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THE GOLD INDUSTRY IN CANADA - 1925

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1. General Review

(a) Definition of the Industry - Canada's gold mining industry falls naturally into two main divisions: the winning of placer gold, or the "Alluvial Gold Mining Industry," and the recovery of free-milling gold from auriferous quartz mines, described under the title "The Auriferous Quartz Mining Industry." But in the treatment of ores containing metals other than gold in commercial values, such as copper and silver, gold is often recovered as a by-product; in making up production figures, gold obtained from the treatment of Canadian ores of every kind, is included in the total. Descriptions of these other industries, which do not obtain gold as their main product, are given in other bulletins of this series. In particular, the one entitled "Copper-Gold-Silver Mining Industry" may be mentioned, as most of the other lode mines producing gold in quantity are included in this group.

(b) Historical - During the early history of the industry in Canada, most of the gold produced was obtained from placer deposits in the province of British Columbia. Later, in 1898, the famous Yukon placers were discovered, and for some time these deposits constituted the principal source of Canada's gold. Recent developments in lode mining, however, have somewhat overshadowed the placer

workings; as the placer yields declined, lode gold recoveries increased until now this constitutes the principal source of supply. During the past ten or eleven years the province of Ontario has come to the front as a gold-producer, through the development of the rich gold quartz mines of the Porcupine and Kirkland Lake districts; the output from British Columbia mines has been improving for several years; new fields, particularly in the Rouyn area in Quebec, are being watched closely as the next gold-producing district.

(c) Sources - In 1925, the auriferous quartz mines yielded 85 per cent of the total production; alluvial deposits provided 4 per cent; Canadian copper and lead smelters recovered 2 per cent; and gold obtained by foreign smelters in the treatment of Canadian ores of various kinds, amounted to 9 per cent of the total Dominion production of gold.

(d) Importance of the Industry - Among Canada's mineral products, gold holds second place in point of value, being surpassed only by coal. In 1925, gold represented 15.8 per cent of the total value of Canada's mineral output.

Steady progress, too, has been made by Canada as a world producer, and for the past four years, Canada has held third place; the Union of South Africa and the United States continue to hold first and second place, respectively. South Africa production provides more than half the world's output, while Canada produces more than three-fifths as much as the United States and more than twice as much as Australia or South America and one and one-half times as much as the continent of Asia.

2. Reviews of the Gold Mining Industry by Areas:

(a) Ontario - Ontario with its rich mines in the Porcupine and Kirkland Lake areas, continues to hold the lead among the gold-producing provinces, contributing 84.2 per cent of the total gold production for Canada in 1925. In the same year Ontario's gold output represented 34.3 per cent of the aggregate value of the mineral production for the province.

Some idea of the phenomenal growth in gold mining in Ontario may be had from the facts that in 1903 the gold output of the province totalled only 9,096 ounces, or 1 per cent of the Canadian aggregate for this metal; in 1913, the output of 219,801 ounces was 27.4 per cent of Canada's total production; while in 1925, as already noted, Ontario's share at 1,461,039 ounces, represented 84.2 per cent of the total for the Dominion.

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In 1925, there were in the Porcupine area, six producing mines of importance, headed by the Hollinger, now one of the world's greatest mines. The others in order of their production values were: Dome, McIntyre, Vipond, Night Hawk Peninsular, and Consolidated West Dome Lake. Gold production from the Porcupine area amounted to 1,196,199 fine ounces or four-fifths of the total for the province. To the end of 1925, the aggregate yield of gold from the Porcupine area reached a value of more than \$180,000,000.

Kirkland Lake, Ontario's second most important gold-producing area, discovered in 1911 and more actively developed since 1919 yielded 260,552 fine ounces in 1925. Wright-Hargreaves and Lake Shore are the two principal producers; others of importance in this camp are: Teck Hughes, Tough Oakes Burnside and Argonaut, and the Barry Hollinger of the Boston Creek camp, in addition to which there are many smaller properties being developed.

The immediate outlook is for further increase in the production of gold. Mines at present producing are steadily increasing the capacity of their mills, enlarging the operations of their mines, and acquiring additional property. Hydro-electric power plants have been increased and the supply is now sufficient for enlarged operations.

Several deposits within the area of the Porcupine and Kirkland Lake camps, although not producing, are being vigorously developed and may be expected to add to the general output. Discoveries of gold ores, made from time to time in many parts of this province also add greatly to the probability of increased production.

Late in 1925 some apparently important discoveries of gold were made following some earlier efforts, near Red Lake in the District of Patricia, Ontario. This place is near the Manitoba boundary line more than 100 miles north of the National Transcontinental Railway line and somewhat less distance east of Bull Dog Lake in Manitoba. Several leading gold mining companies have become seriously interested in the district and thorough exploration is in progress. Attention had already been called to the locality by the Geological Survey over thirty years ago and more recently by the Ontario Bureau of Mines. Geologically, the area is a Precambrian complex. Keewatin lavas and later sediments (conglomerate and slate) are intruded by granite and porphyry. Quartz veins occur, and lavas in contact with quartz porphyry intrusions are characteristically altered. Owing to the keen interest this field has aroused, its merits should soon become definitely known.

