014896

PROPOSED

REGIONAL EXPLORATION PROJECT

HESS MOUNTAIN AREA, YUKON

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CONCEPT

The proposed exploration approach is a helicopter supported stream silt sampling and panning program over a relativ-ely unprospected geologically favourable area of approximately 4,000 square miles. The program will take two years to complete with the first year being devoted to screening the project area for specific areas of interest to be explored in detail during the second year. A similar approach has already been used success-fully by Atlas Explorations and others in searching for base metals in the Yukon. Operation Keno by the G.S.C. in 1964 proved the technique viable for silver-lead vein deposits, Furthermore, theorectically at least, geomorphological conditions presently prevailing in central and northern Yukon are ideally suited to geochemical exploration.

Silt samples will be analysed for lead, zinc, copper and molybdenum by a hot acid extraction technique and panning concentrates will be examined specifically for tungsten, tin and columbian-uranium minerals. The total cost of the project is estimated at $250,000.00 over the two years - $150,000.00 for the initial helicopter program in 1968 and $100,000.00 for follow-up in 1969. If significant discoveries are made during this time supplimentary budgets would be required for develop-ment of each.

INTRODUCTION

The project area shown on Figure I, called the Hess Mountain Project, was selected after consideration of a much larger region shown on Figure 2. The project area encompasses approximately 4,000 square miles and was chosen for the following reasons -

(I) The area lies within a proven base metal province in a part of the Yukon where all known deposits also contain significant quantities of silver.

(2) The geological setting is favourable and in many ways duplicates the setting of the Anvil-Vangorda camp, The project area is cut by a major regional longitudinal fault, similar to the Tintina fault, and the drainage pattern suggests an associated widespread fault couple system. Furthermore, the area includes a belt of granitic stocks that intrude Ordovician and Silurian sediments that appear to be particularly susceptible to replacement.

(3) The area is almost completely unprospected, Construction of the Canol Road in I943 attracted prospectors to the eastern side of the project area where two significant deposits were found with little effort, the Southwest Potash tungsten property and the Hudson Bay Mining Company's Tom property.

(4) The Canol Road passes along the eastern boundary of the area. This road is not accessible north of Ross River Settlement at present but its rehabilitation has high priority in government planning as

part of the Northern Roads to Resources program.

Details of the history and regional geology are given in the Appendix.

EXPLORATION APPROACH

General

The primary exploration tool will be stream geochemistry. The project area will be sampled on a wide spacing during the first year to locate specific areas of interest to be sampled and explored in detail during the following year.

During the first year, a helicopter supported field crew will silt sample the project area on a density of approximately one sample per two square miles. It is the writer's opinion, based on over ten years exploration experience in the Yukon, that this density is more than adequate to locate specific centres of interest and that even areas containing swarms of vein type deposits, similar to the Keno Hill or Ketza River camps, will be located. In addition, panning concentrates will be taken from all streams and examined for tungsten, tin and rare-earth minerals. It is also planned to equip the helicopter with a scintillometer to be used during all low level flights.

Data collected during the first year will be examined in detail during the winter and specific areas of interest will be chosen for exploration during the second year. Such follow-up work will probably include more detailed silt sampling, soil sampling, geological mapping and prospecting possibly followed by bulldozing and/or drilling.

Pre-engineering

Assuming that all financial arrangements are completed by March I, I968, the pre-engineering phase will be March I to May I5 and will include -

(I) Ordering air photos and preparation of air photo mosaics for ground control,

(2) Air photo study followed by pre-plotting of silt sampling traverses, Sample density will be adjusted locally according to stream drainage patterns, geomorphology and structural features,

(3) Hireing crew, assembling field gear, arranging helicopter contract and distributing fuel supplies to pre-determined base camp sites.

First Year Logistics

The I968 field program will be designed around the use of a Bell G3BI helicopter chartered for the four month period beginning May I5. The crew will consist of six field men; a graduate geologist, three senior and three junior students, a cook and a helicopter pilot and mechanic. Students will silt-sample streams on the prearranged traverse patterns,

May I5 - Start field program in low lying areas. Orient field crews. Silt samples will be brought to Whitehorse during camp service trips (about once a week) and sent air express to a contract laboratory to be analysed for lead, zinc, copper and molybdenum using a hot extraction technique. Sample values will be rough plotted on base maps in Whitehorse and the field camp in order to keep a running check on results. Panning concentrates will be stored in Whitehorse for inspection at a later date.

