

MAR 19680002: LUBICON

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ECONOMIC MINERALS
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THE ECONOMIC FEASIBILITY OF DEVELOPING THE
COPPER SHOWINGS AT LUBICON, ALBERTA

REPORT BY
ABTEC LTD.
FOR
LEDO MINES LTD.

By:



D. C. KEFFER, P. Eng.

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THE ECONOMIC FEASIBILITY OF DEVELOPING THE
COPPER SHOWINGS AT LUBICON, ALBERTA

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ECONOMIC FEASIBILITY OF DEVELOPING THE
COPPER SHOWINGS AT LUBICON, ALBERTA

SUMMARY:

The prospects of developing an economic copper deposit underlying Quartz Mineral Exploration Permit No. 4 are reviewed for the purpose of determining if further funds should be expended for exploration. The basic factors associated with the copper showings at Lubicon are summarized and these are compared with what is known about current mining procedures and costs. From this information, conclusions and recommendations are drawn with respect to the advisability of expending funds to explore for copper in the Lubicon area.

CONCLUSION:

The costs of exploration and development of the prospective copper reserves underlying Quartz Mineral Exploration Permit No. 4 preclude development for the foreseeable future.

RECOMMENDATIONS:

It is recommended that no further work be conducted to establish copper reserves underlying Quartz Mineral Exploration Permit No. 4.

HISTORY OF LUBICON COPPER SHOWS:

Samples of native copper were obtained from a hole drilled for oil in Lsd. 2-21-87-13 W5 in early 1966. Several pieces of copper

measuring about 2 inches by 1 inch by $\frac{1}{2}$ inch thick were recovered from the drilling mud while the well was penetrating the Gramina Formation of Upper Devonian age at a depth of about 3640 feet below ground surface. Chemical analysis of the copper indicated it to have a composition similar to that of other native copper deposits found in various parts of the world.

The correct geological and geochemical circumstances may have existed at the reported Lubicon showings to permit the formation and deposition of native copper. The costs of exploration and development however give cause for concern.

CURRENT COPPER MINING METHODS:

As a point of reference it should be recalled that copper occurs in three types of deposits namely: vein deposits, replacement deposits and disseminated deposits.

VEIN DEPOSITS:

Vein deposits occur in fissured granitic rocks which become filled with deposits consisting essentially of quartz, pyrite, chalcocite, bornite and energite with small quantities of covellite, chalcopyrite and other copper sulfides. Because veins are usually thin and require underground mining methods the costs of recovery are always substantially higher than for other types of deposits.

REPLACEMENT DEPOSITS:

These deposits are formed where mineralized solutions and gasses from intruding igneous rocks have reacted chemically in certain favourable zones of limestone beds replacing portions of the limestone with masses of minerals containing copper mineralization. Mining of replacement deposits usually entails underground mining procedures.

DISSEMINATED DEPOSITS:

The disseminated deposits are in aggregate the most important source of copper. They are characterized by the presence of an oxidized or leached capping immediately below the ground surface from which the copper has been leached and redeposited as chalcocite on the underlying sulfides through the processing of secondary enrichment.

Disseminated copper deposits are usually of broad lateral extent but limited in vertical thickness from 100 to 500 feet. The larger deposits range between 500 and 900 million tons of ore reserve containing between 0.5% and 2.0% copper. By comparison, vein and replacement deposits contain from 3% to 6% copper.

The importance of the disseminated deposits lies in the mining procedures that may be employed. A large vein-type mine may produce 1,500 tons of ore per day, whereas a medium size disseminated deposit may produce 15,000 tons per day by surface mining methods.

DISCUSSION:

Comparison of the three types of conventional copper ore

deposits with that found at Lubicon leads one to believe that the mining conditions in the Lubicon area would most closely approximate those of the vein type of deposit. One important difference would exist however, in that a substantial investment would be necessary before actual mining could commence. Since most vein deposits start at or near the rock surface, income is realized from the start of the mining operation and the quantity of risk capital is much less than that expected at the suspected Lubicon deposit.

It is estimated that a minimum of 25 core holes at an individual cost of \$80,000 and a total cost of \$2,000,000 would be required to outline and define the possible copper reserves underlying Quartz Mineral Exploration Permit No. 4. When this was completed it would be necessary to sink a shaft similar to that employed to mine potash in Saskatchewan which would cost between \$8,000,000 and \$10,000,000 depending on the conditions encountered. A reduction and refining plant may cost in the vicinity of \$5,000,000 to \$7,000,000.

A summary of these costs are as follows:

Exploration - core holes 25 @ \$80,000	\$ 2,000,000
Shaft	8,000,000 to 10,000,000
Plant	<u>5,000,000</u>
Total	\$15,000,000 \$17,000,000

The amount of "front end loading" of capital investment is not consistent with the economics required for competitive copper mining. The thickness of the mineral bearing zone at Lubicon is estimated at

between 6' and 12' at a depth of about 3640'. This thin zone will require mining by the "room and pillar" method where an estimated 40% of the mineable rock is left as support. Thus, unless a complex procedure of backfill is employed which appears inconceivable with the depth of the deposit, a good portion of the mineral will have to be left in place. Because of this, the mineable reserves are expected to be small.

The risk of continuing beyond the exploration phase will be in establishing reserves from core analysis which take relatively small samples in relation to possible reserve size. If it were a disseminated deposit where copper mineralization was more consistent, the risk from this aspect would be substantially reduced. Native copper deposits however, are expected to vary considerably in the copper content within short distances.

The risks associated with development of this deposit are therefore beyond that normally anticipated in the copper mining industry. It is becoming increasingly important that mining costs be reduced through mechanization hence the relatively attractive economics of surface mining procedures.

It is difficult to anticipate any circumstance within the next 20 years which would make the copper showings at Lubicon competitive with conventional mining methods. From what is known about copper reserves and demand it is expected that copper can economically be supplied from existing mines for many years. It is recommended therefore, that no further work be conducted to explore for copper underlying Quartz Mineral Exploration Permit No. 4.

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QUARTZ MINERAL EXPLORATION PERMIT No. 4

