



## STATEMENTS AND SPEECHES

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CANADIAN MINING OUTLOOK

A speech by the Deputy Minister of Mines and Technical Surveys, Mr. Marc Boyer, to the American Mining Congress, San Francisco, September 23, 1954.

After filling my lungs with the balmy air drifting in from the Pacific and feasting my eyes on the luxurious natural setting of your splendid city, I can well understand why so many Easterners find themselves humming that rollicking song "California Here I Come" as they speed westward toward the Golden Gate. It calls to mind the story of how the Lord built the United States; of how He started on the East Coast and did a progressively better job as He moved westward, finally attaining perfection here in San Francisco. Depending upon where the story is told of course, the coast would need to be changed.

May I state at the outset that I consider it an honour to be present here today and to share in a small way in your programme. I am in distinguished company for the American Mining Congress includes in its organization engineers, scientists and others who have played and are playing notable roles in the mining and metallurgical industries of this country. Canadians engaged in mining or in related fields of endeavour have always shown a keen interest in your annual deliberations. In fact, the mining fraternities of our two countries are as one when it comes to attending each others conventions. We speak the same language, or considering the accounts of those of us in Canada whose mother tongue is French, and the southern drawl of a large section of your people, perhaps I should say, as President Eisenhower is reported to have said to Prime Minister Churchill on a notable occasion, "We speak practically the same language". This, of course, largely explains why the interest of Canadians in American affairs and developments is matched only by your own interest, including our interest in that widely known lady, Miss Marilyn Monroe, who is as well known to us as our Royal Canadian Mounted Police are to millions of American movie-goers.

My task today is to deal with the outlook for Canadian mining. There are several approaches one could take to a big subject like this. The one I have in mind is much like that of the farmer who found he was the only member of the congregation present for church services one Sunday afternoon. The minister had a carefully prepared sermon to deliver and he was bothered as to what he

should do. So he sought the opinion of the farmer, "Well" the farmer explained, "When I go to feed my cattle and only one turns up, I feed it." Accordingly, the minister proceeded with his sermon and continued to speak for an hour and a quarter. He then asked the farmer what he thought of the sermon. "Well" said the farmer, "When I go to feed my cattle and only one turns up, I don't give it the whole load." I propose to follow the farmer's advice, even though my audience is much larger than the minister's. In other words my talk will be limited to the more interesting features, and even they provide material for a considerable coverage.

### Post-War Headway Remarkable

The headway we have made in the development of our mineral resources since the war has been little short of remarkable. It is this progress of a decade that I plan to portray for you, for in this decade we have the foundation of what lies ahead of us. I have described the headway as remarkable. Seven years ago, for instance, we weren't producing sufficient crude petroleum to meet more than eight per cent of our needs; today crude petroleum tops the list in our mineral production and the output is the equivalent of close to 45 per cent of our requirements. Within a few years we expect it to reach 100 per cent, in balance. Iron ore affords another striking example. Just 16 years ago we produced no iron ore. Our output is still relatively small compared with that of United States but within a decade we have hopes of producing 20 to 30 million tons a year and insofar as known reserves are concerned these tonnages could be greatly exceeded. I could cite numerous other examples, but what it all adds up to is that, mineralwise, we are immensely richer than we had reason to expect, even as recently as a decade ago. Our mineral production in 1953 was valued at 1.3 billion dollars which compares with only half a billion in 1945. Being next door to the richest country in the world, we rather enjoy the experience of learning that we too are a nation of great potential wealth. We are intrigued by our newly disclosed riches and the more so because large regions of our country have yet to be explored in any detailed way, and because several of the most recent discoveries have been made in areas close to the well-beaten trails. Our optimism, I feel is well-founded, but let the facts speak for themselves.

We see these facts to best advantage by considering the changes that have taken place in the Canadian mineral landscape since the war.

### Main Geological Provinces

Note that Yukon, most of British Columbia, and parts of Alberta and Northwest Territories are underlain by Cordilleran rocks. In Canada they cover an area of approximately 619,000 square miles and in 1953 accounted for about 16 per cent of Canada's mineral output. Immediately to the east and stretching from the United States through to the Arctic are the Interior Plains, covering an area in Canada of 775,000 square miles and varying in width from 840 miles at the International border to 300 miles

near the Arctic. They account for over 95 per cent of Canada's crude oil output, most of the natural gas and much of the coal. Mineral production from the region climbed from \$29,700,000 in 1946 to \$244,400,000 in 1953, with promise of a two-fold increase before many years have passed, mainly from a wealth of oil and gas developments.