June 30 - Move emphasis to the higher ground. Students will be more experienced by this time and may be put on individual traverses to accelerate the program.

August I5 - If weather has been good the initial phase may be completed by this time. Results of sampling from the first part of the season will be studied and specific areas of interest may be silt sampled in greater detail.

September I5 - Stake claims if necessary. Cache field equipment and demobilize field crews.

September I5 - December 3I - Begin assembling data, preparation of reports and studying creek panning concentrates.

Second Year Logistics

All compiled data will be studied and a detailed program of follow-up work will be outlined by April I, I969.

BUDGET

First Year (I968)

Helicopter - G3BI - 450 hours	$50,000.00
Air photos and mosaics	3,000.00
Fixed wing charter	5,000.00
Aviation fuel	5,000.00
Mobilization, avgas to field	7,000.00
Labor	2I,600.00
Room and board	I4,400.00
Geochemical assays	I2,000.00
Management	I2,000.00
Radio, scintillometer purchase	2,500.00

Expediting, accout, legal--------------------	$ 3,000.00
Claim registration (assume 250 claims staked)-------------	2,500.00
Miscellaneous (ore assays, drafting expediting, etc)----------------------	4,000.00
	$I42,000.00
Contingencies plus reserve for additional staking--------------------	8,000.00
	$I50,000.00

Second Year (I969)

Plan to spend $I00,000.00 on follow-up work on favourable areas outlined by I968 field work. If significant discoveries are made in I968, a suplimentary budget may be required to cover the extra development work.

PARTICIPATION

Archer, Cathro and Associates Ltd. expect a finders fee for initiating the project. This would amount to I0% of the vendors position in any companies formed (this position being further defined as 75,000 shares in a 3 million share company). In addition, a further I5,000 shares should be set aside for field crew incentive bonus.

Archer, Cathro and Associates Ltd. would be willing to handle the field management of the project for a retainer of $I,000.00 per month on a year round basis. For this fee the following services would be provided.

(I) Field management during the four summer months with one principal in the field at least ten days a month plus between five to ten days a month for office management.

(2) All required winter work. This would include all pre-engineering, airphoto interpretation, hiring a crew, arranging helicopter charter, writing reports, analysis of the data, and supervision of logging stream pannings with a binocular microscope. This would require about 10 - 15 days per month for one of the principals. Expenses such as drafting would be charged separately.

Respectfully submitted,

Archer, Cathro and Associates Ltd.

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APPENDIX I

HISTORY

In the last quarter of the 19th century, prospectors searching for placer gold explored all parts of the Yukon River drainage system. Very few records remain of their travels but the first government geologists to enter the area near the turn of the century found evidence of their workings. Successful bar mining commenced on Big Salmon River in 1881 and discoveries of productive bars on the Yukon, Pelly and Stewart River soon followed, culminating in the fabulous Klondike strike in 1896. Owing to the absence of quartz-rich schists, no coarse gold of consequence was found in the drainage system of the MacMillan, upper Stewart, or Hess Rivers and the district remained virtually unexplored for many years. The first geological reconnaissance was in 1902 when McConnell and Keele of the G.S.C. surveyed the MacMillan River. Keele returned in 1905 to map the upper Stewart River above Mayo. The only government mapping since then is a reconnaissance along the Canol Road in 1944 and 1945 by E.D. Kindle (Paper 45-21) and another in parts of the headwaters of the Stewart and Hess Rivers in 1952 by J.O. Wheeler (Paper 53-7). The pertinent results of this mapping are shown on Figure 2. Also shown on Figure 2 is the more recent government mapping immediately beyond the boundaries of the project area.

