
A GLIMPSE
of
CANADA'S MINERAL
INDUSTRY

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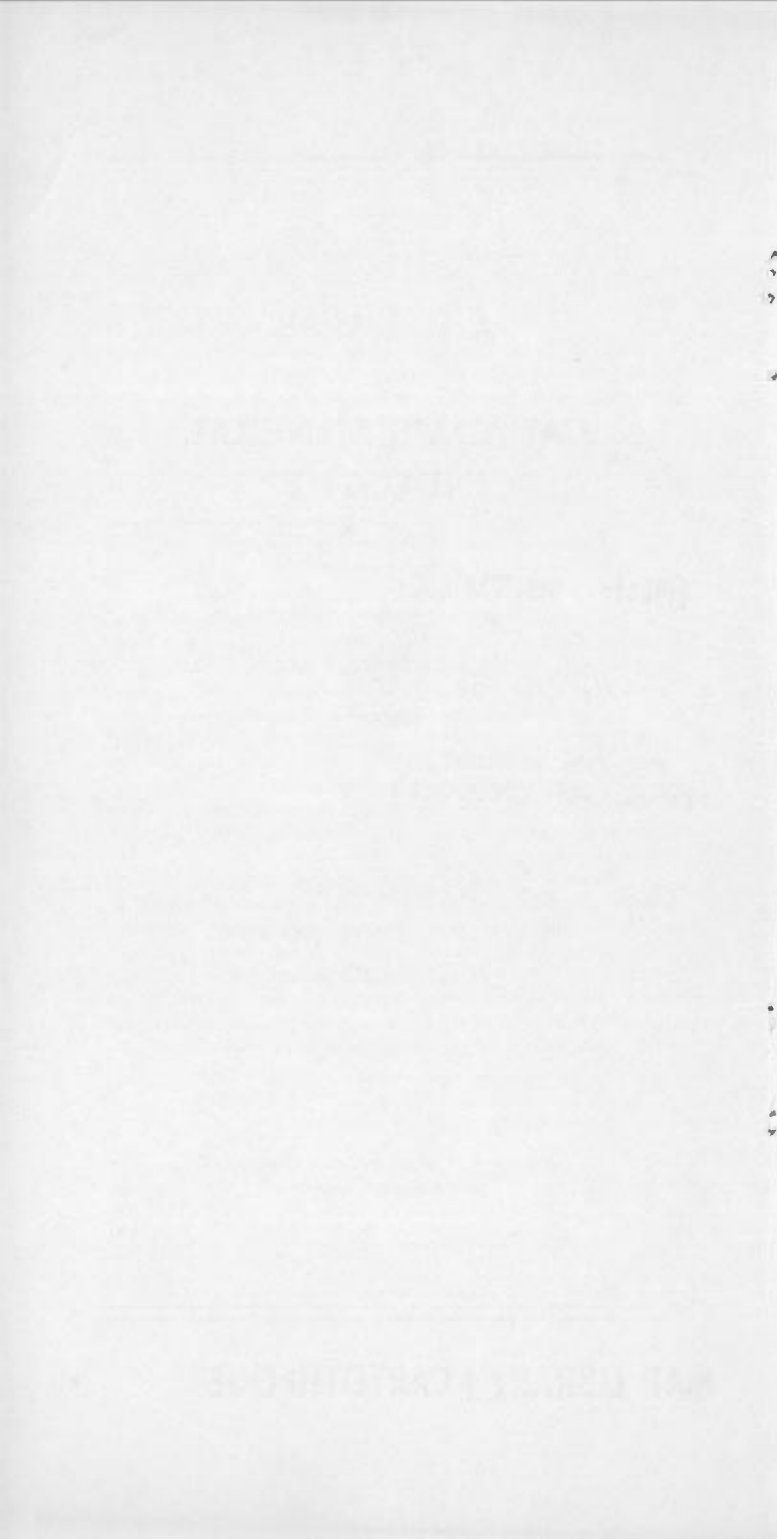
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A GLIMPSE OF CANADA'S MINERAL INDUSTRY

The mineral exhibit installed by the Department of Mines and Resources in the Canadian Pavilion has been designed to present in the space available a general picture of the Canadian mining industry. Because of the industrial character of the Exhibition particular attention is given to the metals that are widely used in industry and commerce, and of which Canada is a large producer.

