (shapes and tubing)	559	572
Aluminum alloys	2,959	3,630
Other products[1]	469	381
Totals accounted for	**4,499**	**5,137**

[1] Includes other alloys, magnesium used for cathodic production and as a reducing agent.

TABLE 39. World Production of Magnesium Metal, by Countries[1]

Country	1962	1963	1964	1965	1966
	short tons[1]				
Canada	8,816	8,907	9,353	10,108	1,723
China[2]	1,000	1,000	1,000	1,000	1,000
France	2,337	1,921	1,090	3,132	3,770
Germany, West[2]	550	550	550	550	220
Italy	6,288	6,092	6,645	6,959	7,165
Japan[3]	2,301	2,689	3,237	4,172	5,832[3]
Norway	16,400	20,000	24,300	29,100	31,195
U.S.S.R.[2]	35,000	35,000	35,000	36,000	40,000
United Kingdom[4]	5,559	5,152	5,264	5,936	4,145
United States	68,955	75,845	79,488	81,361	79,794
Totals (estimate)[1]	**147,200**	**157,156**	**165,827**	**178,318**	**179,844**

[1] This table incorporates some revisions. Data do not add to totals shown due to rounding where estimated figures are included in the detail.
[2] Estimate.
[3] In addition the following amounts of secondary magnesium were produced: 1962, 2,180; 1963, 1,556; 1964, 2,478; 1965, 4,590 and 1966, 5,757 short tons.
[4] 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.

TABLE 40. Production of Manganese Ore, 1947 - 66

Year	Tons	Value
		$'000
1947	225	8
1948	3	..
1949 - 55	–	–
1956	...	2
1957 - 66	–	–

TABLE 41. Imports of Manganese Ore, 1957 - 66

Year	Tons	Value	Year	Tons	Value
		$'000			$'000
1957	131,318	7,520	1962	90,725	4,038
1958	42,060	1,723	1963	106,841	3,822
1959	118,454	5,017	1964	62,813	3,945
1960	56,350	2,544	1965	89,480	5,430
1961	76,016	3,465	1966	184,103	10,866

Source: Trade of Canada, "Imports by Commodities", Catalogue No. 65-007.

TABLE 42. Imports of Manganese Ore, by Principal Countries of Supply, 1962 - 66

Imports from	1962	1963	1964	1965	1966
	tons				
Gabon	–	–	–	–	11,704
Angola	–	–	6,935	–	–
British Guiana	–	–	–	7,217	7,894
Congo, Republic of (Leopoldville)	–	23,972	6,908	12,867	6,672
Japan	61	190	79	–	30
Ghana	49,632	45,439	17,448	26,981	94,139
India	893	–	6,616	3,536	10,227
France	7	11	7	11	4
United States	28,013	16,535	6,659	5,653	6,136
United Kingdom	65	29	14	16	14
Brazil	10,746	20,633	15,530	17,695	36,749
Mexico	–	82	19	11	2,406
South Africa, Republic of	–	–	–	6,469	8,128
Turkey	–	–	–	2,554	–
Greece	1,308	–	–	–	–
Uruguay	–	–	2,598	6,470	–
Total imports	**90,725**	**106,891**	**62,813**	**89,480**	**184,103**

Source: Trade of Canada, "Imports by Commodities", Catalogue No. 65-007.

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

Country	Per cent Mn.	1962	1963	1964	1965	1966
		short tons				
North America:						
Cuba[2]	35-50	83,000	41,341	77,544	80,000	80,000
Mexico[2]	45+	184,900	190,543	210,549	204,721	126,457
United States (shipments)	35+	24,758	10,622	26,058	29,258	14,406
South America:						
Argentina	30-40	13,921	32,204	41,081	22,446	12,236
Brazil	38-50	1,290,461	1,382,727	1,490,077	1,538,893	1,603,745
Guyana	36-42	303,636	157,331	130,907	186,137	201,600
Chile	43-48	47,578	51,234	21,893	18,284	19,754
Peru	42-45	7,403	571	410	1,091	937
Europe:						
Bulgaria	30+	38,581	42,437	57,000	46,000	46,000[2]
Greece	35+	15,097	21,278	20,371	11,909	..
Hungary	30-	142,447	167,960	188,711	234,792	231,485
Italy	30-	48,966	49,887	52,694	52,701	48,484
Portugal	38+	12,666	9,434	7,711	8,559	9,488
Rumania	35	208,337	286,601	110,000[2]	138,891	123,000
Spain	30+	14,101	16,858	17,762	19,247	20,948
U.S.S.R.	[3]	7,057,000	7,345,000	7,822,000	8,351,000	7,720,000[2]
Yugoslavia	30+	16,358	8,964	8,580	8,925	9,498
Africa:						
Angola	30-52	9,115	–	–	–	20,448
Botswana	30+	26,458	11,877	30,639	9,717	7,700[2]
Congo (Kinshasa)	48+	348,547	297,660	341,385	416,205	274,809
Ethiopia (shipments)	51	6,614	..	..	..	..
Gabon	48-53	224,038	701,716	1,057,750	1,411,393	1,403,814
Ghana[4]	48+	418,263	449,121	509,341	665,821	647,422
Ivory Coast	32-47	117,928	153,291	150,383	198,179	194,212
Morocco	35-53	517,377	369,217	375,974	414,337	399,499
Rhodesia, Southern	30+	7,977	–	160	230[2]	..
South Africa, Republic of	30+	1,614,599	1,441,503	1,455,271	1,727,822	1,866,166
South-West Africa, Territory of	45+	–	–	–	4,185	25,367
Sudan	36-44	1,120	275[2]	9,400[2]	1,102	1,653
United Arab Republic (Egypt)[5]	35+	42,577	7,000[2]	47,000[2]	26,000[2]	26,000[2]
Zambia	35+	63,432	38,486	40,091	33,965	29,434
Asia:						
Burma	42+	213	220[2]	..	661	..
China, mainland[2]	30+	882,000	1,102,000	1,102,000	1,102,000	1,102,000
India (including Goa)	32-53	1,429,034	1,428,354	1,548,955	1,779,913	1,849,550
Indonesia	35-49	7,176	3,136	550[2]	457	..
Iran[6]	35+	6,100	16,500	35,300	35,000	42,000
Japan	30-43	340,162	305,028	313,825	333,950	353,733
Korea, South	35+	1,105	4,580	4,753	7,376	6,583
Malaysia	30+	341	7,696	–	1,754	64,803
Pakistan	42+	1,036	1,553	1,098	560	139
Philippines	30+	13,160	8,450	8,824	57,038	61,832
Thailand	40+	3,194	7,285	12,185	36,848	77,825
Turkey	30-50	23,422	6,949	22,366	15,675	24,546

