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THE CONTRIBUTION OF MINING TO A GREATER CANADA

An address delivered by Mr. James A. MacKinnon, former Minister of Mines and Resources, at the Annual Dinner of The Canadian Institute of Mining and Metallurgy, in Montreal, April 26, 1949.

I wish at the outset to thank you for the kind invitation you extended to me to address you tonight. I warmly appreciate the opportunity to meet with you. Such contacts contribute greatly to a mutual understanding of interests common to all who are identified with mineral development in Canada. I have great faith in the future of our mineral industry.

Credit for much of the progress of the industry must go to technical associations like the Canadian Institute of Mining and Metallurgy, who have been responsible for the free interchange of techniques for the solving of mutual problems. Closely associated with these efforts has been the work of the Chambers of Mines in various centres. I wish to mention the work of the Mines and Natural Resources Section of the Montreal Board of Trade, which has been so active in stimulating interest in the mineral possibilities of the Province of Quebec.

That we are edging steadily closer to the billion dollar mark in our annual output of minerals was in evidence in 1948. In 1938 it was \$441,000,000. Last year it was well in excess of \$800,000,000. Quebec, which has been making such spectacular headway as a mineral producer, reported a record year as did all the other mineral producing provinces. Our export trade in metals and minerals was greater than in any past year.

But the improvement is by no means confined to production and trade. Our mineral estate is greatly increasing in value. We now have in the Prairie region a potential self-sufficiency in crude petroleum mainly as a result of recent developments in the Leduc, Redwater, Golden Spike and Woodbent sectors of the Edmonton oil field. That is a great change from a year ago when it was necessary to import upwards of 20,000 barrels of oil a day from the United States to help meet the requirements of those three provinces. In marked contrast, there is now no doubt that much of the oil produced in Alberta will be exported to nearby areas in the United States.

I need scarcely stress the importance of recent developments in the Labrador-Quebec region, though the full significance of these developments can be foreseen only in part as yet. There is a suggestion of this significance, however, in a statement appearing in President Truman's recent Economic Report to Congress. Dealing with capital outlays that will be required by mining in the United States, the Report notes

that "depletion of the high-grade Mesabi ore makes necessary the immediate development of alternative sources." Continuing, the Report states that "whether this takes the form primarily of exploitation of new sources in Labrador and elsewhere, or whether it involves primarily the construction of beneficiation plants for low-grade domestic ore, the new investment outlay will be enormous." From the marketing viewpoint of the Labrador ores, construction of the St. Lawrence Deep Waterway seems essential to the success of the project. Our Government has long been in favour of the Seaway and President Truman has again recommended to Congress that the work be undertaken.

A third development, this one at Allard Lake in Quebec, shows promise of placing Canada in the leading position as a producer of titanium pigments and metal. This comparatively little known metal has a great variety of potential uses in industry.

Today, more than even before, problems of material supply are to the forefront, more especially in relation to mineral raw materials. No industrial nation with an expanding economy can afford to ignore its future needs for these materials. Foreign trade policies must take these needs into account. Shortages of vital raw materials can retard industrial development to a degree that the whole standard of living of the country concerned is adversely affected. A slowing down of industry in general will lessen the demand for these materials. But only for a time. The long range demand is upwards.

The advantages to Canada of its large supplies of most of the principal metals and minerals were well demonstrated during the war. We did have difficulty in obtaining certain of the alloying metals in particular, and a few of the strategic non-metallic minerals. But we became one of the leading Allied producers of war munitions because we were able to obtain most of the metals and minerals from domestic sources.

The advantages in peacetime are no less important. Our wartime production of munitions demonstrated our great potentialities as an industrial nation. We have made notable headway in this direction since the war. Our capacity to produce capital, consumer, and other goods has been greatly increased.

A direct effect of this expanding industrial economy is the increase in the domestic consumption of various metals and minerals. Our consumption of refined copper, for instance, increased from 54,000 tons in 1938 to approximately 110,000 tons in 1948; of lead from 26,000 tons to 60,000 tons; and of zinc from 19,000 tons to 48,000 tons. In our expanding construction industry we are using great quantities of stone, gypsum, clay, asbestos, and products such as cement, brick, and insulation materials. Our chemical industry, which has shown such remarkable growth, uses large quantities of most of the industrial minerals, and several of these minerals also have important agricultural uses.