Occupying the central position in the exhibit is a large map of Canada showing:

- (1) The six well-known physiographic areas or divisions;
- (2) The location of commercial occurrences of metallic and non-metallic minerals, and of refineries and steel plants;
- (3) Railway and aerial transportation routes.

The next important feature is a display of large specimens of ores and minerals representative of the more important deposits that are being commercially developed. These specimens include ores of gold, copper, nickel, lead, zinc, asbestos, etc. On the wall immediately above these may be seen coloured photographs of typical metallurgical and milling plants erected for the recovery of the various metal and mineral products.

A series of panels adjacent to the specimens shows in tabulated form the value and importance of the different products from mines.

Mining is Canada's second largest primary industry, ranking next to agriculture in importance. Although it is an old industry—coal having been mined in Nova Scotia as early as the eighteenth century—its greatest growth has taken place during the present century, during which period nearly every year has been marked by an increase in production. The following table of mineral production indicates the development of the industry:

—	\$	£
1890.....	16,763,400	3,352,700
1900.....	64,420,900	12,884,200
1910.....	106,823,600	21,364,700
1920.....	227,859,700	45,571,900
1930.....	279,874,000	55,974,800
1935.....	312,344,000	62,468,800
1937.....	456,793,000	91,358,600

During 1937 Canada produced a total of twenty metals, four fuels, twenty-four other non-metallics, and fourteen clay products and other structural materials. Brief reviews of the more important of these metals and minerals appear below.

METALS

Bismuth

Refined bismuth has been produced at Trail, British Columbia, since 1928 as a by-product from the treatment of lead-zinc ores. Bismuth concentrates are recovered as a by-product from the treatment of silver ores of northern Ontario, and are exported for treatment.

Production in 1937 was 5,711 pounds valued at \$5,654 (£1,131). Total recorded production to date is 1,110,000 pounds valued at \$1,299,700 (£259,940).

Cadmium

Refined cadmium is produced at Trail, British Columbia, and at Flinflon, Manitoba, it being obtained as a by-product in the production of zinc. Refined cadmium has been produced in Canada since 1928.

Production in 1937 was 744,431 pounds valued at \$1,220,867 (£244,173). Total recorded production to date is 4,762,000 pounds valued at \$4,098,300 (£819,700).

Cobalt

Cobalt is obtained from the treatment of the silver-cobalt ores of Cobalt and adjoining areas in northern Ontario. Cobalt metal, oxides, and salts are produced at Deloro, Ontario. Much of the ore is sold for treatment abroad.

Production of cobalt in 1937 was 507,064 pounds valued at \$848,247 (£169,650). Total recorded production to date is 32,658,000 pounds valued at \$28,491,000 (£5,698,000).

Copper

Canada's supply of copper is obtained from the copper-nickel ores of Sudbury, Ontario; the copper-gold ores of the Noranda mine, and the copper-pyrites ores of the Aldermac and Eustis mines in Quebec; the copper-zinc ores of Flin Flon and of Sherritt-Gordon in northern Manitoba; the copper-zinc ores of Britannia, and the copper ores of Copper Mountain in British Columbia. Some copper is also recovered as concentrate from the lead-zinc-copper ores of Stirling mine, Cape Breton, Nova Scotia.

Canada has two copper refineries, one at Copper Cliff, Ontario, with an annual rated capacity of 120,000 tons of refined copper, and the other at Montreal East, Quebec, with a rated capacity of 81,000 tons of refined copper. The former treats the blister copper produced by International Nickel Company of Canada, Limited; and the latter treats the anode copper produced at the Noranda smelter in Quebec, and the blister copper produced at the Flin Flon smelter in Manitoba.

Production of copper in 1937 was 266,000 short tons valued at \$69,049,734 (£13,809,950). Total recorded production to date is 2,759,200 short tons valued at \$696,798,900 (£139,360,000).

Gold

Canada's gold production is obtained chiefly from the gold-quartz mines of the Porcupine and Kirkland Lake areas in northern Ontario. Important contributors also include the gold-quartz mines of Quebec, British Columbia, Manitoba, and Nova Scotia; the copper and copper-zinc mines of Quebec; the nickel-copper mines of Ontario; the copper-zinc mines of Manitoba; the copper mines of British Columbia; and the placer mines of British Columbia and Yukon. Newly developed mines in Saskatchewan and the Northwest Territories will contribute to the output in the near future.