See footnotes at end of table.

TABLE 43. World Production of Manganese Ore, by Countries[1] – Concluded

Country	Per cent Mn.	1962	1963	1964	1965	1966
		short tons				
Oceania:						
Australia	35-54	80,244	40,389	68,442	112,414	303,470
Fiji	40	1,202	3,621	1,004	6,040	5,871
New Hebrides	49-55	21,859	28,016	66,740	73,535	84,040
Papua	...	–	4	3	–	–
World totals (estimate)[2]	...	15,688,000	16,249,000	17,487,000	19,425,000	19,141,000

[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 13,000 tons and Czechoslovakia approximately 90,000 tons. Malagasy Republic produces negligible amounts of manganese.
[2] Estimate.
[3] Grade unstated. Source: The Industry of the U.S.S.R. Central Statistical Administration.
[4] Dry weight.
[5] In addition to high grade ore shown in the table, the United Arab Republic produced the following tonnages of less than 30 per cent manganese content: 1962, 162,102; 1963, 46,000; 1964, 315,000; 1965, 174,000 (est.); 1966, 178,000 (est.).
[6] Year ending March 20 of year following that stated.

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

MERCURY

Mercury has been produced intermittently in British Columbia. In 1964 and 1965 the Silverquick Development Co. (B.C.) Ltd. operated a mine at Tyaughton Creek in the Bralorne area. In 1955 a small quantity was produced in the Bridge River district. Previous production had been prior to September, 1944. All of the Canadian production in the past came from the Pinchi mine of Cominco 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 1966 were $509 per flask of 76 pounds in January; $397 in April; $379 in July and $485 in December.

TABLE 44. Production of Mercury, 1941 - 66

Year	Pounds	Value	Year	Pounds	Value
		$'000			$'000
1941	536,304	1,336	1955	75	..
1942	1,035,914	2,924	1956 - 63	–	–
1943	1,690,240	4,559	1964	5,548	23
1944	735,908	1,210	1965	1,520	12
1945 - 54	–	–	1966	–	–

TABLE 45. Production of Mercury, Consumption, Imports and Exports, 1957 - 66

Year	Production	Consumption	Imports	Exports
		pounds		
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	..
1963	–	147,396	447,592	..
1964	5,548	208,304	293,900	..
1965	1,520	415,996	1,071,900	..
1966	–	171,588	404,600	..

TABLE 46. Imports of Mercury, from Countries of Supply, 1965 and 1966

From	1965		1966	
	Pounds	Value	Pounds	Value
		$'000		$'000
Mercury metal:				
Italy	–	–	7,600	35
United Kingdom	474,400	2,077	–	–
Mexico	25,500	215	101,700	616
Netherlands	9,400	56	15,200	77
Yugoslavia	41,000	258	15,200	104
Spain	400,400	1,799	69,200	403
United States	121,200	1,174	99,400	569
Turkey	–	–	–	–
Philippines	–	–	19,000	115
Germany, West	–	–	7,600	84
Peru	–	–	46,800	357
Japan	–	–	22,800	116
Totals	1,071,900	5,580	404,500	2,427

Source: Trade of Canada, "Imports by Commodities", Catalogue No. 65-007.

TABLE 47. Available Data on Consumption[1] of Mercury, by Principal Uses, 1962 - 66

Industry	1962	1963	1964	1965	1966
	pounds				
Pharmaceuticals and fine chemicals	5,806	15,652	3,109	109	109
Heavy chemicals	104,189	124,528	190,846	390,750	146,116
Electrical apparatus	4,405	3,603	2,875	22,405	22,098
Gold mines	3,738	3,050	2,653	2,381	2,175
Miscellaneous	17,153	563	8,821	351	1,090
Totals accounted for	**135,291**	**147,396**	**208,304**	**415,996**	**171,588**

[1] Estimated.

TABLE 48. World Production of Mercury, by Countries

Country	1962	1963	1964	1965	1966
	flasks of (76 pounds) 34.5 kilograms				
North America:					
Canada	–	–	73	20[1]	–
Mexico	18,855	17,202	12,561	19,203	22,074
United States	26,277	19,117	14,142	19,582	22,008
South America:					
Bolivia (exports)	11	105	32[2]	52	4
Chile	791	613	267	428	96
Colombia	–	3	3	46	84
Peru	3,481	3,092	3,275	3,117	3,166
Europe:					
Czechoslovakia[1]	725	725	775	825	875
Italy	54,506	54,448	57,001	57,320	53,549
Rumania	222	194	194	191	190
Spain	52,798	56,954	78,322	74,661	70,054
U.S.S.R.[1]	35,000	35,000	35,000	40,000	40,000
Yugoslavia	16,273	15,838	17,318	16,419	15,896
Asia:					
China, mainland[1]	26,000	26,000	26,000	26,000	26,000
Japan	4,199	4,668	4,812	4,536	4,846
Philippines	2,767	2,651	2,496	2,384	2,443
Turkey	2,687	3,042	2,615	2,755	3,420
Africa:					
Tunisia	–	–	87	174	254
World totals[1]	**245,000**	**239,652**	**254,973**	**267,713**	**264,959**

[1] Estimate.
[2] Purchases by Banco Minero.

