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EXPLORATION OF A COPPER DEPOSIT AT SPLIT CREEK - STIKINE RIVER AREA

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This paper provides some data on costs of mineral exploration in a remote area of British Columbia based on recent experience. Split Creek copper prospect is located in the Lower Stikine River area of the Liard Mining Division, 200 miles North of Prince Rupert and 60 miles South of Telegraph Creek. Public roads and communications are non-existent; the only public service employee is the snag-man who cuts and clears obstructione on the Stikine River. Topographic relief is abrupt; the rivers change their courses frequently; the run off is variable with consequent flooding of the flatlands. This is a rain-forest area with very dense surface growth from sea-level to the 3000 ft. elevation. One of the surprising features of the country, in 1965, was the occurrence of a number of forest-fires in an area where dry-wood for camp fires is a difficult material to find.

Split Creek, a local name, is a tributary of Porcupine River, located four miles East of the Stikine. The mineral showings are located between 2000 ft. and 4500 ft. above sea level about 3 miles from the mouth of Split Creek at the Porcupine.

Public carriers who provide transportation to the area are the several charter aircraft companies based at Smithers, Terrace, Prince Rupert, and Wrangell in Alaska. A barge service on a scheduled basis is operated from Wrangell and in 1965 another barge service operated on a non-scheduled basis from Rrince Rupert and Vancouver.

Access from the Stikine to Split Creek is had by helicopter or over a ten mile bulldozed road from a landing point south of the Porcupine River.

Communications are the usual private company radio-telephone system coupled to public or private facilities at locations such as Wrangell and Prince Rupert.

In 1964 and 1965 4 airstrips were constructed in the area by mining companies. When serviceable these can haedle aircraft up to the twin-engine freighter type class.

This analysis of costs covers a three year period 1963 to 1965. Cost figures are taken from usual year end distributions. The statements and opinions are those of the authors and not of their present or past employers.

This paper was prepared by Robert Adamson, now Geologist for Cyprus Corp. and Anvil Mines, at Whitehorse, and myself. During 1963 to 1965 the Split Creek claims were held under an option agreement by Julian Mining Company.

The area of Split Creek is underlain primarily by Upper Triassic volcanics with lesser sedimentary rocks. In the immediate area of the Split Creek copper deposits no sediments have been mapped but do occur at higher elevations in the valley and at the mouth of Split Creek.

(slide) The steeply incised and southwesterly striking valley at Split Creek is modified by lesser northwesterly striking creeks, locally termed Splits. In the mineralized area two of these Splits designated First and Second have important structural significance, with relation to the mineralization.

(slide) Bulldozer stripping in 1964 on the steep hillside between the two splits exposed an intensely altered intrusive, quartz-dioritic in composition. Eventually this intrusive was mapped and traced to the northeast. Elliptical in shape it suboutcrops and outcrops over an area 7000 feet in a northwest direction by 2000 feet width. Probably Cretaceous in age, it invades mnssive andesitic volcanics of a composition similar to itself, so that intrusive contacts are poorly distinguished and very gradational in character. Because of the massive texture of the invaded andesitic flows, which are exposed in the Splits, volcanic bedding is very poorly established but there is a snspicion that they strike northwest and dip moderately northeast so that the diorite intrusive may be a sill, also with a northeast dip. Cutting this diorite - andesite terrain are Albitite, Rhyolite, Andesite and Basalt dykes; the Albitita being the oldest and Basalt the youngest. These four dyke systems for the most part strike northerly which may be related to northerly trends of structural weakness which occur in the Galore Creek basin a few miles to the north.

Enveloping the intrusive on all sides except the northwesterly extension where fresh diorite prevails is a halo of pyritization delineated by I.P. Survey, geologic mapping and drilling. This pyritic zone, a colour anomaly varying from 500' to 1000 feet wide, forms a distinctive blot on the landscape. For the most part the pyrite occurs in the andesite but some is found in the altered intrusive in the contact area.

Weak copper mineralization, chalcopyrite, occurs in erratic fashion in the fine quartz stringers and disseminations within the pyritic halo. This copper mineralization is localized largely in three distinct and separate zones; in First Split Creek, in Second Split Creek (slide), and in the Split directly south of the First Split. Strong distinctive northwest striking steep faults are recognizable in the First and Second Splits. The andesites which lie between these faults and the intrusive contracts are well shattered and sheared providing a structural setting for sulphide solutions.