I have indicated the link that exists between our wealth of mineral resources and our present industrial expansion. I should like now to look further ahead in a survey of what may lie beyond the well-beaten paths. In one of these ventures into a largely unknown wilderness some of you here tonight have shared in the discovery and exploration of the

hematite deposits in New Quebec and Labrador. You have helped to place Canada in a position of great potential importance as a producer of iron ore. I understand that the area of favourable rocks is much larger than that of the far-famed Mesabi range. Already more than 300,000,000 tons have been proven and many times this tonnage will doubtless be disclosed. From an engineering point of view the project is probably the largest ever undertaken in this country. Overall capital expenditures required to bring the deposits into production are estimated at two hundred million dollars, and all but ten million dollars of this will be spent in Canada. To operate on a profitable basis a production of ten million tons a year will be required, the longer range objective being twenty million tons. These figures are indicative of the magnitude and possibilities of the project. We can justifiably foresee the same tremendous benefits accruing to Canada that the United States enjoyed from the development of its iron ore resources.

Iron ore and crude petroleum have been two of the principal gaps in our mineral economy. The former is being bridged and there are now good prospects that the latter will be also. However we are still importing more than 85 per cent of our crude oil requirements, and consumption has been rising rapidly. Our imports of crude oil in 1948 were 77 per cent higher than in 1940 and it is possible that consumption will show a corresponding increase in another eight years.

Great opportunities for industrial expansion on a major scale appear to be opening up in the West. I was tremendously impressed by this during my recent visits to Alberta and to the Yellowknife and surrounding areas.

However, development of mineral resources to full advantage, and more particularly of industrial minerals, is retarded by inadequate market outlets. The answer, in part at least, seems to be more industries based on the use of coal, petroleum, natural gas, salt, sodium, sulphate, clay and clay products, and building stone. If these developments materialize -- and there is increasing evidence that they will -- mining will be a major contributor to Canadian industrial expansion.

We have been steadily increasing our knowledge of the mineral possibilities of the Northwest Territories since 1930 when Gilbert LaBine made his notable discoveries at Great Bear Lake. But we have much more ground to cover. Present areas of active mineral development will provide footholds or bases from which to set out on the mapping, exploration, and development of other areas. For the most part we have only a reconnaissance knowledge of these areas.

Since 1920 we have been among the leading exporters of mine products, principally the non-ferrous base metals, asbestos and gypsum. Our consumption of these and other products is increasing but we are capable of producing much greater quantities of many of these products.

Canada will probably be a main source of world supply for many years to come. It might be of interest to note in this connection that, whereas in 1940 the United States took less than two per cent of our total exports of copper, on a tonnage basis, it took close to 15 per cent in 1948. In the same period the percentage for lead increased from six to 51 and for zinc from one to 51.

Our mineral economy has been further strengthened by the union of Newfoundland with Canada. As a producer of minerals, Newfoundland, on the basis of value of output in 1948, is next to Manitoba and well ahead of New Brunswick. The total value of its mineral output last year was about 16 million dollars. Mineralwise, it is best known to Canadians for its production of iron ore from the Wabana deposits. We have been obtaining this ore for our steel industry at Sydney since 1895. These shipments in 1948 amounted to approximately 710,000 tons. Overseas demand for the ore has been exceptionally strong and in 1948 shipments to Great Britain and Germany reached a total of more than 1,600,000 tons.

Newfoundland also supplies us with most of our requirements of fluorspar for use in the production of aluminum. Next to Great Britain it is the largest producer of this mineral in the Empire. In addition, we obtain part of our requirements of grinding pebbles from Newfoundland.

Next in importance to iron ore is the Newfoundland production of lead, zinc, and copper from the Buchans deposits. This reached a total value in 1947 of close to nine million dollars. A few minerals, other than those I have mentioned, are produced in small quantities. However, except in the Labrador-Quebec iron region, and in limited areas elsewhere, neither Newfoundland nor Labrador has been extensively prospected.

I have briefly reviewed the status of the industry with the idea of bringing to your attention the fact that the Government is fully aware of what a sound flourishing mineral industry means to the prosperity and economic stability of Canada.

Government assistance and encouragement to the mineral industry takes many forms: the services, for instance, of our Geological and Topographical Surveys, and our Bureau of Mines at Ottawa; the financial assistance we have provided in the construction and improvement of roads into mining areas throughout Canada; the power development at Snare River in the Northwest Territories to supply electrical energy to mines in the Yellowknife and other regions; the various income tax concessions granted as a means of encouraging and speeding up mineral development; the bringing in of Displaced Persons to offset the labour shortage in the mines; and about a year ago, the Emergency Gold Mining Assistance Act and its complementary legislation of the present session.