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

MOLYBDENUM

Molybdenite, the sulphite ore of molybdenum is mined in northwestern Quebec. Some of the milled ore is shipped as molybdenite concentrates, and some of concentrates are calcined to molybdic oxide. A lubricant-grade of molybdenum disulphide is also produced. Molybdenum occurs in the copper ores at Gaspé Copper Mines Ltd. The major portion of the Canadian production is from the mines in British Columbia.

Molybdenum has a widening range of uses, but by far the greater part of the output is used in steel to intensify the effect of other alloying metals, particularly nickel, chromium, and vanadium. These steels usually contain from 0.15 to 0.4 per cent molybdenum, but in some instances the percentage is 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 49. Producers' Shipments of Molybdenum, 1957 - 66

Year	Ores, concentrates, sulphides and oxides, shipped or used		Molybdenum content of shipments
	tons	$'000	pounds
1957	633	1,161	783,739
1958	744	1,153	888,264
1959	658	941	748,566
1960	649	1,015	767,621
1961	640	1,092	771,358
1962	675	1,261	817,705
1963	722	1,344	833,867
1964	1,050	2,057	1,224,712
1965	8,027	16,731	9,557,191
1966	14,811	34,671	20,596,044

TABLE 50. World Production of Molybdenum in Ores and Concentrates, by Countries[1]

Country	1962	1963	1964	1965	1966
	thousands of pounds				
Australia	2	13	–	26	4
Canada[2]	818	834	1,225	9,557	20,419
Chile	5,256	6,400	8,393	8,142	10,430
China[3]	3,300	3,300	3,300	3,300	3,300
Japan	825	732	619	611	542
Korea, South	163	154	265	448	659
Mexico	128	90	117	108	289
Norway	575	463	503	527	500
Peru	11	1,122	871	1,499	1,484
Philippines	249	236	231	170	108
U.S.S.R.[3]	12,500	12,500	12,500	12,500	12,500
United States	51,244	65,011	65,605	77,372	90,532
World totals[1,3]	**59,300**	**75,055**	**77,829**	**98,460**	**124,967**

[1] Small quantities of molybdenum were also produced in Argentina, Nigeria, North Korea, Rhodesia, South West Africa, Spain and Bolivia.
[2] Shipments.
[3] Estimate, not in totals.

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 plants 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 1966 was $4.50 per pound for commercial grade to $6.00 per pound for high purity grade.

TABLE 51. Production[1] of Selenium, 1957 - 66

Year	Pounds	Value	Year	Pounds	Value
		$'000			$'000
1957	321,392	3,535	1962	487,066	2,801
1958	306,990	2,302	1963	468,772	2,274
1959	368,107	2,577	1964	465,746	2,259
1960	521,638	3,651	1965	512,077	2,484
1961	430,612	2,799	1966	575,482	2,791

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

TABLE 52. Refinery Output of Selenium from Primary and Scrap Materials, 1957 - 66

Year	Pounds	Year	Pounds
1957	332,011	1962	466,654
1958	342,141	1963	462,385
1959	372,410	1964	462,795
1960	524,659	1965	514,595
1961	422,955	1966	546,085

TABLE 53. Exports of Selenium and Selenium Salts, 1965 and 1966

Destination	1965		1966	
	Pounds	Value	Pounds	Value
		$'000		$'000
Chile	400	2	–	–
United Kingdom	218,600	1,151	272,300	1,577
South Africa, Republic of	4,800	23	3,500	17
Australia	7,400	30	4,900	19
Argentina	9,300	43	11,700	53
Brazil	400	2	11,300	50
France	700	4	1,300	9
Italy	400	2	–	–
United States	196,500	1,138	266,400	1,872
India	4,800	23	2,900	13
Spain	4,000	19	6,500	29
Philippines	2,000	9	2,200	10
Pakistan	100	1	–	–
Greece	–	–	700	3
Israel	300	1	–	–
New Zealand	100	1	300	2
Colombia	200	1	2,700	15
Venezuela	1,600	7	1,300	6
Totals	**451,200**	**2,455**	**588,100**	**3,676**

Source: Trade of Canada, "Exports by Commodities", Catalogue No. 65-004.

TABLE 54. World Production of Selenium, by Countries

Country	1962	1963	1964	1965	1966
			pounds		
North America:					
Canada	487,066	468,772	465,746	512,077	575,412
Mexico	2,458	6,336	6,980	18,137	3,772
United States	999,000	928,000	929,000	540,000	620,000
South America:					
Peru	18,382	19,791	16,797	18,964	13,131
Europe:					
Belgium - Luxembourg (exports)	29,542	54,013	87,082	93,035	91,271
Finland	11,797	15,417	14,500	12,577	11,973
Sweden	154,322	156,500	180,800	176,400	181,000[1]
Yugoslavia	3,986	4,120	8,439	17,441	20,558
Asia:					
Japan	309,314	313,494	325,926	348,038	421,190
Africa:					
Zambia	71,453	45,962	121,699	57,574	58,000[1]
Oceania:					
Australia[1]	3,500	3,500	3,500	5,250	4,400
World totals[1]	**2,091,000**	**2,015,905**	**2,160,469**	**1,799,493**	**2,000,707**

[1] 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.

