REPORT

on

THE JOHOBO LAKE PROPERTY

of

KATHEX MINING CO. LTD.

HAINES JUNCTION AREA, YUKON TERRITORY

by

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Vancouver, B.C.

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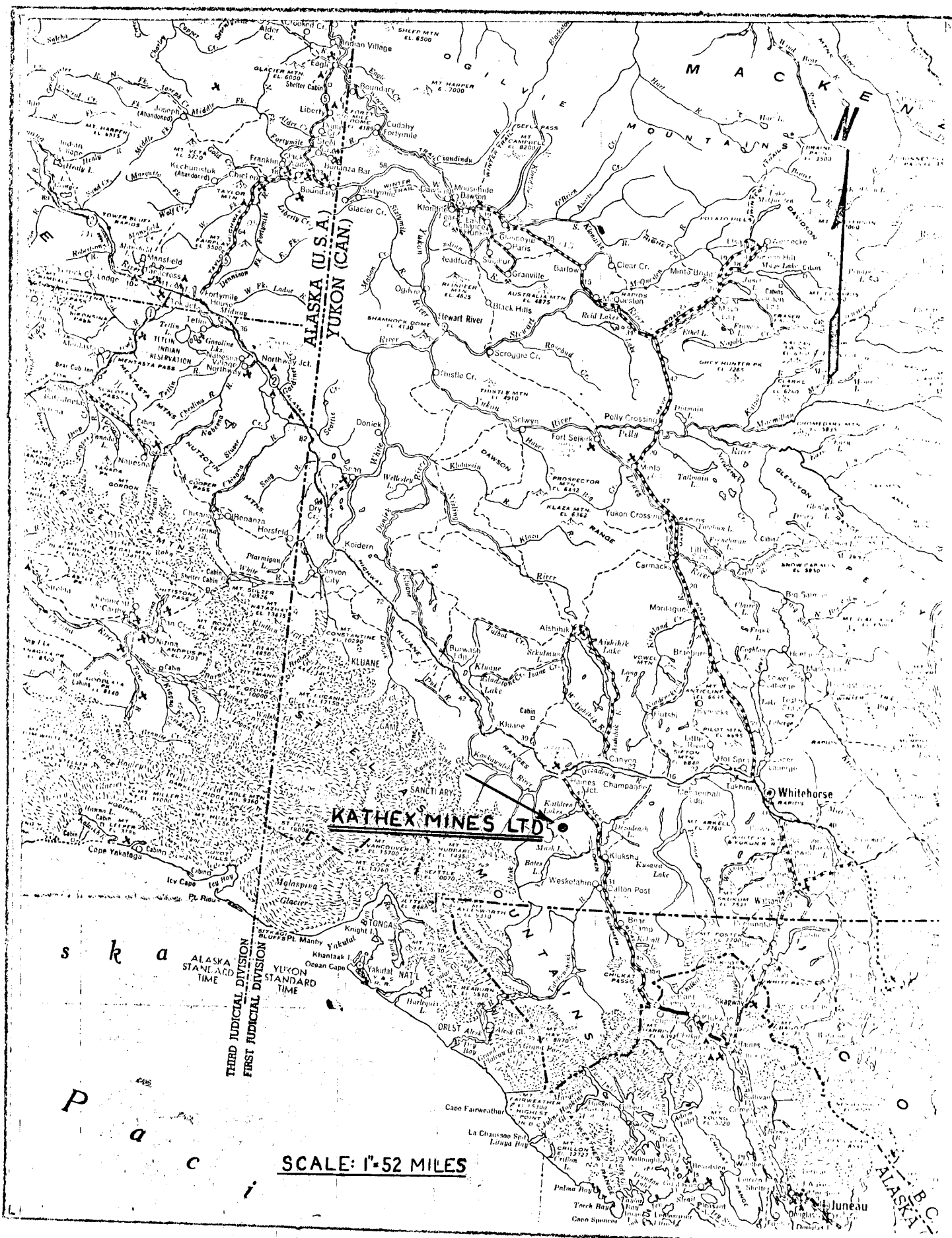
KATHEX MINES LTD
SCALE: 1"=52 MILES
ALASKA (U.S.A.)
YUKON (CAN.)
ALASKA STANDARD TIME
YUKON STANDARD TIME
THIRD JUDICIAL DIVISION
FIRST JUDICIAL DIVISION
MACKENZIE MOUNTAINS
OGILVIE MOUNTAINS
SELWYN MTNS
CASSIAR MTNS
KLUANE RANGES
SANCTUARY
Whitehorse
Juneau
Dawson
Fortymile
Eagle
Boundary
Chicken
Tetlin
Northway Jct.
Tok Jct.
Mansfield
Tanacross
Delta Jct.
Fairbanks
Nenana
Healy
Anchorage
Valdez
Cordova
Yakutat
Cape Yakataga
Icy Cape
Icy Bay
Malaspina Glacier
Pt. Manby
Ocean Cape
Khantaak I.
Knight I.
Pt. Riou
Cape Fairweather
La Chausson Spit
Lituya Bay
Palma Bay
Taylor Mtn
Mt. Harper
Mt. Sanford
Mt. Wrangell
Mt. Churchill
Mt. Logan
Mt. Kennedy
Mt. Hubbard
Mt. Fairweather
Mt. Crillon
Mt. Vancouver
Mt. Augusta
Mt. Queen Mary
Mt. Alverstone
Mt. Archibald
Mt. Sulzer
Mt. Constantine
Mt. George
Mt. Lucania
Mt. Logan
Mt. Kennedy
Mt. Hubbard
Mt. Fairweather
Mt. Crillon
Mt. Vancouver
Mt. Augusta
Mt. Queen Mary
Mt. Alverstone
Mt. Archibald
Mt. Sulzer
Mt. Constantine
Mt. George
Mt. Lucania

