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CANADA

DEPARTMENT OF TRADE AND COMMERCE

DOMINION BUREAU OF STATISTICS

+ + + *Census of Industry* + + +

MINING, METALLURGICAL & CHEMICAL STATISTICS

Report

on

MISCELLANEOUS METALS IN CANADA, 1945

including

Aluminum
Antimony
Beryllium
Bismuth
Boron
Cadmium
Calcium
Cerium
Chromium
Iron
Indium
Lithium
Magnesium
Manganese
Mercury
Molybdenum
Pitchblende
Selenium
Tantalum-Columbium
Tellurium
Tin
Titanium (ilmenite)
Tungsten
Vanadium
Zirconium

OTTAWA
1947

Price 50 cents

A66-30-9-47.

Dominion Statistician: Herbert Marshall
Director - Division of Census of Industry and Merchandising: W. H. Losee
Chief - Mining, Metallurgical and Chemical Statistics: H. McLeod

MISCELLANEOUS METALS, 1945

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 relatively few operators and the annual extraction of certain types often fluctuates in an erratic manner according to demand and supply. Included in this report, with the finally-revised statistics relating to the Canadian production of these ores or metals, are notes and statistical data pertaining to various rare or semi-rare metals or metalliferous ores produced in other countries. Metals and metal-bearing ores produced in Canada during 1945 and classified as miscellaneous include antimony, bismuth, cadmium, chromite, iron ore, magnesium, manganese ore, mercury, molybdenite, pitchblende, selenium, tellurium, titanium ore, tin and tungsten concentrates. In addition to particulars relating to these metals or minerals, the bulletin contains notes of a summary nature on aluminum, beryllium, lithium, vanadium and a few of the rarer metals.

It is to be noted that the majority 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, such statistics as relate 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 non-ferrous smelting and refining industry.

The mining of certain ores, classified as strategic during the war years, and including molybdenite, tungsten minerals, etc., was curtailed or terminated in 1945. The production of these ores, described in some instances as "projects" was conducted principally by or under the supervision of the Wartime Metals Corporation, a Canadian Government organization.

There were 24 active firms in the miscellaneous metals mining industries in 1945; to the 985 employees there was a payment of $2,041,349 in salaries and wages; fuel, electricity, supplies, freight and ore treatment cost $2,519,571. The gross value of production was $4,276,130 in 1945 compared with $5,360,993 in 1944.

Table 1 - Principal Statistics(x) Of The Miscellaneous Metal Mining Industry in Canada, 1944 and 1945

		1944	1945
Number of firms		27	24
Number of plants		27	23
Number of employees - On salary		237	178
On wages		1,148	807
Total		1,385	985
Salaries and wages - Salaries	$	485,401	324,594
Wages	$	2,323,612	1,716,755
Total	$	2,809,013	2,041,349
Value of production (gross)	$	5,360,993	4,276,130
Cost of fuel and electricity	$	951,929	753,184
Process supplies used	$	657,430	356,248
Smelter charges	$	58,937	35,875
Freight	$	389,554	1,374,264
Value of production (net)	$	3,286,886	1,756,559

(x) Does not include data relating to smelters and refineries or to mining in the Northwest Territories. Data for 1945 cover only chromium, iron, molybdenum, titanium and tungsten.

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This report was prepared by A. R. Deir, Mining Statistician.

Table 2 - Average Number Of Wage-Earners, By Months, 1944 and 1945

Month	1944					1945				
	Surface		Under-	Mill		Surface		Under-	Mill	
	Male	Female	ground	Male	Female	Male	Female	ground	Male	Female
January	763	66	454	167	1	527	19	99	85	1
February	829	60	428	173	1	554	20	94	95	1
March	768	57	416	167	3	543	20	93	95	1
April	766	48	362	174	12	582	22	95	98	19
May	794	41	256	144	15	592	21	90	106	22
June	757	34	231	126	18	622	21	87	118	22
July	731	33	210	126	18	648	25	144	135	23
August	643	33	179	101	20	629	22	92	118	18
September	612	34	164	92	16	518	22	90	115	18
October	593	30	163	86	18	528	22	90	124	9
November	575	26	168	91	17	530	9	96	139	7
December	525	27	173	80	1	515	9	91	125	1
Average ...	696	41	267	127	12	566	19	97	113	12

Table 3 - Number of Wage-Earners Who Worked The Number Of Hours Specified, During One Week In Month Of Highest Employment (Including overtime) 1945

	30 hours or less	31-43 hours	44 hours	45-47 hours	48 hours	49-50 hours	51-54 hours	55 hours	56-64 hours	65 hours and over	Grand total	Total wages paid in that week (x)
												$
Male	42	57	4	17	164	26	81	22	356	163	932	37,783
Female ..	1	4	1	...	18	...	1	...	5	18	48	1,573

(x) Including the actual money wages paid, any bonus, the value of room and board, where provided, deductions from employees for income tax and for social services, such as sickness, accident, insurance, pensions, etc., as well as any other allowances forming part of the employees' wages.

Table 4 - Fuel and Electricity Used, 1945

Kind		Quantity	Cost at Plant
			$
Bituminous coal - Imported	short ton	3,859	32,222
Anthracite coal - From United States	short ton	38	754
Lignite coal	short ton	...	...
Coke (for fuel only)	short ton	28,223	89,137
Gasoline (including gasoline used in cars and trucks)	Imp. gal.	145,084	38,794
Kerosene or coal oil	Imp. gal.	6,046	1,251
Fuel oil and diesel oil	Imp. gal.	882,546	115,947
Wood (cords of 128 cubic feet of piled wood)	cord	1,621	13,208
Electricity purchased for power and lighting (including service charge)	K.W.H.	113,496,750	461,971
Total	...	...	753,184

Table 5 - Power Equipment, 1945

Description	Ordinarily in Use		In Reserve or Idle	
	Number of units	Total horse power	Number of units	Total horse power
Steam engines	...	...	...	...
Steam turbines	...	...	...	...
Diesel engines	27	3,380	1	110
Gasoline, gas and oil engines, other than Diesel engines	18	815	6	162
Hydraulic turbines or water wheels	...	...	...	...
Electric motors operated by purchased power	369	15,357	21	1,086
Total	414	19,552	28	1,358
Stationary boilers	10	610	...	...
Motor generator sets	7	188	...	...

Aluminum - Although Canada has no bauxite, the principal ore of aluminum, the Canadian aluminum smelting industry is the second largest in the world, being exceeded 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.

Production is entirely by the Aluminum Company of Canada, Limited, which has an ore treatment plant at Arvida, Quebec, and in 1945 had reduction works at Arvida, Ile Maligne, Shawinigan Falls, La-Tuque and Beauharnois, all in the province of Quebec. These reduction plants had a total rated yearly capacity of 550,000 tons of aluminum or over 20 per cent of the estimated productive capacity of the world.

Fabricating plants are located at Kingston, Toronto and Etobicoke in Ontario, and at Shawinigan Falls in Quebec. These secondary plants consume only a small part of the primary ingot production, from 80 to 90 per cent being exported to all parts of the world.

Developments in 1945 consisted mainly in adjusting production to meet the lesser peacetime demand. The reduction plants at Shawinigan Falls, La Tuque and Beauharnois were closed during the year and operations were concentrated at Arvida and Ile Maligne.

The principal imported raw materials used in the Canadian aluminum industry are bauxite from British Guiana, coal and coke from the United States, fluorspar from Newfoundland, and cryolite, from Greenland and the United States.

No bauxite occurs in Canada, but clay, shale, nepheline syenite, and anarthosite, containing from 20 to 30 per cent alumina, are found in many parts of the country. The utilization of these low-grade materials has been the object of much research and various processes have been developed. The economic success of any of these processes will depend in large part upon local conditions, but it has yet to be proved that any of them can compete on an even basis with the Bayer process, the standard method for producing alumina, and which utilizes bauxite containing less than 7 per cent silica and from 55 to 60 per cent alumina.

Aluminum metal being only one-third as heavy as steel, untarnishable, and also a good conductor of electricity, is finding an increasingly wide field of usefulness. It is available from fabricating plants in many forms as sheets, foil, castings, forgings, rolled and extruded shapes, tubes, rods, wire, powder and paste. Because of its light weight and strength when alloyed, it is widely used in the making of aircraft and for many other purposes where lightness of structural metal is particularly desirable. Large tonnages are used for making cable for transmission of electricity, and for making cooking utensils and containers for food and beverages. It is finding increasing use in architecture and in construction of transportation equipment such as railway cars, automobiles, and boats.

The price of aluminum ingot throughout 1945 was 15 cents per pound f.o.b. plant, but early in 1946 the price was reduced to 13¼ cents per pound.

Table 6 - Production in Canada, Domestic Consumption, Imports and Exports of Aluminum Ingots, 1935-45.

Year	Production	Domestic Consumption	Exports	Imports
		(Tons of 2000 pounds)		
1935	23,171	8,778	29,974	85
1936	29,640	9,423	28,805	27
1937	46,906	10,903	48,500	40
1938	71,203	9,396	64,724	69
1939	82,840	10,544	70,578	189
1940	109,144	18,197	86,536	133
1941	213,873	19,717	192,757	3
1942	340,596	32,700	314,483	...
1943	495,749	40,100	375,383	1
1944	462,065	38,400	295,226	66
1945	215,712	40,800	382,286	51

Table 7 - Imports of Aluminum and Bauxite into Canada, 1944 and 1945

Item	1944		1945	
	Cwt.	Value	Cwt.	Value
		$		$
Alumina	2,442	38,530	6,384	99,975
Bauxite ore	26,560,509	9,984,818	18,794,253	7,262,766
Cryolite	50,373	248,562	99,658	424,486
Aluminum pigs, ingots and blocks	1,324	27,085	1,013	19,383
Aluminum Scrap	4,564	33,034	6,408	47,118
Aluminum angles, channels and beams	3,372	180,226	307	14,692
Aluminum bars, rods and wire	35,424	853,672	5,264	131,791
Aluminum leaf	...	47,845	...	69,437
Aluminum pipes and tubes	594	70,323	120	9,384
Aluminum plates, sheets and strips	27,007	945,287	16,332	476,162
Aluminum powder	28	2,435	46	4,435
Aluminum wire and cable	...	...	27	1,734
Aluminum household hollow ware	...	11,635	...	98,186
Aluminum manufactures n.o.p.	...	420,261	...	951,138

Cwt. = 100 pounds.

Table 8 - Exports of Aluminum from Canada, 1944 and 1945

Item	1944		1945	
	Cwt.	Value	Cwt.	Value
		$		$
Aluminum scrap	36,040	214,572	130,335	770,825
Aluminum wire and cable	...	59,498	...	1,049,797
Aluminum manufactures, n.o.p.	...	9,441,522	...	8,810,816
Aluminum in bars, blocks, ingots and blooms	5,904,532	93,493,588	7,645,729	121,778,512
Aluminum in rods, sheets and circles	62,485	2,310,424	37,821	1,070,281
Aluminum kitchen utensils and hollow ware	...	799	...	86,763

Table 9 - World Production of Aluminum 1939, 1942, 1945 (From the annual report of the American Bureau of Metal Statistics)

Country	1939	1942	1945
		(Metric tons)	
United States	148,367	472,747	450,403
Canada	75,152	308,989	195,694
Total America	223,519	781,736	646,097
Austria	4,283	9,680	...
France	52,500	45,200	37,225
Germany (a)	195,145	254,257	...
Great Britain	25,000	47,525	32,407
Italy	34,200	43,541	...
Norway	31,130	20,498	4,608
Russia	73,000	...	...
Spain	1,080	742	592
Sweden	1,966	1,294	...
Switzerland	28,000	22,000	...
Total Europe (a)	376,704	451,537	...
Japan	30,000	...	...
India	...	500	1,500

(a) Including estimates for uncertain productions in Hungary and Yugoslavia.

Antimony - The following summary has been taken, for the most part, from the Annual Review of the Bureau of Mines at Ottawa.