Production of gold in 1937 was 4,095,872 fine ounces valued at \$143,314,561 (£28,663,000). Total recorded production to date is 60,406,100 fine ounces valued at \$1,484,288,200 (£296,857,600).

Iron

Deposits of iron ore including hematite, siderite, and magnetic iron occur in Canada. With frequent interruptions mining and smelting of Canadian iron ores have been carried out on a moderate scale for more than a century and a half but no ore for blast furnace use has been mined since 1923. Preparations are under way for resuming production in 1939 at the iron mines in the Michipicoten area, Ontario.

At present the iron and steel metallurgical plants in Canada use imported ore.

Lead

Most of the lead produced in Canada has come from the Sullivan silver-lead-zinc mine at Kimberley, British Columbia. Other contributors to the output in British Columbia have been the Monarch silver-lead-zinc mine near Field, and several silver-lead and silver-lead-zinc mines in the Kootenay and other districts.

The high-grade silver-lead mines of the Mayo area, Yukon, have been in operation for a number of years. There has been no production from the lead mines of Ontario for several years. Quebec's production is obtained from a lead-zinc mine in Portneuf county; and Nova Scotia's output comes from a lead-zinc-copper mine at Stirling, Cape Breton.

Canada has one lead smelter and one refinery both of which are located at Trail, British Columbia. The refinery has a rated capacity of 205,000 short tons of refined lead annually.

Production of lead in 1937 was 205,611 short tons valued at \$21,013,400 (£4,202,700). Total recorded production to date is 2,782,900 short tons valued at \$263,141,900 (£52,628,400).

Nickel

With the exception of a small amount recovered as a by-product from the silver-cobalt ores of the Cobalt and adjoining areas in northern Ontario, Canada's entire output of nickel is obtained from the nickel-copper deposits of the Sudbury area in Ontario. International Nickel Company has several nickel-copper mines and two smelters in operation in this area, and also operates a nickel refinery at Port Colborne, Ontario. Falconbridge Nickel Mines, Limited operates a mine and a smelter near Sudbury, and exports its nickel-copper matte to Norway for refining.

Production of nickel in 1937 was 112,395 short tons valued at \$59,507,200 (£11,901,440). Total recorded production to date is 1,184,800 tons valued at \$692,599,800 (£138,520,000).

Platinum

With the exception of a few ounces obtained from the black sands of British Columbia, and of a small output obtained as an impure residue in the refining of gold at Trail, British Columbia, all of the Canadian platinum and allied metals are recovered as a by-product from the treatment of the nickel-copper ores of the Sudbury area.

Platinum metals recovered from International Nickel Company's ores are refined at Acton, in England. Falconbridge Nickel added a precious metal recovery unit to its copper-nickel refinery at Christiansand, Norway, in 1935 for the production of refined platinum, palladium, and associated metals.

Production of platinum and associated metals in 1937 was 259,228 fine ounces valued at \$9,933,709

(£1,986,541). Total recorded production to date is 1,340,400 fine ounces valued at \$49,264,000 (£9,852,800).

Radium and Uranium

Canada is now one of the chief sources of the world's supply of radium and uranium. Pitchblende in association with silver was discovered by Gilbert Labine at Echo Bay, Great Bear Lake, Northwest Territories in 1930. Eldorado Gold Mines, Limited commenced mining the deposits in 1933 and has since erected a plant for the recovery of radium and uranium salts at Port Hope, Ontario, to which concentrates are being shipped regularly, the silver being recovered as a by-product. Production figures are not available for publication.

Selenium and Tellurium

Selenium and tellurium are recovered in the refining of the blister copper produced in Manitoba, Ontario, and Quebec.

Production of selenium in 1937 was 399,472 pounds valued at \$691,088 (£138,218); and of tellurium, 51,622 pounds valued at \$89,306 (£17,861). Total recorded production of selenium to date is 1,270,000 pounds valued at \$2,260,000 (£452,000); and of tellurium, 108,700 pounds valued at \$210,700 (£42,140).