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SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The Johobo Lake property of Kathex Mining Co. Ltd. is in southwestern Yukon Territory, about eighty-five miles west of Whitehorse and 17 miles west of the Haines Road. This copper prospect was discovered by E.D. Kindle of the Geological Survey of Canada while doing routine mapping in 1950. Little was done until 1959 when exploratory work was carried out. For the next few years geological mapping, diamond drilling and tunnelling were done and 11,050 tons of hand-sorted copper ore extracted.

Lenses and pods of bornite and chalcopyrite mineralization are associated with easterly-striking faults in a host rock of competent porphyritic andesite. The massive deposits are apparently accompanied by some dissemination of copper mineral and are controlled by a complex series of cross faults within shear zones.

A study of maps of the "Main Show" underground workings and the results of diamond drilling both here and at the "Bornite Creek" showings indicates that further diamond drilling might well disclose additional copper mineralization of either massive or disseminated nature.

A Turam electromagnetic survey carried out in 1969 northerly from the Main Show, along the strike of the favourable andesite, disclosed the presence of a 400' long conductor and four isolated centres of conductivity. An induced polarization survey should be carried out over the area in which the conductors are located. This work should also be followed by diamond drilling.

Some reconnaissance geochemical work over the claim group should also be considered.

It is recommended therefore that the sum of $70,000 be provided to complete the induced polarization survey, the diamond drilling and the geochemistry.

SCOPE

During July and August of 1969, D. McSpadden was on the Johobo property as geologist. His work included geological mapping, layout of a survey grid and liaison with the geophysical contracting firm of Seigel Associates Ltd.

Mr. McSpadden worked under the direction of the writers. Dr. W.R. Bacon visited the property on August 1st, Mr. J.J. Crowhurst on March 29th and July 9th.

LOCATION AND ACCESS
(See Fig. 1)

The Johobo Lake property of Kathex Mining Co. Ltd. is at an elevation of 2500-3500 feet in the Dezadeash area of Yukon Territory. Whitehorse is 85 miles to the east and Haines, at the head of Lynn Canal, is 140 miles to the southeast of the property.