Antimony in the form of stibnite occurs in various parts of Canada, but with the exception of small experimental shipments in 1939 and 1940 from the Fort St.James deposits in northern British Columbia, no antimony ore has been produced in Canada since 1917. Production of high grade electrolytic antimony was commenced in Canada in 1938 at the plant of the Consolidated Mining and Smelting Company of Canada, Limited, at Trail, British Columbia, but was discontinued indefinitely in the spring of 1944. In place of refined antimony, the Consolidated Mining and Smelting Company is now producing an antimonial lead containing 25 per cent antimony, which for many purposes, is just as suitable as metallic antimony.

The antimony contained in the antimonial lead produced at Trail is obtained from antimonial fume residues which are a by-product of the lead-zinc operations and production is intermittent, depending upon the accumulation of antimonial fume. The recorded output of 1,667,951 pounds in 1945 represents the antimony content of antimonial lead produced in the Trail plant.

During 1945 antimony was in short supply. In the first half of the year Canada was allocated 60 tons of antimony per month from the United States to supplement production of antimonial lead at Trail, which is sold to the producers of battery plates, solders, and babbitt metal, but in the second half of the year this allocation was reduced to 30 tons per month.

Because of the shortage of antimony in the United States and the increased demands in that country and the United Kingdom, coupled with a curtailment of supplies due to a decrease in shipments of antimony ores in Bolivia, the United States served notice that shipments to Canada would continue to be restricted to 30 tons a month during the first half of 1946. This was supplemented by a production of approximately 55 tons a month of contained antimony from the Trail plant during January, February, March and April. Early in 1946 it was understood that Consolidated Smelters would have to close its antimonial lead plant for a time because the stock of antimonial fume had been exhausted. Later information was to the effect that sufficient fume to commence operations would not be accumulated before November 1946.

Antimony was an important war metal. Early in the war its uses were about equally divided between metal and trioxide, but by the end of 1944 the trend was toward a greatly increased use of oxide for use in flame proofing and fire-retarding paints. In peacetime the oxide of antimony is used extensively as an opacifier in enamels.

The post-war demand for antimony will likely exceed that of the pre-war years because of the increasing requirements for storage batteries and other metal products, and of the new uses developed during the war.

The domestic ceiling price set by the Wartime Prices and Trade Board varied from 18 cents to 21 cents per pound depending on the quantity of antimony metal ordered.

Table 10 - Production of Antimony in Canada, 1937 - 1945.

Year	In Ores Exported		Metal Produced in Canada		Total	
	Pounds	$	Pounds	$	Pounds	$
1937	48,163	7,394	...	...	48,163	7,394
1938	24,560	2,200	...	...	24,560	2,200
1939	25,405	3,139	1,200,180	148,330	1,225,585	151,469
1940	44,700	3,800	2,549,792	392,668	2,594,492	396,468
1941	15,292	2,141	3,169,785	443,770	3,185,077	445,911
1942	78	13	3,041,030	516,975	3,041,108	516,988
1943	...	...	1,114,166	189,408	1,114,166	189,408
1944	...	...	1,937,933	281,000	1,937,933	281,000
1945 (a)	...	...	1,667,951	290,557	1,667,951	290,557

(a) No refined metal in 1945; antimony content of antimonial lead.

Table 11 - Production of Antimony Metal in Canada, Consumption, Imports and Exports, 1937-1945.

Year	Production in Canada	Consumption in Canada	Imports	Exports (x)
		(Tons of 2000 pounds)		
1937	...	430	588	...
1938	...	385	428	...
1939	600	426	119	275
1940	1,275	558	118	359
1941	1,585	955	1	676
1942	1,521	1,187	...	166
1943	557	1,303	120	6
1944	968	1,515	779	...
1945	...	778	517	...

(x) Shipped for export - data not available from Customs' Records.

Table 12 - Consumption of Antimony Metal, by Industries,1939-1945

Industry	1939	1940	1941	1942	1943	1944	1945
				(Tons of 2000 pounds)			
In steel foundries	20	28	33	1	...	...	...
White metal foundries	344	368	683	909	907	1,191	614
Electrical apparatus plants	28	83	115	117	165	183	114
Brass foundries	11	4	6	13	14	10	9
Non-ferrous smelters	12	46	29	44	134	76	1
Silverware factories	7	9	13	7	8	8	9
Ammunition plants	...	14	67	91	71	41	26
Miscellaneous	4	6	9	5	4	6	5
Total	426	558	955	1,187	1,303	1,515	778

Beryllium (From the Annual Reviews of the Bureau of Mines, Ottawa)-

"Beryl, a silicate of aluminum and beryllium, is the commonest beryllium mineral, and is the only present commercial source of the element. It generally contains from 10 to 12 per cent of beryllium oxide, corresponding to from 4 to 4.5 per cent of beryllium. The occurrence of beryl is restricted to pegmatite dykes, in which it is usually found as disseminated crystals, sometimes of very large size. Only rarely, however, is the beryl content of pegmatites sufficient to enable the deposits to be worked for this mineral alone, and a large part of the comparatively small world production has been obtained as a by-product from the mining of feldspar, mica, or lithium minerals."

Canada produces no beryl and very little beryl is used or required by domestic industries. Most of the world supply in recent years has come from Brazil, Argentina, India, the United States, and South Africa.

The most noteworthy occurrences of beryl in Canada are in Ontario, south-eastern Manitoba, and the Northwest Territories.

In Ontario, intermittent work was done prior to 1941 on a beryl pegmatite in Lyndoch township, Renfrew county. A few tons of clean cobbed crystals were obtained, and about 200 tons of milling grade rock was stockpiled. Most of the work on the property was done by the present owners, Canadian Beryllium Mines and Alloys, Limited, 901 Royal Bank Building, Toronto, who, however, have reported no sales. A detailed examination of the main, easterly workings, made in 1943 by the Bureau of Mines, Ottawa, and the Metals Controller's Office, indicated an average content of 0.188 per cent beryl in the total rock excavated, with a maximum for the richest quarry sections of 1.24 per cent. Grade of selected clean beryl crystals was 10.41 per cent BeO.

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 Oisea (Bird) River areas, but no shipments were reported.

Beryllium (Concluded)

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

In Quebec, scattered occurrences of beryl are known in 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 2 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.

Various beryllium salts, principally the oxide and carbonate, are used in industry. A growing demand has developed for the oxide for the preparation of zinc-beryllium silicate, used as a coating for fluorescent lighting tubes and lamps, and for fluorescent screens. The oxide and carbonate, activated by uranium salts or rare earths, act as "phosphors" and are utilized in luminescent paints. The oxide is a super-refractory, with a melting-point of 2,570°C., or 520 degrees above that of alundum, and is used in crucibles, insulators, electrodes, furnace linings, and as a filament coating in lamps. Beryllium acetate is used as a coagulating, hardening bath for sodium alginate, a new English textile made from seaweed.

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

Most of the present world production of beryl is marketed in the United States, where the following companies engaged in the primary production of beryllium metal, alloys, and compounds are the chief purchasers: Beryllium Corporation of Pennsylvania, Temple (Reading), Pennsylvania; Brush Beryllium Company, 3714 Chester Avenue, Cleveland, Ohio; and Clifton Products Incorporated, Painesville, Ohio.

The New York price quotations at the beginning of 1945 were: beryllium ore - per unit of BeO, 8 to 12 per cent, f.o.b. mine, $14.50; foreign ore, nominal. As the year closed the price had declined to $9 to $10.

Bismuth - Refined bismuth is obtained in Canada mainly as a by-product from the treatment of the lead-zinc ores of British Columbia and also as a by-product from the treatment of the silver-cobalt ores of northern Ontario. Most of the world supply is obtained from the treatment of lead and copper refinery slimes and as a by-product from the treatment of gold, tin and tungsten ores.

In British Columbia, the Consolidated Mining and Smelting Company's plant for the electrolytic treatment of bismuth residue resulting from the electrolytic treatment of lead bullion has been operated intermittently since 1928, when it was erected. In Ontario, the Deloro Smelting and Refining Company, Limited, Deloro, formerly obtained a lead bullion that contained bismuth (and some gold and silver) from the treatment of cobalt-silver ores of Cobalt and adjoining areas. This bullion was exported to the United States for refining.

The Molybdenum Corporation of Canada, Limited, which operates a molybdenite mill and concentrator in La Corne township, Abitibi county, Quebec, is modifying its process so the bismuth content of the molybdenite concentrate may be recovered. By roasting and flotation, a bismuth concentrate running in excess of 20 per cent bismuth may be obtained. This concentrate will be shipped to European markets with the molybdenite concentrate.

The demand for bismuth increased considerably during the war owing to its increased use for metallurgical and pharmaceutical purposes. Bismuth in peacetime is used mostly in the manufacture of pharmaceuticel products. A much larger portion than formerly is used in the making of so-called fusible or low-melting alloys. There are numerous alloys of bismuth that contain from 33 to 56 per cent bismuth.

The price (London price in Canadian funds) of bismuth in 1945 remained at $1.38 a pound. The price in New York remained at $1.25 a pound.

Table 13 - Production of Primary Bismuth in All Forms (x) in Canada, 1931-1945.

Year	Pounds	$	Year	Pounds	$
1931	118,207	157,650	1938	9,516	9,754
1932	16,855	7,340	1939	409,449	466,362
1933	78,303	81,526	1940	58,529	81,004
1934	253,644	301,215	1941	7,511	10,396
1935	13,797	13,245	1942	347,556	479,627
1936	364,165	360,524	1943	407,597	562,484
1937	5,711	5,654	1944	123,875	154,844
			1945	189,815	260,047

(x) Refined metal plus bismuth content of bullion exported.

Table 14 - Production of Bismuth Metal in Canada, Consumption, Imports and Exports, 1935-45

Year	Production	Domestic Consumption	Exports (x)	Imports
		(Tons of 2,000 pounds)		
1935	3	17	33	1
1936	180	16	40	...
1937	...	14	37	...
1938	...	18	40	...
1939	205	14	64	5
1940	20	12	77	...
1941	...	16	51	...
1942	159	36	199	...
1943	204	65	73	...
1944	62	46	25	...
1945	95	35	41	...

(x) Shipped for export by Canadian producers.

Table 15 - Consumption of Bismuth Metal in Canada, by Industries, 1939-1945.

Industries	1939	1940	1941	1942	1943	1944	1945
			(Tons of 2,000 pounds)				
In medicinals and pharmaceuticals .	14	12	15	13	28	23	15
White metal foundries	...	...	1	13	28	20	16
Miscellaneous	...	...	...	10	9	3	4
Total	14	12	16	36	65	46	35

Boron - According to the United States Bureau of Mines, boron alloys are supplied by United States manufacturers, small quantities being used in the non-ferrous metals industries and in steel making. In cast iron, boron opposes graphitization on solidification and exerts an energetic whitening effect, producing a hard strong iron but reducing malleability. Recently boron has been found to be one of the so-called minor elements that stimulate plant growth and inhibit the development of certain plant diseases.

"The Mineral Industry" reported in 1941 that tests demonstrated that the use of boron deoxidizers and the incorporation of 0.002-0.007 per cent boron in 0.4 per cent carbon steel increases the hardenability, ductility and toughness; the boron is best supplied as a complex alloy of B-Mn-Si-Ti, rather than as ferroboron.

Boron carbide, boron carbide shapes and calcium boride are now produced in Canada.

World reserves of boron minerals are abundant, but known sources are confined to a few countries, chiefly the United States, Chile, Argentina, Peru, Italy and Turkey, although Borax also has been reported in Tibet, Persia, India and Ceylon.

Imports of Borax into Canada during 1945, in packages of 25 pounds or over, totalled 11,425,740 pounds valued at $329,412. Borax was quoted in the United States in 1945 at $41.50 per ton, granular technical, March 1945 - United States prices:- Ferroboron, per pound of alloy, f.o.b. shipping point, ton lots $120. Nickel boron per pound of alloy, f.o.b. shipping point: ton lots, $2.00 (15-18% boron). Manganese-boron, per pound of alloy, f.o.b. shipping point, $1.89 - ton lots (15-20% boron).