Next comes the Canadian Shield, largest by far of Canada's geological provinces and the source in 1953 of 42 per cent of the Canadian mineral production. This great region of Precambrian rocks has an area of 1,800,000 square miles and although its exploration may be said to have begun when Jacques Cartier sailed up the St. Lawrence River in 1534, the task is still far from complete, as I will indicate later. It covers all of Labrador, much the greater part of Quebec province, most of Ontario and Manitoba, parts of Saskatchewan and Alberta, and the eastern mainland of Northwest Territories.

Bordering the Canadian Shield on the south and extending northeasterly from Lake Huron and the head of Lake Erie to Anticosti Island is the geological subdivision known as the St. Lawrence Lowlands.

The three Maritime Provinces and the Island of Newfoundland comprise the Appalachian Region. The Arctic Islands of Canada, together with Boothia and Melville Peninsulas form the Arctic Archipelago, with a total land area of 525,000 square miles. We know comparatively little of the potentialities of this vast region as yet but we are adding to our knowledge each year and I might state we have considerable reason to believe that portions of the region are rich in mineral resources.

#### Changes in Mineral Landscape

I have stated that the growth in Canadian mining has been truly remarkable. The changes that have taken place since the war provide evidence aplenty of this. However, I shall deal only with those changes that will give you a clue to the overall pattern of the growth, and incidentally to the outlook. I will start with Yukon and Northwest Territories and will there go from west to east through the various provinces.

Yukon, by way of background, has been a substantial contributor to the Canadian mineral output since 1896 when the far-famed Klondike gold rush got underway, but its production is relatively small in relation to its size. It amounted to \$14,400,000 in 1953, which, it should be noted, is nine times the value of output in 1946.

Placer gold mining is still going strong but the main interest since the war has been centered in United Keno Hill Company's silver-lead-zinc operations in the Mayo area. The company is Canada's largest single source of silver, with an output of over 6,000,000 ounces in 1953. This whole region is considered to be potentially important as a productive source of lead and zinc.

You may have seen reports recently of a \$700 million power and metallurgical project to be undertaken by Quebec Metallurgical Industries Limited in Yukon and northern British Columbia. The project will involve the

eventual production of 4.3 million horse-power of electric energy to be used in the operation of smelter and refineries that will treat ores from Canada and from various other countries. The development indicates the dimensions of some of the undertakings in the northerly regions of our country.

We come next to the Northwest Territories, the largest by far of Canada's political sub-divisions and considering that they include the Arctic Islands, the least known. Practically all the mineral output comes from three relatively small areas, namely the Norman Wells field, which contributes a small production of oil; Port Radium on the east side of Great Bear Lake, a main world source of uranium; and the Yellowknife area north of Great Slave Lake, where considerable gold is produced. The total mineral output in 1953 was valued at only \$10,521,000, very small indeed for an area of 1,305,000 square miles, but ten times greater than the value in 1946. In both years the value is exclusive of pitchblende products, figures for which are not published. Changes have been occurring, however, the two major developments being at Pine Point on the south side of Great Bear Lake and at Rankin Inlet on the west side of Hudson Bay.

At Pine Point we have what shows some promise of proving to be one of the major disclosures of lead-zinc ore on this continent. However, much work remains to be done before a proper appraisal can be made. Consolidated Mining and Smelting Company and Ventures Limited have already outlined several million tons of ore by drilling.

The Rankin Inlet development is about 300 miles north of Fort Churchill. It is a nickel, copper, platinum property and is being developed toward production.

The fact that most of the Northwest Territories is underlain by potential ore-bearing Precambrian formations suggests that many finds remain to be made.

Turning now to British Columbia, the main post-war change has been at Kitimat, scene of the huge Aluminum Company of Canada project. This will eventually account for a production of 500,000 metric tons of aluminum a year and will bring Canada's total annual output to 1,000,000 tons. Production was commenced in July last at an initial rate of 90,000 tons a year. The ore will all be imported and thus for Canada, it is a manufacturing rather than a mining project.