The first recorded lode prospecting was by Treadwell Yukon, under Livingstone Wernecke, operating from the Keno Hill area. Pioneering in the use of bush aircraft in mineral exploration, prospectors worked in the Fairweather Lake area in 1929, and near the headwaters of Rogue and Stewart Rivers, Russell

Range and Mt. Joy the following year. They reported finding widespread lead-zinc-copper mineralization but Treadwell Yukon subsequently concentrated on other districts where precious metal potential seemed stronger. Low metal prices and World War Two prevented further exploration.

Hudson Bay was probably the next company to enter the area, in I950 and I95I. Concentrating on the Canol Road, they were successful in finding a large, low-grade zinc deposit in I95I. Kerr Addison, Conwest and others carried out reconnaissance programs in the Tay River, Sheldon Lake, Lansing and Niddery Lake sheets following the discovery if the Vangorda deposit in I953. This work consisted of aerial and ground prospecting and mapping but was a few years too early to take advantage of the effective geochemical technigues now in use. A stigma of remoteness and poor economic potential then descended on the region in the late fifties and early sixties. Kerr Addison and Dynasty Exploration were active in the Vangorda District in I963 and I964, but it was not until July, I965, when the Faro deposit was found, that the potential for large open-pit deposits became appreciated. During I966, four large projects were launched along the Tintina Fault on either end of the Anvil-Vangorda District by Conwest, Glenlyon Mines, North Lake Mines and Atlas Explorations. In I967 Atlas Explorations expanded efforts to the north and east and working out of Fairweather Lake staked 4 blocks of mineral claims within the boundaries of the project area. Spartan Explorations Ltd., a new company formed in I967, began exploration along the Canol Road and then shifted to the southeast after making a significant tungsten-molybdenum discovery near McPhearson Lake.

REGIONAL GEOLOGY

Lithology

The lithology of the project area is not fully known and is best estimated by consideration of the bounding areas that have been mapped by the G.S.C. as shown on Figure 2.

The oldest rocks in the region are quartzite and shale, with minor amounts of limestone and phyllite, of Proterozoic or early Cambrian age. This unit extends from east of the Cantung Road to the unmapped Lansing mapsheet in the northwest. The characteristic rock is a massive, gritty, quartz-pebble quartzite (hereafter called grit in this report) which is occasionally micaceous. Green, red and black shale is common within the grit sequence, becoming more phyllitic to the southeast. The only economic potential of the grits is for fresh water, conglomeratic uranium deposits (Blind River type), but limy horizons could be important. Near granitic contacts the argilloceous rocks form contact aureoles. The grits are most likely to occur along the southwest and northwest edges of the project area.

In the Nahanni mapsheet, the grits are overlain by middle Cambrian limestone. This is the host rock for the tungsten deposits along Flat River. Other Cambrian rocks overlie the grits between Frances and Pelly Lakes, consisting of phyllite, which is sometimes limy, and lesser amounts of shale and siltstone. Related rocks northeast of the Cantung Highway contain relatively more slate with phyllite and siltstone. It is possible that this unit will occur in small amounts immediately above the grits in the project area.

From Frances Lake to Mt. Sheldon and beyond, grits are in unconformable contact with widespread Ordovician and Silurion sequence, over I0,00 feet thick. Black shale predominates in the lower part of the sequence, while varicoloured chert is most common towards the top and limy horizons are present throughout. Folding and crumpling has been intense. Strong hornfels aureoles are produced where the shales are intruded by granitic bodies. Southeast of the Nahanni district, these Ordovician and Silurian rocks grade into carbonates through a facies change. This unit, as far as known, forms the major part of the project area.

A fairly distinct belt of moderately small batholiths and isolated stocks cuts the project area in a northwest-southeast direction. These are probably related to the widespread Cretaceous intrusives which are common throughout British Columbia and the Yukon. They range in composition between quartz monzonite and granodiorite, although lesser amounts of syenite and diorite are present. They are usually fine to medium grained, unfoliated, and generally have sharp contacts.