Cadmium - (From the Annual Reviews of the Bureau of Mines, Ottawa)-

"Cadmium is present in small amounts in most zinc and in some lead ores. Its production is limited entirely to the by-product from electrolytic zinc and from the manufacture of lithopone.

"Cadmium metal is produced by the Consolidated Mining and Smelting Company of Canada, Limited at Trail, British Columbia, and by the Hudson Bay Mining and Smelting Company at Flin Flon, Manitoba. The plant at Trail started to produce early in 1928, and like the plant at Flin Flon, which has been in operation since 1936, treats the cadmium residue from the zinc refinery, the procedure being similar. Both plants were in continuous operation during 1945.

"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 sulphide and cadmium sulphoselenide are standard agents for imparting bright resistant yellow and red colors respectively to paints, ceramics, inks, rubber, leather and other products. Paper coated with cadmium sulphide acts as a mustard-gas detector. Cadmium nitrate is used in white fluorescent lamp coatings. The oxide, hydrate and chloride are used in electro-plating solution; the carbonate in ceramics; and the halides in photography.

"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 selenide."

The price (Canadian funds) of cadmium metal in 1945 averaged 99 cents a pound, compared with $1.10 in 1944. The price of metallic cadmium, f.o.b. New York, in commercial sticks, remained at 90 cents a pound.

Table 16 - Production of Cadmium, in Canada, 1928-1945

Year	British Columbia		Manitoba		Saskatchewan	
	Pounds	$	Pounds	$	Pounds	$
1928	491,894	341,374	...	...	...	...
1929	773,976	675,294	...	...	...	...
1930	456,582	337,871	...	...	...	...
1931	323,139	180,958	...	...	...	...
1932	65,425	26,824	...	...	...	...
1933	246,041	78,733	...	...	...	...
1934	293,611	95,665	...	...	...	...
1935	580,530	441,203	...	...	...	...
1936	526,034	468,170	148,133	131,838	111,749	99,457
1937	436,431	715,747	164,223	269,326	144,553	237,067
1938	510,342	410,090	115,166	92,543	73,630	59,166
1939	799,253	563,241	73,830	52,029	66,608	46,939
1940	778,791	905,734	57,742	67,154	71,594	83,264
1941	1,081,374	1,269,533	61,085	71,714	108,832	127,769
1942	972,413	1,147,447	29,236	34,498	147,314	173,831
1943	598,673	688,474	20,985	24,130	166,955	191,998
1944	386,410	425,051	20,921	23,013	119,639	131,603
1945	510,432	505,328	27,891	27,612	107,741	106,663

Table 17 - Consumption of Cadmium Metal in Canada, Consumption and Exports, 1935-1945

Year	Production	Domestic Consumption	Exports
		(Tons of 2,000 pounds)	
1935	290	36	235
1936	392	24	362
1937	372	33	283
1938	349	23	233
1939	470	41	525
1940	454	75	399
1941	625	149	455
1942	574	207	400
1943	393	168	286
1944	263	108	192
1945	319	87	175

Note - Statistics on imports are not available.

Calcium - The commercial production of calcium in Canada started in 1945 when the metal was recovered from dolomite by Dominion Magnesium Limited in its plant located at Haley, Ontario. During the year the production amounted to 22,720 pounds valued at $19,312. Shipments were made to plants in Canada and United States.

Calcium metal was imported into the United States from France and Germany prior to the second world war. Metallic calcium is utilized as a scavenger in steel and secondary aluminum, to produce magnesium castings and calcium hydride, and to harden lead. Calcium is used as a deoxidizer and final addition in obtaining particularly clean steels and in imparting better working properties to high nickel-chromium steels. Calcium-silicon (28-35 per cent calcium and 60-65 per cent silicon) and calcium-manganese-silicon are likewise employed for this purpose, although the unalloyed metal may have specific effects. Calcium-bearing alloys are now being made in Canada.

New York quotation for calcium, 97-98 per cent as cast, September, 1945, was $1.85 per pound, ton lots. Data relating to imports into Canada of calcium are not shown separately in Canadian trade reports.

Cerium -(From the Annual Reviews of the Bureau of Mines, Ottawa)

"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.

"Cerium is usually regarded as belonging to the general group of "rare earths", as it invariably occurs in nature associated with the other fourteen members of the group and is very similar to the other rare-earth elements in many of its chemical properties.

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

"Prior to the war the leading producers of rare-earth products for the European market were located in Berlin, London, and Paris, and those for the American market, in Chicago. In the United States the present supply of cerium products is provided by Cerium Metals Corporation, Niagara Falls, N.Y.

"World production of monazite is approximately 5,000 tons a year.

"Thoria, which was used in gas mantles, was formerly the only commercial constituent of monazite, and monazite is still marketed on the basis of its thoria content, although its content of ceria (Ce_2O_3) and of other rare-earth oxides is of chief interest at present. Probably 50 per cent of monazite derivatives are consumed, chiefly as fluorides, in the cores of arc carbons to increase lighting intensity in searchlights, motion-picture projectors, and therapeutic lamps. About 25 per cent of the consumption of monazite derivatives is used in pyrophoric (sparking) alloys or in ferroceriums for use in sparking flints for lighters. The remainder is used for a variety of purposes, but principally for making optical glassware. Cerium metal is used in the evacuation of radio tubes."

Imports of salts of cerium or of thorium, for the manufacture of gas mantles, was appraised at $12,428 in 1945 compared with $16,445 in the preceding year.

Chromite -(From the Annual Reviews of the Bureau of Mines, Ottawa)

"Owing to the improvement in the chrome supply situation overseas, shipments in Canada were maintained throughout the year by only one producer, namely, Union Carbide Company, which obtains its chromite from the "Montreal" pit in the Black Lake district, Quebec; This mine was operated for the company by Orel Pare. Chromite Limited, near Richmond, Quebec, closed its mine in March after continuous production since the spring of 1942.

"Pure chromite (FeO, Cr_2O_3) contains 68 per cent chromic oxide, but in nature it always contains besides iron, varying amounts of magnesia and alumina. It is a heavy, almost black, lustrous and brittle mineral, and the ore usually occurs in dunite bands in serpentine rocks. Chromite is distinguished in the field from other black minerals of similar appearance by its chocolate brown powder or streak when struck or scratched with a hammer.

Chromite (Concluded)

Most of the Canadian deposits from which production has been obtained are between Quebec City and Sherbrooke in the Eastern Townships of Quebec.

Chromite Limited obtained its output from the old Sterrett mine in Cleveland township, Quebec. The chromite occurs as fairly uniformly disseminated zones, scattered through which are plums of the massive mineral. The ore zone, which varies in width from 5 to 20 feet, has been traced on the surface for about 2000 feet. The mine has been developed at 5 levels to a maximum length of 1800 feet and to a depth of 550 feet. The ore, which averaged 18 per cent Cr_2O_3, was treated in a 150 ton mill.

The old Montreal pit was operated over 50 years ago and was re-opened by Union Carbide Company in 1941, since when production has been continuous.

The Chromeraine mine, also in the Black Lake area, was operated in 1943 by Wartime Metals Corporation, but was closed in August, 1944. The ore is chiefly low-grade, banded and disseminated chromite, averaging 8 per cent Cr_2O_3, with a small amount of the massive mineral. The zone has been traced intermittently for 2000 feet, has an average width of 33 feet, and in places is 60 feet wide. A small amount of drilling has indicated that the ore extends to a depth of at least 440 feet.

Chromite Association did some prospecting in the Black Lake district in 1945.

In Manitoba, little prospecting was done on the large bodies of low-grade chromite deposits that were discovered early in 1942, north of Oisea (Bird) River in the southeastern part of the province. Various zones have been traced for lengths of several thousand feet. The ore is high in iron and an economical method of bringing the chrome-iron ratio to within market requirements has not been devised.

The uses of chromite are divided into three groups, namely, metallurgical (by far the most important), refractory and chemical.

In the metallurgical field, chromium 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 the vital ingredient with nickel and molybdenum in the making of armour plate, armour-piercing projectiles, and high-speed tool steels, and is used as a hard, toughening element in tank axles and frames, in aeroplane parts, and in other essential war materials.

Chrome ore is used for making refractory bricks or materials used in basic open hearth furnaces, in arches of furnaces, in parts of combustion chambers, 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.

In the chemical industry, chromite is mainly fundamental salts such as sodium and potassium bichromates that are used in electroplating, tanning, dyeing, glass making, pigments, photography, bleaching, safety matches, antiseptics, some aniline dyes used in printing, etc. Finely powdered chrome oxide is used as a buffing compound for polishing stainless steels. During the war a large amount of chrome chemicals was used for military purposes.

The principal Canadian buyers of chromite for metallurgical use are: Chromium Mining and Smelting Corporation, Sault Ste. Marie, Ontario, and Electro-Metallurgical Company of Canada, Welland, Ontario. The only important purchaser of refractory ore is Canadian Refractories, Limited, Canada Cement Building, Montreal.

United States price of domestic and imported ores of 48 per cent Cr_2O_3, and 3 to 1 ratio is $43.50; ores of lower grade and ratio vary down to a minimum of $28 a long, dry ton at seaboard. Canadian prices of 47 to 48 per cent Cr_2O_3 concentrates are $25 to $40 a long ton, f.o.b. mines, depending upon the chrome-iron ratio and upon the percentages of certain impurities.

Table 18 - Production of Chromite in Canada, 1928-1945

Year	Short tons	$	Year	Short tons	$
1928	...	...	1937	(x)	43,250
1929	126	900	1938	...	...
1930	...	...	1939	...	...
1931	...	...	1940	335	5,780
1932	78	1,113	1941	2,372	42,679
1933	30	343	1942	11,456	343,568
1934	111	1,578	1943	29,595	919,878
1935	1,144	14,947	1944	27,054	748,494
1936	(x)	13,578	1945	5,755	160,752

(x) Quantity not published.

Table 19 - Principal Statistics for the Chromite Mining Industry (x) in Canada, 1943-1945

		1943	1944	1945
Active firms	No.	15	7	4
Employees - Salaried	No.	48	42	7
Wage-earners	No.	322	202	23
Total	No.	370	244	30
Salaries and wages -				
Salaries	$	108,674	80,065	12,590
Wages	$	460,610	293,529	22,699
Total	$	569,284	373,594	35,289
Gross value of production	$	919,878	748,494	160,752
Fuel and electricity used	$	75,806	60,009	8,224
Process supplies used	$	75,995	83,828	15,023
Freight	$	37,969	45,373	...
Net Value	$	730,108	559,284	137,505

(x) All in the province of Quebec.

Table 20 - Imports of Chrome Ores into Canada, 1938-1945

Year	Tons	$	Year	Tons	$
1938(x)	9,103	142,399	1942	87,628	1,271,482
1939	16,584	232,851	1943	103,471	2,121,228
1940	29,938	554,413	1944	39,089	618,231
1941	92,952	1,460,209	1945	60,691	1,154,985

(x) Nine months only - not shown separately prior to April 1938.

Table 21 - Imports of Chrome Ores into Canada by Principal Countries, 1944 and 1945.

Imported from	1944		1945	
	Tons	$	Tons	$
British South Africa	395	13,500	2,420	76,197
Southern Rhodesia	23,404	342,621	31,590	458,176
British India	14,035	214,032	14,660	223,918
Cuba	...	...	71	1,956
Turkey	...	...	828	35,711
United States	1,255	48,078	11,122	359,027
Total	39,089	618,231	60,691	1,154,985

Indium - Indium was commercially recovered in Canada only in 1942 when 470 troy ounces valued at $4,710 were produced at Trail, British Columbia by the Consolidated Mining and Smelting Company of Canada, Limited. The metal was obtained in the treatment of zinc refinery residues. The United States produces a considerable quantity of indium but data relating to entire world production are not available. Indium is used for plating and as an alloy with other metals. The Bureau of Mines, Ottawa, reports that the augmented production of engine bearings and war restrictions on ordinary plating metals have stimulated interest in indium during the past three years.