Access from Whitehorse by auto is via Haines Junction on the Alaska Highway, thence 17 miles south along the Haines road to the cut-off at Mile 142. From here a four wheel drive vehicle can negotiate the seventeen mile gravel road which passes south of Kathleen Lake to the camp.

Johobo Lake, 800 feet south of camp, is usable by small aircraft from Whitehorse.

Accommodation for ten men is available in a cookhouse and bunkhouse.

PROPERTY AND OWNERSHIP

Kathex Mining Co. Ltd. holds 93 claims in the Johobo Lake area. These claims are in three groups as follows: (See Fig. 2)

1. Thirty-one claims of the original Johobo Mines Ltd. which covers the original showings:

   Jean, Jean 1 and 2
   Roy
   Jay 1-4
   Star 1-6
   Sockeye 15-16
   Ball 1-6
   Tess 23-31

2. Thirty-two claims, centered about one mile southeast of the original showings.

   Mag 1-32

3. Thirty claims, immediately northwest of the original Johobo group.

   Mag 33-62

These claims cover 3784 acres.

HISTORY

Between 1896 and 1900 many prospectors passed along the old Dalton Trail to the Klondike placer gold fields but little prospecting was done for lode deposits. The present Haines road in many places follows the route of the old Dalton Trail.

Some prospecting for placer gold was undertaken in the Dezadeash area around 1900 and geological reconnaissance was carried out on numerous occasions between that date and 1950.

During the course of geological mapping in the Dezadeash map area for the Geological Survey of Canada, E.D. Kindle, in 1950, discovered copper mineralization on the south bank of Bornite Creek, two miles southeast of Sockeye Lake. (Dezadeash Map Area, Yukon Territory, Geological Survey of Canada, Memoir 268, published in 1953). Yukon Star Mines Limited was formed in 1958 to explore and develop this copper prospect.

In 1959 Conwest Exploration Company Ltd. optioned the property and diamond drilled four holes totalling 795' under the original "Bornite Creek showing". Detailed mapping disclosed the presence of the "Main Showing" 2500' to the northwest. Drilling results were apparently discouraging and the option was dropped.

The following year Cerro Corporation held the ground and investigated the Main Showing by diamond drilling seven holes totalling 2082 feet. Cerro dropped the option in the fall of 1961 and, following this, Dominion Explorers Ltd. acquired possession of the ground.

Underground development on two levels and some mining was carried out. During 1962, 11,050 tons of hand-picked copper ore was shipped via Haines, Alaska, to the Tacoma Smelter of the American Smelting & Refining Co. Ltd.

In 1968 Kathex Mining Co. Ltd. was incorporated to acquire and investigate the Johobo Lake property. During the summer of 1969 geological mapping was carried out, a grid was cut and a Turam electromagnetic survey undertaken.

GEOLOGY AND MINERALIZATION
(See Figs. 2 and 3)

The area in which the Johobo Lake property is located is underlain by andesites and minor limestones of the Mush Lake group (Triassic and Jurassic) and clastic sediments and shales of the overlying Dezadeash group (Lower Cretaceous). All formations strike northwest and dip steeply to the northeast, forming the east limb of the Silver Creek anticline.

In the vicinity of the showings the Mush Lake group is made up of four rock units, only one of which contains copper mineralization.

The lowermost formation is described as a light to dark green, fine-grained andesite, generally shattered and healed by calcite. Some bedding has been observed but this may be relic bedding of assimilated sediments. Local schistosity of the andesite parallels the regional trend. (Strike NW and dip 85° NE). Minor quartz and pyrite are also present. This formation has been locally designated "Lower Andesite".

The gradational upper contact of this andesite with overlying limestone leaves little doubt that the andesite was intruded. (after Warnock - private report "Geology of Johobo Mines Ltd., Yukon Territory, Canada" - 1960). Consequently the andesite is regarded as a sill intruded at a very shallow depth.

