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REPORT ON

GEOPHYSICAL SURVEY

CONDUCTED JULY 6 TO JULY 13, 1980

CUB JOINT VENTURE

SPORK 1-24 CLAIMS - YA54995-YA55000
YA55376-YA55393

WATSON LAKE MINING DISTRICT

CLAIM SHEET 95E/3 & 95D/14

Latitude 61°00'N Longitude 127°14'W

C.A. Main, B.Sc.

R.J. Cathro, B.A.Sc.,P.Eng.

January 15, 1981

This report has been examined by the Geological Evaluation Unit and is recommended to the Commissioner to be considered as representation work in the amount of $ 3,600.00

Resident Geologist or
Resident Mining Engineer

Considered as representation work under Section 53 (4) Yukon Quartz Mining Act.

B. R. BAXTER
Supervising Mining Recorder

Commissioner of Yukon Territory

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SUMMARY AND RECOMMENDATIONS

The Spork claim group lies within the southern Logan Mountains of eastern Yukon. It was staked by CUB Joint Venture over suspected scheelite mineralization along the contact of Cambro-Ordovician linestones and a Cretaceous pluton. The contact lies in a valley bottom and is not exposed. Initial evaluation of the target using EM-16 and ground magnetic techniques were inconclusive and more extensive geophysical surveys are recommended.

INTRODUCTION

The Spork claim group was staked in July, 1980 by CUB Joint Venture (Cassiar Asbestos Corporation Ltd., Highland Crow Resources Ltd. and Union Carbide Canada Ltd.). The program was managed by C.A. Main of Archer, Cathro and Associates Ltd.

The property is centered on an overburden-filled valley lying between a Cretaceous pluton and limestones of the Cambro-Ordovician Sekwi formation. The contact is not exposed and no mineralization has been discovered. The property was evaluated by EM-16 and ground magnetic surveys performed by contractor W.A. Barclay Exploration Services Ltd. A report by W.A. Barclay dated October 1980 describing this work is included in Appendix One.

PROPERTY, LOCATION AND ACCESS

The property consists of 24 contiguous claims recorded in the name of Archer, Cathro & Associates Limited at the Watson Lake Mining Recorder's Office as follows:

Claim Name	Grant Numbers	Expiry Date
Spork 1-6	YA54995-YA55000	24 June 1981
7-24	YA55376-YA55393	24 June 1981

The Ivo property lies 8 km west of the Yukon-NWT border at latitude 61°00' N and longitude 127°14' W and is some 140 km northeast of Watson Lake and 120 km southeast of the Cantung Mine. The nearest roads are the Nahanni Range (Cantung) Road 70 km to the west and a winter road from the Alaska Highway to the Mel lead-zinc property, 75 km to the south.

GEOMORPHOLOGY

The Spork property is located at the height of land between the headwaters of Rock River to the east and the Coal River to the west. Maximum elevations reach 2000 m and local relief is about 700 m. Most of this district is mantled by thick vegetation cover below timberline, which occurs at about the 1600 m elevation. Outcrop is generally scarce and thickness of overburden varies greatly.

FIELD PROCEDURES

These are described by N. Rebalski, geophysical operator, in Barclay's Report (Appendix One).

GEOPHYSICAL INTERPRETATION

This is outlined in W.A. Barclay's report. His main assessment for the Spork claims (page 20), is that

"The magnetics over this region are irregular in orientation, heterogeneous, and arise variously from sources both buried and near surface."

and

"In fact, the em. data here offer little that is presently meaningful."

He recommends (page 22) that:

"If possible, the area surrounding the Spork grids should be surveyed by em. and magnetics. The existing grid should be surveyed at a 100 metre line interval."

CONCLUSIONS

Preliminary geophysical investigations of the Spork property have been inconclusive and more data is required peripheral to the claims and a more detailed scale within the claims.

Respectfully submitted,

ARCHER, CATHRO & ASSOCIATES LIMITED

Charles A. Main

C.A. Main, B.Sc.

Association of Professional Engineers of the Yukon Territory
R. J. CATHRO
GEOLOGICAL ENGINEER

R. J. Cathro, P.Eng.

W.A. BARCLAY
EXPLORATION
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Geophysical Report

CUB JOINT VENTURE

IVO and SPORK Claim groups

NTS 95 E 3 & 95 D 14

For

ARCHER, CATHRO & ASSOCIATES LTD.

October 1980

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Those maps at a scale of 1:2500 have been Xerox reduced X .65.

All maps are bound separately.

Introduction

A geophysical survey of two CUB Joint Venture properties - the IVO and the SPORK claim groups - in the Upper Coal River area of the Yukon Territory was initiated on July 3, 1980 and continued until August 27, 1980. Both magnetic and electromagnetic methods were utilized.

The crew consisted of the writer and several assistants from the Archer, Cathro exploration group (usually B. Barrie and R. Johnston). Work was undertaken from four separate camps. A total of 164.5 km magnetics, and 161.1 km of VLF-EM, were completed during the survey.

Preliminary interpretation of the data was attempted in the field by the writer and S. Main (crew chief) to establish a correlation between the geophysical and geological surveys. Also, the geophysical results were reviewed once early in the season by W. Barclay, who was also present at the initiation of the work.

Instrumentation

The magnetometer used was the portable Geometrics G816/826A nuclear precession magnetometer in conjunction with the G826 base station recording unit. Several mechanical problems were dealt with in the course of the survey. We initially used a Hewlett-Packard HP7155B chart recorder to record the base station signal, but it soon developed an erratic chart drive and was replaced by a new Rustrak recorder that worked well for the remainder of the survey (August 6-27).

We encountered the usual difficulties with worn sensor cables, more so than usual because of the constant presence of topofil which tended to slice through the cable shielding. At one point, we were forced to use the backpack sensor arrangement until replacement cables for the staff-mounted sensor set-up arrived in camp.