The development of Canada's mineral resources has been closely associated with the exploration and settlement of large sections of the country. The encouragement of this development has become increasingly prominent. Very large areas, particularly in the north, are of value as a potential source of mineral wealth. A uniform expansion of the population into these areas is considered particularly desirable. In addition to direct assistance and participation in works projects such as construction of roads, power plants, and other services, Parliament has passed legislation placed before it by the Government designed to stimulate exploration and development of minerals and oil. In these concessions Canada has probably gone farther than any other country. Some of this special legislation has been in effect for years.

As mine production involves the gradual exhaustion of the ore, a deduction is allowed in the calculating of tax-

able profits. This amounts to one-third of the profits in the case of all metal mines other than gold mines. Various industrial mineral mines operating on non-bedded deposits, and oil wells in Western Canada are now also allowed the 33 1/3 per cent depletion rate. In the case of gold mines the depletion rate was increased in 1947 to 40 per cent of the profits, or four dollars per ounce of gold produced in the taxation period. Whichever is greater may be deducted.

Another tax concession, originally introduced in 1936, is the three-year tax exempt period following the commencement of production of a new mine. This concession, which can also be applicable to a revised old mine, was in effect under the Income War Tax Act from 1936 to the end of 1942. During the years 1943 to 1946 inclusive, the exemption provision was applicable only to certain new mines under the Excess Profits Tax Act, but it was re-introduced in 1946 under the Income War Tax Act to apply to all mines operating on non-bedded deposits, which came into production between January, 1946, and December, 1949.

In addition to the two main tax benefits I have outlined, there are certain other tax concessions designed especially to induce exploration for minerals, oil, and natural gas. Mining and oil companies are now permitted, in calculating their taxes, to include as costs all expenditures made in connection with the exploration for minerals. Oil companies may also deduct from their taxes, expenses made on deep-test wells, in addition to including these expenses in their operating cost.

Most of you are doubtless acquainted with the main features of the Emergency Gold Mining Assistance Act and the regulations thereunder. It was designed primarily to assist the marginal gold producers, largely with the purpose in mind of maintaining the communities built up around these operations.

Up to, and including April 15, 1949, seventy-six gold mines had received payments under the Act. The total amount of assistance payable to these mines is roughly \$9,137,000., and of this, 80 per cent had been paid by April 15th. The remaining 20 per cent is a holdback to be paid after the books of the mines concerned have been audited by the Comptroller of the Treasury, and after certain inspections have been made by the Department of Mines and Resources.

The total production of these 76 mines amounts to 2,827,675 fine ounces of gold. The average assistance payable per ounce of gold up to and including April 15, 1949, is \$3.23.

Included in the 76 mines are 13 properties that are classified as "new mines" under the Act. They receive the rate of assistance on their total production during their first year of production instead of on the excess of production over two-thirds of the base year output.

Present indications are that total assistance payments under the Act for the calendar year 1948 will amount to over 10 million dollars.

In attempting to offset labour shortages at the mines the Government has a programme of admitting suitable Displaced Persons into Canada.

Following approval of the programme by the Canadian Metal Mining Association's Labour Committee in September, 1947, the first group of 182 immigrant miners arrived in Canada in December of that year. From then until the end of January last, some 3,000 miners have been settled in metal mining communities across the country. Though most of them have gone to the mines of northern Ontario and northwestern Quebec, groups can be found from the asbestos fields of the Eastern Townships to the silver-lead deposits of the Yukon. By the end of January 1949, a total of 1,250 miners had been added to the labour pool of the Quebec mines; Ontario had received about 1,500; Manitoba, 164, and the Yukon, 66.

We have had indications of the success of the scheme both on the part of the mining industry and the immigrants themselves from many sources. The monthly progress reports furnished by the companies indicate continued satisfaction with these newcomers. Actually there has been a requested increase in labour supply from the European Refugee Camps, from the original 2,000 to over 3,500. As to the miners themselves, out of 700 who have completed their contracts, about 80 per cent have indicated their intention of remaining with the industry.