Tellurium is recovered commercially in Canada at the Copper Cliff, Ontario, plant of the International Nickel Company of Canada, Limited, and at the Montreal East refinery of Canadian Copper Refiners, Limited. At Copper Cliff it is recovered from the slimes formed in the process of refining copper produced from the Sudbury nickel-copper ores. At Montreal East it is obtained from the refining of copper anodes made from copper ores at Noranda, and Gaspé, Quebec, and from blister copper originating from the copper-zinc ores of Hudson Bay Mining and Smelting Co., Limited, at Flin Flon, on the Manitoba-Saskatchewan boundary.

The price of tellurium was quoted at $6.00 a pound in New York in December, 1966.

TABLE 55. Production[1] of Tellurium, 1957 - 66

Year	Pounds	Value	Year	Pounds	Value
		$'000			$'000
1957	31,524	5	1962	58,725	352
1958	38,250	65	1963	76,842	499
1959	13,023	28	1964	77,782	506
1960	44,682	156	1965	69,794	454
1961	77,609	376	1966	72,239	470

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

TABLE 56. Refinery Output of Tellurium, 1957 - 66

Year	Pounds	Year	Pounds
1957	34,895	1962	57,630
1958	42,337	1963	79,640
1959	8,900	1964	80,255
1960	41,756	1965	71,730
1961	81,050	1966	72,745

TABLE 57. Available Data on Consumption of Tellurium in Canada, 1961 - 66

Year	Tellurium content
	pounds
1961	4,843
1962	4,306
1963	1,853
1964	1,473
1965	1,870
1966	862

TABLE 58. World Production of Tellurium, by Countries[1]

Country	1962	1963	1964	1965	1966
	pounds				
Australia[2]	–	2,000[3]	3,500	–	..
North America:					
Canada	58,725	76,842	77,782	69,794	72,239
United States	264,000	201,000	145,000	195,000	199,000
South America:					
Peru	50,472	26,634	46,758	36,046	39,654
Asia:					
Japan	23,168	13,256	7,573	20,324	22,701
World totals[4]	396,400	319,732	280,613	321,164	333,594

[1] Compiled mostly from data available May 1968.
[2] Recovered in copper refinery by Electrolytic Refining and Smelting Co. of Australia Pty. Ltd.
[3] Estimate.
[4] Total is of listed figures only; no undisclosed data included.

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

THALLIUM

No production was reported in 1966 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 $1,690 were contained in residues produced by Hudson Bay Mining and Smelting Company, Limited, at the Flin Flon smelter, Manitoba. These residues were exported for treatment in foreign plants. Thallium metal was quoted in the United States at $7.50 per pound nominal, December, 1966.

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.

TABLE 59. Producers' Shipments of Thorium, 1960 - 66

Year	ThO_2 content	Value	Year	ThO_2 content	Value
	pounds	$'000		pounds	$'000
1960	134,638	422	1964	97,892	412
1961	103,282	392	1965	46,339	189
1962	31,939	120	1966	87,393	211
1963	77,539	464			

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 Cominco Limited, has been recovering a portion of this tin as a by-product from the concentration of its lead-zinc ore. In 1966 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 suspended 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, $1.79 April, $1.93 July, $1.77 October, $1.72 December, $1.72 per pound.

TABLE 60. Production of Tin,[1] 1957 - 66

Year	Pounds	Value	Year	Pounds	Value
		$'000			$'000
1957	709,102	580	1962	650,941	443
1958	795,496	625	1963	927,062	649
1959	747,443	630	1964	352,350	534
1960	621,718	522	1965	377,207	726
1961	1,119,350	728	1966	710,752	917

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

TABLE 61. Production of New Tin, Domestic Consumption and Imports, 1957 - 66

Year	Production[1]	Domestic consumption	Imports
	tons (2,000 pounds)		
1957	355	4,057	4,654
1958	398	3,688	3,876
1959	374	4,729	4,685
1960	311	4,346	4,220
1961	560	4,428	3,948
1962	325	5,048	2,547
1963	464	4,942	4,696
1964	176	5,094	5,431
1965	189	5,479	5,592
1966	355	5,568	4,764

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

TABLE 62. Imports of Tin, from Countries of Supply, 1965 and 1966

Country	1965		1966	
	Tons	Value	Tons	Value
		$'000		$'000
Tin blocks, pigs or bars:				
United Kingdom	1	2	34	127
Malaysia	4,769	18,503	3,418	12,110
United States	822	3,177	864	3,153
Thailand	-	-	448	1,494
Totals	**5,592**	**21,682**	**4,764**	**16,884**
Tin fabricated materials n.e.s.:				
United Kingdom	16	27	..	1
United States	13	46	10	36
Totals	**29**	**73**	**10**	**37**

Source: Trade of Canada. "Imports by Commodities", Catalogue No. 65-007.

TABLE 63. Available Data on Consumption of Tin (Ingots and Bars), 1965 and 1966

Used in production of	1965	1966
	tons (2,000 pounds)	
Babbitt	237	284
Bronze	247	278
Galvanizing	8	2
Solder	1,859	1,849
Tin plate and tinning	2,807	2,834
Other uses (collapsible tubes, foil, etc.)	321	321
Totals accounted for	5,479	5,568

