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LITHIUM DEPOSITS OF THE LACORNE AREA, QUEBEC

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LITHIUM DEPOSITS

of the

LACORNE AREA, QUEBEC

by

M. Latulippe and W.N. Ingham

(Paper presented at the Prospectors and Developers Convention

Toronto, March 6-9, 1955)

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INTRODUCTION

Lithium is a metal which has the distinctive property of being the lightest of all metals. Its density is about one half that of water. The uses of the metal and its compounds in atomic energy projects and in the production of special lubricants which maintain a uniform fluidity over a wide range of temperatures has recently greatly increased its strategic importance and demand. The chief commercial compound is lithium carbonate (Li_2CO_3) produced from the three principal minerals - amblygonite spodumene and lepidolite. These contain theoretically 10%, 8% and 4% lithium oxide (Li_2O) respectively. Spodumene and lepidolite occur in pegmatite dykes in the Lacorne area. Here, the Quebec Lithium Corporation has outlined over 15 million tons of ore. Numerous other mining companies are actively engaged in the search for other large deposits.

Dykes carrying lithium are presently known to occur in an area about 12 by 20 miles. This area lies in western Quebec, 60 miles east of Noranda and midway between Val d'Or on the south and Amos on the north. It includes the townships of Lacorne and LaMotte and the southern parts of Figuery and Landrienne. It is underlain mainly by various intrusive facies of the Lacorne and Preissac batholiths.

GENERAL GEOLOGY

The oldest rocks in the area are basic volcanics and greywackes which lie along the northern margin of the main intrusives and also occupy a wedge-shaped area between the Lacorne and Preissac batholiths.

Although the nature and distribution of the intrusive rocks is quite complex, they can be divided into two main sequences, an older group and a younger series. The older group is considerably more altered and often distinctly gneissose as compared with the fresh even grained appearance of the younger series.

The peridotite and gabbro usually form sill-like bodies folded with the enclosing volcanics, whereas the feldspar porphyry, diorite and granite of the older group occur as elongated or rounded plugs and stocks crosscutting the invaded formations. The younger series of intrusives including the quartz monzonite with its marginal granodiorite facies, the syenite and the muscovite granite, are a closely related group with pegmatite dykes as the end phase. These younger intrusives form the Lacorne and Preissac batholiths.

STRUCTURE

The volcanic rocks strike generally east and south east and dip to the north. Those in the central part of the area, where pre-batholithic folding and batholithic intrusive forces were active, have north and north east trends and dip in various directions. The batholithic rocks plunge flatly to the north and they seem to determine the dip of the overlying sedimentary and volcanic formations. These intrusives have come up along the axis of a regional anticline. An important structural feature of the area is the eastern extention of the Manneville fault. It strikes east and southeast along but outside the north edge of the batholiths and dips to the north. Some of the long persistant dykes along the north contact are probably related to this fault.

GENERAL FEATURES OF LITHIUM DEPOSITS

The lithium deposits of the area are all pegmatite dykes, but all pegmatite dykes do not contain lithium. Actually, thousands of dykes occur in the area, particularly in and around the muscovite granite. Those carrying lithium in appreciable amounts are distributed in a "T"-shaped area composed of a northern east-west zone close to the north boundary of the main intrusives, and a wide, central north-south are between the intrusives roughly centered along the LaMotte-Lacorne township line.

The spodumene-bearing dykes varying in width from less than a foot up to 150 feet. One has a known length of a mile and a half, but it is exceptional. Several are over 1,000 feet long. They may be either complex or simple both as to internal structure and mineralogy. Some are banded with aplite, or with quartz-rich, or with muscovite-rich,or with spodumene-rich borders or cores. Others contain lenticular concentrations of certain minerals such as feldspar, mica, garnet, beryl, or lepidolite. Some dykes maintain a constant width along a straight trend others pinch and swell, curve and branch. Semi-circular and podshaped bodies are formed, with both sharp and ill-defined margins.

The feldspar found includes albite, oligoclase, cleavelandite, microcline and perthite. In addition to the minerals mentioned above, others that have been identified are columbite-tantalite microlite, betafite,

bismuthinite, bismutotantalite, hematite and molybdenite. The spodumene may be green, white, buff, gray or pink. It varies from fine grained, to match stick size, to very coarse crystals several feet long. The crystals are normally elongated laths or plates, but short prismatic types also occur. In some dykes all the spodumene crystals have the same orientation or a predominate alignment, often normal to the walls of the dyke. In places the spodumene is altered to a light green scaley mica, or to a very dark green, soft, dense pseudomorphic aggregrate of fine mica grains. In surface exposures the spodumene cleavage planes are often coated with a dark brown or black manganese-bearing mineral. The columbite-tantalite minerals carry a little uranium, so that some dykes are slightly radioactive.