The knowledge and experience gained in the successful development of gold mining in Ontario during the past thirteen or fourteen years is now leading to re-examination of many localities that were unsuccessfully opened at earlier times especially those along the main line of the Canadian Pacific Railway north of the Great Lakes and in the district of the Lake of the Woods. The Goudreau and Michipicoten areas are among those which are receiving renewed attention. Well-known mining companies are engaged in exploration and development work and results so far obtained are reported as promising.

The producing gold deposits of Ontario occur under somewhat uniform conditions but with local variations. All are in rock of Precambrian age and the principal producing deposits are associated with acid intrusives of Algoman age in volcanic or sedimentary rocks of earlier age.

(b) British Columbia - British Columbia, holding second place among the gold-producing provinces, contributes about 13 per cent of the Dominion total for this metal, but most of this yield is obtained from the smelting of ores in which other metals predominate. In the early days, placer production from the Cassiar and Garibee districts was of greater importance than it has been in recent years. From 1858 to 1892 yields from the placer deposits of British Columbia made up the entire production of gold from the province; in 1895 the recovery of gold lode deposits was greater than from the placers, and represented only 6 per cent of the total; while gold from milling ores made up another 9 per cent; gold obtained in the smelting of gold-bearing ores, treated primarily for other metals, constituted 19 per cent; and gold in similar ores exported for treatment made up the balance or 66 per cent.

In lode mining the Portland Canal division furnishes a large production of gold. In 1925 it gave more than 56 per cent of the gold output of the province. This district includes the Premier mine. Trail, (Rossland) Skeena, Boundary-Yale, Nass River and Coast divisions follow in importance. The deposits of Portland Canal, Trail, Skeena and Nass are complex ores, which are important for their content of silver or base metals as well as for gold.

The gold lodes of British Columbia are either in or associated with igneous rock, especially where these invade rocks of earlier age. Such conditions obtain over vast areas along the border of the Coast range and also in other parts of the province. Since the main geological features are on a large scale and the

province is but sparsely inhabited, it follows that many such zones of contact that are favorable for the occurrence of minerals of value, are still little known in detail over great distances. Consequently the province offers a field for prospecting that is of great magnitude and promise and increased production may be looked for with confidence.

(c) Yukon - Still holding third place among Canada's gold-producing geographical divisions, Yukon Territory produced 47,817 ounces of fine gold in 1925 from placer gold recoveries. Following the discovery of placer gold in the Yukon in 1896, there was a great rush to this new field and the placer gold output from the Territory increased enormously in the next few years reaching a maximum in 1900 when the yield totalled more than a million ounces of fine gold. For a few years, production continued on a large scale but by 1908 the annual output had dropped to about 174,000 fine ounces. Lode mining was undertaken in a small way about 1910, but production from this source never reached very great proportions. During the years 1909 to 1913 there was once more a steady upward trend due to increased placer workings. In the following year a recession set in, and the output has shown a continual shrinkage year by year, from 1914 until 1925, when there was again a slight upward turn to production; the output amounted to 47,817 fine ounces as compared with a total of 34,825 fine ounces for 1924. In 1925, there were 5 companies and approximately 93 individual operators working placer deposits in the Yukon. During the year, work was done on 120 miles of ditches and the quantity of material handled was estimated as 2,721,992 cubic yards. In crude placer gold, about 80 per cent of the weight is fine gold, 18 per cent silver, and 2 per cent, base metal or material of no value.

(d) Prairie Provinces - Manitoba, Saskatchewan and Alberta - The major part of the settled portions of the prairie provinces, Alberta, Saskatchewan and Manitoba, is underlain by rocks of sedimentary origin and of comparatively late age. It is, therefore, not likely to contain deposits of the precious metals. Alluvial gold is found in the Saskatchewan river in Alberta, but its recovery has not been found profitable.

The northeastern part of each of these provinces, however, occupies a portion of the Laurentian plateau which is underlain by rocks of Precambrian age and in many places is favorable for the occurrence of gold or other valuable minerals.

In Alberta the Precambrian area is small, about 5,000 square miles, and as yet no gold occurrences have been reported from it. In Saskatchewan,

it occupies about one-third of the province and in Manitoba it is still larger, comprising perhaps two-thirds of that province.