TABLE 64. World Mine Production of Tin (Content of Ore), by Countries

Country	1962	1963	1964	1965	1966
	long tons				
North America:					
Canada	291	414	157	168	317
Mexico	576	1,055	1,207	503	821
United States	[1]	[1]	65	47	97
South America:					
Argentina	231	225	343	497	458
Bolivia[2]	21,492[3]	22,009	24,319	23,036	25,626
Brazil[4,5]	732	1,150	790	1,810	1,855
Peru (recoverable)	11	21	36	49	37
Europe:					
Czechoslovakia[6]	200	200	200	220	148
France	314	272	486	447	418[5]
Germany, East[6]	1,000	1,000	1,000	1,000	1,000
Portugal[7]	679	718	676	557	600
Spain	231	158	91	111	129
U.S.S.R.[8,9]	17,000	21,000	22,000	23,000	24,000
United Kingdom	1,181	1,226	1,226	1,313	1,272
Africa:					
Burundi	26	16	85	100	100
Cameroon, Republic of	23	25	40	40	45
Congo, (Kinshasa)	6,875	6,883	5,108	6,324	5,036
Congo, Republic of (Brazzaville)	46	43	34	48	48[5]
Morocco	11	9	14	12	7
Niger, Republic of	41	54	48	53	60
Nigeria	8,210	8,723	8,721	9,547	9,354
Rhodesia, Southern	706	498	512	510	600
Rwanda	1,325	1,271	1,360	1,424	1,317
South Africa, Republic of	1,408	1,530	1,586	1,671	1,555
South-West Africa, Territory of	369	443	474	416	664
Swaziland	5	3	3	2	1
Tanzania	218	234	287	255	353
Uganda	74	165	217	178	122
Zambia	5	1	8	16	2

See footnotes at end of table.

TABLE 64. World Mine Production of Tin (Content of Ore), by Countries – Concluded

Country	1962	1963	1964	1965	1966
	long tons				
Asia:					
Burma[7]	1,042	1,003	916	677	376
China, mainland[8]	28,000	28,000	25,000	25,000	22,000
Indonesia	17,310	12,927	16,345	14,699	12,526
Japan	859	857	796	837	971
Korea, South	17	–	–	–	32
Laos	367	326	336	284	340
Malaysia	58,603	59,947	60,004	63,670	68,886
Thailand	14,679	15,585	15,597	19,047	22,565
Oceania:					
Australia	2,715	2,860	3,642	3,849	4,838
World totals[5]	**186,900**	**191,051**	**193,664**	**201,413**	**208,577**

[1] Figure withheld to avoid disclosing individual company confidential data: included in world total.
[2] Comibol production plus exports by small and medium mines and smelters.
[3] Exports.
[4] Estimated by authors of the chapter, and in a few instances from the Statistical Bulletin of the International Tin Council, London, England.
[5] Estimate.
[6] Estimate, according to 52nd annual issue of Metal Statistics (Metallge sellschaft) through 1965.
[7] Includes tin content of mixed concentrates.
[8] Estimated smelter production.
[9] 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 1966 were: Ilmenite, 59.5% TiO_2, $30 to $35 per gross ton. The nominal quotation for titanium metal, 99.3 per cent, was $1.32 per pound.

TABLE 65. Producers' Shipments of Titanium Ore to Outside Customers, 1953 - 66

Year	Short tons	Value	Year	Short tons	Value
		$'000			$'000
1953	9,292	80	1958	–	–
1954	1,541	9	1959	26,777	130
1955	1,464	11	1960	2,947	16
1956	2,310	17	1961 - 66	–	–
1957	10,770	97			

TABLE 66. Imports of Titanium Oxide and Titanium Dioxide Extended, 1962 - 66

Year	From the United Kingdom		From the United States		Total imports	
	Pounds	Value	Pounds	Value	Pounds	Value
		$'000		$'000		$'000
1962	23,557,187	5,263	26,285,469	2,819	49,887,795	8,090
1963	3,790,080	812	21,582,476	2,580	25,372,556	3,392
1964	2,240,100	471	22,272,972	2,361	24,564,272	2,843
1965	1,424,000	283	20,634,675	2,246	22,198,075	2,559
1966	1,322,300	265	21,188,976	2,315	22,802,276	2,640

Source: Trade of Canada, "Imports by Commodities", Catalogue No. 65-007.

TABLE 67. Available Data on Consumption of Titanium Oxide, by Industries, 1964 - 66

Industry	1964		1965		1966	
	Pounds	Cost at works	Pounds	Cost at works	Pounds	Cost at works
		$'000		$'000		$'000
Paints:						
Extended titanium dioxide pigments	19,576,220	2,085	16,385,985	1,882	18,261,191	2,017
Titanium dioxide	45,624,764	11,623	45,767,219	11,644	48,469,290	12,461
Pulp and paper	7,374,161	1,669	7,607,548	1,730	8,145,340	1,768
Linoleum coated fabrics industry	4,301,037	1,054	3,139,397	768	4,208,247	1,042
Rubber goods	2,951,752	735	3,382,439	866	4,155,670	1,038
Miscellaneous non-metallic minerals	1,930,847	451	1,612,770	368	1,670,857	376
Toilet preparations	47,735	17	53,699	20	65,145	24
Industrial chemicals	81,810	22	77,601	22	242,953	91
Synthetic textiles	116,821	37	135,851	43	–	–
Other chemical industries, n.e.s.	1,072,107	256	1,301,589	285	1,642,192	327
Totals accounted for	**83,077,254**	**17,949**	**79,364,098**	**17,648**	**86,860,885**	**19,144**

TABLE 68. World Production of Titanium Concentrates (Ilmenite and Rutile), by Countries[1]

