ECONOMIC MINERALS
of
CANADA

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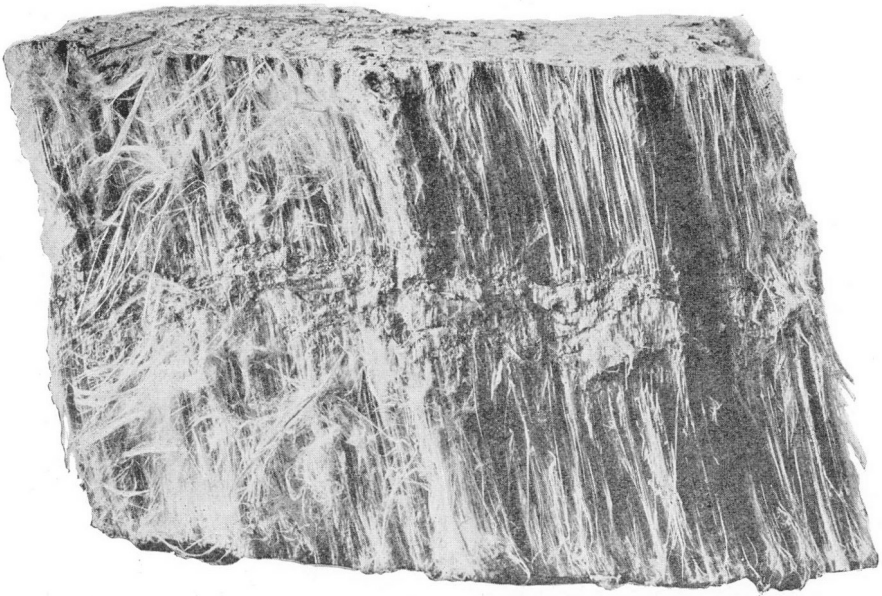

CHRYSOTILE-ASBESTOS, THETFORD MINES, QUEBEC
(Natural size.)

CANADA
DEPARTMENT OF MINES
Hon. Charles Stewart, Minister; Charles Camsell, Deputy Minister

GEOLOGICAL SURVEY
W. H. Collins, Director

ECONOMIC MINERALS OF CANADA

CANADA

BY
WYATT MALCOLM

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ECONOMIC MINERALS OF CANADA

BY WYATT MALCOLM

MINING is one of the most important industries of Canada. It is an old industry: coal was mined in Nova Scotia in the eighteenth century; charcoal iron for local use was smelted from Canadian ores in Quebec early in the eighteenth century and in Ontario at the beginning of the nineteenth century; and the mining and smelting of iron were early industries of Nova Scotia and New Brunswick. More strictly speaking, however, mining in Canada is an industry of the twentieth century, this being the period of its greatest growth, a period during which nearly every year was marked by an increase in production. There have been marked fluctuations in the production of certain metals, such as gold and silver, owing to the rise and decline of important mining areas like Klondike and Cobalt. On the other hand, a steady increase has taken place in the production of base metals such as copper, nickel, lead, and zinc, and in the production of clay products, structural materials, and coal. The following table of mineral production is an indication of the development of the industry:

Growth of Total Mineral Production of Canada

—	£	$
1890	3,444,525	16,763,353
1900	13,237,167	64,420,877
1910	21,950,059	106,823,623
1920	46,820,479	227,859,665

The growth of the mining industry has been concurrent with, and in part dependent upon, a great increase in other branches of industrial activity. To such a degree do the products of the mine and quarry enter into man-made things of the present day that industrial progress creates an increasing demand for metals

and other mineral products. This century has been a period of extensive railway construction, of the building of steel cars and steel ships, and of a great increase in the use of steel, cement, brick, and fireproof materials in the construction of large commercial and industrial buildings. It has been a period of opening of great oil fields and construction of pipe-lines; of waterpower development; of development, transmission, and utilization of electrical energy; of the establishment of the automobile industry; and of the growth of the chemical industry. All these and other activities created demands for such Canadian products as coal, copper, nickel, lead, zinc, asbestos, cement, and brick.

Prospects for continued expansion of the industry are bright. The discoveries and developments of the past may be taken as an indication in a measure of the possibilities of the future. The known mineral resources of Canada are great, and a vast area remains unprospected. Exclusive of the islands to the north Canada exceeds 3,000,000 square miles in extent. The significant feature of this great heritage is that so little is known of it. Two-thirds of the whole country is still unprospected. One-quarter is still unexplored. There are few fields of effort that present greater opportunities for the life work of enterprising individuals than in the development of the mineral resources of this great area.