The signal from the portable magnetometer became erratic towards the end of the program. The fault appeared to originate in a loosely mounted circuit board whose fittings had cracked; but it worked properly in a movement-free situation and was switched with the G826 base station magnetometer unit.

The VLF-EM survey was conducted with two Geonics EM-16 units. Station NLK (Seattle, Washington; 18.6 kHz.) was used as a transmit signal for east-west traverses (Rx. facing east) while two stations, NAA (Cutler, Maine; 17.8 kHz.) and NSS (Annapolis, Maryland; 21.4 kHz.) were used for north-south lines (Rx. facing north). The NLK signal was the strongest of the three, providing a null width of 1% for both in-phase and quadrature readings. The strength of NAA and NSS varied but was always weak and generally provided a null width of 6% in the in-phase and 10% for the quadrature.

Field Procedure

The SFORK claim group, situated in a swampy valley with little visible geology, was surveyed from a 1.8 km baseline bearing 335 degrees, with traverses 200 m apart extending 400 m either side of the baseline. It was located to investigate the possible presence of a granite-limestone contact in the valley, as suggested by outcrop exposures on the valley's flanks. Sampling interval was 25 m with detailing at 12.5 m stations where appropriate.

The IVO claim group is much larger and entailed 13 separate grids, several grid extentions, and a few areas of detailed investigations. Some traverses over an exposed zone of scheelite skarn mineralization initially served to establish a geophysical co..relation with this kind of setting.

In general, the IVO survey was conducted on traverses 200 m apart at a 25 m sampling interval, with detailing of locally anomalous features at 12.5 metres. Orientation of the grids was either north-south or east-west to cover the presumed lithological contact. Detail traverses 100 m apart were completed on the Main Showing (Grid 1), on Grid 4, and on Grid A (within Grid 4), whose traverses were oriented at 135 degrees to cover an evolving geophysical and geochemical anomaly.

Because geophysical crews were deployed from four separate camps, it became necessary to re-establish a value for base station magnetic corrections at each camp. This was accomplished by re-reading a section of traverse from each new location and then determining a correction value that would best adjust the data to agree with previously recorded values. Base station values at each camp were as follows:

Crisco Lake	59,200 gammas
Chicken Creek	59,120 gammas
Salivo Creek	59,050 gammas
Chunder Creek	59,085 gammas

Note that when the backpack sensor was used from July 21-23, it was necessary to add 12 gammas to all magnetic values obtained in the field.

The survey was organized so that two operators, using the EM-16 and flagging in traverses simultaneously, preceded the magnetometer operator. Most of the baselines had been cut and chained previously. Cross traverses were flagged every 25 metres on a compass bearing. Picket to picket distances were generally measured along slope. Accurate location maps for each grid have been prepared to show the true location of traverses with respect to grid baselines.

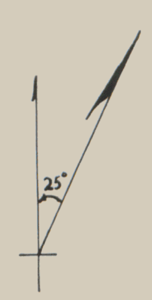
The VLF-EM and magnetic data were plotted in profile form on idealized grid base maps at a horizontal scale of 1:2500. Where warranted, some of the magnetic data has also been presented in contoured form.

September 10, 1980 N. Rebalski

MAGNETOMETER SURVEY

Instrument: Geometrics G816/826A Portable Magnetometer
Operator: N. Rebalski
Base Value - 59,100 ४