Near the margin of the Precambrian, adjacent to the Manitoba-Saskatchewan boundary, is an area known as The Pas district, in which gold, along with copper and pyrites, is found over a wide area, in bodies, some of which are large. A small amount of gold was recovered from some rich copper ores that were mined for a time at the Mandy mine in this district. Free milling gold was also mined for a time at the Rex mine, in the Herb or Wekusko lake district, eighty miles northeast of The Pas.

Other deposits of both classes of ore are found in the region and have received more or less development. Enormous deposits of copper-bearing pyrite at Flin Flon, one hundred miles north of The Pas also have an appreciable gold content. This property has lately changed hands and is under investigation by the new owners with a view to operation.

In Manitoba, east of Lake Winnipeg, prospecting has been carried on for as long as ten years. Numerous occurrences of free gold have been more or less developed in the vicinity of Rice, Gold, and Long Lakes, and more recently at Bull Dog Lake, near the Ontario boundary line. Intensive work was carried on in the Long and Bull Dog lake areas throughout 1925 by strong mining companies of successful experience; the outlook is hopeful for an important mining camp.

Geological conditions are broadly similar to those of other parts of the Precambrian complex in which gold is found.

(c) Quebec - So far, Quebec has not been a great producer of gold or gold-bearing ores, but recent work in the Rouyn field indicates that in the near future, this province will become of much more importance as a producer of metals, including gold, than it has ever been in the past. In reviewing the situation in Quebec, the fact that the ores of the Rouyn area are largely copper-gold, with some containing zinc as well, makes it necessary to consider the problem in connection with the production in other provinces from similar ores; this is done in the bulletin on the "Copper-Gold-Silver Industry," which should be read in conjunction with the present bulletin.

Suffice it to say, here, that the gold production from Quebec ores, to date, has been recovered from gold-bearing pyritic ores sold primarily as a source of sulphur for acid manufacture, and from lead ores, usually exported for treatment.

(f) Nova Scotia - Gold, obtained mostly from free-milling ores, and partly from gold-bearing ores containing arsenic, continued to be one of Nova Scotia's important items of mineral production from about 1862 until 1903 and during these years many deposits were worked, the annual yields varying from 6,363 fine ounces in 1862 to 30,343 fine ounces in 1902, with an average production of possibly 20,000 ounces each year. In 1904, production dropped to 10,362 ounces, and the output held around this figure until 1910; since then there has been no appreciable revival in production and in 1925 the total output was only 1,626 ounces.

Nova Scotia possesses a large number of small gold lodes in quartzites and slates of Precambrian age. In places these yield very rich ore. They have been worked irregularly during the past sixty years and have made a total production little short of \$19,000,000.

Several of these mines have been recently reopened. There is renewed interest in the region and further activity may be expected. Hydro-electric power is now available in most parts of the province.

3. The Alluvial Gold Mining Industry.

It is very difficult to secure complete information on placer mining in Canada, since placer fields are mostly remote and except in a few cases, are operated by small numbers of men of no fixed abode. Dredging companies and hydraulicing companies send annual returns to the Bureau and with the aid of the Mining Lands Branch of the Department of the Interior, some definite information is thus obtainable regarding the Yukon territory.

Statistics on the production of placer gold in British Columbia are obtained from the reports of the resident mining engineers in each of the mining districts who are in close touch with the mining operations in their districts; this figure for placer gold is believed to be approximately correct. In 1925, the output was reported as 16,479 crude ounces. Analyses show that placer gold contains, on the average about 80 per cent gold, 18 per cent silver, and 2 per cent base metal, so that the fine gold in the output amounted to 13,181 fine ounces worth \$272,475 when valued at the standard rate (\$20.671834) for an ounce of fine gold. One dredging company operating in the Cariboo district employed 25 men and paid \$39,876 in wages, for the recovery of 5,533 ounces of crude gold from 381,900 cubic yards of material. The remaining placer production of British Columbia came from the work of individuals operating in the Atlin, Liard, Stikine, Cariboo, Quesnel, Omineca, Peace River and other smaller districts.

During 1925 in the Yukon, 5 companies recovered 45,156 crude ounces or about 75 per cent of the total quantity won, and employed 245 workers to whom wages amounting to \$307,572 were paid. The total amount of earth handled by these operators was 2,721,992 cubic yards in the working of some 120 miles of ditches. There were also 93 prospectors or individual lessees who carried on work during the season, accounting for approximately 15,000 crude ounces of gold.

4. The Auriferous Quartz Mining Industry.

In 1925 there were 52 auriferous quartz mines operating in Canada, and of these 27 produced bullion or shipped ores while 42 carried on development work only. There were 36 mines operating in Ontario, 11 in British Columbia, 4 in Nova Scotia and one in Manitoba. The corresponding data for 1924 were: Ontario 41; British Columbia 11; Nova Scotia 6; Manitoba 2; and Quebec 10. All the properties mentioned as gold properties operating in the province of Quebec during 1924 were re-classified as belonging to the Copper-Gold-Silver group in 1925. Ontario mines produced over 90 per cent of the total gold recovered from the auriferous quartz mines of Canada.