Structure

The Tintina Fault, lying just off the lower edge of Figure 2, is one of the major structures on the North American continent. This longitudinal fault and corresponding trench can be traced about 600 miles from the British Columbian border to the Yukon River Flats in Alaska. Offset of geological units and regional trends indicate a right-hand movement of from 220 to 260 miles. Available evidence suggests that about 40 miles of transcurrent movement took place along the fault in early Paleozoic time followed by some 220 miles in Cretaceous time. Atlas Explorations have proven the existence of a similar but weaker longitudinal fault about 50 miles to the northeast that follows the South MacMillan and Riddell Rivers. This fault can be projected southeast to Traffic Mountain, where it separates Mississippian and Proterozoic rocks. The writer suspects that a third longitudinal fault exists a further 40 miles to the northeast. The location of this fault is shown on Figure I and evidence for its existence is primarily the lineation created by the headwaters of the Hess River through to the South Nahanni River to the southeast.

It is logical to assume that the three major longitudinal structures will have an associated widespread fault couple system. Evidence of such a system is substantiated by the distinct drainage pattern occuring between the longitudinal lineaments. There are two prominent trends, the strongest in a N45°E direction and the weakest in a N45°W direction. It is interesting to note that these two trends are identical to the structural features of the Keno Hill district which is situated between the longitudinal faults.

Glaciation and Geomorphology

The project area is characterized by a plateau-like upland gradually increasing in elevation and ruggedness from the northwest to the southeast. The upland averages between 4,000 and 6,000 feet in elevation at the west to over 6,000 feet to the east. Drainage is generally east to west with valley elevation about 2,500 feet in elevation at the west and 3,500 - 4,000 at the east.

A major ice-sheet probably covered all but the highest peaks along the N.W.T. boarder during the Pleistocene. The ice sheet gradually thinned to the west where only valley glaciation occured to a maximum elevation of 4,000 to 5,000 feet. Ice flow was probably west or southwest. Intense post-Pleictocene Alpine glaciation has occured in the higher areas, particularly near the N.W.T. border where such glaciation is still active on the higher peaks.

Deposits of glacial till are generally restricted to valley bottoms and the lower flanks of the bordering mountains. Elsewhere, till is mainly residual. In the western part, where the plateau is generally unglaciated, such till is very abundant and true outcrop is scarce, Further east the till is usually coarser, thinner, and is primarily a result of recent mass wasting.

Most of the project area is permanently frozen and post-Pleistocene frost action has greatly contributed to the present cycle of rapid erosion.

ECONOMIC GEOLOGY

There are no known significant mineral deposits in the project area because it has never, to the writer's knowledge, been activelly prospected. Mineral deposits are known in the more accessible areas to the east (near the Canol Road) and to the south. These are summarized as follows in order to provide a clue to the types of deposits that might be expected. Except for the Norquest and Atlas-Pike and Pay deposits, which were found by geochemistry, all mineral occurences described were found by conventional stream prospecting, tracing float, or ground and airborne gossan hunting.

Cantung - first discovered in I954 by Northwestern Exploration Ltd.; mapped and sampled as a copper showing in I955 and I956 and dropped in I958 as too low in grade. Restaked in November of that year by Karl Springer's Mackenzie Syndicate, which recognized the scheelite content and tungsten potential; surface drilling in I959 and I960 indicated I.2 million tons of open-pit ore grading 2.47% WO_3 and 0.5%Cu; mill operated for one year until September, I963, treating 43,500 tons, and again in mid I964 until the fire in December I966. Ore reserves are now quoted as about 800,000 tons @ 2.5WO_3. Ore is a structurally controlled, high-temp limestone replacement and contact metasomatic deposit; scheelite and chalcopyrite replace "ore limestone" and pyroxene skarn, and also occur in uneconomic quantities in calc-silicate hornfels; "ore limestone" has limited extent near mine and disappears elsewhere through facies change and unconformities.

Hudson Bay M&S - Tom Group - discovered by company prospectors in I95I; 39 drill holes totalling I7,800 feet between I95I and I953 proved I0.5 million tons averaging 5% zinc and low silver-lead content; during I966 the company did a local geochemical survey; conducted a major drill program in I967 and although nothing is known of the results, rumors are that they have significantly increased their reserves, have found better silver-lead mineralization, and will continue drilling in I968; occurs at 5,400 feet elevation in black cherty shale, two miles north of an intrusive plug two-miles in diameter; known sphalerite, pyrite, minor galena occur with borite, quartz, calcite and dolomite in a thin-bedded, altered carbonate rock, up to 200 feet thick and 3,600 feet long.