Before mentioning the other major changes in British Columbia, I should perhaps note that this province accounts for close to 80 per cent of Canada's output of lead, 47 per cent of the zinc, 37 per cent of the silver, and is an important producer of coal, tungsten, iron ore and other minerals. In annual value its mineral output increased from \$74,600,000 in 1946 to \$160,700,000 in 1953.

I will mention the other major changes briefly, with some of the pertinent facts:

First is the development of asbestos deposits by Cassiar Asbestos Corporation Limited in the McDame Lake area in northern British Columbia. Regular

production was commenced a few months ago. About 200 miles to the southwest interesting copper deposits are being explored by Granduc Mines Limited.

Next is the disclosure of huge quantities of natural gas in the Peace River section, in the vicinity of Fort St. John. Reserves have been placed at two trillion cubic feet and I understand there is hope of disclosing much larger quantities. However, much depends upon the finding of market outlets. The intention has been to build a pipe line to the Vancouver area, but this would not have been economic without access to the northwestern United States market, and application to enter this market was recently turned down by the Federal Power Commission in Washington.

Arising from the oil developments in Alberta is the construction of the Trans Mountain oil pipe line from Edmonton to the Vancouver area which was completed last October at the cost of \$97,000,000 and having a capacity of 120,000 barrels daily.

Last is the expansion programme of the Consolidated Mining and Smelting Company of Canada Limited whose Sullivan mine at Kimberley is one of the largest sources of lead and zinc in the world. The programme includes a \$30,000,000 hydro-electric power plant on Pend d'Oreille River; a \$9,000,000 ammonium phosphate fertilizer plant which is now in production at Kimberley; a \$3,200,000 addition to the zinc refinery; and a \$15,000,000 expenditure to reconstruct the lead smelter.

#### Oil and Gas Highlight Changes in Prairies

I imagine most of you are familiar with the changes in Alberta. The "Texas of Canada", we called it for a time; at least until we learned that some Americans were referring to Texas as the "Alberta of the United States". Until the discovery of the Leduc oilfield about 18 miles southwest of Edmonton early in 1947 we were very discouraged indeed in regard to our crude petroleum outlook. Our economy was expanding rapidly and yet our production of crude oil was dwindling. In contrast, we are now producing at a rate in excess of 260,000 barrels daily and from the viewpoint of reserves are capable of producing close to three times that rate.

Alberta's natural gas reserves are enormous, some recent estimates being as high as 13.4 trillion cubic feet. As and when market outlets become available still greater quantities are likely to be disclosed.

The 1765-mile Interprovincial pipe line from Edmonton to Sarnia in Ontario provides the main outlet for the oil, and the proposed Trans-Canada pipe line from the Prairies to Ontario and Montreal will provide the main outlet for the natural gas. This line will have a length of 2250 miles and will be the longest in the world.

Alberta's mineral production reached a value of \$246,000,000 in 1953, more than four times that of 1946.

The post-war changes in Saskatchewan are mainly a smaller version of those in Alberta, but in addition Saskatchewan is moving rapidly to the forefront as a

producer of uranium ore. Most of this latter activity is in the Beaverlodge region north of Lake Athabasca. One mine, the Ace-Fay owned by Eldorado Mining and Refining Limited, which in turn is owned by the Federal Government, has been in steady production since April 1953, and the privately owned Gunnar property about 20 miles distant from the Ace-Fay is scheduled for production by the fall of 1955. The fact that approximately \$20,000,000 is to be spent to bring the property into production will afford a suggestion of the size of the deposits. Another private property, the Rix-Athabasca, has been shipping crude ore to the Ace-Fay mill on a custom basis.

Saskatchewan's mineral production, exclusive of uranium, was valued at \$48,000,000 in 1953, double that of 1946.

Next is Manitoba, where two main changes have occurred since the war.

Early in 1951 the first discovery of crude oil in the province was made in the Virden area in southwestern Manitoba. Production is increasing steadily and is now at a rate of about 5,500 barrels a day. It is a light crude and is fed directly into the Interprovincial pipe line.

The other change is at Lynn Lake about 520 miles northwest of Winnipeg, where Sherritt Gordon Mines Limited brought a new nickel-copper property into production late in 1953. The company ships its nickel concentrates to its plant at Fort Saskatchewan near Edmonton, Alberta for treatment. Development of the Lynn Lake property involved construction of a 145-mile railway at a cost of \$15,000,000.