Vertical Scale: 1 cm = 100 ४

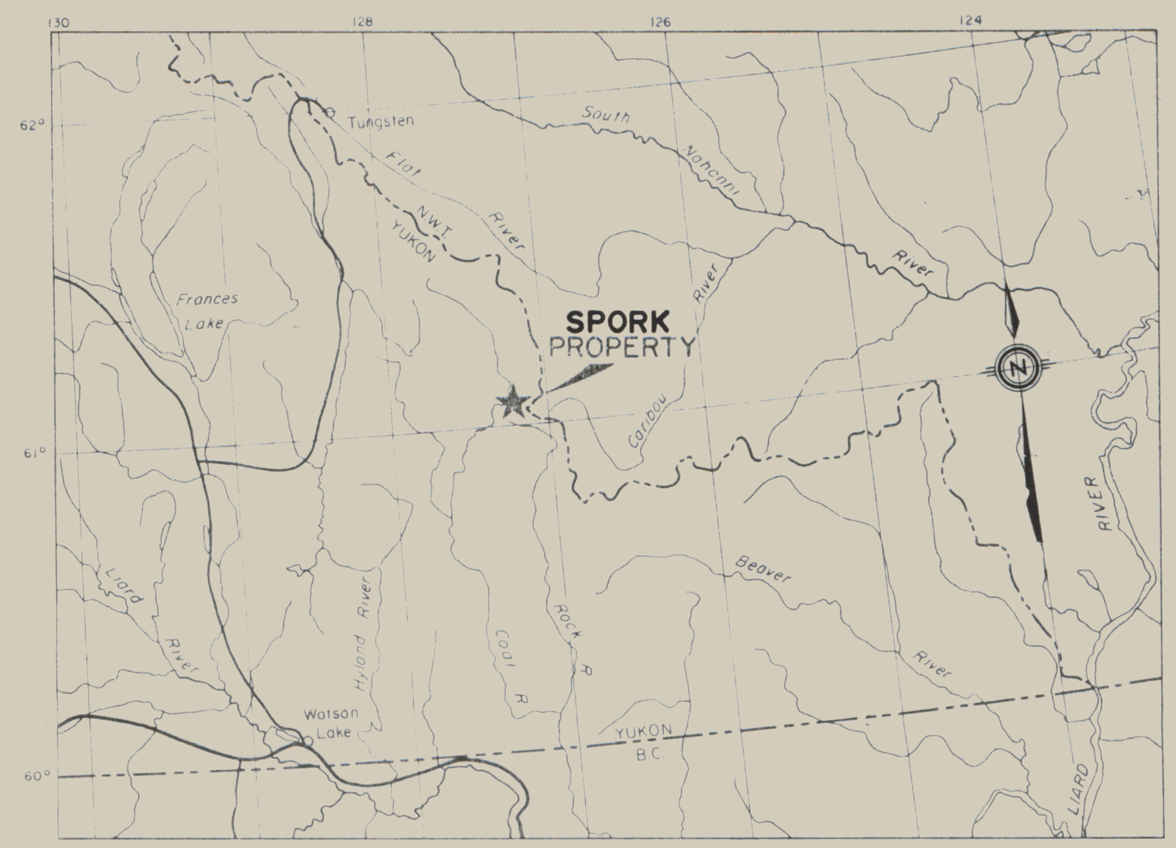


VLF-EM SURVEY

Instrument: Geonics EM-16
Operator: N. Rebalski
Tx Station: Seattle (NLK) 18.6 kHz / Rx: Facing East
In Phase / Quadrature

Vertical Scale: 1cm = 10 %

For grid location see Figure 2



LOCATION MAP

SCALE — 1: 2,000,000

40 20 0 20 40 60 80 100 Km

20 10 0 10 20 40 60 Miles

FIGURE 1

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GEOPHYSICAL DATA

SPORK PROPERTY

CUB JOINT VENTURE

HORIZONTAL SCALE 1: 2,500

125 0 125 Meters

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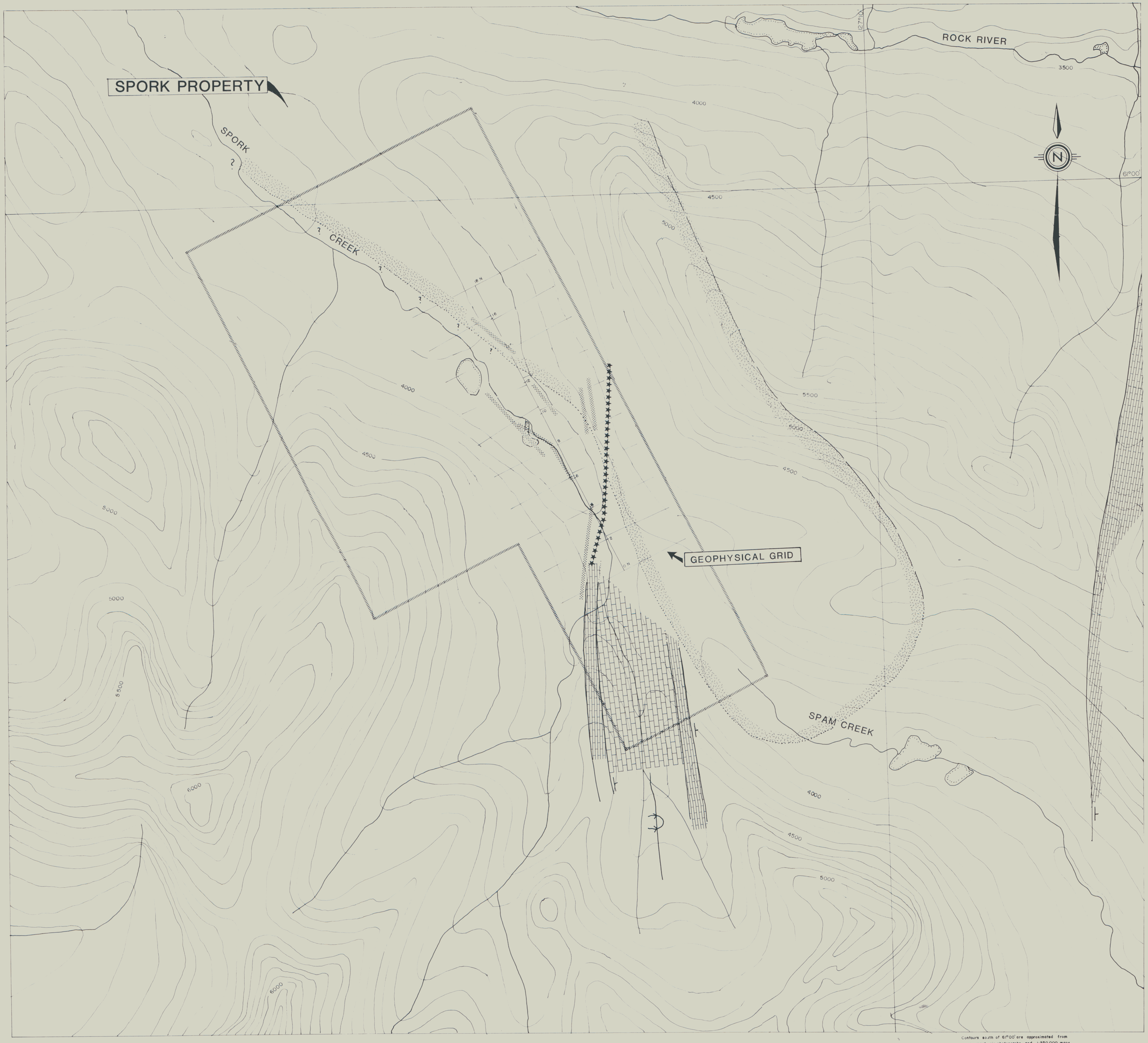
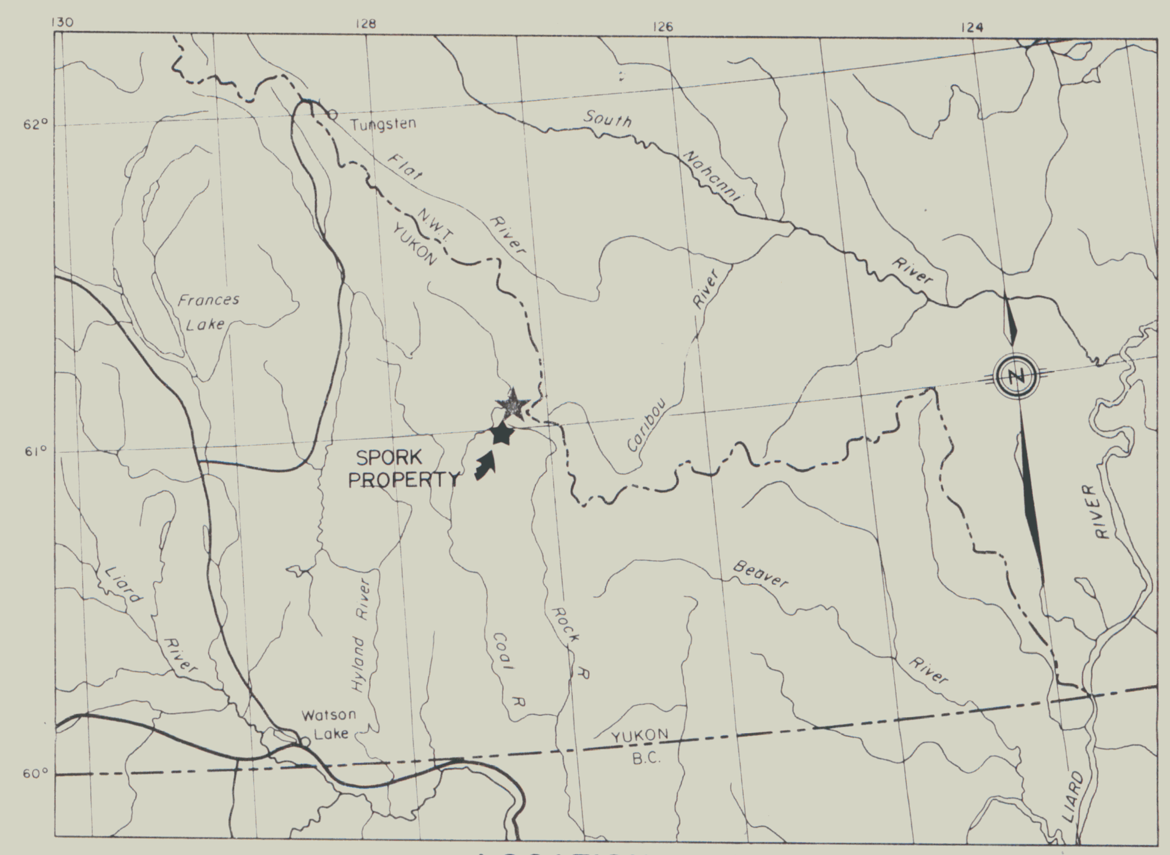
ENGINEER
Jan /81