Quoting from E & M.J. Metal and Mineral Markets - June 28, 1945 - "The price situation in indium remains unsettled. During the last week producers lowered the quotation to $3 an ounce troy, a reduction of $1. Supplies are ample, reflecting increased recovery of this by-product of zinc operations that has occurred in recent years. Use of indium has expanded but not at a rate to keep pace with production. At the beginning of the year indium was quoted at $7.50 an ounce troy and a year prior to that at $10."

At the close of 1945 the quoted price of indium was $2.25 per ounce troy.

Iron Ore -(From the Annual Reviews of the Bureau of Mines, Ottawa)

" Production of iron ore in Canada increased markedly in 1945 and is expected soon to equal the requirements of the Canadian iron and steel plants. However, most of this ore, which is quite high grade, is being exported to the United States in exchange for ores that can be used to greater advantage in the Canadian furnaces. The Dominion Steel and Coal Company, Sydney, Nova Scotia, continues to draw the bulk of its supply from its own mines at Wabana, Newfoundland. Preliminary development work on large deposits in the interior of Labrador and adjoining territory in Quebec which were discovered in 1936, indicates a large tonnage of high-grade ore.

" Though deposits of iron are widespread throughout eastern Canada and British Columbia, few have been found of sufficient purity and size to meet the requirements of the modern industry; so few, in fact, that from 1923 until 1939 no iron ore was produced in this country. In 1939 the Helen mine in the Michipicoten area, north of Lake Superior, began to ship sinter. In 1944 the first small shipments of hematite were made from the Steep Rock mine, 150 miles west of Port Arthur. In 1945 the Josephine mine in the Michipicoten area, commenced production of lump hematite. All these mines have substantial reserves of ore, and give promise of steady production for many years to come.

" The Algoma Ore Properties Limited, a subsidiary of Algoma Steel Corporation, Limited, shipped 565,078 short tons of sinter from its Helen plant in 1945. The siderite calcined and roasted to make this sinter was derived mainly from the Victoria open-cut, a short distance east of the open-cut that has furnished the ore since 1939. Preparations are being made for underground mining beneath the original open-cut. This mining can be continued for many years in the massive ore body, estimated to contain 100,000,000 tons of ore.

" Concentration tests have been continued on the Goulais siliceous magnetite deposit, 50 miles northeast of Sault Ste. Marie, where 100,000,000 tons has been indicated by drilling.

" The Josephine mine of Michipicoten Iron Mines, Limited, came into production late in the year and shipment of lump hematite was commenced in December. The mine is equipped for an output of 1200 tons a day, of which about 150 tons is expected to be lump ore for use in the open-hearth. The remainder, after washing to remove silica, will be mixed with the siderite of the Helen mine to make sinter. Algoma Ore Properties will purchase the concentrate to be sintered and the company is sales agent for the lump ore. The mine is developed on several levels to a depth of 1000 feet.

" In spite of the difficulties inherent in a new operation, Steep Rock Iron Mines Limited, produced 565,345 short tons of hematite in 1945, its first full season. Most of the ore was exported to the United States. Part of it was shipped through a port in Wisconsin and the remainder from the new ore dock of Canadian National Railways at Port Arthur. The ore was all derived from an open-cut on "B" ore body. The approximate average analysis of this deposit and of the three grades shipped in 1945 is as follows:

	Shipping Grades			
	"B" Orebody	Steep Rock 4" to 10"	Atikokan 2" to 4"	Seine River Minus 2"
Iron (dry basis)	60.80%	59.97%	60.38%	59.09%
Phosphorus	0.017	0.030	0.027	0.024
Sulphur	0.039	0.035	0.029	0.046
Silica	3.37	3.41	4.39	4.11
Natural Iron	55.68	57.925	57.880	53.317
Loss on Ignition	8.04	3.41	4.14	9.77

Pumping of the residue of water from the middle arm of Steep Rock Lake and stripping of overburden from "B" orebody proceeded throughout the year. It is expected that this will permit an increased output from this deposit during 1946. It is intended also to commence operations on "A" orebody, 2 miles to the north, during the coming season.

Development of the hematite deposits in the interior of Labrador, 300 miles north of the port of Seven Islands, and northward across the height-o-land in Quebec, was continued in 1945, Labrador Mining and Exploration Company included the following table in its annual report:

Labrador Iron Ore Deposits (to end of 1945 season)

	Fe/Mn.	P.	S.	S. O.	Long tons per vertical foot
Burnt Creek No.4	58.7	.075	.009	7.91	19,000
Knob Lake	60.2	.059	.028	3.65	22,000
Ruth Lake No.1	59.9	.055	.010	4.99	65,000
Ruth Lake No.2	60.3	.090	.011	2.43	5,000
Ruth Lake No.3	62.0	.128	.014	2.11	225,000
Ruth Lake No.5	58.8	.148	.008	4.51	60,000
Ruth Lake No.6	59.2	.083	.008	5.97	2,500
Ruth Lake Extension ..	63.6	.035	.030	4.94	84,000
Sawyer Lake	68.4	.010	.038	1.43	32,000
Wishart Lake No.1	63.0	.049	.010	5.98	110,000
Wishart Lake No.2	63.3	.063	.015	5.38	35,000
Average and Total	62.1%			3.99%	659,500

Less work has been done on the known deposits northward across the border in Quebec, held by Hollinger North Shore Exploration Company. The grade is similar to the above and the tonnage now indicated is about the same as on the Labrador side. In all cases these measurements have been made on outcrops or with the aid of a little shallow trenching and the full size of the deposits has still to be determined.

The ore so far discovered is partly of Bessemer grade, and most of it will be "lump" ore when mined.

Both the exploration companies named above are controlled by Hollinger Consolidated Gold Mines. The M.A. Hanna Company of Cleveland, Ohio, has a minority interest in Labrador Mining and Exploration Company.

At the end of the year plans were completed for an electric iron smelting plant at Anyox. It is intended to rehabilitate the hydro-electric power plant of 15,000 horsepower capacity, to use charcoal made from local sawmill waste and to smelt magnetite from Texada Island, 500 miles to the south. The project is being financed jointly by B.C. Minerals and Resources Development Company and Privateer Mines Limited."

Table 22 - Principal Statistics for the Iron Ore Mining Industry in Canada, 1943 - 1945.

	1943	1944	1945
Active firms	14	8	10
Employees -- On Salary	99	99	145
Wage-earners	404	580	657
Total	503	679	802
Salaries and Wages -- Salaries .....$	205,857	242,271	272,716
Wages .....$	1,229,098	1,220,182	1,481,956
Total .....$	1,434,955	1,462,453	1,754,672
Gross value of production .....$	2,032,240	1,909,608	3,635,095
Fuel and electricity used .....$	363,354	642,761	709,398
Process supplies used .....$	396,915	200,438	304,666
Freight and treatment charges .....$	222,013	276,653	1,367,526
Net value .....$	1,049,958	789,756	1,253,505

Table 23 - Production of Iron Ore (x) in Canada, 1939-1945.

Year	Short tons	Value
		$
1939	123,598	341,594
1940	414,603	1,211,305
1941	516,037	1,426,057
1942	545,306	1,517,077
1943	641,294	2,032,240
1944	553,252	1,909,608
1945	1,135,444	3,635,095

(x) Exclusive of titanium-bearing ores. All iron ore was from mines in Ontario, except 187 tons from Quebec in 1942 and 143,062 tons from New Brunswick in 1943.

Table 24 - Imports into Canada and Exports of Iron Ore, 1936 - 1945.

Year	Imports			Exports
	From United States	From Newfoundland	Total(x)	
	(Tons of 2000 pounds)			
1936	755,414	489,036	1,317,033	2,725
1937	1,416,015	1,188,771	2,124,972	4,644
1938	631,031	607,025	1,302,430	209
1939	1,205,261	1,606,775	1,764,844	10,540
1940	524,849	716,317	2,418,237	251,626
1941	2,212,437	962,259	3,254,655	282,068
1942	2,033,961	610,871	2,701,968	295,960
1943	2,978,388	911,450	3,906,425	374,677
1944	2,501,737	624,890	3,126,649	308,424
1945	2,988,484	736,665	3,739,867	771,495

(x) Includes some ore from other countries, principally Brazil.

Table 25 - Iron Ore Charged to Iron Blast Furnaces in Canada, 1936-1945.

Year	Canadian	Imported	Total
	(Tons of 2000 pounds)		
1936	...	1,365,082	1,365,082
1937	...	1,796,562	1,796,562
1938	...	1,382,565	1,382,565
1939	50,570	1,425,536	1,476,106
1940	154,643	2,188,074	2,342,717
1941	166,263	2,542,826	2,709,089
1942	229,253	3,383,439	3,612,692
1943	302,780	2,955,671	3,258,451
1944	266,150	3,227,039	3,493,189
1945	235,757	2,797,697	3,033,454

Lithium - (From the annual reviews of the Bureau of Mines, Ottawa)

"Amblygonite, spodumene, and lepidolite are the chief lithium minerals of commerce: their ores contain, respectively, about 8, 6, and 4 per cent of lithium oxide. Spodumene is in greatest supply, and is the base raw material for the manufacture of many lithium salts, lithium metal, and alloys. Amblygonite has similar uses, but is scarcer and more expensive. Lepidolite, or lithia mica, is employed mainly in the natural state as a batch ingredient in glass. The occurrence of all three minerals is confined to pegmatite dykes of a definite type, which usually have a localized, regional distribution and often carry, also, important amounts of beryl and tantalite-columbite. In some cases, such dykes have been worked for the recovery of all of these minerals.

Lithium (Continued)

"There has been no recorded production of lithium minerals in Canada since 1937, when 32 tons of amblygonite and spodumene valued at about $1,700 was shipped, and little if any lithium ore is known to be used or required for any purpose in the Dominion. Thus, an outside market would have to be found for any production. Considerable development work has been done in recent years, however, on deposits in the Pointe du Bois area in southeastern Manitoba; and in the three years ended 1944 increased interest was shown in the commercial possibilities of lithium deposits in other sections of that province, though activities have been confined to exploratory drilling. Some attention has been given, also, to lithium-bearing deposits in the Yellowknife-Beaulieu area in the Northwest Territories.

"Lithium ores and compounds early became of strategic importance in the present war, and to conserve supply for defence needs the United States Government placed both under allocation control in 1942. Government assistance also was given to the establishment of two spodumene mills, one in North Carolina, and the other in South Dakota.

"All of the small Canadian production of lithium minerals has come from the Pointe du Bois area in Manitoba. Lithium Corporation of Canada, 409 Avenue Building, Winnipeg, is the company that has been most actively interested in furthering the development of the lithium-bearing pegmatites in the area, and it has carried out considerable work on its holdings, mainly on those at Bernic Lake. It mined and stock-piled about 50 tons of mixed ore in 1941, but was inactive during 1942-45. The material taken out in 1941 comprised about equal amounts of cobbed amblygonite and spodumene, and included also a few tons of triphylite, a phosphate of lithium and iron, containing, theoretically, about 9 per cent of lithium oxide.

"Lithium is the lightest of the metals, having a specific gravity of only 0.53. A wide range of master alloys of lithium with calcium, silicon, brass, copper, manganese, zinc, lead, tin, magnesium, and aluminum has been developed in the United States. The alloys are being used to an increasing extent as deoxidizing, degasifying, and desulphurizing agents in copper, brasses, bronzes, etc.; as scavengers for cast iron and in the refining of high-carbon steel; and for the hardening of lead and aluminum. Alloys of lithium with zinc, aluminum, and magnesium are strong and highly resistant to corrosion."

Prices of lithium minerals in 1945 showed little change from those of the previous year. Amblygonite, 8 to 9 per cent Li_2O, was quoted at $40 to $50 per ton; spodumene, 6 per cent grade, at $5 to $6 per unit for mill concentrates; and lepidolite, 3 per cent Li_2O at $25 per ton, all f.o.b. mines. Lithium metal was changed from $15 per pound to $12.50 per pound.