Alteration features are pronounced and variable. The dioritic intrusive has been subject to strong sericitization, particularly on the southeast extension of the pyritic zone. (slide) Propyllitization of the adjacent andesites has taken place with the development of chlorite, pyrite and epidote. Fine biotitic alteration is characteristic of and appears to be exclusive to the copper zones.

In 1963 a detailed examination of the Split Creek copper showings was made by a sixman crew in a period of 37 days. The rocks exposed in First and Second Split Creek tributaries were mapped, and areas of interest were trenched and sampled. Two drill holes were attempted in First Split Creek using pack sack drilling equipment. Some preliminary soil - sampling was done and reconnaissance type mapping and prospecting

was done in all of the tributary creek, in the valley of Split Creek.

The crew was moved in from Wrangell by charter aircraft and a helicopter was used for transportation from the Stikine to Split Creek and for moving crews to the work areas on the claims. The field cost of this 1963 work cost $17,000.00.

The following year, 1964, a detailed investigation was conducted by a crew of 16 men in a two month period. An area of interest was defined; 53,000 feet of line cutting and clearing was done, half of which was cut in very dense alder on the steep northwest slope of Split Creek. An access road was opened from the Stikine to the valley of the Porcupine and camp building facilities were transported on a trailer towed by a D-7 te the mouth of Split Creek. The bulldozer then worked its way to the 2500 ft. elevation and into the basin of Split Creek in a 20 day period, and the camp and supplies were ferried in by helicopter. 325 soil samples were taken at regular intervals along the cleared and surveyed lines and analysed in the field and then check assayed in the laboratory.

To facilitate geological mapping, the surface cover was stripped to bed-rock along these location lines af soil sampling by the bulldozer. Mapping of the surface was done on a scale of 100 feet to the inch and both I.P. and Magnetic Surveys were completed along the contour trenches on the north side of the main valley.

Field costs for the two months of work total $69,000.00.

In 1965 a program of diamond drilling was completed involving 7200 feet of B.Q. drilling using wire line equipment. A crew of 8 men were employed by the company and a crew of 12 drillers was supplied by the drilling contractor. The work period was 3.1/2 months of which 24 days was occupied getting the equipment into the site. The line cutting and stripping started the previous year was extended to the southeast side of the valley and stripping and drill site preparation was done using a leased D-6. Geophysical surveys were done along extensions of some of the lines completed the year previous and the survey was extended to the south side of the main valley. Field costs for 1965 were $219,000.00.

To summarize the three seasons of work, in 1963 a preliminary investigation was completed. In 1964, a detailed examination of surface was made and an extensive test by geophysical and geochemical means was made of the sub-surface. In 1965 additional geophysical work was done - the sub-surface was tested by diamond drilling. The field costs for the three years of seasonal work were $305,000.00.

An analyses of these costs indicates the following:-

The largest cost item was the surface drilling of 7200 feet of B.Q. core. Direct cost was $114,000.00. Drilling progress was normal in most respects; the rate of progress excluding moving between sites averaged 70 feet per shift on a 2 shift/day basis and 51 feet per shift if moving time is included. Core recovery was 90%(one drill hole was not completed) in 11 drill holes; there were no delays chargeable to the job once drilling commenced.

The indirect costs of drilling due to the remote location are a significant figure - they total $69,500.

To summarize then on a cost per foot basis, the direct cost of this drill program was $15.90/foot and cost of mobilization, camp construction,logging of core surveying and supervision and site preparation was $9.65 per foot, or a total of $25.55 per foot.

When the total of $25.55/foot is compared with the contract cost which was $9.20 per foot it is apparent that a thorough study of some alternate methods of investigation to secure the desired information obtained by diamond drilling is warranted.

Cost of transportation is the next significant item in this three year program. $69,000.00 was spent and of this figure $43,000.00 was paid for helicopter service and $26,000.00 for surface and air transportation of men and supplies. The significant figure that can be related to the location is the latter figure and in 1963 and 1965 this cost was $8.00 per man day and in 1964 it was $7.00 per man day.

Salaries and maintenance averaged $25.00 per man per day and direct costs of geophysical survey - Magnetics and I.P. cost $275/line mile. Line cutting costs cannot be calculated since the work was done by a combination of axe men and the bulldozer in conjunction with the stripping to expose bed-rocks.

We concluded from this study that assuming the cost figures outlined in this analyses compare with costs experienced by others, the relatively high cost of exploration in remote areas of the province can be related directly to three factors; these are -

1. the rugged and often unstable nature of the surface, coupled with the dense surface cover

2. the distance in terms of land or air miles from supply bases

3. the lack of normal communications from the supply bases to the areas of work.