Map# 95-E/3 95-D/14 Doc# 090737 80

To accompany report dated Jan /81



Contours south of 61°00' are approximated from government air photographs and 1:250,000 maps.



LOCATION MAP

SCALE — 1:2,000,000

40 20 0 20 40 60 80 100 Km

20 10 0 10 20 40 60 Miles

LEGEND

CRETACEOUS

Kqm — Quartz monzonite

UPPER CAMBRIAN to ORDOVICIAN

€Or — **Rabbitkettle Fm** Wavey banded limestone

LOWER CAMBRIAN

l€s — **Sekwi Fm** Limestone and dolomite; swiss cheese limestone

LOWER CAMBRIAN and OLDER (?)

l€brq — **Backbone Ranges Fm** Quartzite, siliceous light grey hornfels, quartz-biotite schist, lesser green phyllite and siltstone

l€brl — Siliceous limestone, pebbly limestone

ONLY SHOWN WHERE RELEVANT

ELECTROMAGNETIC CONDUCTOR

CONTACT, DEFINED BY MAGNETICS

FIGURE 2

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GEOPHYSICAL TRENDS

SPORK PROPERTY

CUB JOINT VENTURE

SCALE – 1:10,000

300 200 100 0 100 200 300 400 500 600 700 Metres

1/4 0 1/4 1/2 Miles

Association of Professional Engineers of the Yukon Territory
R. J. CATHRO
GEOLOGICAL ENGINEER
Jan/81

MAP# 95-E/3 95-D/14 Doc# 090737

79

To accompany report dated Jan./81

REVIEW OF DATA

W. Barclay

Introduction

Comprehensive magnetometer and VLF-EM surveys undertaken this season on the CUB Joint Venture's IVO and SPORK claim groups have described a number of anomalous features pertinent to a search for tungsten skarn mineralization. As a further benefit, the field results often have confirmed, or added to, existing knowledge of the intrusive-sedimentary contact setting under scrutiny.

The operational details are described fully in the preceding pages by the technician responsible for data acquisition. Following are a few general comments on the applicability of geophysics to this particular program, a review of the most intriguing results, and recommendations for subsequent efforts.

Data Presentation

No attempt has been made to formally draft the survey data at the time of this writing. The map sheets which accompany this report are Xerox reductions (x .65) of the original field plot sheets, in many instances spliced for handling convenience. Only profiled forms of the magnetic and em. data normally are present.

Contoured magnetics are included from two areas of emerging importance on the IVO property: the Main Showing and the southeast flank. Occasionally it has been necessary to re-plot data profiles to combine results elsewhere.

An overlay indicating the main features interpreted in the data review - at a scale of 1:10,000 - is enclosed with this report, primarily for orientation purposes.

These and additional features are indicated with greater accuracy on individual grid map sheets.