The notes given in this booklet present but a few salient features of the mineral industry, and mineral resources of Canada. Mention is made of a number of the most important mining districts, but there are many districts having a considerable output to which no reference is made by name. It is not claimed that the information is even approximately complete. If the reader is interested in any particular mineral or mining district he should apply to the Deputy Minister, Department of Mines, Ottawa, Canada, for detailed information.

ARSENIC

IN 1924 the production of white arsenic amounted to 4,672,339 pounds valued at £72,401. Canadian arsenic is derived mainly from the arsenides and sulpharsenides of cobalt and nickel from the Cobalt and neighbouring silver mining districts of Ontario, and to a less extent from auriferous mispickel of British Columbia and Nova Scotia.

ASBESTOS

CANADA leads in the production of asbestos. This mineral holds an important place in commerce and industry because it is readily separated into fine, strong, cottony fibres that are non-inflammable and can be spun and woven. It is used in the manufacture of fireproof fabrics, fireproof building material, brake lining, packing, and heat and electric insulation. It occurs in veins in serpentinized peridotite. The veins are mostly 2½ inches or less in width, the greater number being less than ½ inch. The fibres, as a rule, run at right angles to the vein wall, and very commonly the vein is divided longitudinally by a film of iron oxide. The length of the fibre is thus limited by the width of the vein, or the parts into which the vein is divided by the film of iron oxide.

The best grades of asbestos, known as crude, are cobbed by hand from the rock, but in the recovery of the asbestos of the smaller veins the rock is crushed and the fibre removed mechanically. Although a small quantity of asbestos has been produced in Ontario, nearly the whole production comes from the province of Quebec. The most important deposits are at Thetford, Black Lake, Danville, East Broughton, and Robertsonville in the Eastern Townships. The asbestos-bearing rock is recovered partly by open-pit quarrying and partly by mining.

Asbestos of all grades produced in 1924 amounted to 220,005 tons valued at £1,354,161.

CHROMITE

CHROMITE is found in the Eastern Townships of Quebec It occurs in irregular bodies in peridotite and as disseminations through the rock. Some of the ore is sufficiently pure for shipment as mined, but concentration is generally necessary. The mineral occurs also in Ontario and British Columbia and in the latter province a small quantity has been mined. Nearly the whole production, however, comes from the province of Quebec.

COAL

CANADA has large reserves of coal in seams of 3½ feet to 20 feet, and more, thick. In 1913 it was estimated that the reserves in seams 1 foot or more thick amounted to 1,234,269 million metric tons.

Some of the most important coal fields that are now being operated lie on the seacoast in Nova Scotia and British Columbia —the extreme eastern and western provinces—in localities favourable for the establishment of manufacturing industries. Extensive metallurgical plants in both these provinces use coke made from domestic coal. Thin seams of bituminous coal are mined in New Brunswick. Saskatchewan has lignite beds of considerable extent, and Alberta has immense resources in lignite and bituminous coal. Anthracite coal, also, is found in western Alberta and northern British Columbia. Ontario and Quebec, the two most populous provinces of Canada, unfortunately have no coal fields and up to the present have drawn the greater part of their fuel supply for power and heating purposes from the United States.

The coal seams of Nova Scotia and New Brunswick occur in geological formations of Carboniferous age and those of Saskatchewan, Alberta, and British Columbia in Tertiary and Cretaceous formations, most of them being of Cretaceous age.

The growth of the coal mining industry of Canada is indicated by the following figures of production expressed in short tons (2,000 pounds).

Year	Tons
1881	1,537,106
1891	3,577,749
1901	6,486,325
1911	11,323,388
1921	15,057,493

COBALT

ARSENIDES and sulpharsenides of cobalt are found associated with silver in Cobalt mining camp, Ontario, and cobalt is recovered at the refineries. This has been for some years the principal source of the world's supply of this metal. Cobalt is used as a colouring agent in the enamel, porcelain, and glass industries. It also enters into the manufacture of stellite, a cobalt-chromium-tungsten alloy, used in making high-speed cutting tools. Stellite, on account of its resistance to oxidation and corrosion by acids, makes a very fine grade of cutlery. In 1924 the production amounted to 960,266 pounds, valued at £344,820.