#### Iron and Nickel to Forefront in Ontario

We now come to Ontario, Canada's leading mineral producing province, source of about 70 per cent of the world nickel output, and a leading producer of copper, gold, the platinum metals, iron ore and cobalt. Production in 1953 was valued at \$460,500,000 compared with \$191,500,000 in 1946.

The most recent and in some respects the most colourful change in Ontario was the discovery of copper-zinc deposits in the Manitouwadge area about 40 miles north of Heron Bay on Lake Superior. The discovery property is owned by Geco Mines Limited and diamond drilling has disclosed huge tonnages. One hundred companies are now active in the area and over 10,000 claims have been staked.

The most important change in Ontario, however, was the bringing into production of the large hematite deposits in the Steep Rock area about 140 miles west of Port Arthur in 1945, when regular shipments were commenced. Thus for the first time, as the President of Steep Rock Iron Mines Limited, has stated, Central Canada had a producing iron range, an integrated group of ore deposits supporting several mining operations. Although exploration is far from complete, known reserves are sufficient to support a production of 10 million tons a year for decades, that tonnage being an early objective.

The iron ore operations in the Michipicoten area about 130 miles northwest of Sault Ste Marie are mainly post-war also and perhaps should be listed among the changes. The ore is siderite and like Steep Rock, most of the production goes to the United States. Production is at a rate of about 1.1 million tons a year. There are several hundred million tons of reserves in the various deposits.

Again, at Marmora, is another iron ore development, the ore in this case being magnetite, discovered in 1949 as a result of an airborne magnetometer survey. You may have seen an article on it in Fortune magazine a few years ago. Production is to start in October this year, and is to be at a rate of 500,000 tons of agglomerated concentrates annually. Bethlehem Steel Corporation is the parent company and shipments to the company's plant at Lackawanna, near Buffalo, are to commence next spring via Picton on Lake Ontario.

A further post-war change in Ontario is the production of asbestos, the source of the output being Canadian Johns-Manville deposits about 150 miles almost due north of Sudbury. About 2,000 tons of fibre a month are produced. The deposits are extensive but are by no means as large as those in the Eastern Townships of Quebec which are the source of about 60 per cent of the world output.

Two further changes in Ontario are of exceptional interest, not only to Canada but to the whole of the free world.

The first is the great expansion of the nickel industry. Since the war, the International Nickel Company of Canada Limited, which accounts for 71 per cent of the free world output of nickel, has spent upwards of \$150,000,000 in expanding and modernizing its mines, plants and facilities. This programme has involved the change-over to complete underground mining from open pit and underground operations, and the mining and treatment of low grade ores. Much of the 14,000,000 tons of ore a year Inco is now treating is low grade. In 1946 the company treated 7,736,000 tons of ore. It has started construction of a \$16,000,000 plant in which it will treat nickeliferous pyrrhotite to recover nickel and high grade iron ore.

Also in connection with nickel, and this too in the Sudbury area, is the \$55,000,000 expansion programme of Falconbridge Nickel Mines Limited. This programme involves the bringing of six new mines into production, the most important of these being the Fecunis property on the north rim of the Sudbury basin which is scheduled to commence production in 1958. The objective is an output of 55,000,000 pounds of nickel a year by 1960, compared with a present annual output of about 40,000,000 pounds. Both Inco and Falconbridge have firm contracts with the United States Government for the purchase of much of their nickel and through Falconbridge, that of three new producers, namely East Rim, Milnet, and Nickel Offsets, all in the Sudbury area.

The other change is in the Blind River area, half-way between Sudbury and Sault Ste Marie. I have reference to the recent discoveries of uranium deposits in that area and in particular to those of Pronto Uranium Mines Limited and Algom Uranium Mines Limited. Pronto expects to commence production in September 1955 at a rate of 1,000 tons of ore daily. Algom is developing its Quirke Lake property toward production. Tentative plans call for a 3,000-ton-a-day mill and the company hopes to commence production in about two years.

#### Quebec-Labrador Deposits Now in Production

I now come to my native Province of Quebec and of course the major post-war change there is pretty much a matter of common knowledge throughout the mining world. Here in the United States you know them best as the Labrador iron ore deposits but in Canada we usually refer to them as either Quebec-Labrador or Labrador-Quebec deposits, depending largely on whether your home province is Newfoundland or Quebec. In any event, following pre-production expenditures of \$250,000,000 output from the deposits became an accomplished fact late in June last when the first trainload was brought over the 360-mile railway to Seven Islands on the Gulf of St. Lawrence. The ore was shipped to Philadelphia and some of it has doubtless been used to produce a Cadillac, a Buick, a pint-sized Nash, or possibly a gun or two for the common defence of our two countries.