L.P. Tremblay, of the Geological Survey of Canada, has identified spodumene as an accessory mineral in the muscovite granite. This fact, coupled with the close spatial relation of the dykes to the muscovite granite is diagnostic of a genetic connection.

DESCRIPTION OF MINING PROPERTIES

About 2,000 mining claims have been staked in the area mainly during the last year. These are held by various individuals and some 40 mining companies. A considerable number of the companies are currently engaged in exploration and development of their property, and some success has been achieved in locating deposits other than the important ore bodies indicated at Quebec Lithium Corporation.

In Figuery township, close to the centre of range II, LITHIUM CORPORATION OF AMERICA carried out limited, shallow drilling in a pegmatite dyke 600 feet long and averaging 30 feet wide, which contains an estimated 20 per cent of quite large, green spodumene crystals. Assuming the dyke extends to a depth of at least 500 feet, nearly a million tons of ore grade material are indicated.

INTERNATIONAL LITHIUM MINING CORPORATION are exploring spodumene showings a short distance east of the above deposit. About 30 drill holes have partially outlined apparently flat-lying spodumene-pegmatite lenses over an area roughly 300 by 400 feet. The main body is 12 feet thick and carries close to 1.0 per cent lithia. TIDE LAKE LITHIUM MINES have started drilling in the favourable granite contact area east of International, but so far no important spodumene dykes have been found. MAGNET CONSOLIDATED recently drilled for holes near the east end of range I. Figuery township, and although pegmatite was intersected it contained very little spodumene.

LACORNE LITHIUM MINES, A Ventures subsidiary, hold a group of claims in the northwest corner of LaMotte township. Several spodumene-dykes occur on the property, one of which, about 20 feet wide, has been traced in outcrops for a length of 400 feet. The lithium content at surface appears to be erratic with higher grade patches separated by lean material. GAITWIN

EXPLORATIONS, adjoining south of Lacorne Lithium, have a drilling program in progress. The third crossectional hole cut a 6-foot wide spodumene-bearing dyke.

SILANCO MINING and LYNDHURST MINING companies are just starting drilling programs on their properties in the central part of LaMotte township in the southern contact area of the Preissac granite mass.

ISO URANIUM held options on two claim groups, one at the east end of range VII, LaMotte township, and one at the west end of range V, Lacorne township. Seven short drill holes were put down on one group and ten on the other. This limited work explored at shallow depth several outcropping dykes and gave mainly low grade lithium assays.

QUEBEC BERYLLIUM have several properties in the area. Recently the company opened a crushing plant on their Figuery township claim group which, it is reported, can handle 100 tons of rock per day. A spodumene-bearing dyke on their property at the western end of range III, Lacorne township, is now being systematically trenched to determine its character and grade. The dyke is up to 40 feet wide and has been traced on surface for a length of 1,200 feet. It contains large crystals, some 3 feet long, of green spodumene, books of clear green mica, clean white feldspar, a few grains of black columbite-tantalite, and molybdenite. The very coarse spodumene crystals are scattered in sporadic enriched patches.

Near the western end of range II a number of promising looking spodumene-bearing pegmatite dykes occur on the PORTEOUS CLAIMS. The dykes strike northwesterly in biotite granite. One, which is 18 feet wide, has been trenched at intervals for a length of 1,000 feet. The dykes consist mainly of quartz, microcline, perthite, albite and spodumene, with lesser amounts of lepidolite and beryl, and small amounts of columbite-tantalite and bismuthinite. In 1947 Great Lakes Carbon Corporation tested the main dyke with seven drill holes. The spodumene content to a depth of 300 feet was found to be from 5 to 15 per cent, although at surface the dykes contain an estimated 20 per cent.

The principal showing on the property of VALOR LITHIUM MINES is in lot 23, range VIII, Lacorne township. The country rock is muscovite granite in the vicinity of a large included mass of older biotite granite and a smaller volcanic rock inclusion. An irregular body of pegmatite is exposed by continuous trenching along 150 feet with a maximum width of 45 feet. It contains abundant, large, massive aggregrates of spodumene, a considerable number of big beryl crystals, and numerous patches rich in lepidolite. Individual spodumene crystals are as much as 6 feet long. A 1,800 pound bulk sample, crushed and reduced to 70 pounds at the Quebec Department of Mines sampling plant at Val d'Or, and shipped to the Department of Mines laboratory in Quebec, was found to contain 1.75 per cent lithia. Material of this grade has a gross value of $17.00 per ton. Arrangements are being completed with Newkirk Mining Corporation to drill this deposit and two other essentially unexplored showings on the property.

