REPORT OF GEOLOGICAL PROGRAM

Conducted 15 May-1 August, 1979

for Rio Alto Exploration Ltd.

RUSTY SPRINGS PROSPECT

N.T.S. Map Sheet 116-K-8 and 9

Porcupine Ranges

Yukon Territory

David Hansen
Joe Bankowski
August, 1979
Whitehorse, Yukon Territory

090532

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

$ 40,600.00

J A Morin

Registered Engineer
Resident Mining Engineer

Considered as representation work under Section 50 (4) Yukon Quartz Mining Act

F. R. BAXTER
Supervising Mining Recorder

for Commissioner of Yukon Territory

CONTENTS:

GEOLOGICAL REPORT OF THE RUSTY SPRINGS PROSPECT, YUKON TERRITORY - 1979 FIELD SEASON

1. LOCATION AND WORK TO DATE

The Rusty Springs Mineral Prospect is located in the Yukon Territory, 20 miles (32 km) east of the Alaska Border and 4 miles (6.4 km) south of the Arctic Circle. Copper, lead, zinc and silver mineralization was discovered at the Tim showing in the summer of 1975. Preliminary prospecting, geological mapping, soil sampling and trenching were undertaken in 1976. In 1977, 3200 feet (921 m) of diamond drilling was completed. D. Hansen was hired to prospect, map and supervise 6000 feet (1830 m) of diamond drilling during the summer of 1978. Academic studies of the Prospect were undertaken by G. Schoel (1978) and by D. Hansen (1979) under the direction of Dr. Robert Hodder, University of Western Ontario.

2. OBJECTIVES OF THE 1979 GEOLOGICAL PROGRAM

As recommended in the Report of 1978 Exploration of the Rusty Springs Mineral Prospect (P. White, 1979), the 1979 geologic program included mapping of and prospecting of the largely unprospected portion of the claim group. The following objectives were undertaken in order to maximize the geological knowledge of the Rusty Springs Prospect. The objectives of the geological crew, consisting of David Hansen and Joe Bankowski, were to:

(1) Soil sample, prospect and map the zone stratigraphically below the dolostone-shale or dolostone-chert-shale contacts in order to find new mineralized showings and confirm the geologic model as proposed in D. Hansen's A Geological Model of the Rusty Springs Prospect, Porcupine Ranges, Yukon Territory (1979);

(2) Document all mineral occurrences for company records;

(3) Supervise the geophysical program, supply geological knowledge to aid in the geophysical interpretation and suggest regions which require more detailed geophysical surveys;

(4) Undertake a traverse of Carroll Creek east from Salmon Fork to sample and investigate the many iron springs encountered along the way.

After these objectives were attained, the amalgamation of all the geological data could then yield an evaluation of the mineralized occurrences in the Rio Claim Group, to aid in interpretation of geophysical data and to serve as a base for future exploration.

3. RESULTS OF THE 1979 PROGRAM

During the period May 15 to July 31, 1979, David Hansen and Joe Bankowski soil-sampled, prospected and mapped the dolostone-chert-shale contacts in the Rusty Springs Prospect. The 1979 "Geological Map of the Rusty Springs Prospect" details all the known dolostone-chert-shale contacts. Examination of creek gravels, outcrops and talus slopes on the balance of the Rusty Springs Claim Group indicates that the Upper Ogilvie Formation is restricted to the 5 square miles (12.5 sq.km.) indicated on the 1979 Geological Map. Mineralized showings have been discovered in most regions where the Upper Ogilvie Formation is exposed. During the 1979 field season, 17 new showings were found; a detailed description of these is included as Appendix A.

4. SIGNIFICANCE OF THE NEW SHOWINGS

The southern end of Mike Hill contains sub-economic concentrations of copper, lead, zinc, silver, iron and barium, as predicted by Hansen (1979). Approximately 600 feet (183 m) below the Bek Showing, minor plumbojarosite and ruby sphalerite were found at the David Showing. North of David, at the Chris Showing, and to the south at the Mia and Don Showings, barite crystals have been discovered. The barite to the south is intergrown with botryoidal hematite. The Mia Showing contains these minerals as fracture fillings in dolostone outcrop. Assays of the hematite as well as soil samples below this showing contain moderately anomalous amounts of silver (assays DRS 79-136 and 79-141). The Don Showing is the southernmost point of hematite mineralization found on the property, while the Southerly Showing marks the southerlymost point of barite mineralization found to date.

On the southwest side of Mike Hill, the region between the Southerly Showing and the White Showing (approximately 5000 feet, or 1.52 km) is covered by overburden. Soil samples from this region are not anomalous. The Marilyn Showing 500 feet (150 m) to the north of the White Showing yielded freibergite (silver-bearing tetrahedrite) which assayed 186 ounces of silver per ton (DRS 79-196).