The sedimentary sequence of the Mush Lake group consists of about 150-300 feet of phyllite and limestone that strike to

the northwest and dip 45°-70° NE. These rocks are intruded by narrow andesite porphyry sills.

Overlying the sediments to the northeast are massive porphyritic andesites. The rock is dark green and fine-grained with phenocrysts of pyroxene and calcite. Complete shattering with injections of quartz and calcite obliterates any vestige of linear elements. This unit is designated on the accompanying plan (Fig. 3) as porphyritic andesite, or mine andesite, and is the host for all known mineral deposits on the property.

Northeast of the above unit is a highly altered phase of the porphyritic andesite that is about 1250 feet thick. The composition of the altered andesite is similar to the unaltered variety except for the presence of 25-35% limonite and significant silicification.

Overlying the Hush Lake group along a fault contact are the argillites of the Dezadeash group. These are fine-grained, black, faintly bedded, carbonaceous and contain numerous veinlets of calcite and quartz. This rock unit is believed to be Cretaceous.

The major structural feature of the property is the fault contact between the Hush Lake and Dezadeash group rocks. This fault strikes N55°W and dips 80°NE and displacement appears to be of major proportions. This fault has been offset along Bornite Creek by the Bornite Creek shear which strikes east and shows a horizontal displacement of about 900'. Minor shear zones and mineralized quartz veins in the Bornite Creek workings parallel the Bornite Creek shear. Northerly-striking faults appear to offset these mineral zones. A third set of minor low

angle faults or slips appears to be significant as far as mineral concentrations are concerned. Mineralization consists of chalcopyrite, bornite and pyrite with minor chalcocite and covellite.

Two significant mineral zones have been discovered to date, the original discovery on Bornite Creek and the Main Show occurrence 2500 feet to the northwest. The mineral deposits on Bornite Creek consist of lenses and pods of massive bornite with minor chalcopyrite that generally strike E-W and are associated with the two sets of subsidiary faults mentioned previously. These pods range up to 50 tons in size. Two mineral zones about 50 feet long and 20' apart are parallel and constitute the showing, although a 2" wide stringer of bornite 280' to the east appears to be the continuation in this direction. Prior to 1960, 350 tons of hand-cobbed bornite ore was mined from these zones. Chip samples reportedly taken along the strike of one of these zones averaged 4.3% Cu along 54.0' (G.F. Warnock - 1960).

The Main Show appears to consist of a series of lenses and pods of chalcopyrite and bornite irregularly distributed over an area 260' long (E-W) by 60'. The mineral zones strike easterly and lie close to the contact between the altered and unaltered phases of the porphyritic andesite. Silicification of the host rocks is strong and is most noticeable close to a dominant shear zone that strikes N70°E, dips vertical and is from 20 to 40 feet wide. Most of the significant mineral lenses are closely associated with this shear zone, although ore deposition is locally controlled by subsidiary fractures or slips

within the shear zone. Diamond drilling was carried out in 1960 and although chalcopyrite and bornite mineralization was intersected in numerous locations, no sample results are available.

On the Main Show underground development was carried out on two levels (3340 and 3440) and mining was carried out on at least two ore zones. The principal zone, the 46,900 N orebody, was 47' long, 7' wide and had a vertical extent of 50'. Records do not indicate grade although G.F. Warnock mentions "high-grade copper and low-grade silver values". A second mineral pod, the 46,700 N zone, measured 30' x 20' on the lower level (3340) and is described by Warnock as containing "low-grade copper values". Other unrelated mineral zones were mined from surface.

It is probable that the mineralization in both the Bornite Creek showing and the Main Show is associated with easterly-striking tension faults that are related to the principal northwesterly-striking shear zone that forms the contact between the Mush Lake group and the Dezadeash group. The porphyritic andesite, which is the host for the mineral zone, apparently formed the most favourable environment during faulting and subsequent period of mineralization.

Other mineralization in the area is minor, consisting of limited exposures of pyrite, limonite, malachite and chalcopyrite.