There are no plants in Canada for the chemical treatment of lithium ores. Most of the world production marketed prior to the war was treated by a few large chemical firms specializing in the business, the principal plants being in the United States, Great Britain, Germany, and France. Such firms usually purchased their requirements under individual contract, and there has thus been little in the way of an open market, price quotations given in trade journals being merely nominal. Some of the larger consumers own and operate their own mines.

Magnesium - Production of magnesium in Canada, in common with that in other countries, showed a marked decrease after the war. The only Canadian producer, Dominion Magnesium, Limited, at Haley's (near Renfrew) Ontario, ceased operations in August after accumulating a large stock of metal and alloys. Shortly after the end of the war in Europe the plant was purchased from the Canadian Government by the operating company and extensive changes in equipment were under way at the close of the year. The magnesium powder plant of the Consolidated Mining and Smelting Company of Canada, Limited, at Trail, British Columbia, in which magnesium powder was made from purchased ingots, was also closed after the war. Magnesium foundries were operated in 1945 by Aluminum Company of Canada, Limited, at Toronto and Etobicoke; by Robert Mitchell Company, Limited, at Montreal; and by Light Alloys Limited at Renfrew.

Dolomite, the double carbonate of calcium and magnesium, and which contains 13 per cent of magnesium, is found in all provinces of Canada except Prince Edward Island. It is particularly abundant in Ontario and Manitoba.

Magnesite, the carbonate of magnesium, containing 28.7 per cent magnesium, and hydromagnesite, containing 26.5 per cent of magnesium, are available in British Columbia. Deposits of magnesitic dolomite consisting of an intimate mixture of magnesite and dolomite occur in Argenteuil county, Quebec, where they are being worked for the production of basic refractories. The magnesite deposits in British Columbia are undeveloped, but magnesium has been made from them on an experimental scale. Magnesitic dolomite possesses no advantages over dolomite or magnesite as a source of magnesium.

Magnesium -(continued)

Brucite, in the form of granules 1 to 4 mm. in diameter thickly disseminated throughout crystalline limestone and forming 20 to 35 per cent of the volume of the rock, occurs in large deposits in Ontario and Quebec. Brucite is the hydroxide of magnesium and contains 41.6 per cent of magnesium. The Canadian deposits are the largest known in the world. The brucite is being recovered in the form of granules of magnesia from one of these deposits near Wakefield, Quebec, and though the granular magnesia so obtained is being used principally for the manufacture of basic refractories and as an ingredient in chemical fertilizers, it is a very suitable raw material for the production of magnesium metal.

Serpentine, the silicate of magnesium, contains 25.8 per cent of magnesium, and occurs in many deposits throughout Canada. It is also available in huge waste dumps aggregating probably 100,000,000 tons in the asbestos-producing region of Quebec. The average magnesium content of these dumps is about 23 per cent. A process has been worked out for the recovery of magnesium from serpentine.

Sea-water, although it contains only 0.13 per cent magnesium, is a source of the metal in England and the United States. Dolomitic lime is used to precipitate the magnesia from the sea-water in the form of hydroxide, and the magnesia from both is recovered in the process.

Underground brines containing $MgCl_2$ and residual brines from salt-making operations, containing $MgCl_2$, are used in the United States as sources of magnesia and magnesium, but brines containing sufficient $MgCl_2$ to render them of value are not available in Canada.

Processes for the production of the metal from the various raw materials may be divided into two groups, namely, electrolytic, and thermal. The electrolytic process provides most of the magnesium made, except in Canada where a thermal reduction process is used. The three thermal reduction processes in use throughout the world involve reduction of magnesia with carbon (in use in the United States); reduction of magnesia with calcium carbide (in use in the United Kingdom); and reduction of calcined dolomite with ferrosilicon (in use in Canada, the United States, and Italy).

The field of usefulness of magnesium is steadily expanding. Magnesium was formerly used almost exclusively in pyrotechnics, but it is used also as a structural metal, particularly in the form of castings and extruded shapes. For structural use it is alloyed with various portions of other elements. It is used as a constituent in many aluminum-base alloys.

The price quoted by Engineering and Mining Journal for magnesium in ingot form in carload lots during 1945 was 20 1/2 cents per pound, U.S. currency, f.o.b. New York.

Table 26 - Production of Primary Magnesium Metal in Canada, 1916-18 and 1941-45.

Year	Quebec		Ontario		British Columbia		CANADA	
	Pounds	$	Pounds	$	Pounds	$	Pounds	$
1916-1918	(a)	(a)	...	....	200,000(b)	(b)	...	...
1941	...	...	...	...	10,905(c)	2,944	10,905	2,944
1942	141,081(d)	62,076	473,910	208,520	193,727	85,240	808,718	355,836
1943	...	...	7,153,974	2,074,652	...	...	7,153,974	2,074,652
1944	...	...	10,579,778	2,575,695	...	...	10,579,778	2,575,695
1945	...	...	7,358,545	1,607,264	...	...	7,358,545	1,607,264

(a) Magnesium metal produced in 1918 at Shawinigan Falls, Quebec by Shawinigan Electro Metals Company Limited from imported magnesium chloride but data not available.
(b) Approximately 200,000 pounds produced at Trail from imported magnesium chloride; complete data not available.
(c) Powder.
(d) Produced in Ontario from Quebec brucite.

Table 27 - Consumption of Magnesium Ingots in Canada.

	1941	1942	1943	1944	1945
			(pounds)		
In non-ferrous smelters	825,717	1,072,346	1,298,650	1,480,528	487,773
In white metal alloy foundries ...	9,515	9,850	16,821	55,496	37,740
In brass and bronze foundries	42,821	44,553	132,465	51,040	66,116
In aluminum products	127	...	89,523	34,930	45,452
Total Accounted For	878,180	1,126,749	1,537,459	1,621,994	637,081

Manganese - (From a Report by the Bureau of Mines, Ottawa)

"All manganese properties in Canada were inactive in 1944 and 1945. The small Canadian production in the past came mainly from deposits in the Maritime Provinces. Known deposits of high-grade manganese in Canada are small and are almost exhausted. No commercial grade deposits have been found and future production appears to be unlikely unless sufficient manganese is disclosed during the operation of the iron deposits of Steep Rock Iron Mines, Limited, west of Port Arthur, Ontario, to warrant its recovery as a by-product. Consumption is steadily increasing, however, as adequate supplies of high quality ore can now be obtained from foreign deposits, the output from which was restricted during the war.

"World production of manganese ore is estimated to be between five and six million tons annually, the leading producing countries being Russia, British India, Gold Coast, United States, Union of South Africa, Brazil, and Cuba. Prior to the last war, Russia was the source of nearly half the world production, the principal deposits being in the Republic of Georgia and Ukraine. During the last quarter of 1945 Russia was the largest individual shipper of manganese ore to the United States".

"The Canadian imports of manganese oxide amounted to 198,277 tons valued at $4,571,592 compared with 85,795 tons at $2,370,109 in 1944. Most of this ore is used in making ferromanganese, spiegeleisen and other manganese alloys for the domestic iron and steel industries and for export. The dry cell battery industry in Canada used 3,550 tons of battery grade ore in 1945. "

Table 28 - Production of Manganese Ore in Canada for Years Specified, 1915-1945.

Year	Tons	Value $	Year	Tons	Value $
1915	201	9,360	1936	221	1,596
1916	957	89,544	1937	85	817
1917	158	14,836	1938	...	...
1918	440	6,230	1939	396	3,688
1924	584	4,088	1940	152	4,315
1925-1929	...	...	1941	(x)	(x)
1930	273	1,356	1942	435	8,932
1931	117	2,893	1943	48	985
1932-1934	...	...	1944	...	...
1935	100	800	1945	...	...

(x) 7,500 pounds manganese metal produced at the mine from Nova Scotia manganese ore.

Table 29 - Imports of Manganese Ore into Canada, 1935-1945.

Year	Tons	$
1935	36,780	353,414
1936	64,262	684,175
1937	77,226	802,269
1938	21,050	463,673
1939	29,787	621,931
1940	70,460	777,416
1941	104,473	1,170,768
1942	57,389	860,248
1943	51,234	1,445,252
1944	85,795	2,370,109
1945	198,277	4,571,592

Table 30 - Imports of Manganese Ore into Canada, by Principal Countries, 1943-1945.

	1943	1944	1945
		(tons)	
From - Gold Coast	20,663	42,442	182,779
British India	2,325	33,832	11,927
Chile	...	2,493	...
French Africa	2,469	...	...
United States	25,774	7,024	3,569
United Kingdom	3	4	2
Total Imports	51,234	85,795	198,277

Mercury - No mercury has been produced in Canada since the summer of 1944, all shipments in 1945 being from stock. All of the Canadian production has come from the Pinchi mine of the Consolidated Mining and Smelting Company of Canada, Limited, and from the Takla property of Bralorne Mines Limited, both of these mines being in the Omineca Mining Division, British Columbia. The Pinchi mine was the largest single producer of mercury in the western hemisphere.

The controlled price for mercury in the United States early in 1944 was $176 per flask. This dropped to $96 by midsummer, rose to $140 in December, and to $160 in February, 1945. This rise was traceable to sudden demand for battery use. Large quantities of mercury then became available from Spain and the price dropped to $96 in September. Ceiling price restrictions in the United States were suspended in late August and the purchase of surplus mercury stocks by the government caused an upward swing at the end of the year to $108. The price in March 1946 was $105. In 1938 the average price was $75 per flask.

If the expected large scale production of the mercury dry cell for civilian use materializes the demand for the metal will increase, but production from Spain and Italy will soon be back to normal, and imports from Europe and other countries will not be restricted. These circumstances, together with a price of only half that obtained in 1943, do not encourage the reopening of Canadian mercury mines.

Table 31 - Production of Mercury in Canada, 1895 - 1945.

Year	Pounds	$	Year	Pounds	$
1895	5,396	2,343	1940	153,830	369,317
1896	4,408	1,940	1941	536,304	1,335,697
1897	684	324	1942	1,035,914	2,943,807
1924-1927(x)	380	(x)	1943	1,690,240	4,559,200
1938	760	760	1944	735,908	1,210,375
1939	436	1,226	1945	...	...

(x) Data from a report issued by Bureau of Mines, Ottawa; value not recorded.

Table 32 - Production of Mercury in Canada, Consumption, Imports and Exports, 1939-1945.

Year	Production in Canada	Consumption in Canada	Imports	Exports
		(Pounds)		
1939	436	89,617	109,232	...
1940	153,830	75,643	78,597	108,000
1941	536,304	151,351	8,599	360,164
1942	1,035,196	185,118	1,971	692,753
1943	1,690,240	201,982	2,047	1,304,692
1944	735,908	130,515	35,428	362,670
1945	...	100,700	27,101	261,720

Table 33 - Consumption of Mercury in Canada by Principal Uses, 1939-1945.

Industries	1939	1940	1941	1942	1943	1944	1945
				(pounds)			
Pharmaceuticals and fine chemicals	20,473	30,246	70,826	78,362	79,786	24,307	20,652
Heavy chemicals	58,954	30,904	35,520	50,968	72,531	78,300	53,701
Electrical Apparatus	2,161	1,899	25,738	42,313	30,065	4,652	4,500
Gold mines	6,313	6,000	11,091	10,000(x)	10,000(x)	10,000(x)	10,000(x)
Miscellaneous	1,716	6,594	8,176	3,475	9,600	13,256	11,847
Total	89,617	75,643	151,351	185,118	201,982	130,515	100,700

(x) Estimated.

