deposits at Bernic Lake in Manitoba. This is a most unusual deposit because of the remarkable combination of metallic elements that it contains. Mineralogists at the Branch have made substantial progress in the study of the mineralogy, the mineral associations, and the distribution of the elements among the minerals found. The nature of this deposit can be considered an alkaline complex in which the metals cesium, rubidium and lithium are prominent, with minor amounts of tungsten, tin and tantalum. An acid leaching process for the extraction of cesium has been developed on a laboratory scale by the Branch. An important use predicted for cesium is as a fuel for ionic-drive rocket engines for space flight. It will have many applications in chemical and metallurgical processes, for example as a catalyst in hydrogenation, as well as in the medical field. However, there is no established commercial market at the present time. The deposits are, accordingly, considered as a future resource with research being carried out in advance of industrial requirements.

Iron Ore

Between 1886 and 1924, 6,500,000 tons of iron ore were produced in Canada but during the following 14-year period no iron ore shipments were recorded. However, production was resumed in 1939 when Algoma Ore Properties Limited brought its Helen mine in the Michipocoten area back into production and since that time there has been a continuous growth in this industry, particularly since 1954 when first shipments were made from the Quebec-Labrador deposits. In 1959, producers' shipments reached an all-time high of 21,488,325 tons valued at $192,666,101.

Most of the recent growth has been based on large reserves of direct-shipping ores found in Labrador and Quebec and, to a lesser extent, in Ontario. Much more important are the technological advances in iron ore beneficiation which make possible the exploitation of many low-grade iron formations that are relatively common in these areas. These advances, combined with the inability of direct-shipping deposits to meet the demand for iron ore, which is increasing particularly in the United States, assure the growth of the industry and the accompanying expenditure of large sums of capital. An important new source of supply is the development by Quebec Cartier Mining Company in the Lac Jeannine area. Approximately 20,000,000 tons of crude ore grading 30 p.c. iron from one open pit mine will be required to produce 8,000,000 tons of concentrate annually.

Beneficiation of iron ore has received great impetus from steel producers in recent years as the emphasis has shifted from cost of ore to the cost of iron in the ladle, so that research and technology on both the grade and structure of the ore for blast furnace feed are essential.

Crushing and screening is the simplest form of beneficiation and practically all direct-shipping ores receive this treatment. It is applied by Iron Ore Company of Canada to its Schefferville ores. Concentration by Humphrey Spirals is a water gravity separation process which will be used on the coarser specular hematite ores of the Wabush Lake–Mount Wright–Mount Reed belt by Quebec Cartier Mining Company, Iron Ore Company of Canada and others. Typically, on iron ores consisting of magnetite, magnetic methods are most suitable. These methods may also be applied to ores containing hematite by first converting hematite to magnetite in a preliminary magnetic roast. The sintering process, the oldest and most widely used method of agglomeration, produces a porous, strong sinter cake. Algoma Ore Properties Division of the Algoma Steel Corporation, Limited use this process for their siderite-containing ores while the Hilton Mines and Marmoraton Mining Company Limited use the other commonly applied agglomeration method—that of pelletizing—in the treatment of their fine magnetic concentrates.

The most obvious reason for the rapid development of iron ore deposits in Canada and sharply increased tonnages of shipments to the United States is the need of the steel industry of that country to secure an increased volume of ore from dependable and long-term sources of supply on economic terms. Iron ore represents a two-way traffic between the United States and Canada but it is only since 1953 that Canada has been a net exporter.