Four new showings were discovered on the northeast portion of Mike Hill. The New Galena Showing contains galena and sphalerite. The Reef Showing, Jackson Showing and New Showing contain malachite, azurite, sphalerite, galena and tetrahedrite. The New Showing also contains plumbojarosite. Another plumbojarosite showing was discovered at the Andrea Showing on the northeast side of Mike Hill. These showings indicate that Mike Hill is not as lead-poor as originally suspected.

Two new showings were discovered to the west of Mike Hill. The Ullr Showing contains very minor galena, sphalerite, tetrahedrite, azurite and malachite. The Joe Showing contains appreciable amounts of galena and sphalerite in quartz boulders. The significance of these showings will be described more fully in Section 8.1. These showings were predicted by applying the geological model to the prospect.

On Bruce Hill, azurite, malachite and tetrahedrite were seen in a dolostone outcrop at the Eagle's Nest Showing. The Tara Showing at the

southern end of Orma Hill has barite crystals in botryoidal hematite. This barite and hematite have been traced (irregularly) to above the Rowan, Orma and Galena Boulder Showings (see Section 5).

5. SIGNIFICANCE OF BARITE AND HEMATITE

During the 1978 field season, barite crystals were discovered in outcrop at the Bek Showing and in the core of DDH 78-103 (which was drilled stratigraphically above the high silver values of DDH 8 (1977). There appeared to be a correlation between barite and the other potentially economic minerals. Ruby sphalerite was found in the talus north of and stratigraphically below the Bek Showing. This year, plumbojarosite was found at the David Showing (also below the Bek Showing) correlating to the plumbojarosite of the Orma Showing. Botryoidal hematite has been found near the Bek Showing, above the Galena Boulder, Orma and Rowan Showings. Soil samples taken 600 feet (183 m) below the botryoidal hematite and barite contain anomalous amounts of silver (DRS 79-410 to DRS 79-411). The barite and hematite of the White Showing occur 500 feet (152 m) from the silver-rich tetrahedrite of the Marilyn Showing (186 ounces of silver per ton). At the Andrea Showing, plumbojarosite contains greater than 10,000 ppm barium and the soil contains approximately one ounce of silver per ton (DRS 79-178, DRS 79-182).

Barite and hematite have not been seen at the northeast portion of Mike Hill. Some of the rocks are gossan; a few samples of this material appear to be goethite, pseudomorphic after botryoidal hematite.

S. Blusson of the Geological Survey of Canada has indicated (1979, pers.comm.) that the Canol Shale (equivalent to the Unnamed Shale) contains anomalous amounts of barite and iron as well as copper, lead, zinc and silver. He suggests that this shale is probably the source of sulphide mineralization. It is these authors' belief that the barite-hematite concentrations overlie the concentrations of copper, zinc, lead and silver and that this can be used as an effective tool in mapping and prospecting.

6. REGIONAL EXPLORATION

Silt samples were collected 5 miles (8 km) north of the Salmon Fork-Carroll Creek junction (assay DRS 79-382) and 3.5 miles (5 km) south of this junction (DRS 79-383 and 79-384). One of the samples from the south contained 928 ppm zinc, moderately anomalous.

The balance of the regional samples (DRS 79-385 to DRS 79-394) were taken from Canol Shales, iron-rich chert nodules and from iron springs 5 to 7 miles (8 to 11 km) west of camp. The highest assay of silver (1.6 ppm) came from goethite in a chert nodule. The remainder of the samples, including iron precipitates, were not anomalous.

7. GEOCHEMISTRY

During the 1979 season, approximately 400 soil samples were collected.

These samples were taken from Ma Hill, the southern end of Mike Hill and to the east of the Bruce Showing. All geochemical samples were taken from approximately 12 to 18 inches (30 to 46 cm) below the surface to maintain correlation with previous soil sampling programs. The results are included as Appendix B and are plotted on the "Map of the Rusty Springs Prospect showing Geochemical Analysis in ppm of Cu, Pb, Zn and Ag, 1979". Generalized summaries of these results with those of previous years are included in this report as Figures 1 through 4. The sampling program reveals that mineralization is not confined to the previously-known regions; it also reveals that, although the balance of the Upper Ogilvie Formation is mineralized, the greatest concentrations of known mineralization and the highest anomalies as indicated by the soil sample data are confined to the north end of Mike Hill and the west side of Orma Hill.

Silver values in soil samples did not appear to be as indicative of mineralized regions as they have been in previous years. For example, galena at the Joe Showing assays 20.44 ounces silver per ton, yet the soil below it only yields 1.4 ppm silver. A freibergite specimen of the Marilyn Showing contains 186 ounces silver per ton; however, the soils only contain 10.8 ppm silver. Two factors may account for the lower 1979 soil sample assays: the first is that the quantity of sulphides present at the showings found in 1979 is significantly less than that found elsewhere in previous years; secondly, these new showings contain a higher proportion of primary sulphides compared to secondary supergene minerals than those showings previously found. With less weathering, less copper, lead, zinc and silver would be released to the soils.