COPPER

THE production of copper in 1923 amounted to 86,881,537 pounds having a value of £2,574,490, and in 1924 to 106,350,730 pounds having a value of £2,846,120. Most of this comes from the provinces of British Columbia and Ontario, the production of the former being much greater than that of the latter.

The greater part of the copper produced in British Columbia is derived from large, low-grade deposits, the two most important mines being located at Anyox and Britannia Beach, both on the Pacific coast. A large amount of money has been spent in developing a copper deposit on Allenby mountain in southern British Columbia, and in erecting a concentrator. A spur of the railway has been run to the concentrator and mine, and the power-line from Bonnington falls extended to the camp. Mining operations were started in October, 1920, but, owing to the drop in the price of the metal, work was discontinued. There are other mines in British Columbia from which considerable copper is produced, and deposits of prospective value on both the mainland and Vancouver island. The geological conditions of British Columbia are of such a nature as to warrant the prediction that further prospecting will result in the discovery of additional important deposits of copper ore.

In Ontario the production of copper has been almost wholly from the nickel-copper deposits of Sudbury district. The ores consist of sulphides of nickel, copper, and iron. The amount of copper produced is dependent, therefore, to a great extent, on the market for nickel.

A large sulphide deposit consisting of pyrite, chalcopyrite, and zinc blende has been proved on Flinflon lake in northern Manitoba. It is calculated that there are over 16,000,000 tons of ore within a depth of 800 feet. This is probably too low grade to be commercial under present conditions of transportation. The copper deposit at Mandy mine, not far from the Flinflon deposit, was sufficiently rich, however, to permit of profitable exploitation, although transportation conditions necessitated a haul of 32 miles, part way by horse teams, and part way by boats, to The Pas, whence the ore was shipped by rail (about 1,300 miles) to the smelter at Trail, in southern British Columbia.

A considerable production of copper has been made by Quebec and Yukon. In Quebec the most encouraging development of recent date is the discovery of a large deposit of auriferous copper ore on the Horne property in Rouyn township. This will, it is expected, form the basis of very important mining operations.

FELDSPAR

FELDSPAR is quarried in eastern Ontario and southern Quebec. This mineral occurs in pegmatite dykes in rocks of Precambrian age. In economic deposits the crystallization is sufficiently coarse to permit of ready separation of the feldspar from other minerals by hand, at the quarry. Quebec produces a fine grade of white potash feldspar for use in the dental industry.

The shipments during 1924 amounted to 39,776 tons valued at £61,570. The greater part of this was exported in the crude condition.

GOLD

GOLD is the most important of the metallic minerals produced in Canada. The production for 1924 amounted to 1,516,360 ounces worth £6,440,947. The bulk of this came from Ontario, and most of the balance from British Columbia and Yukon.

Most of the gold mined in Ontario comes from the Porcupine and Kirkland Lake camps of northern Ontario. It occurs in quartz veins, irregular masses of quartz, and mineralized schist of Precambrian age, comprising some of the oldest rocks exposed at the surface of the earth. Porcupine district includes the Hollinger mine, one of the most productive gold mines in the world. From the time operations were started on a small scale in the winter of 1909-1910, until January 1, 1925, the dividends paid by the Hollinger Consolidated Gold Mines, Ltd., amounted to £5,373,699. Large reserves of ore have been developed in this and other mines of the district, and with an increase in available hydro-electric power an increase in production is expected.

Prospectors have, during the last two years, devoted much attention to that part of western Quebec which is underlain by geological formations similar to those in which the gold of Ontario is found, and encouraging discoveries have been made.

In British Columbia gold is recovered from veins, from placers, and in the refining of copper derived from ores mined from enormous low-grade deposits. In Cariboo district in central British Columbia, where the gold occurs in pre-Glacial gravels, dredging operations are soon to be initiated.

Over twenty-five years ago the rich Klondike placers, of Yukon, created intense excitement, and led to one of the greatest rushes of prospectors in the history of mining. Yukon has produced £37,039,031 in gold, the maximum production being reached in 1900 when it amounted to £4,577,055. Placer mining is still carried on, but the Klondike is no longer a poor man's diggings. Most of the gold is now recovered by means of powerful dredges, a method that involves a very considerable capital expenditure.

Gold mining on a moderate scale has been carried on in Nova Scotia for over sixty years. The gold occurs in quartz veins of saddle shape, lying in the bedding planes of closely folded slates and quartzites.