Silver

Most of Canada's silver production is now obtained as a by-product from the treatment of base metal ores, the chief producer being the Sullivan mine at Kimberley, British Columbia, which contributes about forty per cent of the total annual output. Important quantities are also obtained from the refining of blister copper from gold-quartz ores. The silver-cobalt mines of the Cobalt area, Ontario, which for many years were the chief Canadian producers of silver, now contribute about seven per cent of the total annual output.

Production in 1937 was 22,683,000 fine ounces valued at \$10,180,400 (£2,036,080). Total recorded production to date is 737,987,400 ounces valued at \$435,520,100 (£87,104,000).

Zinc

More than two-thirds of the zinc produced in Canada comes from the Sullivan mine near Kimberley, British Columbia. The remainder is obtained from the Flin Flon mine in northern Manitoba; from several small lead-zinc mines in British Columbia; from the Waite-Amulet copper-zinc mine near Noranda, and the Tetreault lead-

zinc mine near Notre-Dame-des-Anges, both in Quebec; and from the Stirling copper-lead-zinc mine in Cape Breton, Nova Scotia.

Canada has two zinc refineries, one at Trail, British Columbia, with a rated capacity of 145,000 short tons of slab zinc annually, which is operated by Consolidated Mining and Smelting Company of Canada, Limited, and the other at Flinflon, Manitoba, with a rated capacity of 30,000 short tons of slab zinc annually, which is operated by Hudson Bay Mining and Smelting Company of Canada, Limited.

Production of zinc in 1937 was 185,209 short tons valued at \$18,157,894 (£3,631,580). Total recorded production to date is 1,754,400 short tons valued at \$156,856,700 (£31,371,340).

NON-METALLICS

Asbestos

Canadian chrysotile asbestos is produced only in the Eastern Townships, Quebec. Fibrous minerals similar in structure to asbestos, but lacking the fineness and elasticity of chrysotile, have been reported from other localities in Canada, but the qualities and quantities of the material so far discovered are such that no commercial developments have followed. However, such materials are occasionally used for making mineral fillers. Most of the Canadian asbestos is exported.

Production in 1937 was 410,026 short tons valued at \$14,505,791 (£2,901,160). Total recorded production to date is 6,276,100 short tons valued at \$226,268,100 (£45,253,600).

Feldspar

With the exception of a few thousand tons mined in Manitoba, all of Canada's feldspar production has come from mines in Ontario and Quebec. Pegmatite dykes, the main source of commercial feldspar, are distributed widely throughout the Precambrian rocks of eastern and northern Canada. Development possibilities, however, in view of the comparatively low unit value of the mineral, hinge upon the run-of-mine freedom from iron-bearing impurities and cost of transportation to grinding plant.

Production in 1937 was 21,330 short tons, valued at \$178,160 (£35,630). Total recorded production to date is 751,700 short tons valued at \$4,990,000 (£998,000).

Graphite

For a number of years the entire graphite production has come from a single operator, the Black Donald Graphite Company, with mine and mill at Whitefish Lake, 22 miles west of Calabogie, in Renfrew County, Ontario. The deposit is of exceptional size and richness, and although the graphite flakes are too small to be suitable for crucible use, the products made are well adapted for lubricants and foundry facings. In recent years the highest grade has been successfully employed in pencil manufacture.

Production in 1937 was valued at \$125,776 (£25,155). Total recorded production to date is 64,000 short tons valued at \$3,565,800 (£713,160).

Gypsum

Nova Scotia is the largest producer of gypsum in Canada followed by New Brunswick, Ontario, Manitoba, and British Columbia. It is marketed in the crude lump form, ground as "land plaster" and "terra alba", or ground and calcined as plaster of Paris and wall plaster. Each year an increasing proportion of the calcined material enters into the manufacture of wall-board, gypsum blocks, insulating material, acoustic plaster, etc. Anhydrite, the anhydrous calcium sulphate, is used mainly as a fertilizer for the peanut crop in the Atlantic seaboard States of southern United States.

Production in 1937 was 1,042,239 short tons, valued at \$1,536,587 (£307,317). Total recorded production to date is 25,817,700 short tons, valued at \$56,664,200 (£11,332,840).