Southwest Potash - found by aerial reconnaissance in I962 at 6,000 feet in rough mountainous terrain; disseminated scheelite occurs in altered limestone bed in chert-shale sequence in skarn-hornfels zone at contact with small granodiorite stock; mapping and sampling in I963 and I964 indicated a grade of 0.90%WO_3; no drilling has been done.

Norken Property - reportedly an old Kennco property from early I950's, restaked in I959 as Norken, Fool Peak and Rain claims by Canadian Yukon Mining Co. Ltd.; ground mag and EM surveys in I960 and I96I followed by 4,600 feet of drilling in I3 holes in I96I and I962 revealed sub-economic pyrrhotite, pyrite, chalcopyrite, galena, sphalerite disseminations in argillite, hornfels and quartzite of either proterozoic or Ordovician age; very little outcrop; restaked by Atlas in I966.

Pike Lake - during I966, Atlas Explorations discovered porphyry copper-type mineralization in a silicified, chloritized and biotized fracture zone within a porphyritic intrusive; mineralization consists of chalcopyrite, sphalerite, galena, arsenopyrite, pyrite and garnet with minor silver values; work in late I966 indicated too low a grade to warrant further immediate development.

Pay Property - staked in I966 by Atlas Explorations on a geochemical anomaly; bulldozing in I967 indicates an extensive zone of sphalerite and minor silver-lead replacement in limy schists; not much is known about this showing but Atlas are very inpressed with their results and plan to continue development in I968.

Norquest Syndicate - six Zn-Pb-Ag deposits found between I964 and I966; all occur in epidote and clinopyroxene rich beds, within schist and parogneiss, possibly from alteration of limy beds; replacement bodies up to 40 feet thick appear to average up to 8% combined, mostly zinc, with some silver; the best showing, Black Jack received 2,000 feet drilling in I966 revealing up to II% zinc in a zone I2 - I5 feet wide and I,400 feet long.

Matt Berry - galena, sphalerite veins carrying silver values were found by prospecting in the I930's and were later examined by C.M. and S.; Matt Berry Mines acquired the property in I965 and during I966 and I967 trenched and did 2,I20 feet of drilling in I3 holes; the mineralized zone averages about 4.0 feet wide and was followed 800 feet along strike and is still open; the best drill intersection assayed 20.6 ounces silver per ton, 32.8% lead and 22.3% zinc over a width of 4.5 feet; more drilling is planned for I968; the vein occurs in Devonian shales near an intrusive stock.

Dragon Lake - discovered in I945 by G.S.C.; staked in I960 by Kennco as PAD group, mapping, sampling and a mag survey showed uneconomic amounts of chalcopyrite, scheelite and pyrrhotite in a skarn zone near a small stack.

Sheldon Mtn. - in I945, G.S.C. found quartz, pyrrhotite and arsenopyrite veins carrying low values in copper,

tin and gold over an extensive area in granite and slate.
Emerald Lake - scheelite float was found by the G.S.C. in I952 at the foot of a glacier; minor scheelite was seen in carbonate veins and disseminated in a syenite stock; also reported are quartz veins, containing pyrrhotite, pyrite, chalcopyrite, molybdenum and arsenopyrite.
Spartan Explorations - staked almost I,000 claims on molybdenum, scheelite showings found in August I967 by gossan hunting from the air followed by ground prospecting and silt geochemictry; rumoured to a very significant find; occurs along the contact of intrusives with Proterozoic grits; our firm attempted, unsuccessfully , to finance an exploration program in the exact area of the discovery during June and July I967.

The Hess Mountain Project area has potential for large tonnage deposits of the following three types:

(I) Massive Sulfides - Anvil-Vangorda Type

Known deposits range in size from 5 to over 40 million tons of open pit ore and are pyrite-pyrrhotite bodies grading about I0% combined lead and zinc, 0.3% copper and I - 2 ounces silver per ton. They are located close to intrusive contacts, in locally complex structural settings. Evidence to date suggests that ore minerals have replaced syngenetic pyrite concentrations within siliceous horizons of a Mississippian (or older) schist-quartzite sequence. The exploration approach is a combination of geochemistry, looking for localized targets within the favourable belt, and EM surveys, looking for conductors. The camp was found in I953, mainly because the Vangorda deposit outcropped in a creek canyon. It is doubtful if it would have been found yet if this had not been the case. The geological features of the project area have many similarities to the Anvil-Vangorda camp.