GRAPHITE

GRAPHITE has been mined intermittently in eastern Ontario and southwestern Quebec for over fifty years, and in recent years a small quantity has been obtained from Baffin island. The mineral occurs as disseminations of varying degrees of richness through rock, in veins, and in aggregations of irregular shape in rocks of Precambrian age.

GYPSUM

GYPSUM occurs in abundance in the provinces of Nova Scotia and New Brunswick in sedimentary rocks of the Carboniferous system. Many of the deposits lie near the sea and have excellent shipping facilities. The mineral is obtained by quarrying, the overburden consisting of varying thicknesses of loose drift.

Lenticular beds of gypsum occur in the flat-lying Silurian sediments along Grand river in southern Ontario. These are not deep and are reached by slightly inclined tunnels driven in the sides of the valley. Beds of gypsum outcrop in Moose River basin, northern Ontario.

Large deposits of this mineral are found in rocks of Silurian age, in Manitoba, northwest of lake St. Martin. It is recovered by quarrying.

Deposits of gypsum occur at a number of points in British Columbia, and an extensive deposit is exposed in cliffs on lower Peace river, in northern Alberta.

The production in 1924 amounted to 645,020 tons valued at £451,767.

IRON

IRON ore mining and smelting from Canadian ores have been conducted on a moderate scale in Canada for over a century and a half, with interruptions. The ore now feeding the Canadian smelters, however, is imported. The large iron and steel works of Nova Scotia are dependent on ores brought from Newfoundland, where under-sea mining operations are carried on in one of the largest iron deposits of the world. The smelters of Ontario draw their supply from the large deposits in the United States at the head of the great lakes. Until very recently a sideritic ore was mined from the Magpie mine of Michipicoten district, Ontario, and a larger body, of about 100,000,000 tons, has been proved at the Helen mine, where at one time a pocket of about 2,700,000 tons of hematite was mined.

A great number of bodies of magnetic iron ore are found in Ontario and Quebec, the Maritime Provinces, and British Columbia. Many of these, unfortunately, carry rather a large amount of silica or sulphur, and many in Ontario and Quebec are titaniferous. Deposits of bog ore and hematite are also found. A number of deposits of these different kinds of ore have been worked.

LEAD AND ZINC

THE lead and zinc minerals of Canada, common associates in ore deposits, come mainly from two mining districts in British Columbia, Slocan and Fort Steele districts. In Slocan district the deposits consist of silver-lead-zinc ores in fissures and in replacement veins in slates, quartzites, and limestones. In Fort Steele district the ores come chiefly from the Sullivan mine. This is one of the world's big mines. It is the source of the greater part of Canada's production of lead and zinc. The country rocks are quartzites and argillaceous quartzites. The ore-body, consisting of galena and zinc blende, conforms in dip and strike with the formation, and replaces the fine-grained quartzites. Mining of lead and zinc minerals on a smaller scale is carried on in other parts of British Columbia.

A considerable quantity of rich argentiferous galena has been shipped in recent years from Mayo area, Yukon. The other provinces in which lead and zinc are mined are Ontario and Quebec.

The production of lead in 1924 was 177,756,076 pounds valued at £2,960,004, and the production of zinc for the same year was 98,788,667 pounds valued at £1,287,771.

The growth of the lead mining industry is indicated by the following figures of production:

Year	Pounds
1913–1920 (average)	40,696,281
1921	66,679,592
1922	93,307,171
1923	111,234,466
1924	177,756,076

MAGNESITE

MAGNESITE is one of the minerals the production of which was accelerated by the war. The cutting off of the supply from Austria, and the nearness of the Canadian deposits to the markets of eastern North America, where the material is used as a refractory for furnace linings, greatly favoured the industry. The deposits worked lie in Argenteuil county, west of Montreal, Quebec, in rocks of Precambrian age.

Deposits of hydromagnesite are found in central British Columbia, and in Atlin district, but little has been done towards their exploitation.

MICA

MICA was produced to the extent of 3,317 tons, in 1924, valued at £58,899. It is mined in eastern Ontario and southwestern Quebec. The crystals from which the commercial sheets are split occur in rocks of Precambrian age, as scattered crystals or in irregular aggregates, or in veins. The mica which is of the phlogopite (amber mica) variety is associated with apatite, pyroxene, and calcite in varying proportions. The deposits occur in pyroxenite or in other rocks closely associated with the pyroxenite.