Country	1962	1963	1964	1965	1966
			short tons		
Ilmenite:					
Australia (shipments)	200,332	225,715	340,064	493,959	574,578
Brazil[2]	5,891	6,484	9,117	10,796	14,920
Canada (Titanium slag)[3]	301,448	379,320	544,721	545,916	524,773
Ceylon	4,652	21,041	50,880	54,222	45,415[4]
Finland	96,110	103,461	127,937	117,947	129,588
India	152,241	28,619	13,273	33,132	33,253
Japan (titanium slag)	578	963	2,161	3,190	3,867
Malagasy Republic	3,510	4,027	5,291	6,957	6,821
Malaysia (Exports)	113,856	164,656	144,774	136,154	130,364
Mexico	–	155	–	–	–
Norway	276,788	267,040	299,854	311,017	407,546
Portugal	75	45	63	83	278
Senegal	24,727	13,436	1,455	–	–
South Africa, Republic of	87,096	31,039	–	–	–
Spain	45,935	55,745	48,418	35,458	46,548
United Arab Republic	49,210	596	23	–	607
United States[5]	807,725	888,400	1,001,132	969,459	965,378
World totals ilmenite (estimate)[1,3]	**2,170,200**	**2,190,742**	**2,589,163**	**2,718,290**	**2,883,936**
Rutile:					
Australia	133,499	205,251	204,256	243,410	277,200
Brazil	388	429	315	397	37
India	1,781	2,062	2,062	1,452	2,002
Senegal	811	780	60	–	–
South Africa, Republic of	3,575	1,385	–	–	–
United Arab Republic (Egypt)	198	4	–	–	37
United States	9,981	11,915	8,062	6	6
World totals rutile (estimate)[1,7]	**150,200**	**221,826**	**214,755**	**245,259**	**279,325**

[1] Titanium concentrates are produced in U.S.S.R. but no reliable information is available; no estimates are included in the total.
[2] Production – Comissao National de Energia Nuclear only.
[3] Containing approximately 70-72 per cent TiO_2.
[4] Exports.
[5] Includes a mixed product containing ilmenite, leucoxene and rutile.
[6] Withheld to avoid disclosing individual company confidential data.
[7] Estimate.

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

TABLE 69. Consumption of Ferrotitanium in the Manufacture of Steel, 1957 - 66

Year	Tons	Value	Year	Tons	Value
		$'000			$'000
1957	252	82	1962	123	39
1958	210	77	1963	90	26
1959	252	85	1964	129	33
1960	418	207	1965	96	24
1961	236	110	1966	100	21

TUNGSTEN

Canada Tungsten Mining Corporation Ltd. operate an open-pit mine and a concentrator in the Northwest Territories near the Yukon border about 135 miles north of Watson Lake. Production prior to 1960 was mainly from mines in British Columbia.

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 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 1966 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 $43.00 scheelite $43.00.

TABLE 70. Production (Commercial Shipments) of Tungsten Concentrate, 1957 - 66

Year	Concentrate	WO_3 content	Value
	pounds		$
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
1963	..	1,224,305	683,814
1964	..	..	..
1965	..	..	..
1966	..	..	..

TABLE 71. Imports of Tungsten Ores, from Countries of Supply, 1965 and 1966

Country	1965		1966	
	Pounds	Value	Pounds	Value
		$'000		$'000
United Kingdom	37,100	44	–	–
Bolivia	–	–	82,500	139
Korea	–	–	35,500	69
United States	320,300	370	147,500	279
China (Communist)	–	–	258,100	414
Totals	**357,400**	**414**	**523,600**	**901**

Source: Trade of Canada, "Imports by Commodities", Catalogue No. 65-007.

TABLE 72. World Production of Tungsten Ore and Concentrate, by Countries

(60 per cent WO_3 basis)

Country	1962	1963	1964	1965	1966
	thousand pounds of contained tungsten[1]				
North America:					
Canada	3	–	..	..	..
Mexico	88	36	8	192	150
United States (shipments)	8,429	5,384	8,798	7,566	8,482
Guatemala	–	–	–	–	9
South America:					
Argentina	619	194	64	152	174
Bolivia[2]	2,798	2,300	2,106	1,912	3,760
Brazil	1,368	582	402	402	420[3]
Peru	484	542	676	836	762

See footnotes at end of table.

TABLE 72. World Production of Tungsten Ore and Concentrate, by Countries – Concluded

Country	1962	1963	1964	1965	1966
	thousand pounds of contained tungsten[1]				
Europe:					
Austria	320	234	110	206	144
France	772	–	–	–	–
Italy	1	..	..	..	..
Portugal	2,754	1,698	1,854	1,724	2,096
Spain	777	154	40	46	102
Sweden	295	..	..	..	..
U.S.S.R.[3]	11,600	11,000	11,400	12,600	13,000
Yugoslavia	57	..	..	..	..
Africa:					
Congo, (Kinshasa)	406	212	244	224	198
Rhodesia, Southern	24	..	..	..	..
Rwanda	165	14	156	288	432
South Africa, Republic of	28	..	..	..	..
South West Africa,[3] Territory	184	228	198	178	186
Tanzania	–	–	–	–	7
Uganda (exports)	13	2	–	50	74
United Arab Republic (Egypt)	–	–	–	–	–
Asia:					
Burma[3]	882	780	600	360	240
China	24,900	23,600	21,400	17,600	17,600
Hong Kong	18	..	..	..	..
India	12	..	..	..	..
Japan	1,160	816	910	758	724
Korea: North[3]	4,400	4,200	4,200	4,720	4,720
Republic of South	7,456	5,798	5,698	4,698	4,530
Malaysia	12	–	–	–	4
Thailand	471	216	452	580	586
Oceania:					
Australia	1,946	1,706	1,768	2,090	2,322
World totals[3]	72,500	59,676	61,924	60,146	64,040

[1] Including WO_3 in tin-tungsten concentrates.
[2] Exports.
[3] Estimate.

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

URANIUM

In 1966 the output of uranium precipitates from the mines in Ontario were valued at $42,758,135. The Beaverlodge area in Saskatchewan shipped $11,576,652 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 Energy, Mines and Resources, Ottawa.

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 1957-66.

TABLE 73. Producers' Shipments[1] of Uranium, Radium, etc., 1957 - 66

Year	U_3O_8	Value	Year	U_3O_8	Value
	pounds	$'000		pounds	$'000
1957	13,271,414	136,304	1962	16,859,169	158,184
1958	26,805,232	299,538	1963	12,770,421	102,951
1959	31,784,189	331,143	1964	14,570,307	83,509
1960	25,495,369	269,938	1965	8,885,213	62,361
1961	19,281,465	195,692	1966	7,863,690	54,335

[1] Compilation method is shown in text above.