(2) Lode Replacement or Contact Metasomatic Deposit

At the contacts of many of the granitic stocks limy skarn zones and pyritic argillaceous hornfels zones are worthy of careful exploration. Carbonate horizons are present in almost all the units in the project area, although sometimes in minor amounts, and these have good potential at greater distances from the intrusives. Some of the more brittle rocks have a potential for fracture and breccia zones in the appropriate structural setting. The main potential in these categories is for Cu-Pb-Zn-Ag or Cu-W deposits. Included in this classification are the Keno Hill type vein silver-lead deposits.

(3) Porphyry-Type Deposits

The only known occurences which fall into this classification are the Pike Lake showing and possibly Spartan's discovery. The small acid intrusives that occur in abundance in the project area should be investigated for the conditions associated with disseminated Cu-Mo-W deposits - abundant K feldspar, intense fracturing and quartz vein stockwork.

In addition, several other types of deposits could be present in the project area. The potential for these is lower than those given above but the exploration approach used should be designed to find them if present. These are:

(I) Conglomeratic Uranium Deposits (Blind River Type)

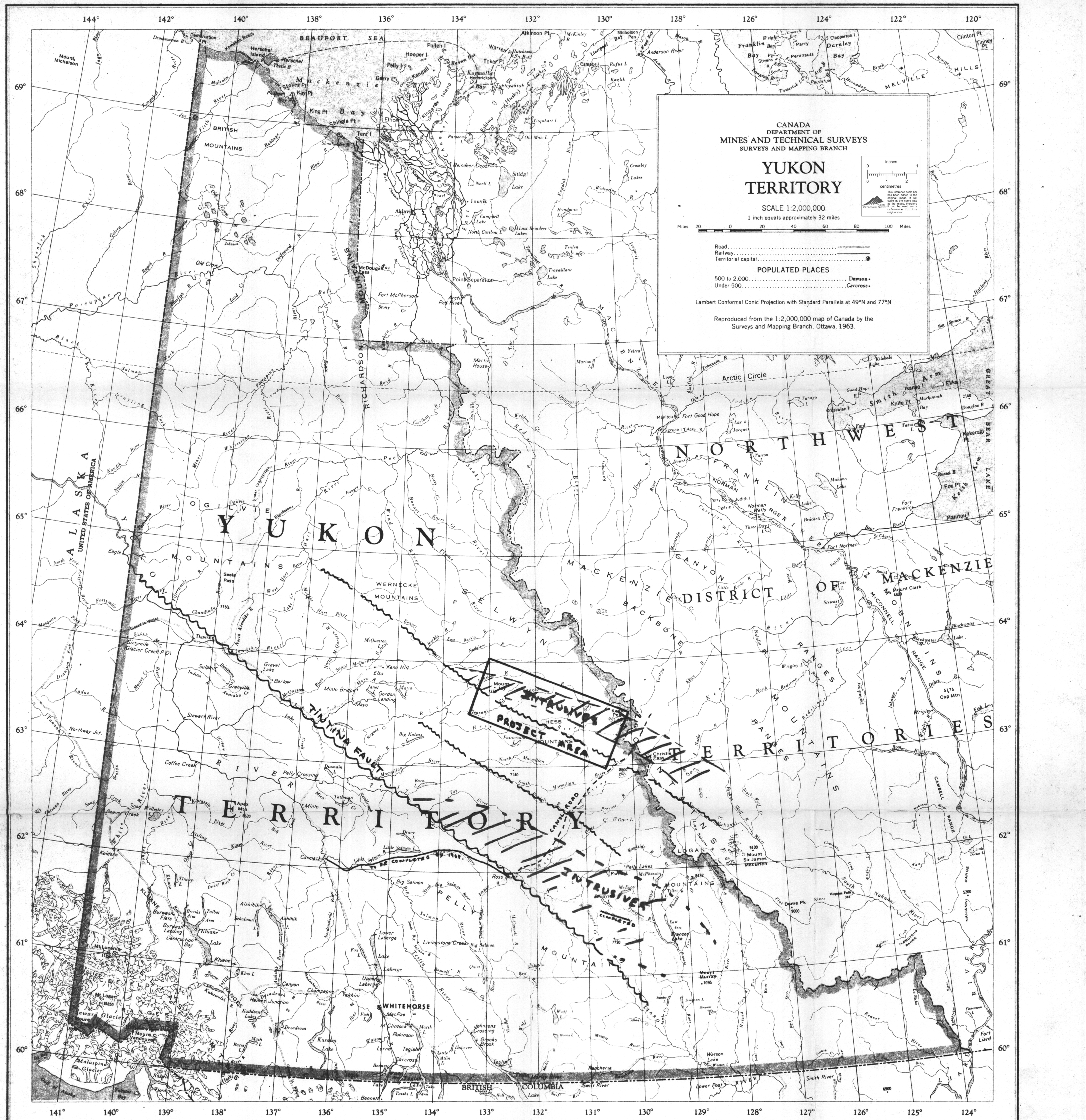
No uranium occurences have yet been reported from the grit sequence but prospecting has been cursory. The grits are somewhat similar in age and composition to the Blind River Huronian conglomerate and their prospecting potential has been noted by the G.S.C. (Roscoe, Unexplored Uranium and Thorium Resources of Canada, Paper 66-I2). All mineral occurences which are visited should be tested for radioactivity, and a scintillometer should be carried on all flights or ground traverses over the grits.