NATURAL GAS

NATURAL gas, a most convenient fuel for domestic purposes, is obtained in abundance in the provinces of Ontario and Alberta, and to a less extent in New Brunswick.

The gas fields of Ontario lie in that part of the province adjacent to lake Erie and south of a line stretching from Hamilton at the west end of lake Ontario to Sarnia at the foot of lake Huron. The gas-bearing horizons are mainly of Silurian age and lie at a depth of about 600 feet in Welland county at the east, and at about 1,400 feet in the Tilbury field, Kent county. In some fields, wells with an initial capacity of over 5,000,000 cubic feet of gas per diem were not uncommon. In most fields, however, the capacity ranges from 100,000 to 1,000,000 cubic feet a well per diem. Ontario has been producing natural gas for thirty years.

A number of gas fields have been opened in Alberta. The gas occurs at different horizons in sediments of Cretaceous age, which are, except in the foothills of the west, nearly horizontal. A field at Medicine Hat supplies fuel for domestic use and for manufacturing purposes in the city. A field opened a number of years ago at Bow Island between Medicine Hat and Lethbridge provided gas for Calgary and other towns. A few of the wells had an initial capacity of over 10,000,000 cubic feet per diem. A field opened at Foremost is also an important source of supply. A strong flow of gas has been obtained in some of the wells drilled for petroleum on Sheep river, southwest of Calgary. Gas has also been struck at Viking and is piped to Edmonton. Heavy flows of gas have been struck at numerous other points throughout the province of Alberta.

A field operated a few miles from Moncton, New Brunswick, finds a market for the product in the city of Moncton.

The production of natural gas during 1924 amounted to:

599,972 thousand cubic feet in New Brunswick;
7,100,000 thousand cubic feet in Alberta; and
7,422,512 thousand cubic feet in Ontario.

Helium, a non-inflammable gas superior to hydrogen for the inflation of balloons, is found in some natural gases of Canada.

NICKEL

CANADA supplies over three-quarters of the world's nickel. A small part of this comes from the ores of Cobalt silver camp, but most of it comes from large deposits mined in Sudbury district, Ontario. Other less important deposits in Ontario, Manitoba, and British Columbia, are known.

The ore of Sudbury district consists of a mixture and chemical combination of sulphides of nickel, copper, and iron, together with a certain amount of rock. Small quantities of platinum and palladium and related metals are recovered in the refining process.

The ore deposits are large bodies of irregularly lenticular form extending to an unknown depth. At one mine, the Creighton, the shaft has been carried to a depth of more than 2,000 feet on an incline. The bodies of ore lie at or near the outer edge of a wide belt of igneous rocks that outcrops in the form of an ellipse, 36 miles long and 16 miles wide. The igneous mass is conceived by most geologists to have forced its way as a thick sheet or sill between a series of sediments and underlying older rocks and to have sagged down in the centre so as to become boat-shaped. Subsequent erosion has removed much of the overlying rock, exposing the igneous sill in such a way that its edge now forms the large elliptical belt described above.

The discovery of the fact that the ore-bodies lie at or near the outer edge of the belt, that is, at what is really the bottom of the sill, has been of great service in prospecting—so much so that in 1917 by using this knowledge a very large body of ore was discovered in an area where the rocks are concealed by gravel and sand to a depth of over 100 feet.

The prominence given to nickel during the war has given the impression to many that nickel is essentially a war metal, and is useful only for the manufacture of armour plate, ordnance, and projectiles. This is a misconception. Nickel is used for plating; it enters into the composition of alloys, and as pure metal and in the form of alloys it has, as the result of research and educational propaganda, established a broad market for itself. It is used in the manufacture of a variety of steel of great tensile strength that is employed for a variety of industrial purposes such as rails for the terminal points of railways, bridges, automobiles, and safes.

The construction of the Canadian Pacific railway led to the opening of Sudbury mining camp. Mining has been carried on for about forty years and there are known reserves of ore sufficient to last for many decades, at the normal rate of consumption. The following figures indicate the growth of the nickel mining industry in normal times, the effect of the war on production, the slump, and the recent recovery.