The deposits form part of an iron-bearing belt of rocks known as the Labrador Trough and extending from well within Labrador through with some breaks, to Hudson Strait, a distance of over 400 miles. How many billions of tons of ore will eventually be disclosed in this trough is anyone's guess. The Cyrus Eaton interests of Cleveland and Fenimore Iron Mines Limited have disclosed what appear to be tremendous tonnages of iron-bearing material on the west side of Ungava Bay that are amenable to beneficiation.

Incidentally, the existence of a railway into the heart of this potentially rich Labrador-New Quebec region is bound to play an important role in the search for and development of deposits throughout the region.

The other changes in Quebec are of smaller dimensions than the iron ore developments but are quite sizeable also; the titanium ore deposits at Allard Lake in eastern Quebec, for instance. They were discovered in 1946 and are among the world's largest deposits of ilmenite. They are being developed by Kennecott Copper Corporation and New Jersey Zinc Company through a subsidiary, Quebec Iron and Titanium Corporation. The ore is shipped to the company's plant at Sorel, Quebec, where titanium dioxide concentrate is made for use in the pigment trade. Eventually, of course, when a cheap process is worked out, it is the intention to produce titanium metal.

Next is the big copper industry that is in the making in the Gaspé Peninsula where Noranda Mines Limited, through a subsidiary, is spending \$40,000,000 to bring a large copper deposit into production. Operations are scheduled to start early next year at a daily rate of 6,500 tons, the largest initial milling rate in the history of Canadian mining.



We move now to the Chibougamau area, roughly 130 miles northwest of Lake St. John. Mineral exploration came almost to a halt prior to the war owing to low prices and inadequate transportation. Transportation has since been greatly improved and copper prices have risen, and as a result, one copper-gold property is in production and two others are planning production. The area is to be connected by rail to the transcontinental line of the Canadian National Railway. Hydro-electric power will be available next year.

No coverage of the post-war changes in Quebec would be complete without reference to some of the developments in that part of old Quebec lying mainly east of Montreal and south of the St. Lawrence River known as the Eastern Townships. It is from deposits in this region that about 60 per cent of the world output of asbestos is obtained. This Canadian industry has undergone exceptional expansion in recent years. When the whole programme is completed it will have involved the expenditure of an estimated \$100,000,000 in the reconstruction of milling plants, in the bringing of new plants into production and in general, in the modernization of the whole industry. A \$20,000,000 project now being started involves the draining of an entire lake to gain access to the extensive orebody beneath.

The post-war years have also seen a revival of interest in the base metal potential of this region. Three producers are in operation and a fourth, Eastern Metals Corporation Limited, is expected to commence production early in 1955.

#### Major Base Metal Discovery in New Brunswick

Leaving Quebec, we come to the Bathurst area in New Brunswick, the scene two years ago of one of the most spectacular base metal discoveries in Canada's history. It looked big then and it still does. For a province that produced no metals and had only a small output of minerals, the development is of the greatest importance. Work to date has shown that upwards of 50 million tons of lead-zinc-copper ore containing tin and silver are available in the two major orebodies. Production is still a few years away. Present indications are it will be at a rate of 4,000 tons daily, and will later be increased to 6,000 or 8,000 tons. Large chemical and metallurgical works are also in the offing.

The last two changes are the result of what is now the province of Newfoundland joining Canada in March 1949. This brought within the Canadian economy the Wabana iron ore deposits in the southeastern part of the island of Newfoundland which are estimated to contain four billion tons of ore. It also gave Canada an abundant supply of fluorspar, which had previously been a deficient mineral.

#### Factors in Post-War Mining Growth

From this sort of cross-sectional account of the nature and dimensions of the post-war growth, we turn now to a consideration of some of the factors that have brought it about. If you were to say that much of the growth was underscored by dogged determination and perseverance, with a good sprinkling of Mr. Churchill's famous sweat and tears, you would be quite right. Certainly it was dogged perseverance on the part of Imperial Oil Limited and its

staff of geologists and engineers that led to the discovery of the Leduc oil field and indirectly to developments that have since followed. Many millions of dollars had been spent in the Prairies in a fruitless search for new sources of oil and then, when hope was all but abandoned, and with the aid of geophysical methods, the Leduc well found oil in a reef structure.