Accurate traverse location maps, prepared by N. Rebalski, are available with the original data.

General Comments

The relevance of geophysics, as it has been applied here, is accepted mainly on the premise that detectable pyrrhotite and/or magnetite often may occur in association with scheelite-bearing skarns situated within an intrusive-limestone-phyllite environment. Its usefulness extends to the normal capability of magnetics to distinguish abutting rock units of contrasting ferro-magnesian composition, and to VLF-EM's ability to define weak conductivities such as may occur at lithological contacts and along fault or fracture zones. The approach is an indirect one.

An idealized source model would be expected to yield a fairly localized magnetic anomaly of modest to strong intensity, sometimes - though not always - accompanied by electromagnetic corelation. Sulphide concentrations may range from disseminated to massive, and may often be discontinous and pod-like.

Not all possibilities for mineralization are encompassed by this simplified scenario. Scheelite can occur within calc-silicate skarns devoid of sulphides. In this situation, geophysically derived contact definitions may yet guide the exploration search; and it is important to recognize that an absence of local magnetic anomalies near a contact setting does not preclude ore potential.

VLF-EM response is subject to occasional topographic distortion, often misleadingly anomalous. Moreover, its heightened sensitivity (through the use of higher frequencies than are available in conventional em. systems) often facilitates the introduction of superfluous anomalies unrelated to mineralized settings.

Two recognized physical phenomena yield VLF-EM anomalies: inductive coupling and current channelling.

Where inductive coupling occurs, the primary signal induces a secondary electromagnetic field in a local conductor, producing a localized aberation in the primary field. This is then measured at the receiver using appropriate nulling procedures. Significant anomalies occur only when the conductivity-thickness product of a source exceeds about 1 mho.

In the case of current channelling, local structures of lower resistivity than surrounding rock (such as unmineralized shear zones and fracture systems) channel the propogation of the primary transmitted field. Anomalies are generated whose amplitudes can be pronounced and can vary significantly according to the orientation of such a structure relative to the transmitter location.

A healthy caution consequently must guide any review of VLF-EM data. Thus magnetics serves as the main tool in the present search.

This survey was undertaken along traverses normally spaced 200 metres apart (and sometimes 400 metres): a coarse, reconnaissance scale necessary if most of the intrusive stock's contact was to be covered this season. That a mineralized zone could be missed at such a scale is patently obvious, given the discontinuous and often unpredictable nature of skarn development. Detailed surveying at a closer line spacing was applied only where initially encountered anomalies seemed important by virtue of their stratigraphic setting or of associated geochemical anomalies.

Discussion of Results

IVO CLAIM GROUP

Grids 1 & 2:

Grid 1 encompasses the Main Showing and the Trevor Showing.

The Main Showing comprises a well-mapped sulphide skarn at an intrusive-phyllite contact overlain by a limestone 'cap'. As such, it provided a logical setting for initial tests of magnetic and em. response.

The first instrument pass on line 160N yielded a magnetic anomaly centred at 58+50W of about 1500 gammas intensity, largely negative. Data indicate that the source lies near surface, and dips to the east at a modest inclination. Its amplitude intimates the presence of magnetite, but pyrrhotite may also be a component. Some considerable width to the zone is suggested, although its oblique strike with respect to the traverse would enlarge the apparent width indicated by the profile.

A weak response 100 metres to the southwest likely reflects a less magnetic extention (after possible faulting) of this anomaly. To the northeast, the zone is traced as far as the 900 gamma anomaly at line 161N/57+62W. The weak magnetic effects which are observed at about 57+00W on line 161+50N describe a further continuation of the favourable horizon, if not of the strongly magnetic component itself. (High grade scheelite reportedly occurs here). Clearly the system does not appear at line 162N.

A weakly indicated conductor axis corelates with the strong magnetics. A flanking axis 25 metres west may pertain to the intrusive contact, or to a local structural event.

When viewed from a larger perspective, this anomalous zone of magnetics is seen to be part of an irregular series of localized anomalies which roughly encircle the sedimentary cap. These features occur at or near either the intrusive contact or the higher, interpreted phyllite-limestone contact on the east side of the dome.

Two particularly evident anomalies within this context occur at line 57W/155+30N (7500 gammas, dip north) and at line 158N/54+50W (1300 gammas, dip west). Both originate from near surface material likely including magnetite. They are not necessarily more important to skarn possibilities than more modest anomalies (likely reflecting pyrrhotite) such as at line 158N/59+25W and at line 156N/58+87W.

The Main Showing is surrounded by expanses of flat magnetic relief (approximately 59,100 gammas background level) which evidently characterizes - and assists in defining the limits of - the intrusive stock. The setting is obviously limited in area, and some of the local magnetic anomalies could derive from ferruginous components of the phyllite unit rather than from sulphide skarn. Some potential is nevertheless perceived here.

Near the Trevor Showing, several anomalies of 100-500 gammas intensity are detected in a random arrangement between lines 138N and 144N, from 51W to 56W. The setting may resemble that at the Main Showing; skarn float reportedly was encountered frequently by the geophysics crew. The 200 metre traverse interval employed here is too wide to permit reliable extrapolations of data between individual features or along the intrusive contact. The same can be said of features at line 144N/63W and at about 68W on lines 140N and 142N. A somewhat tentative indication of the intrusive contact is offered on the compilation map.

Grid 5

Apart from two brief incursions to line 138N of the anomaly systems described in the preceding paragraph, nothing of local interest occurs in the magnetic data from this grid. The uniformly flat background must reflect uninterupted intrusive and/or dolomite. If both are present, there appears to be no means of differentiating one from the other magnetically here. Disconcertingly, data recovered from two westward extentions to the grid (lines 130N and 126N) eschewed contact indications even when over reported phyllites.