Year	Tons nickel produced
1905	9,438
1910	18,635
1913	24,838
1914	22,759
1915	34,154
1916	41,479
1917	42,165
1918	46,254
1919	22,272
1920	30,668
1921	9,642
1922	8,799
1923	31,227
1924	34,793

PETROLEUM

PETROLEUM was discovered in the province of Ontario about sixty years ago; and since then there has been a continuous production. A number of gushers were struck at first, but most of the oil has been obtained by pumping, the great proportion now coming from wells yielding only a few gallons each per diem. The occasional discovery of a new, small field increases the production temporarily, but the yield from the more recently discovered pools has as a rule declined rapidly. The petroleum of Ontario is derived mainly from rocks of Devonian age and in a smaller degree from rocks of Silurian age. Traces of oil are found in the Trenton limestone (of Ordovician age) on Manitoulin island, and a pool of oil was struck recently in this formation at great depth in the southern part of Ontario.

A small amount of petroleum is obtained from wells in the gas field near Moncton in southeastern New Brunswick.

In recent years a great deal of attention has been given to the oil possibilities of western Canada, more particularly of the province of Alberta. Many wells have been bored and as a result a small field was opened on Sheep river, a few miles southwest of Calgary. Oil occurs here in beds of Cretaceous age. A well in this field carried to greater depth struck, in 1924, in sediments of the Carboniferous system, a very heavy flow of wet gas from which oil is now being obtained. Oil in small quantities is being obtained from a pool struck in Wainwright district, eastern Alberta. Traces of oil have also been found at other points in the province.

Seepages from sediments of Devonian age are common in Mackenzie River basin and a good flow of oil was struck a few years ago in a boring made at a point on the Mackenzie 45 miles below Norman. This is unfortunately a long distance from any market.

The total production of crude petroleum in Canada during 1924 amounted to 160,830 barrels. The production from Ontario was 154,167 barrels, from New Brunswick 5,561 barrels, and from Alberta 1,102 barrels.

METALS OF THE PLATINUM GROUP

METALS of the platinum group occur in noteworthy quantities in the nickel-copper ores of Sudbury mining district, Ontario, and in small quantities in placers of western Canada. The production in 1924 was as follows:

—	Ounces	Value
		£
Platinum	9,186	224,266
Palladium	8,923	166,848
Rhodium, etc	593	10,504

PYRITES

IRON pyrites is a compound of iron and sulphur. It is burned in specially constructed furnaces for the production of sulphur dioxide gas for use in the manufacture of sulphuric acid. The deposits lie chiefly in British Columbia, Ontario, and Quebec. Many of the deposits carry large reserves. The abnormal conditions occasioned by the war greatly stimulated production and in 1917 a maximum of 416,649 tons was reached. The substitution of cheap native sulphur in the manufacture of acid has interfered with Canadian production in recent years, and in 1924 the amount of pyrites produced was only 23,571 tons.

SALT

THE production of salt has for many years been an important industry in the province of Ontario. The salt occurs in beds of Silurian age underlying the counties adjacent to lake St. Clair and the southern part of lake Huron, in the south-western part of the province. As a rule more than one bed is struck in boring; and in a diamond-drill hole made at Goderich as many as six were penetrated. The beds have a wide range in thickness, some greatly exceeding 100 feet. They lie at depths of 900 to 1,800 feet according to location.

The salt is recovered in the form of brine, wells being bored, casing inserted, pumps installed, and water forced from the surface down to the bed or allowed to pass to the salt bed from overlying water-bearing formations. A part of the salt is used in the chemical industry.

A deposit of rock salt discovered a few years ago near Malagash, Nova Scotia, is being mined. It occurs in rocks of the Carboniferous system, and is one of a great number of occurrences of salt in Nova Scotia and New Brunswick.

Western Canada produces very little salt. Borings at McMurray in northern Alberta have, however, revealed the presence of salt beds, and steps are being taken to exploit the deposit.

The total sales of salt in Canada in 1924 from domestic sources, including the salt-equivalent of the brine used in the chemical industry, amounted to 205,780 tons valued at £387,521. Ninety-seven per cent of this came from Ontario and the balance from Nova Scotia.

SILVER

MOST of the silver produced in Canada comes from the provinces of Ontario and British Columbia. Out of a total production of 20,243,846 ounces in 1924, Ontario is credited with 11,288,632 ounces and British Columbia with 8,023,409 ounces.

Nearly the whole of the production from Ontario comes from Cobalt and neighbouring camps. Cobalt is one of the best-known silver camps of the world. Silver was discovered there in 1903 by men employed in construction work on the Temiskaming and Northern Ontario railway, which was then being pushed northward through a non-arable rocky section to the fertile "clay belt" in the northern part of the province. Since shipments were first made in 1904 there has been a production of over 350,000,000 ounces of silver.