KEYBOYCON MINES are starting to drill in the central part of range I, Landrienne township to explore for the possible northern extension of a spodumene dyke outcropping 100 feet to the south on Canadian Lithium ground. This dyke is 17 feet wide and is exposed along 250 feet. A grab sample assayed 1.25 per cent lithia. MARTIN-McNEELY MINES, adjoining to the east, are drilling their first hole in lot 28, close to a promising showing on adjacent Canadian Lithium claims.

THE CANADIAN LITHIUM MINING CORPORATION property extends for eight miles along the favourable northern margin of the Lacorne intrusive masses. Spodumene-bearing dykes are known on the property in five areas. Seven holes put down to test a group of dykes exposed at the west boundary of the property gave core lenths of from 4 to 9 feet assaying from 0.4 to 0.8 per cent lithia. Three northwesterly trending dykes have been explored in the north margin of the granodiorite in the eastern part of the property in lots 38 to 41, range X, Lacorne township. One of these has been tested by eleven drill holes along 820 feet. Some holes gave widths of over 20 feet, and the grade was found to average about 0.25 per cent lithia. Four spodumene pegmatite dykes outcrop in the central part of the property on the Lacorne-Landrienne township line at lots 25-26. These occur at intervals across 600 feet. The main one is 125 feet wide and is exposed along 1,250 feet. Surface inspection of the dyke shows a sporatic distribution of spodumene with enriched lenses 15 by 100 feet separated by lower grade sections. Scattered beryl crystals and small grains of columbite-tantalite also occur in the dyke.

The deposits of the QUEBEC LITHIUM CORPORATION are in lots 50 to 61 range IX Lacorne township. Numerous spodumene-bearing pegmatite dykes have been outlined by 70,000 feet of diamond drilling. The company has estimated from the drilling results that 15,000,000 tons of lithium ore grading 1.-2% lithium oxide are indicated.

These dykes are at or near the north contact of the Lacorne batholith. The contact rocks are mostly volcanics with sills of peridotite, gabbro, amphibolite and their related schists. These rocks trend slightly south of east and dip from 40° to 60° to the north. The batholithic rock is a biotite hornblende granodiorite. The contact between the granodiorite and volcanics plunges to the north at about 40°.

The eastern extension of the Manneville fault crosses the north part of the property. This fault dips to the north at 40° to 70°. It has mostly vertical movement with the south side moving up and west. Most of the important pegmatite dykes lie parallel to the fault but dip in the opposite direction. They probably represent tension openings related to the fault.

From the drilling results the following observations can be made:-

1 - The highest concentrations of spodumene are found at or near the contact zone.

2 - In the volcanics the dykes become weak and low grade at a distance of about 600 feet above the contact.

3 - In the granodiorite the dykes remain strong and become low in spodumene only at a distance of 2,000 feet below the contact.

4 - The amount of spodumene diminishes with an increase in pink orthoclase feldspar. This feldspar begins to appear in the dykes within the granodiorite at a distance of about 2,000 feet below the contact.

5 - The peridotite is an unfavourable host rock for the dykes.

6 - The spodumene tends to be light grey in the volcanics and light green in the granodiorite.

7 - The spodumene crystals are finer grained in the volcanics than those in the dykes in the granodiorite.

The main or No. 1 dyke has been traced for more than 8,000 feet in a slightly south of east direction. Its width varies from less than 10 feet up to 123 feet. The grade various between 1/2% and 1 1/2%. The average is about 1.2%. There are at least ten parallel dykes and also many cross dykes. These vary in width from 3 to 136 feet and in grade from 1/2% to 1.9% lithium oxide.

The dykes are composed mostly of quartz, feldspar and spodumene. The minor constituants, which represent a very small part of the dykes, are mica, beryl, garnet columbite-tantalite, microlite and betafite. The last three named are rare. The spodumene crystals are oriented normal to the walls of the dykes.

The company is presently sinking a vertical three compartment shaft. The first ore will come from one of the higher grade dykes. Plans call for treatment of 1000 tons of ore per day with production slated to begin by the end of this year.

CONCLUSION

Exploration of the Lacorne area is just getting started. The widespread known occurrences of lithium bearing dykes is the indicator that prospecting will uncover many more, whether it be with a rock pick, a grub hoe or a diamond drill.

There is no doubt that mining of the already indicated tonnage, as well as the additional and equally as large potential tonnage of ore at the Quebec Lithium Corporation deposit, will prove to be a profitable operation. This is the largest known source of lithium in America. Its development is a fine credit to the enterprise of the executive and technical members of Sullivan Consolidated Mines. It is further proof of the diversity and importance of the mineral deposits of the Province of Quebec.