In 1925, the ore mined totalled 3,646,460 tons of which 3,527,021 tons were put through the mills and 3,458,451 tons were cyanided. About 176,569 crude ounces were recovered by amalgamation and 1,713,903 crude ounces, by cyanidation. Shipments of bullion having a total net value of \$30,825,895, amounted to 1,890,101 crude ounces containing 1,482,294 fine ounces of gold and 254,514 fine ounces of silver. Ores and residues and high-grade slugs shipped to smelters were valued at \$4,275,908.

The total capital employed in this industry in Canada in 1925 amounted to \$84,964,062 as against \$83,982,765 in the previous year. Of this total approximately 74.5 million dollars was invested in Ontario and about 10 million dollars, in British Columbia. There was also a small amount reported as invested in gold mines in Nova Scotia and Manitoba.

Salaries and wages paid in 1925 amounted to about 10.6 million dollars as against 10.5 million in 1924. Employees in operating mines numbered 7,052 of whom 445 were on salary, 1,871 were wage-earners working on surface, 4,146 worked underground and 590 were employed in the concentrators. Of this total number employed, 6,248 were in Ontario gold mines, 702 in British Columbia, 49 in Nova Scotia and 53 in Manitoba.

Gold production in 1925 was the greatest of any year on record, and with the increase in milling capacity, the development of prospects into mines, improved mechanical equipment and the increase in the metallurgical knowledge concerning this metal, there is little doubt that Canada's gold production will continue to show steady growth.

5. The Copper-Gold-Silver Mining Industry.

The copper-gold-silver mining industry comprises a group of mines producing ore containing gold, silver and copper, in which the copper values predominate. The largest mines and the greatest number of this type are located in British Columbia, though Manitoba is known to have big ore reserves of copper awaiting adequate transportation and smelting conditions; Ontario has several small properties of this class, but they are mostly idle. In the province of Quebec the Eustis mine is at present the only producing property in this group, but recent developments in the section of the province adjacent to Ontario bid fair to make Quebec in the very near future, an outstanding copper-gold producer. British Columbia is the largest copper-producing province of the Dominion.

Ores from the principal mines in this group are handled as follows: the Granby Consolidated Mining, Smelting and Power Company mine and smelt on the property at Anyox on the Portland Canal; the Britannia Mining and Smelting Company situated at Britannia Beach on Howe Sound, and the Belmont Surf Inlet Mining Company, Ltd., export ore and concentrates to the Tacoma smelter of the American Smelting and Refining Company. From the mines of the Rossland district, which are mainly owned and operated by the Consolidated Mining and Smelting Company, ore is shipped to the smelter at Trail. The Allenby Copper Company which is mining at Copper Mountain near Princeton, B.C., concentrate the ore in their own mill and ship the concentrates to the smelter at Trail.

In all, 41 mines of this class were reported in 1925; of these, 9 were producing, 8 being located in British Columbia and one in Quebec. Of the remaining 32 mines which were operating but not producing, 28 were located in the province of Quebec and 4 in British Columbia.

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Because of close interplant relations, some companies do not possible to separate the capital invested in mines from that invested in their smelting operations. The Granby Consolidated is one of these and the total capital employed by this company has been credited in the report on "Metallurgical Works," in which total also the capital employed by the Consolidated Mining and Smelting Company in their smelter at Trail has been included, but the amounts invested in different mining properties have been accounted for separately, some in the Copper-Gold-Silver group and some in the Silver-Lead-Zinc group. With these limitations, the capital employed in the Copper-Gold-Silver Industry in 1925 amounted to approximately \$23,000,000 of which over \$9,000,000 was invested in the province of Quebec, and \$14,000,000 in British Columbia. Shipments of ores and concentrates from the copper-gold-silver mines in Canada amounted to slightly less than a million tons valued at approximately 7.7 millions of dollars. Foreign shipments amounted to over 125,000 tons valued at about 5 million dollars. Shipments to Canadian smelters amounted to 840,000 tons having a value of about 2.5 million dollars. These shipments of concentrates and ores were reported to contain 62,401 fine ounces of gold, 567,759 fine ounces of silver, 73,689,945 pounds of copper; in addition to 6,125 tons of sulphur which was exported in the form of gold-bearing pyrite from the Eustis mine in Quebec.

Salaries and wages paid in the industry amounted to \$3,555,844 and employees numbered 2,476 persons. Of the wage-earners, 861 were employed on the surface, 1,055 underground and 247 in the mills. Bituminous coal, coke, gasoline, oil, etc., consumed cost over \$152,000 and the electric power used was valued at slightly more than \$261,000. Power equipment employed numbered 400 units having a total rating of 32,483 h.p.

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