The oil in Western Canada occurs in close physical association with natural gas and so, as drilling for oil proceeded, tremendous quantities of natural gas were disclosed. Actually this has been a problem as well as a blessing, and will remain so until adequate market outlets for the gas become available. And speaking of Mr. Churchill's sweat and tears, I might add that we sweated it out for nearly two years awaiting the outcome of Westcoast Transmission Company's application before the Federal Power Commission in Washington to bring natural gas from the company's wells in the Peace River areas of British Columbia and Alberta into the northwestern United States. We had high hopes almost to the last that the application would be granted. Then our hopes turned to tears when we sadly learned of the turn-down.

With the disclosure of new sources of oil, in Alberta mainly, but also, as you have seen, in Saskatchewan and Manitoba, came the construction of pipe lines, the construction of new refineries in various parts of Canada, and the extensions of existing plants. Thus in the space of seven years a great and expanding, well-integrated oil industry has developed. Already, as offshoots of the oil and natural gas developments, numerous petrochemical industries have been established. An example of this is the use of natural gas by Consolidated Mining and Smelting Company as a base material in the manufacture of ammonium nitrate at Calgary, Alberta; a second is the production of elemental sulphur from natural gas by Shell Oil Company and Royalite Oil Company at Jumping Pound and Turner Valley, Alberta, respectively; and another is the use of natural gas by Sherritt Gordon at its \$24,000,000 chemical metallurgical plant at Fort Saskatchewan erected to treat its Lynn Lake ore and to make ammonium sulphate fertilizer. A much greater development of petrochemical industries is anticipated in the years ahead, and more especially following the construction of the natural gas pipe line to eastern Canada.

Perseverance also played a major role in placing Canada on the iron ore map of the world, and this pertains equally, but in different ways both to the development of the Steep Rock and the Quebec-Labrador deposits. Development of the Steep Rock deposits is considered one of the greatest engineering feats in mining history in any country, involving among other things the draining of a lake, and the scooping of many millions of cubic yards of material from the lake bottom. And who but men of vision and courage like Jules Timmins and his associates would have built a 360-mile railway into the Labrador-New Quebec wilderness. In the oil and gas developments and in the iron ore developments, we have some of the best examples to be found anywhere of free enterprise in operation.

The rapid rate of exhaustion of the Mesabi ores has played and continues to play a part in the growth of Canada's iron ore industry. The construction of the St. Lawrence Seaway will expedite and facilitate the

development of the Quebec-Labrador deposits. Eventually the development of the large iron-bearing deposits west of Ungava Bay will be under way, and already the Canadian Hydrographic Service has charted inlets in the Bay that may be used as harbours.

In the case of Canada's base metal industry, the post-war growth has been largely a matter of an unprecedented world demand during most of the period and the resultant rise in prices; also, of course, in part to the discoveries I have mentioned. Canada exports close to 95 per cent of its nickel output, approximately 80 per cent of its copper, and most of its lead and zinc. Thus world demand has an important bearing on the growth of the industry. During the war, as part of our contribution to the common effort, we shipped much the greater part of our base metal output to Great Britain and at prices well below world levels. Immediately following the war, world demand showed a marked decline and for a time the base metal outlook was far from bright. Then came the uneasy peace that has since developed into the cold war, and still later came the Korean Emergency or "police action" as it is sometimes called. In the meantime consumer demand, held in close check during six years of war, reached record levels and soon too, did the demand for the base metals. The resultant price rise caused attention to turn to the exploration and development of new prospects, and to the expansion of operations and productive facilities at established producers. Great Britain had been the chief outlet for our exportable surplus but was replaced by the United States a few years after the war. In 1946, for instance, we shipped 21,500 tons of lead to the United States and 50,200 to Great Britain; in 1953 we shipped 90,700 tons to the United States and 51,200 to Great Britain. There has been a similar shift in the direction of trade in copper and zinc.