Last fall another phase of the programme got under way with the arrival of their families in Canada. This has proved to be a stabilizing factor in the whole programme and is proceeding as rapidly as transportation and accommodation facilities permit. In most mining centres, accommodation has not been difficult, and in outlying mines, homes are being constructed by the companies themselves or jointly with the miners. Approximately 100 housing units have been provided in remote communities. To date some 250 families have been reunited in this way.

The assimilation of these people into the Canadian way of life has proceeded rapidly. Assistance given by Federal and Provincial governments in conjunction with local organizations in studies of Basic English and citizenship have been most successful. These people have proved to be an asset, not only to the mining industry, but to the communities in which they have settled. We may look forward to their admittance to full Canadian citizenship within the next few years.

The success of this programme, due largely to the initial careful selection of the immigrants by Government and industrial representatives, is an indication of what can be accomplished by Government and industry co-ordinating their efforts in the development of Canada.

Delivery of power from the Snare River Storage and Power project was commenced early in October last. The project was built at a total cost to the Government of approximately four and a half million dollars. This was the cost of the 8,350 horse power plant and of the 94-mile transmission line. As the project neared completion Parliament passed the Northwest Territories Power Commission Act. By this Act a Commission was set up to facilitate the construction and operation of power plants in the Territories for mining and other interest. Electric power from Snare River and such other plants as may be constructed will be sold at as low a rate as possible, subject to the plants being on a self-sustaining basis. Through the Commission, power will be made available in the Northwest Territories as soon as its need is definitely

established in any area, thereby encouraging the development of mineral properties.

The field of Government assistance I have mentioned are quite apart from the services of our Geological and Topographical Surveys and our Bureau of Mines. We have been extending these services and we plan further extensions as qualified staff becomes available.

In the geological mapping of Canada we have accomplished much, but we have a tremendous task ahead. Since its establishment in 1842 the Geological Survey has mapped about 27 per cent of the total area of the Dominion. Much of this work has been done on the standard one-mile and four-mile scales and we have also issued many maps on more detailed scales. Much of the work in the less accessible areas and most of that in the remote areas has been in the nature of reconnaissance surveys.

In line with our endeavour to speed up the work of mapping the geology of Canada we have 70 field projects tentatively in mind for the 1949 season. Emphasis this year will be given to the Yukon, the Northwest Territories and to the mapping of areas having metal mining possibilities. We are assigning geologists to the Quebec-Labrador region.

In Newfoundland, we are arranging this year to complete the geological work that the Government there has had in progress, and to start some new work. This latter will be mainly in the nature of inspectional surveys. In due course a geological map of the Island of Newfoundland will be made.

Our geological programme will perhaps include a reconnaissance survey of the Frobisher Bay area, Baffin Island.

Looking further ahead, we are endeavouring to increase our geological staff to the point where we can place 100 parties in the field each year. As soon as base maps become available it is our intention to map that almost wholly unexplored section of the Northwest Territories extending from Hudson Bay westwards for about 500 miles.

We anticipate a steadily increasing need in the years ahead for work on Pleistocene geology -- such matters in particular as soil surveys and ground water supplies. Work in this field of endeavour is to be expanded, as is our work in engineering geology. We propose to train several geologists in this work during the 1949 season.

Under the best of conditions, geological mapping is a relatively slow process. However, we have some reason now to believe that it can be greatly speeded up by use of the airborne magnetometer. This instrument should prove of great assistance in the interpretation of geological structures in Canada's many large drift-covered areas. It can also be used to locate directly any ore deposits that are themselves magnetic. By use of it, regional geological features can be identified and their possible relationship to local features assessed in a fraction of the time that would be otherwise required to study these features.

Last year, in a continuation of our experimental work with the airborne magnetometer, we covered the entire area of the Quebec-Ontario gold belt from Kirkland Lake to Senneterre, or roughly 15,000 square miles. Had this instru-

ment been available several years ago when we were mapping much of this area, a great saving of time would have resulted. From last year's work in this area we anticipate a speeding up of the detailed mapping of the region.

This year it is planned to cover with the airborne magnetometer the area extending roughly from Renfrew and Kingston to Georgian Bay, much of which contains iron-bearing rocks. This is in co-operation with the Ontario Department of Mines, who intend to do geological work in the area.

The maps resulting from all our airborne magnetometer work will be made available to industry as soon as possible.