Molybdenum

During 1945 production was maintained only from the LaCorne mine in LaCorne township, Quebec. From July, 1942 to July, 1945, the mine was operated by Wartime Metals Corporation, after which the property and all assets were taken over by the original owners, Molybdenite Corporation of Canada, who carried on without interruption with Wartime Metals personnel. Since July, concentrates have been sold in the open market, prior to which they were shipped through the Metals Controller and under contract to Climax Molybdenum Company, Langeloth, Pennsylvania, for conversion into oxide or ferromolybdenum, and equivalent amounts of these products were shipped by that company to Railway and Power Engineering Company, Toronto, the distributor for Canada. As there are no plants in Canada to convert the concentrate into addition agents, there is no sale for concentrate in Canada. Sales to United States are likely to be barred because of tariffs, large productive capacity, and surplus stocks in that country. A considerable European demand for concentrate may develop, however, in connection with the manufacture of structural and engineering molybdenum steels and with other new fields of use, such as electronics. However, Canadian concentrate must meet strong competition from United States sources.

Molybdenite, the chief ore of molybdenum, is a soft and shiny steel blue-grey sulphide containing 60 per cent of the metal. In eastern Canada it is usually found in pegmatite dykes or along the contacts of limestone and gneiss, commonly associated with greenish grey pyroxenites in which other metallic minerals such as pyrite and pyrrhotite often occur. In northern and western Ontario, Quebec, and in British Columbia, molybdenite usually occurs in quartz or in quartz veins, along the contacts of, or intruded into granites, or diorites. It generally occurs in the form of soft, pliable flakes or leaves, but it is sometimes semi-amorphous, filling cracks and smearing the rock surface. It can be readily distinguished in the field by the olive-grey-green smear it leaves when rubbed on glazed white porcelain or enamel. Graphite, for which it is often mistaken leaves a grey-black smear.

The LaCorne mine, source of the output in 1945, is being developed to a depth of 500 feet on four levels. Two distinct types of ore occur. The east-west veins, which were first worked, are quartz veins; the north-south veins, which are richer and wider, are characterized by the presence of red feldspar. A zone of good grade ore averaging 0.8 per cent MoS_2 was struck at the bottom of the shaft. About 300 tons of ore averaging 0.65 per cent MoS_2 are being milled daily. The company is erecting a plant to extract the bismuth from the concentrate and is considering the installation of a plant to convert the concentrate into oxide.

Indian Molybdenum Limited (Dome Mines Limited) closed its property in Preissac township, Quebec, in April 1944, and Quyon Molybdenite Company's mine near Quyon, Quebec, was also closed early in 1944.

At least 400 molybdenite deposits and occurrences are known in Canada, distributed in all provinces except Alberta. Present indications, however, are that the Abitibi area in Quebec will continue to be the principal source of production. The area is about 100 miles from the Ontario boundary and in general, extends from Rouyn to Val d'Or. It is probably one of the most favourable areas for the discovery of other workable deposits.

Molybdenite concentrate is converted into an addition agent that is introduced into steel as molybdenum trioxide, ferromolybdenum, or to a small extent as calcium molybdate. The oxide is usually moulded into briquettes which weigh 5 pounds each, and contain 2½ pounds of molybdenum.

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

Molybdenum alloys are used widely for the hard-wearing and other important parts of airplanes. They are used in the automobile industry, in high-grade structural die and stainless steels; 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 radio industry; and new alloys suitable for electrical resistance and contacts and for heating elements contain molybdenum.

The chemical uses continue to increase, and the salts are used in pigments, in vitreous enamels for coating steels and sheet iron, in welding rod coatings, and for analytical work.

United States specifications for concentrate dried at 212°F. are: MoS_2, minimum 85 per cent: copper, maximum 0.6 per cent; iron, maximum 3.0 per cent; combined phosphorus, antimony and tin, maxima 0.2 per cent.

There is no Canadian market for concentrates as there are no conversion plants, and since July 1945 the only shipments have been to Europe at a price of 42½ cents per pound.

Molybdenum (continued)

The price per pound of contained molybdenum, f.o.b. Toronto, in Canadian funds, for the following imported compounds is approximately: calcium molybdate (42 per cent Mo), 90 cents; ferromolybdenum (60 per cent Mo), $1.13 and molybdic oxide (52 per cent Mo), 90 cents. Calcium molybdate is sold in bags of about 12½ pounds containing exactly 5 pounds of molybdenum. (Bureau of Mines, Ottawa)

Table 34 - Molybdenite Mining in Canada, 1943 - 1945.

		1943	1944	1945
Active firms	No.	12	4	3
Capital	$	3,672,813	(x)	(x)
Employees -- On salary	No.	38	31	21
Wage-earners	No.	221	148	98
Total	No.	259	179	119
Salaries and wages -- Salaries	$	82,319	62,954	34,295
Wages	$	394,952	332,512	189,729
Total	$	477,271	395,466	224,024
Gross value of production	$	549,515	1,079,698	411,663
Fuel and electricity used	$	73,961	54,614	34,991
Process and supplies used	$	81,072	103,774	35,736
Freight and treatment charges	$	3,249	72,681	42,613
Net value of production	$	391,219	848,629	113,340

(x) Data not recorded in 1944 and 1945.

Table 35 - Production of Molybdenite in Canada, 1902-1945

Year	Ores milled	Ores and concentrates shipped or used		Total MoS_2 content of shipments
	Tons	Tons	Value (a)	Pounds
			$	
1902	(c) 3	3.3	400	(b)
1903	(c)600	85.0	1,275	(b)
1904-1913	...	...	...	...
1914	(c)166	16.5	2,063	3,814
1915	216	39.0	28,920	29,210
1916	9,100	610.0	188,316	156,461
1917	22,605	1,554.3	320,006	330,316
1918	33,935	461.3	428,807	378,482
1919	6,783	46.0	69,203	83,002
1920-1923	...	...	...	...
1924	668	10.0	9,370	18,739
1925	2,779	15.3	11,176	22,350
1926	4,490	12.6	10,472	20,943
1927	...	...	...	...
1928	...	...	...	...
1929	2,900	9.5	6,400	16,150
1930	...	...	...	...
1931	12	0.61	280	1,222
1932-1936	...	...	...	...
1937	5,307	8.25	8,147	(b)
1938	(b)	6.5	4,500	(b)
1939	1,492	1.3	816	(b)
1940	3,936	11.1	10,280	(b)
1941	28,100	98.3	88,470	173,991
1942	39,708	113.7	134,963	158,780
1943	120,576	392.4	549,515	653,200
1944	187,130	1064.0	1,079,698	1,870,132
1945	80,575	489.1	411,663	839,419

(a) Value as given by the operators 1902 to 1939; 1940-1945 value estimated using market or Government prices.
(b) Not known.
(c) Mines.

Pitchblende - Pitchblende, the ore from which radium and uranium products are made, is mined in Canada only in the Great Bear district of the Northwest Territories.

An atomic bomb, possessing more power than 20,000 tons of T.N.T. was dropped on Japan by an American airplane on August 6, 1945. The news, released by President Truman, also broke the silence imposed on all concerned on the part that uranium has played in what is described as the outstanding scientific discovery of all time. That the uranium atom had been split in two was known for some tima, but knowledge of the feverish activity to apply this source of "cosmic" energy was a deep military secret. Research and work on the project in the United States cost more than $2,000,000,000. Available supplies of uranium ore mined in Canada and the United States were taken over by the military authorities soon after Pearl Harbour and an open market in the mineral ceased to exist. Before the war uranium and uranium salts were used in the manufacture of luminous dials and other products, in the ceramics and glass industries, and in photography.

Statistics with regard to the production and refining of pitchblende ores are not available for publication.

Selenium - Selenium is fairly widely distributed, but in no case does it occur in quantity large enough to be mined for itself alone. It is not widely used in industry though new uses are being steadily developed. Canada and the United States are the principal sources of supply.

In Canada selenium is recovered during the refining of blister copper produced in Manitoba, Ontario, and Quebec, and was first produced in the Dominion in 1931 in the copper refinery of International Nickel Company of Canada at Copper Cliff, Ontario. The only other producer is Canadian Copper Refiners, Limited, with refinery at Montreal East, Quebec, where production was commenced in November, 1934. The Copper Cliff product is derived from the treatment of the copper-nickel ore of the Sudbury district, and at Montreal East the selenium by-product is obtained from the treatment of the gold-copper ore of Noranda, Quebec, and the gold-copper-zinc ore of the Flin-Flon mine on the boundary line between Manitoba and Saskatchewan. The plant at Montreal East is the largest producer of selenium in the world.

A plant for the manufacture of selenium compounds was erected in 1944 at Montreal East by Canadian Copper Refiners, Limited. The compounds being made in addition to refined selenium are double distilled selenium, C.P. selenium, commercial selenium dioxide, sodium selenite, and sodium selenate.

Selenium is marketed as a black to steel-grey amorphous powder, but cakes and sticks are also obtainable. Among the other products are ferroselenium, sodium selenite, selenious acid, and selenium dioxide. The most important outlets for selenium prior to the war were in glass, rubber, and paint industries. The greatest single development in the utilization of selenium since 1939 has been in its use in electrical rectifiers that played such an important role in connection with radar and with generators for aeroplanes and army field equipment. Considerable quantities are being used as accelerators in the vulcanization of synthetic rubber. Selenium is used to develop free machining qualities in stainless metal and as an ingredient of austenitic chromium steels. For the latter purpose it is supplied in bars of selenium-bearing stainless metal.

Selenium is useful in producing good ruby glass; is a quality-improver in lubricating oil; and is a potent ingredient of anti-fouling paints for ship bottoms.

Since 1938, the nominal price for selenium, black powdered, 99.5 per cent pure, at New York has been $1.75 per pound.

Table 36 - Production of Selenium in Canada, 1931-1945.

Year	Pounds	$	Year	Pounds	$
1931 (x)	21,500	40,850	1939	150,771	266,714
1932	...	...	1940	179,860	343,533
1933	48,221	70,345	1941	406,930	777,236
1934	104,924	171,311	1942	495,369	951,108
1935	366,425	703,536	1943	374,013	654,523
1936	350,857	621,017	1944	298,592	537,466
1937	397,227	687,203	1945	379,187	728,039
1938	358,929	622,742			

(x) First commercial production in Canada.

Tantalite-Columbite - Canada produces no tantalite or columbite and according to the Bureau of Mines, Ottawa, the known Canadian occurrences of these minerals are scarce and of undetermined economic interest. The minerals tantalite and columbite are the tantalate and columbate, respectively, of iron and manganese, with the general formula $(Fe,Mn)(Ta,Cb)_2O_6$. They grade one into the other according as whether tantalum or columbium predominates. Both tantalite and columbite were of increasing importance in the war effort and tantalite was placed in the group of "strategic" minerals having the highest priority rating. The occurrence of all tantalum-columbian minerals is restricted to granite-pegmatites, or to residual or alluvial deposits derived from such rock. The chief world sources of tantalite proper have been Western Australia, Belgian Congo, Southern Rhodesia, Uganda, United States and Brazil. The supply of columbite has come mainly from Nigeria, Belgian Congo, Southwest Africa, Argentina and Brazil. The annual world output of tantalite-columbite is small and complete data on same are not available at present. Tantalum metal is highly resistant to corrosion and possesses remarkable conductivity for heat; one of its important uses is in equipment, such as stills, condensers, tubes and heaters in chemical plants and laboratories; it is being used to an increasing extent in the field of electronics. Columbium is employed chiefly as an alloying component in various special-purpose steels, and also in copper, aluminum and other metals.

There are no users of tantalum or columbium ores in Canada, the chief world market being in the United States. The principal American consumer-buyer of tantalite is Fansteel Metallurgical Corporation, North Chicago, Illinois, and of columbite, Electro-Metallurgical Company, 30 East 42nd Street, New York City. These companies have been pioneers in the fields of industrial applications for tantalum and columbium metals, alloys, and products, respectively, and are the leading companies engaged in treating the ores.

United States quotations for tantalum ore, August, 1945 were, per pound Ta_2O_5, $2 to $3 for 60 per cent concentrate, the price depending on the source. Columbium metal, per kilo, base prices: rod $560; sheet $500. Tantalum metal, per kilo, base prices, $160.60 for C.P. rod; sheet $143; discounts on volume business.

