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The Future Development of the Mineral Resources of Canada

Mining is one of the most important industries of Canada. Its growth 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 the opening of great oil-fields and construction of pipe lines; of water-power development; of the improving of transmission and utilization of electrical energy; of the establishment of the automobile trade; 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, cement, and brick.

The prospects for the 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 three million 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 are still unprospected, one-quarter being even unexplored.

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"The geographical location of a mining area and its accessibility to transportation, determine to a marked degree the costs of operation." In Canada it is especially noticeable that much of the country is sparsely populated, and that transportation through these regions is extremely costly, thus rendering the development of mines at present an economic impossibility, and deterring prospecting in those regions. But Canada is well supplied with lakes and rivers, and as the exploitation of hydro-electric power progresses and is applied to transport making the cost of production of a metal increasingly less, it is highly probable that Canada may double or even treble her mineral output. One-third of the country has been prospected, but not all of that area has been exploited, so that a survey of the mineral output of the Dominion in the past may be taken as an indication of the glorious possibilities of the future. In 1931 alone, the total value of the mineral output of Canada was 227,769,000 dollars, and although this shows a fall of 52 million dollars from the 1930 total, and a fall of 83 million dollars from the 1929 total, it must be remembered that 1929 was the peak year in the price of

Statesman's

Year Book 1932.

metals, and the fall in the total is due to two factors — first, slightly increased quantity but greatly decreased value, and second, the fact that the low metal prices prevailing during the depression have necessitated the closing of many smaller mines. The mineral products are so numerous and so varied that I shall proceed to ~~to~~ take them in order, and show what they have meant to Canada, how the demand for them is increasing and how they cannot fail to be a future source of increasing prosperity to the Dominion.

Canada is now the second largest producer of gold in the world, and her total output for 1931 was valued at 55,395,000 dollars. Most of this gold is produced in Ontario — in fact in 1930, 82.4 per cent of the Dominion total came from Ontario. The chief mine is the Hollinger, one of the largest in the world, whose total production to the end of 1930 was valued at 159 million dollars. Encouraging discoveries have lately been made in western Quebec, where rocks of the geological character such as are found in the gold-producing districts of Ontario, have been found, but as yet there has been little production. Taking into consideration the nature of recent discoveries, and the fact that the depression has to some extent deterred the opening of mines though the high price of gold has led to increased prospecting, it seems quite reasonable that the production of gold in Canada will keep increasing for some years to come.

Native silver, associated with the arsenides of cobalt and nickel, with a trace of calcite,

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occurs in wide deposits, especially in the cobalt area, Ontario. Last year, Canada's total production of silver was valued at 5,984,000 ~~sat~~ dollars, a great decrease from 1930 owing to the reduced demand for silver, and consequent low market value of the metal. The ores are high grade and a great deal has been mined running a thousand ounces of silver to the ton. In the refining of the ores, the metals nickel and cobalt and their oxides are recovered. The chief deposit in British Columbia is the "Premier" mine, which, by coincidence, has now become the premier mine of the Dominion. Rich argentiferous galena has also been shipped from the Mayo district, Yukon. The future development of the silver industry will depend largely on the future demand for the metal.

Cobalt is a by-product in the extraction of the silver, and in 1930, Ontario's production of cobalt was valued at 1,144,007 dollars. For the last few years, Canada has been the world's chief source of the metal, which, as well as being used in paints, porcelain, and glass, is used in the manufacture of stellite - a cobalt, chromium, tungsten alloy - which is used in making high speed cutting tools, and is therefore likely to be in great demand in the future. Canada's cobalt resources have only been touched, and there are bright prospects for the opening of a valuable industry here.

Canada supplies over three-quarters of the world's nickel, the value of the production of this metal being 14,694,000 dollars in 1931. Although nickel is widely distributed

throughout the world's crust, there are comparatively few workable deposits of nickel ore. The most extensive source of this metal is in the mines of the Sudbury district, Ontario. The ore, which carries on an average 3% nickel and $1\frac{1}{2}\%$ copper, is remarkable as carrying also appreciable quantities of gold, silver, platinum, palladium and other metals of the platinum group, all of which are recovered by refining. With a further demand for these metals, which is likely in future, the production will be greatly increased.

Copper has occupied a leading position among the mineral products of Canada for many years, and the value of the 1931 production was 13,772,000 dollars.

1930 Report of
the Minister of
Mines for
Brit. Columbia

"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 copper output is semi-dependent on the production of nickel, while the Flin Flon mine in Manitoba is estimated to contain sixteen million tons of copper ore, not more than 800 feet deep. At the Mandy mine, the deposit was rich enough to permit of profitable exploitation, although the transportation conditions necessitated a haul of thirty-two miles, part by horse teams and part by boats to The Pas, whence the ore was railed one thousand three hundred miles to the smelter at Trail in Southern British Columbia. If, even in these conditions, its exploitation was possible, how profitable it will be when modern transport can be applied. There has been

a considerable production of copper from Quebec and Yukon, and in the former, 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 has formed the basis of important mining operations.