TABLE 74. World Production of Uranium Oxide U_3O_8, by Countries[1,2]

Country	1962	1963	1964	1965	1966
	short tons[2]				
North America:					
Canada	8,430	8,352	7,285	4,443	3,761
United States	17,010	14,218	11,847	10,442	9,587
South America:					
Argentina	4	10	37	50	8[3]
Europe:					
Finland[3]	–	–	–	–	–
France	1,978	1,987	1,911	1,887	1,260
Portugal	11	11	22	42	46
Spain[3]	55	–	100	130	..
Sweden[3]	10	10	10	20	50
Africa:					
Gabon	514	582	586	724	600[3]
Malagasy Republic[3]	111	123	169	65	65
South Africa, Republic of	5,024	4,532	4,445	2,942	3,286
Oceania:					
Australia[2]	1,300	1,200	370	370	330
World totals (estimate)[1,2]	34,500	31,025	26,782	21,115	18,993

[1] In addition to the countries listed, uranium is also known to have been produced in India, Italy, Japan and West Germany, but production data are not available.
[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.
[3] Estimate.

TABLE 75. Exports of Uranium Ores and Concentrates, 1964 - 66

Destination	1964	1965	1966
	$'000		
United Kingdom	39,627	38,949	22,605
Germany, West	159	–	–
Japan	5	–	–
United States	34,863	14,749	13,761
Brazil	–	–	–
Totals	74,653	53,698	36,366

Source: Trade of Canada, "Exports by Commodities", Catalogue No. 65-007.

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, 1966 at $1.30 per pound, ($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 76. World Production of Vanadium in Ores and Concentrates,[1] by Countries

Country	1962	1963	1964	1965	1966
	short tons				
North America:					
United States (recoverable vanadium)	5,211	3,862	4,362	5,226	5,166
Mexico	2	–	–	1	–
South America:					
Argentina	15	3	3	–	–
Europe:					
Finland	629	771	1,084	1,063	1,069
Norway	–	755	740	750	730
Africa:					
South Africa, Republic of	1,393	1,392	1,282	1,519	1,711
South-West Africa (recoverable vanadium)	1,019	1,134	1,102	1,275	1,353
Zambia	3	–	–	–	–
World totals[2]	8,272	7,917	8,573	9,834	10,029

[1] Figures for Finland and Republic of South Africa are for vanadium in vanadium pentoxide product. The U.S.S.R. had vanadium production but data are insufficient for estimation.
[2] Total is of listed figures only; no undisclosed data included.

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

YTTRIUM

The waste liquors from the uranium plant of Rio Algom Mines Ltd. at Elliot Lake contain yttrium, thorium and rare earths. Yttrium is used in the manufacture of colour television tubes. Shipments of yttrium oxide were made in December 1965.

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, 1966 were: zircon ore, 65 per cent ZrO_2, $61 per long ton, at Atlantic seaboard; zirconium sponge, $5 to $10 per pound for commercial grade.

TABLE 77. World Production of Zirconium Ores and Concentrates, by Countries

Country	1962	1963	1964	1965	1966
	short tons				
Australia	149,904	207,011	206,173	253,978	273,458
Brazil[1]	2,642	392	569	543	546
Ceylon	–	–	–	2	167
Korea, South	–	–	–	–	90
India	2	2	2	2	2
Malagasy Republic	390	428	564	710	777
Malaysia (Zircon exports)	67	289	162	629	866
Nigeria	542	886	171	–	..
Senegal	2,575	3,383	611	2	2
South Africa, Republic of	7,581	2,648	–	–	–
United Arab Republic (Egypt)	188	44	45	2	429
United States	3	3	3	3	3

[1] Chiefly baddeleyite.
[2] Data not available.
[3] Figure withheld to avoid disclosing individual company confidential data.

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

List of Establishments classified to this Industry, 1966

Name of firm and product	Head office address	Location of mine or plant
Bismuth:		
Molybdenite Corp. of Canada Ltd.	485 McGill St., Montreal, Quebec	LaCorne Twp., Quebec
Preissac Molybdenite Mines Ltd.	485 McGill St., Montreal, Quebec	Preissac Twp., Quebec
Columbium, Tantalum:		
St. Lawrence Columbium & Metals Corp.	1010 St. Catherine St. W., Montreal, Quebec	Oka, Quebec
Molybdenum:		
Quebec:		
Anglo American Molybdenite Mining Corp.	715 - 3rd Ave., Val d'Or	Preissac Twp.
Molybdenite Corp. of Can. Ltd.	485 McGill St., Montreal	La Corne Twp.
Preissac Molybdenite Mines Ltd.	485 McGill St., Montreal	Preissac Twp.
British Columbia:		
Brynnor Mines Ltd. (Boss Mt. Division)	44 King St. W., Toronto, Ontario	Quesnel Forks
Endako Mines Ltd.	1030 Georgia St., Vancouver 5	Omineca
Red Mountain Mines Ltd.	Rossland	Rossland
Thorium:		
Rio Tinto Nuclear Products Ltd.	335 Bay St., Toronto, Ontario	Elliot Lake, Ontario
Titanium ore:		
Quebec Iron and Titanium Corp.	1625 Route Marie Victorin, Tracy	Parker Twp., Sorel, Quebec
Tungsten concentrates:		
Canada Tungsten Mining Corp. Ltd.	702 - 1281 West Georgia St., Vancouver, British Columbia	Flat River, Northwest Territories
Uranium:		
Ontario:		
Denison Mines Ltd.[1]	4 King St. W., Toronto	Quirke Lake
Rio Algom Mines Ltd.[1]	120 Adelaide St. W., Toronto	Elliot Lake, Quirke Lake
Stanrock Uranium Mines Ltd.[1]	80 Wellington St. W., Toronto	Elliot Lake
Saskatchewan:		
Eldorado Mining & Refining Ltd.[1]	151 Slater St., Ottawa, Ontario	Beaverlodge
Yttrium:		
Rio Tinto Nuclear Products Ltd.	335 Bay St., Toronto, Ont.	Elliot Lake, Ontario

SUPPLEMENT

The following establishments classified to other industries, e.g. Smelting and Refining recover the commodities indicated and are included for information purposes to support the statistical material relevant to these commodities which is presented in this report.