Such a lack of anticipated response is puzzling, and makes any projection of the stock's extent in this region uncertain. Based on the data alone, one wants to conclude that Grid 5 is comprised almost exclusively of intrusive. If this perception reflects geological realities as they are presently understood, then there is reason to suspect that the stock may extend west and south beyond the surveyed area.

Two noted VLF-EM axes striking north-south exhibit weak conductivities. They probably delineate structures conducive to current channelling rather than sulphide horizons. At present, they appear to have little bearing on the search for skarn.

Grids 12 & 13

Grids 12 and 13 cover the northwest section of the stock such that Grid 13 adjoins the western side of Grid 2.

The uneventful magnetic relief which has been noted over interpreted intrusive on much of Grids 1 & 2 here is seen continuing to the west on Grid 13. Each traverse has provided a local magnetic expression of modest intensity (100-450 gammas) which likely originates in a pyrrhotitic source. It seems reasonable, given the reported phyllite exposures to the west, that the magnetics are situated at or near a contact setting. Its course can be extrapolated coarsely (because of the 400 metre traverse interval here) from line 140N/75+25W to line 156N/77+75W. That skarn may be present along this presumed contact is a real possibility that invites further scrutiny.

By line 160N on Grid 12, the environment has become much more complex. Highly variable magnetic relief is observed in an area of frequently reported phyllite outcrop. Individual peaks assuredly originate from sources at surface.

Somewhere between 156N and 160N - and likely closer to the latter - the contact evident on Grid 13 veers drastically to the east. Thence it is delineated northwards along the east side of Grid 12, generally at about 72+50W, atleast as far as line 176N.

Locally intense magnetics accompany this contact between lines 160N and 166N, unlike the character of the modest anomalies observed in the same setting on Grid 13. The response exhibits considerable widths, is largely negative in amplitude, and attains a maximum intensity of 1500 gammas at line 164N/73+60W. The source is clearly heterogeneous; on line 166N both near-surface and buried origins are indicated. Though less intense to the north, this broad horizon continues to flank the contact as far as line 174N.

The em. data confirm that a broad sequence of zoned conductive material corelates with the magnetic events consistently along strike. A significant quadrature response, generated on most traverses, intimates that inductive coupling phenomena prevail - probably from sulphides. The width of the system reaches as much as 150 metres.

The anomalous horizon could be explained by parallel concentrations of magnetic sulphides within a phyllite sequence flanking the contact. The possibility that the response originates within skarn development seems, on balance, less likely although not entirely precluded.

The series of parallel magnetic anomalies which extends along the west side of the grid between lines 164N and 172N define related near-surface features separated by 150 to 175 metres. Direct VLF-EM corelation is consistent along both axes, with good conductivities suggested at line 164N/79+25W and line 166N/79+30W. A distinct, shallowly dipping unit of weakly magnetic composition, with local concentrations of pyrrhotite at its edges, would account for the response. Down-dip extent may be limited. Its situation within abundantly exposed phyllites is discouraging, but the response itself is not. Any evidence of limestone in the area might greatly enhance its significance.

Grids 3, 4, 11, 7, 8, and Detail Grid 'A'

These contiguous grids cover the southeast flank of the intrusive stock as it was understood at the onset of this survey.

Particularly over the region of Grids 3, 4, and 11, the magnetic results describe a geological setting more complex than thus far seen elsewhere on the property (see contoured data). Quiet magnetic relief, such as normally might reflect intrusive or possibly dolomite, is observed in the south of Grid 11, the northwest corner of Grid 3, and briefly in the north-central area of Grid 4. In the locale centering Grids 3 and 4, the active magnetics evident there must signify one of two possibilities. Either sedimentary units prevail (in which case, the intrusive contact extends north of present grid coverage between lines 34W and 18W), or an intrusive is present which has been subjected to a degree of magmatic segregation not reflected on previously discussed grids. If the first bears some validity, then survey coverage ought to be extended northwards; even the latter possibility may still have some bearing on the emerging importance of this area.

A major em. and magnetic system, which appears to conform with a contact setting, dominates the results obtained over these grids. A zone of strong magnetics is delineated from line 118N/9+50W on Grid 7 through to line 14W on Grid 4 between 102+75N and 104+25N. Intensities range between 1000 gammas and 2000 gammas above background, implying an at least partial magnetite component. The system varies in width from 20 to 40 metres, and dips away from the presumed stock at 45 dgrees or less.

As a result of detailed surveying at a 100 metre line spacing, it has become apparent that concentrations of magnetic source material are discontinuous along this horizon. At least four cross-faults are evident. Whether these preceded or followed sulphide deposition is unclear. But the perceived interuptions in continuity do speak favourably for the prospects of this setting as a skarn development.

The VLF-EM data here define a conductive zone which corelates closely with the general trend of this intensely magnetic axis. On some traverses, however, the conductor location is displaced from the peaks of magnetic anomalies. Further, it is sensed that the em. response originates from depths greater than those suggested by magnetics. Good conductivities are indicated along the axis by generally strong quadrature response; and the relatively shallow dip is confirmed.

All of this implies further complexity. The em. axis may be delineating the contact itself (or possibly a strike-fault). Whichever the case may be, conductivities suggest a sulphide presence extending to depth while the magnetics enhance localized mobilizations of magnetic sulphides lying closer to surface.

A contact exists, roughly bearing east-west, from line 6W/107+25N to line 8W/106+75N and presumably thence to the zone described above. To ascribe this to a limestone (or dolomite)-intrusive abutment is speculative at this stage. But its importance to the mineralized setting may be real in the long run.

This pronounced em. and magnetic system is contained within a larger sequence of geophysically defined events. To the west, the favourable setting can be traced as far as line 28W/100+50N in the magnetic data.