Iron ore mining and smelting have been carried on in Canada intermittently for a century and a half. The ore now feeding the Canadian smelting works is, however, imported. Until recently a sideritic ore was mined from the Chagpie mine of the Michipicoten district in Ontario, and a large body of about a hundred million tons has been proved at the Helen mine, where, at one time a pocket of about two million seven hundred thousand tons of haematite was mined.

Of the other mineral products of Canada, lead and zinc are outstanding. In 1931, Canada's output of lead was valued at 7,241,000 dollars, a fall of over 5 million dollars from the 1930 value. Of this quantity, 95 per cent comes from the Sullivan mine in British Columbia, which is one of the biggest lead mines in the world. The Mayo district in Yukon has produced some rich argentiferous galena, and from time to time Ontario has produced considerable quantities. The zinc output for 1931 was valued at 6,019,000 dollars, which showed an increased quantity but a decreased price. Again British Columbia was the chief source of supply. For many years the production of salt has been an important industry in Ontario, being valued in 1931 at

2,315,000 dollars. This seems to be a steady industry, which has increased rapidly over a space of ten years from a mere by-product to Canada's chief source of supply of salt, and despite the depression, increased its value in 1931 by about 40% of the 1930 total.

The prospects for future metal mining in Canada are extremely bright for Canada possesses an abundant distribution of smaller metals, not at present able to be mined by themselves in commercial quantities but which in future will be important by-products in the extraction and smelting of the more abundant ores. As the process of smelting and refining is perfected, more and more of these metals will be recovered. A short survey of some outstanding deposits may indicate the possibilities of the future metal production of the Dominion. Arsenic is found in Ontario and British Columbia, the value produced from the former province in 1930 being 109,932 dollars. Gypsum is prevalent in Manitoba and parts of British Columbia, there being a production valued at 851,677 dollars in 1929. Manganese occurs in small deposits in Nova Scotia, New Brunswick and British Columbia, while Magnesium Sulphate and Sodium Sulphate are recovered from the lakes of British Columbia, and Saskatchewan. Mercury, Strontium and Barium are found in parts of British Columbia and Ontario, while the value of other metals of note has been; Bismuth 263,701 dollars Cadmium 675,294 dollars, and 300,000 lbs. of Antimony have been recovered.

To complete this survey of Canada's

resources, a study of her potentialities in coal, natural gas, and petroleum is necessary. In Ontario and Alberta, natural gas has been found a convenient fuel for domestic purposes, and the amount harnessed from its abundant sources was valued at 5,061,588 dollars in 1930. As the rocks of Ontario are similar in character to those of the petroleum-producing fields of the United States, there is reason to believe that Canada may develop a large production, though her 1930 output was valued at only 235,746 dollars. In coal, Canada has large reserves, mainly in seams of from $3\frac{1}{2}$ to 20 and more feet in ~~that~~ thickness. The output from British Columbia alone in 1929 was 2,251,252 tons.

Canada's mineral industry, third in importance among the primary industries of the Dominion, being surpassed in output value only by the great basic industries of agriculture and forestry, brings to the nation a prestige beyond the monetary measure of the mineral output. First in nickel and asbestos, second in cobalt, third in gold and silver, fourth in lead and copper, and sixth in zinc among the world's producers, Canada enjoys an enviable position in the mining world with every prospect of continued expansion. At the moment Canada has every reason to believe that she is on the threshold of an era in which the contributions to national wealth from mining will be on a scale not known before, and this at a time when the metals play an increasing part in industry.

— 1992 words.

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Bibliography

(Books and references consulted in compiling the essay)

1. The Statesman's Year Book 1932
2. Whitaker's Almanac 1932
3. Canadian Handbook 1930.
4. First Annual Report on Mines & Minerals of Manitoba, Vol. I.
5. The Mining Situation in Manitoba — by J.S. De Lury
6. The Mineral Resources of Manitoba (1927) — R.C. Wallace
7. British Columbia, The Mining Province of Canada 1930
8. Ontario's Mines and Mineral Resources — Dept. of Mines
9. Economic Minerals of Canada — booklet from N.Z. & S.S. Exhibition (No. 2076, 1925)
10. Annotated List of Mineral Deposits of Canada — G.H. Young.
11. Annual Report of Minister of Mines of Brit. Columbia 1930.
12. Report of the Royal Ontario Nickel Commission 1917
13. The Sudbury Nickel Field — A.P. Coleman
14. Igneous rocks of Sudbury & their relation to the ore deposits,
— T.C. Phemister
15. Geology of Economic Minerals of Canada — G.H. Young
16. The Mineral Industries of Canada — Ont. Dept. of Mines.
17. Contributions to Canadian Mineralogy 1924, — T.L. Walker & H.L. Parsons
18. Lead & Zinc Deposits in Ontario & Eastern Canada — W.E. Uglov.
19. The Sudbury Basin Area — A.G. Burrows & H.C. Rickaby
20. Cobalt — Its occurrence, Metallurgy, Uses & Alloys — C.W. Drury
21. Geology & Underground workings of Cobalt and South Lorrain
Silver Areas — C.W. Knight
22. Gowganda Silver Area — A.G. Burrows.
23. Ontario Gold Deposits — P.E. Hopkins
24. Porcupine Gold Area — A.G. Burrows
25. Report on Kirkland Lake Gold Area 1929 — L.W. Todd.