This shift in the direction of trade is simple enough to explain. The United States like Canada has been witnessing a remarkable post-war industrial growth and its base metal production has been far short of the requirements. The world demand slackened off during the past two years; prices of lead and zinc have declined, and as a consequence voices were raised here in the United States for tariff protection. However, we are pleased to learn it has been decided not to increase the import duties on the two metals, and that other steps are being taken by your government to assist United States producers lead and zinc. It does seem crystal clear that our two countries are interdependent in relation to the principal base metals, that so long as the curve of industrial activity in your country continues to move upwards - and it has been moving in that direction most of the time - you are going to need more and more of our base metals. We in turn can supply our full share of your requirements much better under conditions of stabilized tariffs than we can when the tariffs are subject to change with temporary changes in the supply and demand situation. We expect a substantial increase in our production of lead and zinc in the years ahead as a result mainly of recent discoveries and increases in refinery capacity. This will mean that larger quantities will be available for export. In the meantime, the Paley report anticipates an increase of 78 per cent in the United States consumption of lead in 1975 over that of 1950 and of 60 per cent in its consumption of zinc. From this distance it doesn't seem

likely that Canadian output of the two metals will have increased by these percentages by 1975. In other words, there seems little danger of Canadian production increasing to a point where it will give American producers much real cause for concern.

Turning now to the non-metallics and structural materials, our production of these minerals, with the chief exception of asbestos, gypsum, and barite, is marketed within Canada. There has been a tremendous growth in this branch of our mineral industry as is evident from the increase in the value of production from \$110,000,000 in 1946 to some \$311,000,000 in 1953. For asbestos and the other minerals we export, this growth is mainly attributable to world demand; for the others it is accounted for mainly by the unprecedented demand for raw materials in Canada's rapidly expanding chemical and construction industries.

#### Plenty of Elbow Room for Mineral Exploration

So far I have made little direct mention of the outlook for the mineral industry. Actually the matter of outlook is largely evident from the growth the industry has been witnessing, the chief features of which I have traced for you. In the main we have only really got started in the development of our wealth of crude oil, natural gas, and iron ore. The known reserves are large and the territory remaining to be explored is large. In fact this latter is true of the industry as a whole. The Province of Quebec affords a good illustration. Much if not most of the northern stretches of the province remain to be explored in any detail for minerals. Likewise large sections of the Northwest Territories have received only limited exploratory attention as yet.

In this connection I might state that the development of Canada in depth is very much in the mind of our Federal Government. I mean by this that we are each year making explorations and investigations in the more northerly mainland regions and in the Far North as well in order to gain knowledge of the potentialities of these regions and to further their development. Partly to this end the Geological Survey of Canada two years ago undertook a reconnaissance survey of a 57,000 square mile portion of the Territories lying north of the 60th parallel and west of Hudson Bay. The survey showed about 25 per cent of the area covered to be favourable for mineral deposition. This year we are covering a large area immediately to the north. By use of the helicopter and other modern devices we can cover more ground in one season than we could in 25 years by the older methods.

As you can see, then, there is plenty of elbow room and our knowledge of the geology of these areas suggests that the hunting will be good for those willing to take the risks that go with all mining ventures.

I have indicated that the outlook for the base metals will be governed largely by the extent of the demand in the United States. Your Government is one of the largest, if not the largest, purchasers of Canadian nickel and has contracted for the purchase of 260,000 tons over a ten-year period at prices that will serve to stimulate production.

If prices remain at or near present levels there will need to be little concern as to the outlook for copper. Certainly the long range outlook points to a much greater consumption, although increases in production in various countries, plus the use of aluminum and other substitutes, might possibly adversely affect the immediate outlook.

By inference I have already touched on the outlook for lead and zinc in my reference to the Paley report and United States consumption. Until about two years ago the post-war demand for both metals had been rising steadily. Since then we have been witnessing what might be described as a levelling-off period, the indications being that world consumption will soon again follow its normal upward course.

I might note that practically all of Canada's producing base metal deposits contain one or more of the precious metals that are recovered as by-products. An excellent example of this is the nickel-copper deposits of the Sudbury area from which the platinum metals are recovered in amounts sufficient to make Canada the largest producer of these metals. Another is Noranda's Horne mine in Quebec, which is an important source of gold as well as of copper. This by-product recovery of precious metals at Noranda, Sudbury, Flin Flon, Trail, and other centres of base metal production places Canada in a very strong competitive position in world markets.