Local anomalies are less intense, and occur over a broader area. Complex faulting and/or folding are indicated in the contoured presentation particularly, and it is suggested that the arrangement of stratigraphic sequences (and their structural controls) is far from a simple matter here. Ferruginous sediments within a phyllite sequence could account for these features, but so could localized skarn occurrences. Additional detailing seems warranted.

To the north, the em.-magnetic corelation which characterizes much of this system extends as far as line 118N. Only the conductor can be traced further. Two parallel axes of inflexions are observed in the in-phase profiles, and it is the more westerly of these which seems to agree consistently with the magnetic definition of the contact. The response over both suggests an absence of good inductive coupling source material. Cross-faulting is evident between lines 116N and 120N.

Either of these two em. axes - despite the absence of local magnetic anomalies - could define a contact setting favourable to calc-silicate skarn. The 300-400 gamma magnetic relief which flanks the interpreted contact from line 120N to the north seems unrelated to the setting described on detail Grid 'A'. More likely, it reflects magmatic differentiation in the intrusive or sedimentary sequences similar to those postulated in the north-central region of Grids 3 and 4.

In the south part of Grid 3, a series of magnetic features extends between lines 34W and 44W. On each traverse, a local anomaly of modest intensity occurs at a magnetically defined contact. The system is probably part of a larger package of magnetically active sediments; individual anomalies near the contact merit further scrutiny.

Grids 6 & 9

These two grids were situated to cover the east flank of the stock's northeast corner. Grid 9 encompasses the Tuanipal Showing.

In contrast to the generally quiet tenor of the magnetics over this region, VLF-EM results have defined a number of major features. Some of these apparently reflect structural events which have affected the setting.

A geological contact has been traced in the magnetics from line 146N/39+75W as far north as line 158N/35+60W. The gently varying relief immediately west of the contact recalls similar response on Grids 7 & 8. East of the contact, the magnetics are uniformly flat without locally anomalous expression.

The em. axis which flanks this feature is comprised of two components, the more westerly of which coincides reasonably well with the magnetic definition of the contact. Conductivities are weak generally, although modest quadrature response is associated with the east component between lines 152N and 158N. The system is coincident with the course of a local creek. The response seems to originate mainly through current channelling, such as would occur along a major fault or fracture system. Non-magnetic sulphides may be present locally.

This conductor is displaced by about 150 metres between lines 158N and 160N; a cross-fault oriented more or less east-west would account for this. From here, the em. axis continues north as far as line 168N centred at 32W, where it is truncated and again displaced to the east, off present grid coverage. Several other conductors parallel the axis elsewhere.

Logically, the intrusive also has been displaced eastwards between 158N and 160N. On Grid 9, two contact delineations are revealed. One can be traced more or less north from line 162N/31+25W to line 168N/30+00W, the other from line 162N/29+00W to line 164N/27+25W and thence east of the grid. The possibility that a sequence of phyllites and limestone overlies the intrusive within these limits ought to be considered. There is evidence here, and at the east end of Grid 10, to suggest that the stock may extend well beyond the northeast corner of survey coverage.

A local magnetic anomaly occurs at line 166N/30+00W at the first of these interpreted contacts. This is the kind of response which is often typical of pyrrhotite-rich skarn limited in down-dip extent. The source probably dips east at a shallow angle, and lies at or near bedrock surface. A second feature on line 166N centred at 25+50W similarly recommends itself. Further surveys at a detail scale seem warranted.

The Tuanipal Showing, situated between line 172N and line 174N at about 35+75W, unfortunately was not sampled at all, let alone at an appropriately close line spacing. A 400 gamma magnetic anomaly lies 100 metres south at the nearest traverse (line 172N/35+80W); it could be related to the pyrrhotite-rich showing. The differentiated calc-silicate and pyrrhotitic zones observed by the writer at this occurrence recall sources observed elsewhere which typically generate extremely localized magnetic response, often exhibiting much discontinuity along a given horizon. Such a setting can only be sampled properly at a 25 or 50 metre line interval. In the present data, weak anomalies from line 170N/36+75W to line 174N/33+00W could signify the extent of a predominantly calc-silicate development.

Grid 10

The generally east-west orientation of the intrusive contact in this area has been confirmed, and its course accurately traced, by magnetics once again. Certainly its definition from line 44W/186+25N west to line 62W/188+30N, and thence north, is unequivocal. The flat background values obtained over the stock contrast dramatically with the highly variable magnetic relief observed north of the contact in a region where outcrop exposures of phyllites predominate. Here, much of the anomalous response originates in near-surface material; intensities of individual peaks range to a maximum of about 1300 gammas. Any of these localized features could assume enhanced importance given reasonable proximity to intercalated limestone. Otherwise, the setting seems unpromising.

East of line 44W, the contact swings north off the grid. It is temporarily recovered at line 38W/185+75N, with an associated anomaly of about 850 gammas (near surface), and traced to line 36W/186+25N. The uneventful relief further east suggests that the intrusive may extend over and beyond much of the remainder of the grid.

The isolated anomalies which were encountered on the northernmost three traverses of Grid 9 are now seen to lie within a sedimentary unit likely overlying the granite. Ferruginous sediments within the phyllite sequence could account for these anomalies - and that at line 38W/185+75N - but their proximity to the Tuanipal Showing and possible limestone precludes off-hand dismissal.

The VLF-EM results define a number of conductors, at least two of which are situated within interpreted intrusive. Another extends across stratigraphic boundaries from line 62W to line 42W, and possibly further east, on the north side of the grid. Despite large in-phase amplitudes, inherent conductivities are generally unimpressive. Even within the erratically magnetic phyllites noted earlier between 44W and 62W, direct corelation between em. and magnetic anomalies is conspicuously lacking. It is suspected, then, that these conductors pertain to fracture systems or fault zones along which minor concentrations of non-magnetic sulphides conceivably may occur.