In the Topographical Survey work our objective is 100 field parties. Last year we had 38. This year we expect to have 70 parties in the field. We have been adding to our staff of topographers as rapidly as men become available and our present staff of 200 engineers and office technicians compares with a staff of only 40 in 1940. Our annual appropriations for this work have shown a five-fold increase since 1940, and in line with these expansions we are now producing close to ten times as many topographical maps as in 1940.

In vertical air photography we covered a total of 340,000 square miles last year. This compares with only 44,000 square miles in 1938. This aerial photographic work is essentially for mapping purposes, but it also serves many other uses in the development of Canada's natural resources. Most of it is done by the R.C.A.F., but as an encouragement to free enterprise, some of it is let out to private companies.

In all our topographical work full advantage is being taken of the use of modern equipment and scientific tools. For instance, we are considering the use of the helicopter in mountainous areas for the movement from station to station of field parties and their equipment. This would enable the covering of much more territory in a field season in such regions and would largely eliminate the use of pack horses.

In the Bureau of Mines we have a staff of engineers and scientists engaged in tests and research on all types of Canadian ores and minerals, and we maintain the most up-to-date facilities and equipment for this work.

It is no secret that the recent war ate heavily into our ore reserves and those of the United States. Moreover, current rates of metal and mineral consumption in both countries are even higher than during the war. Consequently, there is now a greater need than ever before for us to devise ways and means of making full use of our reserves. Ways must be found for the efficient and economical treatment of ores and minerals occurring in refractory deposits, and even more so for the development of low grade ores. There are several large bodies of refractory or low grade deposits in Canada for which there is at present no process by which they can be treated on a profitable basis even with the present high prices of metals. It will be the work of the Bureau of Mines to help to develop processes for the economic working of these deposits.

Among the problems the Bureau now has in hand is the treatment of the refractory gold ores of the Yellowknife and other areas. In this we are well advanced toward a solution though some difficulties still remain to be overcome.

The Bureau has been following developments relating to the production of synthetic fuels very closely and is arranging for the installation of a plant to operate at high pressures. We hope to obtain valuable data on the yields that can be expected from our Canadian resources, and at the same time to do some pioneering work of a fundamental nature.

In the case of the industrial minerals, few of the Canadian producing companies are equipped either technically or financially to do the research necessary to meet the highly competitive specifications that are becoming more rigid. In addition to its work on the beneficiation of industrial minerals the Bureau does research on the development of new products and on the improvement of existing products. It was the Bureau's work that led directly to the establishment of a rock wool industry in Canada, with a present production value well in excess of five million dollars a year. The brucite magnesia industry at Wakefield, Quebec, also owes its origin to the work of the Bureau.

In its Physical Metallurgy Research Laboratories the Bureau has several projects of major interest in hand. One of these relates to the development of light alloys, with particular reference to magnesium alloys. This is of special interest in jet propulsion development. A closely related project is the development of new high temperature alloys, the object being to produce an alloy superior to existing alloys that can be cast into blades for gas turbine jet engines. The preliminary results of this work have been promising.

Another important phase of our research is the investigation of the properties of metals at low temperatures. This brings in the whole study of welding at low temperatures. Still another is work aimed toward the simplification of steel specifications. This involves a study of the relationship between American and British standards.

The Bureau also handles all research dealing with the properties of metals in connection with the Atomic Energy project at Chalk River.

I stated at the outset that I have great faith in the future of mining. In my remarks I have indicated my reasons for this faith. They are based on the evidence of past achievements, present developments, and what appears to me to be future prospects. The industry has come a long distance since the turn of the present century when its operations were confined in the main to a few widely scattered areas. It is a leading industry in every province but one, and in the two Territories. Its growth has been rapid and the influence of this growth on the Canadian economy has increased to a corresponding degree. The fact is that, quite apart from the employment it affords and the market outlets it provides, the industry is the principal mainstay of our industrial expansion. This feature will loom much larger as the beneficial effects of developments gradually unfold in the oil fields of Alberta, in the Quebec-Labrador region, and at Allard Lake. It is becoming increasingly apparent that the industry is capable of making a much greater contribution to the national welfare in the years ahead. How much greater, will depend upon how wisely we manage our mineral estate. In this, we have acquired a great wealth of "know how" over the years, not only in the technological field but in every phase of mineral endeavour. By continuing to put it to the best possible use,

by taking full advantage of scientific research, and by giving every encouragement to this research, we have the means of deriving the utmost benefits from our wealth of mineral resources, and thus, of keeping Canada well to the forefront among the industrial nations.

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