Tellurium - Tellurium was first produced in Canada in 1934 at Copper Cliff, Ontario by International Nickel Company of Canada, Limited. The only other producer, Canadian Copper Refiners, Limited, started production in 1935 at its plant in Montreal East, Quebec. The former plant treats the slime from the refining of the blister copper produced by International Nickel Company at Copper Cliff; and the latter, the slime from the refining of anode copper of Noranda Mines, Limited, Noranda, Quebec and the blister copper of Hudson Bay Mining and Smelting Company, Flin Flon, Manitoba.

Very finely powdered tellurium is used as rubber-compounding material, this being the most important use of tellurium at present. Small quantities are used as a colouring agent in the ceramic industry. When alloyed with lead the tensile strength and toughness of the lead are increased greatly. Lead alloys containing from 0.1 to 0.5 per cent tellurium have been in use for some time in applications requiring resistance to vibration and corrosion. Tellurium is used for improving the machining qualities of certain steels.

Table 37 - Production of Tellurium in Canada, 1934-1945.

Year	Pounds	$	Year	Pounds	$
1934 (x)	5,130	25,599	1940	3,491	5,607
1935	16,425	32,850	1941	11,453	18,394
1936	35,591	62,997	1942	11,084	17,735
1937	41,490	71,777	1943	8,600	15,050
1938	48,237	82,967	1944	10,661	18,657
1939	2,940	4,769	1945	484	929

(x) First commercial production in Canada.

Table 38 - Consumption of Tellurium Metal in Steel and White Metal Foundries, 1940 - 1945.

Year	Steel Foundries	White Metal Foundries
	(pounds)	
1940	400	629
1941	185	492
1942	50	612
1943	135	453
1944	398	531
1945	...	308

Thallium - There was no production of thallium during 1945 in Canada. The first commercial production of this element in this country was in 1944 when 128 pounds valued at $1,690 was contained in residues produced by Hudson Bay Mining and Smelting Company, Limited at the Flin Flon smelter, Manitoba. These residues were exported for treatment in foreign plants. Thallium metal was quoted in the United States at $12.50 per pound nominal, September 1945. The element has an atomic weight of 204 and has been used in alloys and glass-making.

Tin - Cassiterite (SnO_2) the only important ore of tin, is a widely distributed mineral, but in only a few countries are the deposits sufficiently large for commercial development. Stannite, a sulphide of copper, iron and tin, is of little importance as an ore.

Canada's production of tin is obtained from the small cassiterite content of the lead-zinc-silver ore of the Sullivan mine of The Consolidated Mining and Smelting Company of Canada, Limited, at Kimberley, British Columbia.

The tin supply situation remained critical throughout the world during 1945, and though there was an increase in the number of mines in production in Malaya, the chief source of supply, in the first quarter of 1946, most operations remained on a restricted scale. In February, 1946, according to "Metal and Mineral Markets" published by the Engineering and Mining Journal, a British mission, which started to investigate the tin situation after Malaya was recaptured by the allies, estimated total 1946 (tin content) production at 12,500 tons. This compares with an average prewar output of approximately 75,000 tons.

An autonomous international body, known as the Combined Tin Committee functions to assure cooperation in the distribution of tin during the period of short world supply. The Committee includes representatives of the United States, United Kingdom, Netherlands, France, and Belgium.

The tin concentration plant of the Consolidated Mining and Smelting Company, Limited, at Kimberley, B.C., has been in operation since March 1, 1941, and its plant for the production of refined tin, also at Kimberley, since April 1942. The tin produced at this plant, and the small domestic recovery of secondary tin are far from sufficient to meet Canadian requirements.

During recent years numerous tin-bearing occurrences were disclosed in Yukon and in the Northwest Territories. Although none of these appears to be of near future economic interest, geological conditions in the regions concerned warrant considerable prospecting attention. Known cassiterite occurrences elsewhere in Canada are not of present economic interest.

Tin is used chiefly in the manufacture of tin plate, mainly for use in making tin cans and containers of all kinds. To conserve supplies, the use of tin in solders and in babbitt metal has been restricted in recent years and there has been wide use of low-tin or virtually tin free solders. Smaller quantities of tin are used in foil, terneplate, type metal, bronze and galvanizing.

The price of tin in New York was fixed at 52 cents a pound in August 1941, and this price prevailed to the end of 1945.

Table 39 - Production of New Tin in Canada, Domestic Consumption, Imports and Exports, 1935-1945.

Year	Production in Canada	Domestic consumption	Exports	Imports	Stocks at end of period
		(Tons of 2,000 pounds)			
1935	...	2,111	...	2,339	
1936	...	2,165	...	2,424	Not
1937	...	2,503	...	2,939	avail-
1938	...	2,305	...	2,637	able
1939	...	2,787	...	2,913	
1940	...	3,868	...	5,918	2,655
1941	32	6,436	...	8,719	4,621
1942	619	3,571	...	3,601	5,120
1943	390	2,865	...	1,311	3,920
1944	258	3,383	...	1,341	2,622
1945	425	4,108	...	3,597	2,565

Tin (continued)

Table 40 - Production of New Tin in Canada, 1941-1945.

Year	Pounds	$
1941 (x)	64,744	33,667
1942	1,237,863	643,689
1943	776,937	450,623
1944	516,626	299,643
1945	849,983	492,990

(x) First commercial production.

Table 41 - Consumption of Tin (Ingots or Bars) in Canada, By Principal Industries, 1939-1945.

	1939	1940	1941	1942	1943	1944	1945
	(Tons of 2,000 pounds)						
In white metal foundries (solder, babbitt, etc.)	1,640	2,087	3,141	1,530	1,264	1,200	1,320
In steel plants (chiefly for tinplate)	810	1,207	2,346	1,428	1,148	1,517	2,010
In brass and bronze foundries	129	277	437	247	200	406	532
In other industries	208	297	512	366	253	260	246
Total Accounted For	2,787	3,868	6,436	3,571	2,865	3,383	4,108

Titanium - Titanium-bearing ores found in Canada are of two classes. Ilmenite, containing 30 to 40 per cent TiO_2 occurs in three localities in Quebec. In the St.Urbain district on the St.Lawrence, 60 miles below Quebec City, a part of the ore contains free TiO_2 as rutile mixed with the ilmenite, and its content of TiO_2 reaches 50 per cent and more. The other two deposits are at Ivry, 65 miles north of Montreal, and Allard Lake, 12 miles north of Havre St.Pierre on the Gulf of St.Lawrence.

Titaniferous magnetite, the second class of titanium-bearing ore, is composed of the two minerals, ilmenite and magnetite, mixed intimately in varying proportions, with a content of 5 per cent or more TiO_2. This ore is more abundant and occurs more widely in Canada than does ilmenite. It is not used in this country at present as a source of titanium. Large deposits occur at Mine Centre in Northwestern Ontario; in the southern part of Hastings county north of Belleville, Ontario; at Desgrosbois 65 miles north of Montreal; and on the Saguenay River near Arvida, Quebec.

Deposits of magnetic beach sands containing titanium occur at a number of places on the north shore of the Gulf of St.Lawrence. An interesting bed of such sand that has been consolidated into solid ore occurs at Burmis, Alberta, just east of the Crowsnest Pass.

Small shipments of ilmenite were made formerly from the Ivry deposit, but during recent years the only production has been from the St.Urbain deposits. The largest potential source of ilmenite is the recently discovered Allard Lake ilmenite deposits from which only experimental shipments have been made. These deposits are very large, though their full extent is not yet known. The ore as exposed in hills and ridges contains several million tons above ground level. It averages about 35 per cent TiO_2, 37 per cent iron, and 3 per cent silica. Its convenient location near ocean port will permit large-scale development when there are sufficient market outlets.

The two principal uses for ilmenite are as an alloying agent in steels, and as a pigment. At Niagara Falls, N.Y., ferro-titanium and ferro-carbon-titanium alloys are made from it for use in improving the quality of steel. By far the larger part of the ilmenite consumed in the world, however, is used to make the pigment, titanium white. New uses for this pigment are being found constantly and the demand continues to increase rapidly. There were reports during the year of a Canadian plant to make titanium white, but no definite action was taken.

To the present the substantial amounts of titanium white used in Canada have been imported from the United States. A part of the ore for the United States plants is produced in the southern states. Normally much of the ore for these plants was Tranvancore sand from India, which is particularly well suited to the process at present in use. When this became unobtainable during the war the McIntyre titaniferous magnetite deposit in New York state was opened and operated on a large scale, but this property has been closed.

Titanium (continued)

The New York quotation for ilmenite remained at $28 to $30 per gross ton of 60 per cent TiO_2 f.o.b. Atlantic seaboard. The price for rutile 94 per cent TiO_2 remained at 8 to 10 cents per pound of concentrate. The price of ferro-carbontitanium f.o.b. plant remained at $142.50 a ton, and metallic titanium at $5 to $5.50 a pound throughout 1945. (Bureau of Mines, Ottawa)

Table 42 - Production of Titanium Ore in Canada (x), 1927-1945

Year	Short tons	$	Year	Short tons	$
1927	2,029	8,980	1937	4,229	26,432
1928	2,244	6,732	1938	207	1,449
1929	2,748	7,359	1939	3,694	21,267
1930	412	1,239	1940	4,535	24,510
1931	1,509	10,261	1941	12,651	49,110
1932	...	...	1942	10,031	50,906
1933	...	...	1943	69,437	308,290
1934	2,023	14,161	1944	33,973	165,195
1935	2,288	16,400	1945	14,147	67,575
1936	2,566	18,318			

(x) All from Quebec.

Table 43 - Imports into Canada of "Antimony Oxide, Titanium Oxide and White Pigments Containing Not Less Than 14 Per Cent By Weight of Titanium"

Year	From the United Kingdom		From the United States		Total Imports	
	lb.	$	lb.	$	lb.	$
1937	2,220,330	262,660	3,410,121	264,085	5,630,451	4,710,481
1938	1,599,659	199,814	4,110,672	312,384	526,745	512,219
1939	1,689,329	227,805	7,302,923	574,193	9,003,693	803,198
1940	477,912	65,747	8,292,103	717,210	8,700,015	782,957
1941	418,962	64,302	12,801,017	1,257,065	13,219,979	1,321,367
1942	115,360	27,697	14,527,348	1,395,345	14,642,708	1,423,042
1943	33,700	8,094	16,855,800	1,525,368	16,889,500	1,533,462
1944	...	...	20,174,795	1,871,434	20,174,795	1,871,434
1945	79,440	16,752	21,279,636	2,029,137	21,359,076	2,045,889

Table 44 - Consumption of Titanium Oxide in Canada, By Industries, 1944 and 1945.

Industry	1944		1945	
	Pounds	Cost at works $	Pounds	Cost at works $
Paints -				
Extended titanium dioxide pigments	13,176,631	1,061,614	12,120,296	901,144
Titanium dioxide	4,600,654	933,199	6,306,213	1,192,404
Polishes and dressings	240,890	35,386	242,834	33,185
Pulp and paper	672,000	126,966	770,000	141,028
Linoleum	456,735	Not	Available	
Inks	39,600	"	"	
Wallpaper	86,000	"	"	
Rubber goods	90,000	"	"	
Miscellaneous	125,000	"	"	
Total Accounted For	19,487,510		19,439,343	

Titanium (continued)

Table 45 - Consumption of Ferrotitanium in Manufacture of Steel in Canada, 1939-1945.

Year	Tons	$
1939	118	23,498
1940	118	24,233
1941	181	52,128
1942	439	66,555
1943	614	118,416
1944	786	149,527
1945	656	123,975

Tungsten - The supply of tungsten has been in excess of the demand for the past two years although it was critically short during the war up to the fall of 1943. Canadian production ceased at the end of 1943, since when only the small amounts on hand at the mines have been shipped. Canada's requirements can be adequately supplied from the Emerald property in southern British Columbia if an urgent demand again arises.