SPORK CLAIM GROUP

Grids 1 & 2

Any attempt to differentiate stratigraphic units on these grids, through examination of the presently available em. and magnetic data, would be hazardous. The magnetic response, which in over-all character is unlike anything observed on the nearby IVO property, is often inconsistent from line to line. A complex series of faulting events entailing major displacements might account for this. There is a suspicion retained, moreover, that the grid may be mis-oriented relative to local geology.

That said, a rather ambiguous pattern in the data is perceived. A wide magnetic low, with localized irregularities, is traced from line 16N at about 2+50E to the west side of line 8N, where it converges with an even more pronounced low flanking the west side of the grids across lines 14N through 10N. The system appears to be truncated between 8N and 6N, and further extrapolation to the south seems uncertain. If there is an area where uneventful magnetics contrast with more variable relief, it occurs within relatively constricted limits to the east of this low: across the central part of the grids from line 4N just west of the baseline to the east side of line 12N.

The magnetics over this region are irregular in orientation, heterogeneous, and arise variously from sources both buried and near surface. A local 500 gamma peak at line 14N/0+50W may link up with a similar peak at line 16N/0+25E, or alternatively strike towards the 300 gamma anomaly at line 16N/2+00W. Its relevance to skarn potential cannot be determined from the data alone. No direct VLF-EM corelation accompanies either possibility of strike continuity. In fact, the em. data here offer little that is presently meaningful.

This area seems thus far to be part of a whole new ball park in which the rules of the game have been altered. Much more information from an expanded geophysical application - both in areal extent and through closer line spacing - is required if any data assessment is expected to clarify matters here.

Conclusions

This survey has covered a large extent of intrusive contact at a reconnaissance scale, and successfully drawn attention to a number of local features offering skarn potential. Both geophysical methods employed have contributed substantially to an understanding of the geological setting under investigation in this CUB Joint Venture.

Following are some specific concluding remarks and recommendations.

1. A series of magnetic anomalies consistent with the Main Showing suggest that additional skarn occurrences may flank the sedimentary 'cap' there, beyond presently

exposed mineralization. Further detailing and possible drilling are dependent on the apparent lateral limitations of the setting. If pursued, additional surveying should include the northeast corner of the 'cap', where anomalous features remain open.

2. In the area of the Trevor Showing, several noted magnetic anomalies require detailed testing at a 50 metre traverse interval to better establish local continuities.

3. The interpreted intrusive contact on Grid 13 should be examined at an initial line spacing of 100 metres using both VLF-EM and magnetic techniques. Much of the area of Grid 12 - with the possible exception of the noted magnetic horizon on the west side of the grid - seems presently uninteresting.

4. Survey coverage should be extended, initially at a 200 metre reconnaissance scale, west and south of Grid 5 in order to close the gap between Grids 13 and 3. The extent of the intrusive in this region appears uncertain; it may be desirable to pursue coverage as far west as 80W and as far south as 102N.

5. The anomalous horizon flanking the southeast corner of the stock is favourably situated and offers an attractive exploration target. Drill testing is warranted. Additional potential exists, along the interpreted contact setting extending north through Grids 7 & 8, and two described zones of magnetic anomalies to the west. Detailed surveying by em. and magnetics, initially at a 100 metre traverse interval, should be undertaken to examine each possibility.

6. If the present gap between Grids 8 & 6 is to be closed, then reconnaissance traverses between 13W

and 45W should extend north of BL 140N and, near Grid 8, south as far as 132N.

7. The intrusive stock extends east of Grids 9 and 10, and survey coverage should be expanded appropriately.

8. Two magnetic anomalies on line 166N at 30+00W and 25+50W appear to be favourably situated at a contact in which sedimentary sequences overlie intrusive. They should be detailed at a 50 metre line spacing, as should any extentions to them which may emerge in forthcoming data.

9. An area surrounding the Tuanipal Showing merits proper testing. It should be surveyed with VLF-EM and magnetics, between 169N and 175N, at a 50 metre line separation. Traverses at 25 metres may be warranted locally. At least three north-south lines, centred over the Showing, should be included in this effort.

10. The magnetic anomaly at line 38W/185+75N should be bracketed by further tests at a 50 metre separation.

11. The magnetic anomalies north of the interpreted intrusive contact on Grid 10 west of 43W seem presently uninteresting. To the east of here, the contact locally swings north of the survey grid, and expanded coverage may be warranted.

12. If possible, the area surrounding the SPORK grids should be surveyed by em. and magnetics. The existing grid should be surveyed at a 100 metre line interval. Present data are pregnant with ambiguity, and would be well served by being placed within a geological context through either outcropping evidence or laterally expanded geophysical coverage.

Of a less specific nature, the following comments are offered.

As efforts within a favourable setting become more concentrated, an understanding of fault controls becomes increasingly important. VLF-EM can usefully delineate these faults, particularly when traverses are oriented perpendicular to their anticipated strike. Such testing, where appropriate, should be undertaken.

Similarly, the contribution which a contoured presentation of magnetic data can make increases. Much of the contouring undertaken in the field this season has been coarsely rendered, either by reasons of haste or inexperience: witness the data from the Main Showing and the southeast corner of the property, as re-contoured by T. J. Miles & Associates against the original attempts. The former elucidates subtleties as well as major events. Greater attention ought to be given to this form of data presentation as the program evolves, and it should be attempted by someone cognizant that good, successful contouring borders on an art form.

The field procedures followed in the course of this survey have been effective from a production standpoint, given the topographic realities of this region. The data obtained are notably free of system and operational noise.

Respectfully submitted

W. A. Barclay

23 October 1980

W. A. Barclay

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IDEALIZED GRID LOCATION MAP

1:50,000