Most anomalous soil values correspond to mineralized showings. The following soil anomalies were not explained. On line 3S, 51 to 53 east, samples contain on an average 4.1 ppm silver with anomalous zinc and copper (up to 1560 ppm zinc, 636 ppm copper). This region contains vuggy dolostone, very near the dolostone-chert contact. Although prospecting in this area has not uncovered any evidence of mineralization, it is believed that there must be a nearby sub-surface occurrence.

Prospecting the region around the geochemical anomaly at line 51S near 60E did not uncover any mineralization in this overburden area. Since this region is below the Tara Showing (see Section 5) and also in the same stratigraphic horizon as the Rowan and Orma Showings, further prospecting could locate mineralization.

The anomalous values of line 23S, 10 to 15 west, are caused from run-off from the New Showing (18S and Baseline) since the major drainage in that region is a gully from the New Showing past this spot. There is no apparent reason for the slightly anomalous silver values in the soils in the cherts of the hill west of the David Showing; it is possible that the chert-dolostone contact is just below surface and that the silver has migrated from mineralization below.

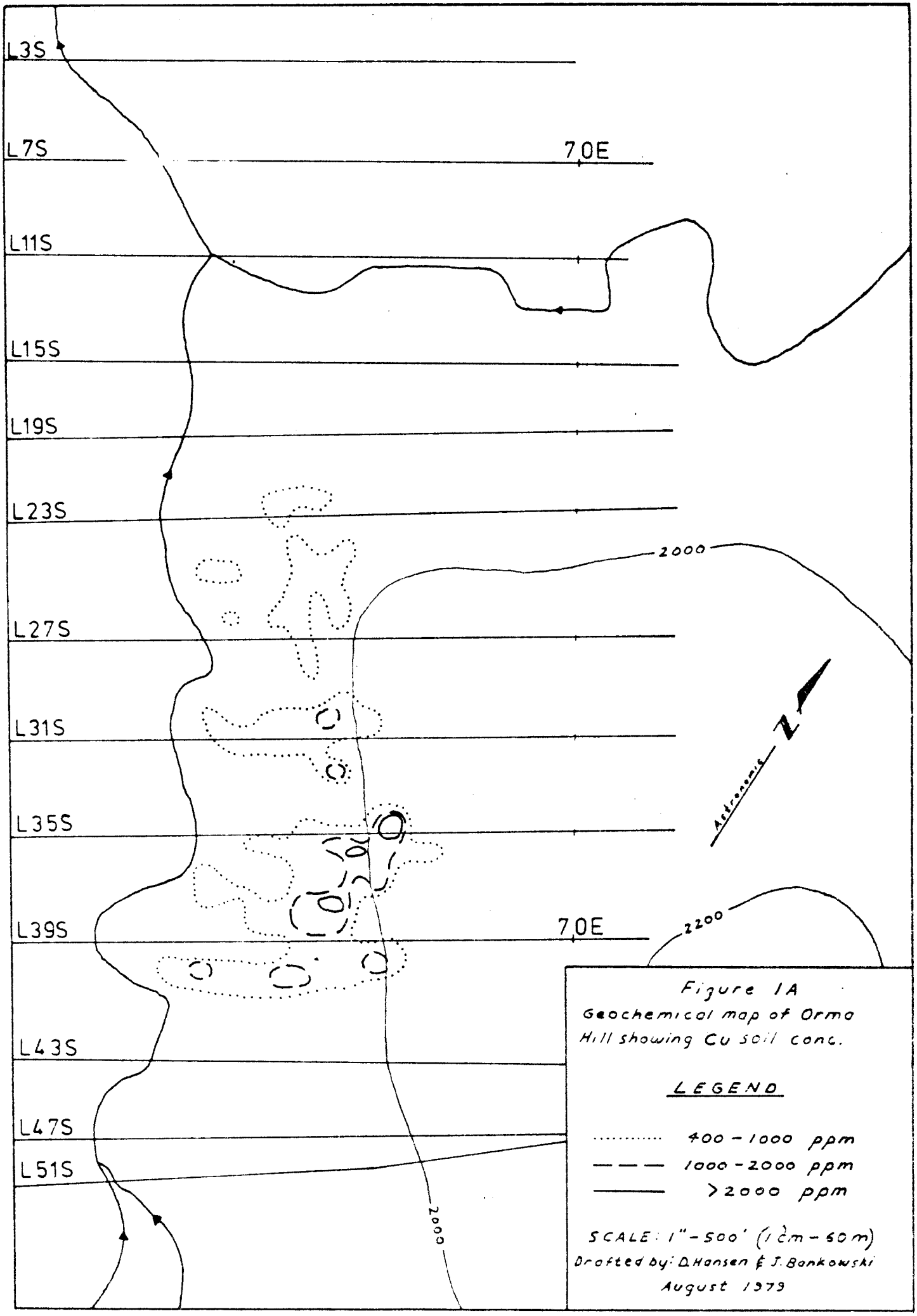


Figure 1A
Geochemical map of Ormo Hill showing Cu soil conc.