The ore consists of native silver associated with arsenides of cobalt and nickel, with a gangue of calcite. It occurs in veins traversing Precambrian conglomerates, greenstones, and diabase. The minerals are thought by geologists to have had their origin in the diabase that takes the form of sills intruded in the conglomerates and greenstones. The ores are high grade and a great deal of ore has been mined running several thousand ounces of silver per ton. In the early days of Cobalt camp many spectacular showings were revealed by the removal of drift from the surface of the veins, which had been smoothed and polished by glacial action and protected by the mantle of drift from subsequent oxidation. In the refining of the ores the metals nickel and cobalt and their oxides are recovered; arsenic is another product.

The silver of British Columbia is derived mainly from the silver-gold deposits of Salmon River area, from lead-zinc deposits of the southeastern part of the province, and from copper ores. The Premier mine of British Columbia exceeded all other Canadian mines in 1924 in the production of this metal; the Premier, and the Nipissing mine of Cobalt, each produced more than 3,000,000 ounces during that year.

For several years rich argentiferous galena has been shipped from deposits in Mayo district, Yukon.

STRUCTURAL MATERIALS

THE value of the structural materials, including cement, clay products, lime, sand, gravel, and stone, produced in 1924, amounted to over £6,845,079.

Good grades of granite, marble, limestone, and sandstone are quarried. Clays and shales suitable for the manufacture of building brick are widespread, and material of superior grade, some suitable for fire-brick, is found and utilized at a number of points.

Limestone, low in magnesia, and adaptable to the manufacture of Portland cement, is common, more particularly in the southern part of the provinces of Ontario and Quebec, the most densely settled parts of Canada. Manitoba, Alberta, and British Columbia have producing cement mills, but by far the greater part of Canada's production comes from Ontario and Quebec. The total amount sold from Canadian mills in 1924 was 7,499,372 barrels valued at £2,762,703.

TALC

TALC is found in the provinces of Ontario, Quebec, and British Columbia. It is mined in small quantities in British Columbia, but nearly the whole production of Canada comes from Hastings county, Ontario, where it occurs in sediments of Precambrian age. Most of this is ground for shipment.

OTHER MINERALS

A NUMBER of other minerals are produced, the value of which amounts to a considerable sum in the aggregate. Quartz and quartzite are quarried for metallurgical purposes. Limestone and dolomite are quarried for chemical and metallurgical purposes. Sand suitable for common glass is found in southern Ontario and Quebec and elsewhere. Antimony ore has been mined in New Brunswick and Nova Scotia. Grindstones, pulpstones, and scythestones are produced in the Maritime Provinces, infusorial earth in Nova Scotia, and corundum in Ontario. There has been a small production of volcanic ash, garnet, and titanium ore. Bentonite is found in Saskatchewan, Alberta, and British Columbia. Actinolite for the manufacture of roofing is produced in small quantities in Ontario. Ochre and other iron oxides come from Quebec. Small manganese deposits occur in Nova Scotia, New Brunswick, and British Columbia. Magnesium sulphate and sodium carbonate are obtained as natural products in small lakes of British Columbia and sodium sulphate from lakes in Saskatchewan. Kaolin of fine quality is found at St. Rémi-d'Amherst, Quebec. The mineral-water industry is established. There are extensive peat bogs in the eastern half of the country. Native mercury and cinnabar are found in British Columbia and cinnabar deposits were exploited a number of years ago. Strontium minerals are also found. Molybdenite is widely distributed; tungsten is of more restricted distribution. Fluorite is found in Ontario and British Columbia, and barytes in Nova Scotia and elsewhere. Numerous occurrences are known in eastern Ontario and Quebec of minerals containing radioactive elements, beryllium, and other rare elements, though these are all small. The mining of apatite was carried on a number of years ago, but the discovery of large deposits of phosphate in the United States, that could be more cheaply worked, led to a great curtailment in the mining of this mineral in Canada. As apatite is frequently associated with mica it is now obtained in small quantities as a by-product in the mining of mica. Increasing interest is being shown in the possibilities of the bituminous shales of New Brunswick and Nova Scotia, and the bituminous sands of northern Alberta.

For further information concerning the geology and mineral deposits of Canada apply to *The Deputy Minister, Department of Mines. Ottawa, Canada.*