Magnesite

No magnesite, within the strict meaning of the term, is produced in Canada at the present time, but deposits of magnesitic dolomite consisting of an intimate mixture of magnesite and dolomite are quarried at Kilmar and Harrington East, in Argenteuil County, Quebec, and are processed for use as refractory materials. Products at present marketed include caustic-calcined magnesitic dolomite, dead-burned or grain material, bricks and shapes (both burned and unburned), finely ground refractory cements, and, in combination with chrome, the dead-burned material is used as an ingredient in certain other types of refractories. Caustic-calcined magnesitic dolomite is used for fettling the bottoms of basic open-hearth furnaces, and for the construction of floors and the making of floor tile.

The Quebec deposits are the only deposits of magnesitic dolomite, or of magnesite of commercial grade, known in the eastern part of North America, and consequently are favourably situated to supply the large markets for refractory products in eastern Canada and eastern United States. Large deposits of magnesite containing silica and alumina occur near Marysville, British Columbia. A number of other deposits of magnesite are known in British Columbia and Yukon Territory.

Magnesitic-dolomite products were valued in 1937 at \$677,207 (£135,441). Total recorded production is valued at \$8,594,200 (£1,717,000).

Mica

The production of sheet mica in Canada is almost wholly of the phlogopite, or amber mica, variety. It is derived almost entirely from adjacent sections of Ontario and Quebec, within an area extending roughly from Kingston, on Lake Ontario, northeastward into Hull and Papineau Counties, Quebec. In Quebec, the mica-bearing rocks extend for some distance both west and east of the main productive area, into Pontiac and Argenteuil Counties, respectively, but production from these districts has been comparatively small.

Production of muscovite, or white mica, in Canada has been negligible, although small amounts have been recovered occasionally as a by-product from feldspar mining.

Production in 1937 was 1,798,600 pounds valued at \$132,000 (£26,400). Total recorded production to date is valued at \$7,611,600 (£1,522,300).

Nepheline Syenite

Nepheline syenite is used in the ceramic trade (at present mainly in the glass industry) as a substitute for straight feldspar. Interest in the material as an industrial mineral or rock is of recent date, the first production being in 1936, when a quarry was opened at Blue Mountain, in Methuen Township, Peterborough County, about 27 miles northeast of Lakefield, and a mill was erected at Lakefield to crush and process the rock for market.

Production in 1937 was valued at \$121,481 (£24,300).

Salt

Common salt (sodium chloride) is obtained in two forms, in solution in a brine from which the salt is extracted by evaporation, and in lump or solid form by direct mining.

Salt is produced in southern Ontario; at Malagash, Nova Scotia; at Neepawa, Manitoba; and at McMurray, Alberta. Ontario salt is obtained from brine wells, as is also the salt produced in Manitoba. At Malagash it is recovered by mining rock salt, as well as by recovery by evaporation from brines produced by leaching of salt from the waste material in the mine. Unexploited occurrences of salt are also known in various parts of Canada, including Nova Scotia, New Brunswick, Ontario, and Alberta.

Production in 1937 was 459,027 short tons valued at \$1,799,465 (£359,900). Total recorded production to date is 7,549,500 short tons valued at \$43,651,300 (£8,730,300).

Talc and Soapstone

The production of talc has, for many years, been derived from the deposits near Madoc, Hastings County, Ontario. This talc is of the foliated variety, has a good white colour, and occurs as a series of vertical veins or bands in white crystalline dolomite. Soapstone is obtained from a quarry near Broughton, in the Eastern Townships, Quebec, where furnace blocks are cut.

Production of ground talc in 1937 was 12,457 short tons, valued at \$123,300 (£24,660). Total recorded production of talc and soapstone to date is 388,400 short tons valued at \$3,315,700 (£663,140).

FUELS

Coal

Nova Scotia, New Brunswick, and Yukon Territory produce only bituminous coal. Coal produced in British Columbia is almost all bituminous except for a small quantity classified as lignitic. Alberta production includes bituminous, sub-bituminous, and lignitic coals, and Saskatchewan and Manitoba produce only lignitic coal.

Nova Scotia contributes about 45 per cent of the total production of coal in Canada, Alberta 35 per cent, British Columbia 10 per cent, Saskatchewan 7 per cent, and the rest is derived from New Brunswick, Manitoba, and Yukon.