(2) Rare Earth Deposits and Tin

Such deposits, if present, will probably be assiciated with the intrusive stocks. Evidence of these can be found in stream panning concentrates and followed to the source. Cassiterite is known to occur in minor quantities in intrusive stocks in this part of the Cordillera.

(3) Sedimentary Deposits

Black shales are common in many parts of the project area and are worthy of investigation for possible copper content.



Copies may be obtained from the Map Distribution Office, Department of Mines and Technical Surveys, Ottawa.

FIGURE 1.


HESS MOUNTAIN PROJECT AREA
N.W.T.
YUKON
CANTUNG HIGHWAY
RUSSELL RANGE
SOUTH FORK RANGE
CAMPBELL RANGE
PREVOST CANYON
AREA OF EXTENSIVE STAKING BY CYPRESS EXPL.
Frances Lake
68 MILES TO WATSON LAKE
LEGEND
PALEOCENE
Sandstone, Conglomerate, Coal
CRETACEOUS (?)
Andesite, Dacite, Basalt, minor pyroclastics; commonly porphyritic.
Granodiorite, Quartz Monzonite, minor Diorite & Syenite; in part porphyritic
MISSISSIPPIAN OR OLDER (?)
Schistose Hornfels, Phyllitic Schist, Quartzite
Altered green Volcanics (Greenstone), minor pyroclastics
Siliceous Slate & Shale, Chert, Greywacke
SILURIAN & DEVONIAN
Dolomite, commonly sandy; limy Quartzite, minor Chert
ORDOVICIAN & SILURIAN
Shale, Slate, varicoloured Chert, minor Conglomerate, Quartzite, Limestone
CAMBRIAN
Phyllite; minor Dolomite, Shale, Siltstone, Chert
Limestone, limy Siltstone
PROTEROZOIC (?)
(a) Quartz pebble Quartzite (Grit), Varicoloured Shale; minor Limestone
(b) Quartz-mica Schist & Gneiss, micaceous Quartzite
Yukon Group - Quartz-mica-chlorite Schist, micaceous Quartzite, minor Limestone
Claims in good standing
Mineral occurrence
GEOLOGY COPIED FROM GEOLOGICAL SURVEY OF CANADA MAPS.
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mi.
HESS & LOGAN MOUNTAINS, EAST-CENTRAL YUKON
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Consulting Geological Engineers
DATE 7 April 1967
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