I would like to be able to say that the outlook for our gold industry is bright, but the best I can say at this time is that it is improving. For 22 years ended 1952 gold was the chief single contributor to our mineral output, but it was replaced last year by crude petroleum. However, the production is approximately \$140,000,000 a year. For the past number of years the Canadian Government has been providing cost aid to the gold mines, the amount of this assistance in 1953 being about \$15,000,000. A favourable factor in the outlook is the considerable improvement in labour efficiency. New equipment and new techniques are also bringing greater efficiency. Actually, however, several of the producing gold mines have been showing as much interest in the discovery and development of other minerals as they have in gold prospects. Others have promising-looking prospects on which relatively little work is being done pending an improvement in the conditions affecting the gold industry.

#### Free Enterprise and Government an Indispensable Partnership

From the outset, mineral resources development in Canada, like that in the United States, has operated under the free enterprise system, and like you, we have found that it works well. Governments, both at the federal and provincial levels, give every reasonable encouragement to private initiative in the development of our mineral resources. Like you, we have taxes, of course, but mining and exploration companies are granted various tax concessions by the Federal Government, particularly in reference to exploration and to the early years of production. The provinces have administrative control of the mineral resources within their borders, and in all cases they encourage the development of these resources by private enterprise.

In Canada we consider the relations between Government and the mineral industry as a sort of partnership. The Minister of our Department, Mr. Prudham, has described it as "The indispensable partnership".

Separately and together over the years the members of the partnership have done a great deal of pioneering in the various fields of research. Metallurgists of our department, for instance, were among the pioneers in developing the now universally-used flotation process. In fact, our department was doing work on flotation before flotation machinery came into general use. Many of the Canadian ores are complex and some of them highly so, and our metallurgists and ore dressing experts have had to use every ingenuity at their command in working out treatment methods and in overcoming recovery problems. In the treatment of uranium ores our metallurgists have been doing outstanding work, more particularly in the treatment of low grade ores by leaching. The work in this field was also a pioneering effort as was the development of a process for roasting high arsenical gold ores. The leaching process devised by Professor Forward of the University of British Columbia and his associates for treating the Lynn Lake ores is another outstanding accomplishment.

All these researches on ore treatment and allied problems, of course, have a very important bearing on the overall outlook, for one of the results is to bring within economic range deposits that could not otherwise be developed. Canada is well advanced, too, in the use of new methods and new techniques in the field of geophysics, and in geodetic and topographic mapping. We have done much of the pioneer work in the use of modern methods.

In the development of our mineral resources, as in so many other ways, we have had occasion quite frequently over the years to work in close harmony with you people in the United States. This was particularly in evidence during the war when Americans and Canadians were often found serving on the same boards and committees, and it is very much in evidence in the atomic energy field. Mineralwise, the economies of our two countries are closely linked for we have a surplus production of several of the metals and minerals your country must have to meet the requirements of its expanding economy. And of course the trade in minerals is not all one-way, for we are heavy importers of coal and other minerals and mineral products from your country. Moreover, in the very important matter of our common defence, Canada's strength in minerals and the diversity of its output are vital factors. In many respects - in mineral development and otherwise - we are what might be termed natural partners, and it is a partnership that has proved mutually profitable from the outset. May it long continue to do so.

Summing it all up, then, I can say that we look to the future of our mineral industry with every confidence. We have come a long way since those days near the turn of the present century when hardy people from all parts of the world were trekking northward to the Klondike searching for gold. Some of them followed the trail to the sunset without finding the gold, others fell by the wayside, and still others made their fortunes. We were a young country then and we knew little of our potentialities. We know a

great deal more now; we have been described as "a great big country flexing its muscles" and mineral-wise, that, I would say, is an apt description. Even as recently as the end of the war we appeared to have definite limitations in the way of mineral potentialities. After what has since developed the opportunities for growth seem almost unlimited, taking into consideration the large regions still only partly explored. A great Canadian statesman once said as he gazed into the crystal ball nearly a half century ago "The Twentieth Century Belongs to Canada". What he meant was simply that Canada had the resources that could make of her a great nation if Canadians were to take up the challenge. That is what we have been trying to do, and I think, with considerable success, to the mutual benefit of both our countries.

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S/A

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 DEPARTMENT OF  
 MINES AND TECHNICAL SURVEYS  
 MINES BRANCH  
 OTTAWA

MAJOR MINERAL DEVELOPMENTS IN CANADA  
 1946-1954