Production in 1937 was 15,775,432 short tons valued at \$48,662,559 (£13,732,512). Total recorded production to date is 566,757,200 short tons valued at \$1,700,024,900 (£340,005,000).

Natural Gas

Natural gas has been found in almost all the provinces of Canada but the principal fields producing in commercial quantities are in Alberta, Ontario, and New Brunswick. Comparatively small quantities are produced in Saskatchewan, Manitoba, Quebec, and in the Northwest Territories.

The principal producing fields in Alberta are: Turner Valley, Viking, Medicine Hat, Fabyan, and Brooks.

In Ontario the greater part of the production comes from the southwestern part of the Province, north of Lake Erie.

In New Brunswick, the only field of importance is at Stony Creek, which supplies the city of Moncton and the town of Hillsborough. In Saskatchewan, Lloydminster is being served with natural gas from a well near the town. Natural gas is obtained from a number of small wells along the St. Lawrence River in Quebec.

Production in 1937 was 29,599,200 M cubic feet, valued at \$11,738,800 (£2,347,760). Total recorded production to date is valued at \$186,556,200 (£37,311,240).

Petroleum

Petroleum is produced in Canada in Alberta, Ontario, New Brunswick, and the Northwest Territories. The product varies from a very volatile naphtha to semi-solid bitumen.

The largest production comes from Alberta, and Turner Valley is the main producing field in the Province. This field is about 40 miles southwest of the city of Calgary. Other regularly producing fields are at Red Coulee, on the International Boundary between Alberta and the State of Montana, and at Wainwright and Ribstone about 160 miles east of the city of Edmonton. Crude petroleum has also been found at Taber, Skiff, Del Bonita, and Moose Mountain. In Ontario, crude oil is found in commercial quantities only in the southwestern part of the Province. The principal producing fields are at Petrolia, Oil Springs, Bothwell, and in the Townships of Dawn, Onondaga, and Mosa. In New Brunswick some production is obtained from the Stony Creek field, about 9 miles southeast of the city of Moncton. In the Northwest Territories a small production is obtained along the Mackenzie River at Fort Norman; and some bitumen is obtained from deposits near McMurray in Alberta.

Production in 1937 was 2,978,268 barrels valued at \$5,370,981 (£1,074,200). Total production to date is 40,042,700 barrels valued at \$79,556,900 (£15,911,400).

STRUCTURAL MATERIALS

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

Limestone, low in magnesia, and adaptable to the manufacture of Portland cement, is common, more particularly in the southern parts of Ontario and Quebec, the most densely settled parts of Canada. Manitoba, Alberta, and British Columbia have producing cement plants, but by far the greater part of Canada's production comes from Ontario and Quebec.

Production of structural materials in 1937 was valued at \$34,401,700 (£6,880,340). Total production to date is valued at \$929,000,000 (£185,800,000).

OTHER MINERALS

A number of other minerals are produced, the value of which amounts to a considerable sum in the aggregate. Antimony ore has been mined in Nova Scotia, New Brunswick, and British Columbia. Small manganese deposits occur in Nova Scotia, New Brunswick, and British Columbia. Occurrences of molybdenite are widely distributed. Titanium ore has been mined in Quebec. Tungsten occurrences are found in the Maritime Provinces, in British Columbia, and in the Yukon.

Arsenious oxide is obtained from the silver-cobalt ores of Ontario and occurs associated with gold in Nova Scotia, Quebec, Ontario, and British Columbia. Barite occurs in Nova Scotia, Quebec, Ontario, and British Columbia. Beryl is found in Ontario and Manitoba. Bentonite occurs in Saskatchewan, Alberta, and British Columbia. Large deposits of bituminous sands are found in northern Alberta, and oil shales in Nova Scotia and New Brunswick. Diatomite is mined in Nova Scotia, and deposits occur in British Columbia. Fluorspar is mined in British Columbia. Ochre and other iron oxides come from Quebec, also kaolin of fine quality. Magnesium sulphate and sodium carbonate are obtained from British Columbia, and sodium sulphate from numerous lakes in Saskatchewan. Phosphate is found in Quebec, Ontario, and British Columbia.

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