DIAMOND DRILLING

In 1959 Conwest Exploration Company Ltd. drilled four holes totalling 795' on the Bornite Creek showings. The drilling was done by T. Connors Ltd. under the direction of G.D. Tikkanen. The drill holes are as follows:

D.H.	Dip	Length	Bearing	Core Recovery	Location
B-1	0°	154'	South	55%	East of main ore zone
B-2	-35°	201'	"	40%	40' E of main ore zone
B-3	-20°	256'	"	40%	40' W " " " "
B-4	-20°	184'	"	25%	140' E " " " "

D.H. B-1 reported the presence of a small blob of chalcopyrite (¼") at 143'. D.H. B-2 reported the presence of a narrow quartz vein with disseminated chalcopyrite (1" - 2") at 21.0'. It is unfortunate that holes B-3 and B-2 passed 40' on either side of the principal mineral zone. Apparently no hole was drilled directly below the richest mineral lenses.

Under the direction of G. Warnock of Cerro Corporation, New York City, seven holes totalling 2082' were drilled in 1960. All holes were drilled in the vicinity of the Main Show workings, as follows:

D.H.	Bearing	Dip	Length	Mineralization Intersected
#1	S65°E	-45°	277'	Chalcopyrite at 4, 60, 83, 104, 175, 179, 228-257'.
#2	N25°E	-45°	410'	" at 12-18, 68-71, 80-89, 127, 135, 156, 323'.
#3	N30°E	-45°	212'	" at 97, 111, 118-146, 147-161, 167'.
#4	N50°E	-45°	273'	Bornite at 17, 29, 43'. Chalcopyrite at 104, 172, 184, 213'.
#5	N50°E	-60°	372'	" at 33, 68, 133, 143, 151, 157-163, 186, 204'.
#6	N45°E	-45°	300'	" at 57'.
#7	N15°E	-45°	134'	" at 93'.

Average core recovery was 67%.

It is almost certain that core samples were taken but assays are not available.

Although the Johobo Lake deposits are primarily massive bornite and chalcopyrite, considerable amounts of disseminated mineralization are present, according to detailed descriptions of core by G. Warnock.

GEOPHYSICAL
(See Fig. 3)

Between August 20th and October 5th, 1969, Seigel Associates Limited conducted a Turam electromagnetic survey on part of the property. Lines 200' apart covered an area 3.5 miles long by 2000'-2500' wide, the long dimension striking with the favourable porphyritic andesite. This method was chosen because it is relatively unaffected by rough topography and provides deep penetration.

The survey located one conductor that is approximately 400 feet in length and is interpreted to be within a few tens of feet of the surface. Four other isolated conductor axes were revealed. The first mentioned conductor lies close to Sockeye Creek and will be named the Sockeye zone. It strikes N75°W, parallel to the shear zones with which the Bornite Creek and Main Show mineral deposits are related. It also parallels the westerly flowing Sockeye Creek which follows a topographic depression, possibly within a zone of weakness.

The four isolated conductors are in the same general vicinity as the Sockeye zone.

PROPOSALS

Further geophysical investigation should be undertaken of the area in which the electromagnetic conductors occur. The induced polarization method should be used. This method can detect disseminated as well as more abundant, continuous forms of mineralization.

Diamond drilling should be carried out on the Sockeye zone but this can be planned more intelligently after induced polarization results are available. Other anomalous zones may be detected by the induced polarization survey and should be drilled.

It is recommended that diamond drilling be undertaken on the Bornite Creek workings and under the Main Show workings. These holes should intersect the projections of the mineral zone at least 100' below previous exploration. Modern drilling methods should be able to recover core where previous drilling failed to do so.

BIBLIOGRAPHY

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2. Report on the Kornite Creek Copper Property - C.D.Tikkanen, August, 1959.

3. Geology of Johobo Mines Ltd., Yukon Territory, Canada - George F. Warnock - 1960.

4. Report on Kathex Mining Co. Ltd., Dezadeash Area, Y.T., by J.J. Crowhurst, April, 1969.

5. 1969 Field Season Report on the Kathex-Johobo Property - D. McSpadden - September, 1969.