Wolframite (FeMn) WO_4, is the principal ore of tungsten, the next in importance being scheelite ($CaWO_4$), a calcium tungstate. The former is a dark brown to black, heavy mineral, which contains 76.4 per cent WO_3 (tungsten oxide) when pure, and is not common in Canada. Scheelite, the chief Canadian ore of tungsten, is a heavy, fairly soft, usually buff, but sometimes white mineral with dull lustre, which contains 80.6 per cent WO_3 when pure. It is commonly associated with quartz and frequently occurs in gold-bearing veins and in certain contact metamorphic deposits. It can be detected readily in the dark by its brilliant, pale bluish-white fluorescence under ultra-violet light and purple filter.

During 1941 and 1942 scheelite was obtained from many deposits throughout Canada, most of them small. The three largest producers were Red Rose Mine, south Hazelton, northern British Columbia, the Emerald mine near Salmo, southern British Columbia, and Hollinger Consolidated Gold Mines, Limited, at Timmins, Ontario.

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 tungsten content is 15 to 20 per cent. Alloy steels containing tungsten have been used extensively in making armour plate, armour-piercing projectiles, and other military equipment. The use of tungsten in hard facing compounds is growing. Minor amounts of tungsten are used in steels for dies, valves, and valve seats for internal combustion engines, and for permanent magnets. Stellite, the most known non-ferrous alloy, contains 10 to 15 per cent tungsten with higher percentages of chromium and cobalt, and accounts for about 2 per cent of the tungsten consumed. Tungsten carbide is widely used as an extra hard cutting tool and for projectiles. Pure tungsten is used in lamp filaments (about 1.5 per cent of the total tungsten consumption), in radio tubes, contact points, etc.

Until production ceased late in 1943, all sales of Canadian concentrate were made through the Metals Controller, Ottawa, at a price of $26.50 a short unit (20 pounds) of WO_3 for scheelite concentrate containing 70 per cent WO3 (within specifications), delivered at Welland, Ontario. At the end of 1945 prices were $17.50 per unit of WO_3 for scheelite and $1.54 per pound of contained tungsten in ferrotungsten.

The Deloro Mining and Smelting Company of Canada, Limited, Deloro, Ontario, is the principal user of tungsten metal in Canada, and the Atlas Steels, Limited, Welland, Ontario, is the main consumer of tungsten concentrates. The former company makes "Stellite" alloys and the latter produces alloy steels.

Tungsten (continued)

Table 46 - Production (Commercial Shipments) of Crude Tungsten Concentrates in Canada, 1912-1945.

Year	Pounds	$	Average per cent WO_3
1912	28,000	(a)	72
1917	580	234	69.41
1918	27,000(c)	11,700	73.8
1939	8,825	4,917	(a)
1940	12,002	7,303	70-75
1941	82,846(b)	38,712	51.1
1942	520,981	406,275	61.8
1943	1,508,621	1,083,538	54.2
1944	886,745	245,780	31.9
1945	1,153	1,045	68.7

(a) Not recorded.
(b) Includes export of considerable low-grade material to U.S.A.
(c) Included 11 tons produced at Burnt Hill, N.B., with smaller shipments from Yukon, Nova Scotia and Manitoba.

Table 47 - Consumption of Ferrotungsten in Steel Furnaces in Canada, 1938-1945.

	Short Tons	Cost at works $
1938	34	69,806
1939	106	173,250
1940	376	829,859
1941	482	1,003,314
1942	203	524,007
1943	550	1,721,967
1944	86	287,116
1945	138	455,317

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 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 color 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; the ever-increasing demand for vanadium directs attention to all possible vanadium sources, as well as to efforts to extend known deposits. In the United States the principal ores are roscoelite and carnotite in sandstones, disseminated or in spots, bunches, lenses and seams.

Data relating to possible imports of vanadium ores or vanadium compounds or alloys are not shown separately in Canadian trade reports. In 1944 there were 257 tons of ferrovanadium valued at $188,661 consumed in Canada in the manufacture of steel.

Vanadium ore was quoted September, 1945; 27 1/2 cents per pound contained V_2O_5, f.o.b. shipping point, by "E & M J Metal and Mineral Markets", New York.

Vanadium (continued)

Table 48 - Consumption of Ferrovanadium in Steel Furnaces in Canada, 1940-1945.

Year	Short tons	Cost at works $
1940	57	130,566
1941	182	438,639
1942	203	524,007
1943	204	558,717
1944	67	176,596
1945	57	188,661

Zirconium - The metal is not produced in Canada; zircon is the most common zirconium mineral and the Department of Mines and Resources, Ottawa, states that it, or curtolite, commonly occurs in greater or less amount in Canadian Precambrian pegmatites, also in the pegmatitic apatite-pholgopite deposits of the Granville areas in Ontario and Quebec.

Zircon is used to a steadily growing extent in refractories, specialized porcelains and heat-resisting glass.

Zircon is recovered from the beach sands near Melbourne, Florida, by the Riz Mineral Company, as an accessory of titanium ore and from the gravels near Lincoln, California, as a by-product of gold dredging. Zirconium metal purifies, hardens, and strengthens steels and acts with aluminum to harden cupronickel. Metallic zirconium as powder or ductile metal is used in photoflash bulbs, radio tubes, ammunition primers and welding rods.

Zircon ore was quoted in September, 1945 by "E & M J Metal and Mineral Markets", New York: per ton f.o.b. Atlantic seaboard, minimum 55 per cent ZrO_2, $65 to $75 nominal. Zirconium alloy, 12 to 15 per cent Zr, 39 to 43 per cent Si, $102.50 to $107.50 per gross ton; 35 to 40 per cent Zr, 47 to 52 per cent Si, 14 to 16 cents per pound.

Table 49 - Consumption of Ferrozirconium (x) in Steel Furnaces in Canada, 1939-1945.

Year	Short tons	Cost at works $
1939	21	2,122
1940	1	93
1941	40	1,647
1942	51	7,337
1943	8	2,153
1944	15	1,613
1945	5	836

(x) Does not include other zirconium alloys (silvaz) etc.

DIRECTORY OF FIRMS IN THE MISCELLANEOUS METAL MINING INDUSTRY IN CANADA, 1945.

(x) Active but not producing.

Name of Firm and Product	Head Office Address	Location of Mine or plant
Aluminum -		
Aluminum Company of Canada Limited	1700 Sun Life Bldg., Montreal, Que.	Arvida, Que. Shawinigan Falls, Que. La Tuque, Que. Isle Maligne, Que. Beauharnois, Que.
Antimony -		
Consolidated Mining & Smelting Company of Canada Ltd.	215 St.James St., Montreal, Que.	Trail, B.C.

DIRECTORY OF FIRMS IN THE MISCELLANEOUS METAL MINING INDUSTRY IN CANADA, 1945.
(x) Active but not producing

Name of Firm and Product	Head Office Address	Location of Mine or plant
Beryl -		
Canadian Beryllium Mines & Alloys Ltd.(x)	Room 401, 100 Adelaide St.W., Toronto, Ont.	Renfrew Co., Ont.
Bismuth-		
Deloro Smelting & Refining Co. Ltd.(x)	900 Victoria Bldg., Ottawa, Ont.	Deloro, Ont.
Consolidated Mining & Smelting Company of Canada Ltd.,	215 St.James St., Montreal, Que.	Trail, B.C.
Cadmium -		
Consolidated Mining & Smelting Company of Canada Ltd.,	215 St.James St., Montreal, Que.	Trail, B.C.
Hudson Bay Mining & Smelting Co. Ltd.	500 Royal Bank Bldg., Winnipeg, Man.	Flin Flon, Man.
Chromite -		
Chrome Association	342 Notre Dame St., Black Lake, Que.	Black Lake, Que.
Chromite Ltd.	404 Notre Dame St. W., Montreal, Que.	Cleveland Twp.,Que.
Pare, Orel	Black Lake, Que.	Caleraine Twp.,Que.
Iron Ore-		
Hollinger North Shore Exploration Co. Ltd. (x)	721 Royal Bank Bldg., Montreal, Que.	N. E. Quebec, Que.
Labrador Mining & Exploration Co. Ltd.(x)	721 Royal Bank Bldg., Montreal, Que.	Labrador, Que.
Algoma Ore Properties Ltd.	Cornwall Bldg., Sault Ste.Marie, Ont.	Algoma dist., Ont.
Michipicoten Iron Mines Ltd. (x)	25 King St.W., Toronto, Ont.	Algoma dist., Ont.
Rebair Gold Mines Ltd. (x)	9 Adelaide St.E., Toronto, Ont.	Atikokan, Ont.
Steep Rock Iron Mines Ltd.	25 King St.W., Toronto, Ont.	Rainy River dist.Ont
Tomahawk Iron Mines Ltd. (x)	Suite 405, 67 Yonge St., Toronto, Ont.	Hastings Co., Ont.
Rawn Iron Mines Ltd. (x)	Atikokan, Ont.	Steep Rock Lake,Ont.
Indium -		
Consolidated Mining & Smelting Company of Canada Ltd.	215 St.James St., Montreal, Que.	Trail, B.C.
Lithium Ore -		
Hudson Bay Mining & Smelting Co.Ltd.(x)	500 Royal Bank Bldg., Winnipeg, Man.	Cat Lake, Man.
Lithium Corporation of Canada Ltd. (x)	403 Avenue Bldg., Winnipeg, Man.	Bernic and Cat Lakes Man.
Sherritt Gordon Mines Ltd.(x)	25 King St. W., Toronto, Ont.	Crowduck Bay, Man. East Braintree,Man.
Magnesium -		
Consolidated Mining & Smelting Company of Canada Ltd. (x)	215 St.James St., Montreal, Que.	Trail, B.C.
Dominion Magnesium Ltd.	Room 1107, 67 Yonge St., Toronto, Ont.	Haley, Ont.
Mercury -		
Bralorne Mines Ltd. (x)	555 Burrard St., Vancouver, B.C.	Omineca District,B.C
Consolidated Mining & Smelting Company of Canada Ltd.	215 St.James St., Montreal, Que.	Pinchi Lake, B.C.
Molybdenite -		
Molybdenite Corp. of Canada Ltd.	59 St.James St.W., Montreal, Que.	La Corne, Que.
Quyon Molybdenite Co. Ltd. (x)	Quyon, Que.	Quyon, Que.
Wartime Metals Corp. (LaCorne Project)	637 Craig St.W., Montreal, Que.	Abitibi Co., Que.
Selenium-Tellurium -		
International Nickel Co. of Canada Ltd.	Copper Cliff, Ont.	Copper Cliff, Ont.
Canadian Copper Refiners Ltd.	1600 Royal Bank Bldg., Toronto, Ont.	Montreal East, Que.
Thallium -		
Hudson Bay Mining & Smelting Co. Ltd. (x)	500 Royal Bank Bldg., Winnipeg, Man.	Flin Flon, Man.

DIRECTORY OF FIRMS IN THE MISCELLANEOUS METAL MINING INDUSTRY IN CANADA, 1945 (concl)
(x) Active but not producing.

Name of Firm and Product	Head Office Address	Location of Mine or plant
Tin -		
Consolidated Mining & Smelting Company of Canada Ltd.	215 St.James St., Montreal, Que.	Trail, B.C.
Titanium Ore -		
Baie St. Paul Titanic Iron Ore Co.	Baie St. Paul, Que.	St. Urbain, Que.
Coulombe, J.	71 Ave. Royal Monument, Quebec, Que.	St. Urbain, Que.
Simack Ulmenite Co. Ltd.	c/o C. N. Knowles & Co., 360 St.James St. W., Montreal, Que.	Romaine River Dist.Que.
Loughborough Mining Co. Ltd.	Sydenham, Ont.	St. Urbain, Que.
Tungsten Concentrates -		
Hollinger Cons. Gold Mines Ltd. (x)	Timmins, Ont.	Timmins, Ont.
Wartime Metals Corp. (Emerald Tungsten Project) (x)	637 Craig St. W., Montreal, Que.	Salmon, B.C.