Aluminum:		
Aluminum Company of Canada Limited	1700 Sun Life Building, Montreal, Quebec	Arvida, Quebec; Shawinigan Falls Quebec; Ile Maligne, Quebec; Beauharnois, Quebec; Kitimat, British Columbia
Canadian British Aluminum Co. Ltd.	Baie Comeau, Quebec	Baie Comeau, Quebec
Antimony:		
Cominco Limited	215 St. James St., Montreal, Quebec	Trail, British Columbia
Barium:		
Dominion Magnesium Ltd.	Haley, Ontario	Haley, Ontario
Bismuth:		
Anglo American Molybdenite Mining Corp.	Val d'Or, Quebec	Preissac Twp., Quebec
Cobalt Refinery Ltd.	Cobalt, Ontario	Cobalt, Ontario
Cominco Limited	215 St. James St., Montreal, Quebec	Trail, British Columbia
Gaspe Copper Mines Ltd.	44 King St. W., Toronto, Ontario	Murdockville, Quebec
Cadmium:		
New Brunswick:		
Heath Steele Mines Ltd.	Newcastle	North Esk (Boom)
Quebec:		
Cupra Mines Ltd.	507 Place d'Armes, Montreal	Stratford Twp.
Lake Dufault Mines Ltd.	7 King St. E., Toronto, Ontario	Dufresnoy Twp.
Lake Mines Ltd.	44 King St. W., Toronto, Ontario	Matagami
Solbec Copper Mines Ltd.	507 Place d'Armes, Montreal	Stratford Twp.
Ontario:		
Estall Mining Ltd.	Toronto-Dominion Centre, Toronto	Timmins
Noranda Mines Ltd. (Geco Division)	44 King St. W., Toronto 1	Thunder Bay
Zenmac Metal Mines Ltd.	80 Richmond St. W., Toronto	Schreiber
Manitoba and Saskatchewan:		
Hudson Bay Mining & Smelting Co. Ltd.	333 Broadway, Winnipeg	Flin Flon

[1] Firms in this group refer to operators classified as establishments in Uranium Mines, 057 in accordance with the new S.I.C.

Note: Many of the metals listed above are by-products of firms classified to the Smelting and Refining industry. Columbium, molybdenum and tungsten mines are classified to S.I.C.-059 and uranium mines to S.I.C.-057.

List of Establishments classified to this Industry, 1965 – Concluded

Name of firm and product	Head office address	Location of mine or plant
	SUPPLEMENT – Concluded	
Cadmium – Concluded:		
British Columbia:		
Aetna Investment Corp. Ltd.	170 The Donway W., Toronto, Ont.	Invermere
Anaconda Co. (Canada) Ltd., Britannia Mine	Britannia Beach	Britannia Beach
Canadian Exploration Ltd.	Royal Bank Bldg., Vancouver	Salmo
Cominco Limited	215 James St., Montreal, Quebec	Trail
Giant Soo Mines Ltd.	355 Burrard St. Vancouver	Cranbrook
Johnsby Mines Ltd.	2200 Yonge St., Toronto, Ontario	Silverton
Mastodon Highland Bell Mines Ltd.	1200 W. Pender St., Vancouver	Revelstoke
New Cronin Babine Mines Ltd.	844 W. Hastings St., Vancouver	Smithers
Reeves Macdonald Mines Ltd.	237 W. Hastings St., Vancouver	Remac
Yukon:		
United Keno Hill Mines Ltd.	7 King St. E., Toronto, Ontario	Elsa, Yukon
Northwest Territories:		
Pine Point Mines Ltd.	Trail, British Columbia	Pine Point
Calcium:		
Dominion Magnesium Ltd.	67 Yonge St., Toronto, Ontario	Haley, Ontario
Indium:		
Cominco Limited	215 St. James St., Montreal, Quebec	Trail, British Columbia
Magnesium:		
Dominion Magnesium Ltd.	67 Yonge St., Toronto, Ontario	Haley, Ontario
Molybdenum:		
Gaspé Copper Mines Ltd.	44 King St. W., Toronto, Ontario	Murdochville, Quebec
Bethlehem Copper Corp. Ltd.	355 Burrard St., Vancouver, British Columbia	Ashcroft, British Columbia
Selenium-Tellurium:		
Canadian Copper Refiners Ltd.	1600 Royal Bank Building, Toronto, Ontario	Montreal East, Quebec
International Nickel Co. of Canada Ltd.	Copper Cliff, Ontario	Copper Cliff, Ontario
Thorium:		
Dominion Magnesium Ltd.	67 Yonge St., Toronto, Ontario	Haley, Ontario
Tin:		
Cominco Limited	215 St. James St., Montreal, Quebec	Trail, British Columbia
Tungsten concentrates:		
Taylor, Fred	Mayo, Yukon	Mayo, Yukon
Uranium:		
Consolidated Canadian Faraday Ltd.	100 Adelaide St. W., Toronto, Ont.	Bancroft, Ontario
Zirconium:		
Dominion Magnesium Ltd.	67 Yonge St., Toronto, Ontario	Haley, Ontario