6. Report on a Turam Electromagnetic Survey - Haines Junction Area, Yukon - Jon G. Baird - October 30, 1969.

Stream sediment sampling in the area covered by the claim groups should be considered.

COST ESTIMATE

Induced Polarization Survey, 20 miles @ $500/line mile	$10,000
Diamond Drilling - 3000' of BQ drilling @ $12/foot	36,000
Reconnaissance Geochemical Survey	2,000
Engineering and Geology	5,000
Camp Operation	5,000
Move in and move out	6,000
	$64,000
Contingencies	6,000
Total	$70,000

Respectfully submitted,

BACON & CROWHURST LTD.

J.J. Crowhurst, B.A.Sc., P.Eng.

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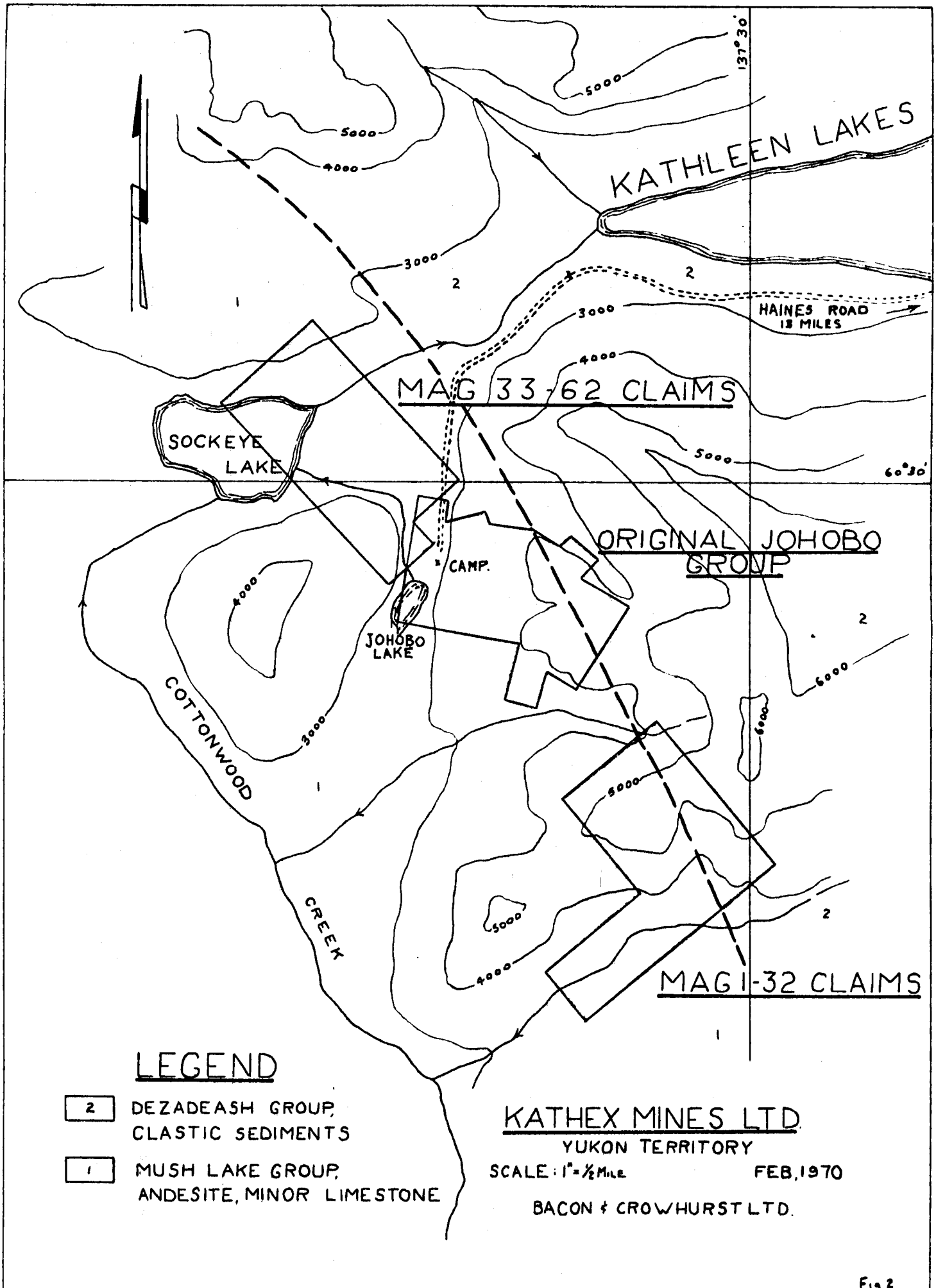
137°30'
5000
4000
3000
KATHLEEN LAKES
2
1
HAINES ROAD
13 MILES
MAG 33-62 CLAIMS
SOCKEYE
LAKE
5000
60°30'
ORIGINAL JOHOBO
GROUP
CAMP.
JOHOBO
LAKE
4000
3000
6000
COTTONWOOD
CREEK
5000
4000
MAG 1-32 CLAIMS
LEGEND
2 DEZADEASH GROUP, CLASTIC SEDIMENTS
1 MUSH LAKE GROUP, ANDESITE, MINOR LIMESTONE
KATHEX MINES LTD.
YUKON TERRITORY
SCALE: 1"=½ MILE
FEB, 1970
BACON & CROWHURST LTD.

Fig 2

40,000 E. 45,000 E. 50,000 E. 55,000 E.

55,000 N. 50,000 N. 45,000 N.

NORTH HILL

13,400N. 13,000N. 12,800N. 11,000N. 10,000N. BASELINE

SOCKEYE LAKE 2525'

LOW FLAT GROUND

WEST HILL

JOHOBO LAKE 2710'

STEEP SLOPE

5% Outcrop of Mush Lake Sediments

20% Outcrop of Mush Lake Sediments

20% Outcrop of Andesite (?)

disseм. Cp ~3'

Rock Point

LANDING

Tuff

SOCKEYE CREEK

BORNITE CREEK

TESS CREEK

STEEP CREEK

Dezadeash Sediments

To Haines Road (Mile 142) 17 Miles

Kathleen Lake 2 Miles

RECOMMENDED I.P. AREA

Outcrops of Lower Andesite

Lines show area covered by Turam Electromagnetic Survey, October, 1969.

CAMP 2725'

MAIN SHOW WORKINGS

3340' LEVEL PORTAL

"ORE" STOCKPILE

Diamond Drilling by Cerra Corporation in 1960.

Diamond Drilling by ConWest Exploration Ltd in 1959.

FAULT

CONTACT

some disseм. Cp.

Andesite dyke

BORNITE CREEK WORKINGS

Massive bornite lenses

Malachite float

Narrow acid dyke

BORNITE CREEK SHEAR ZONE

LEGEND

CRETACEOUS

- DEZADEASH GROUP SEDIMENTS

TRIASSIC - JURASSIC MUSH LAKE GROUP

- ALTERED ANDESITE PORPHYRY (Upper)
- PORPHYRITIC ANDESITE (Mine)
- MUSH LAKE SEDIMENTS (Lower)
- LOWER ANDESITE FINE GRAINED

OUTCROP

CONTACTS, Defined, Assumed

FAULT

MINERALIZATION

- Bn. Bornite
- Cp. Chalcopyrite
- Py. Pyrite

ELECTROMAGNETIC CONDUCTOR AXIS, POORLY DEFINED.

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GEOLOGICAL MAP

JOHOBO LAKE PROPERTY

DEZADEASH AREA, YUKON TERRITORY

SCALE: 1" = 500'

FEET 500 0 500 1000 1500 FEET

Geology by G. Warnock, 1960

FIG. 3

JAN., 1970