LEGEND

..... 400 - 1000 ppm
— — — 1000 - 2000 ppm
——— > 2000 ppm

SCALE: 1" - 500' (1 cm - 50 m)
Drafted by: D. Hansen & J. Bonkowski
August 1979

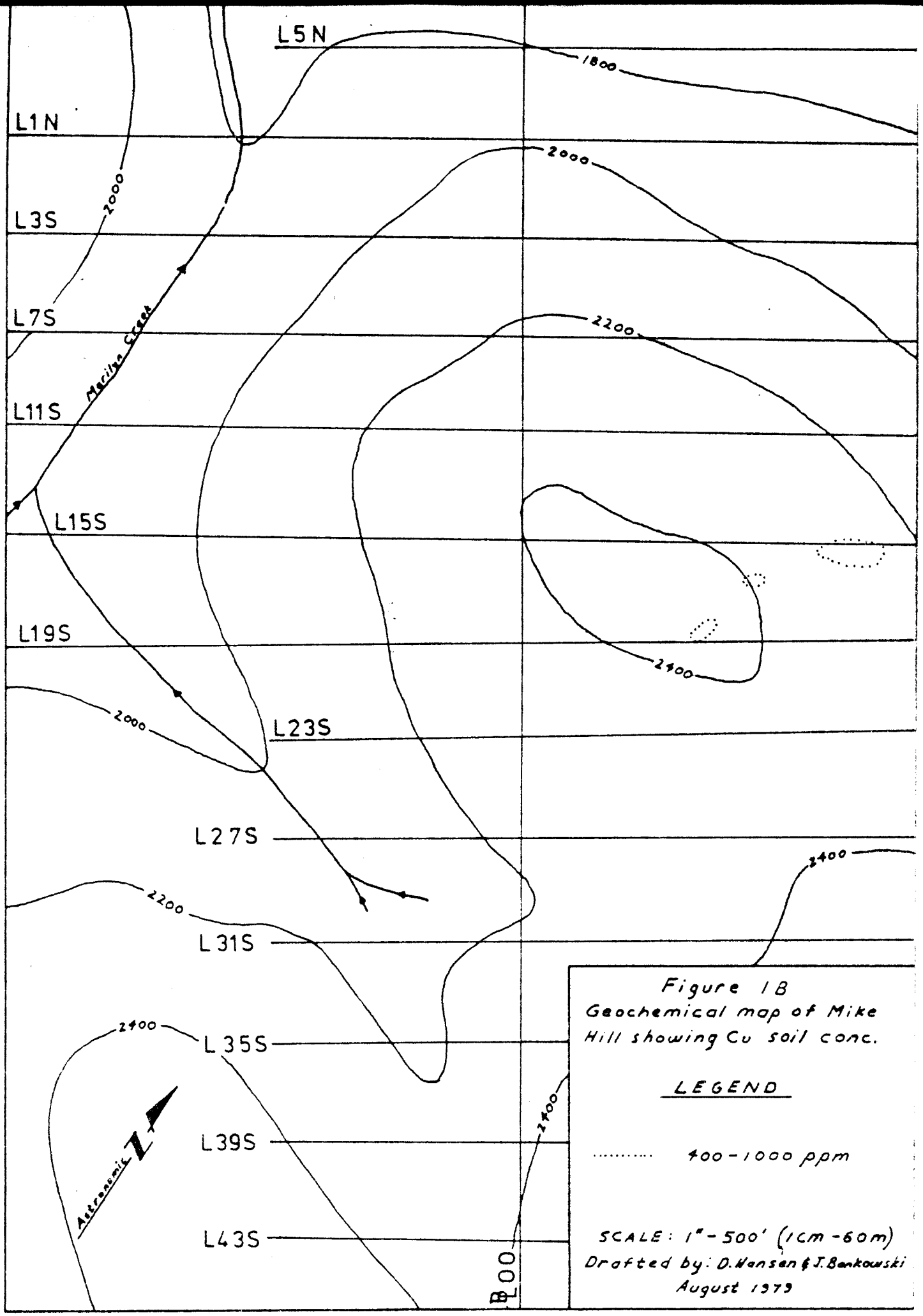


Figure 1B
Geochemical map of Mike Hill showing Cu soil conc.

LEGEND

..... 400 - 1000 ppm

SCALE: 1" - 500' (1cm - 60m)
Drafted by: D. Hansen & T. Bankowski
August 1979

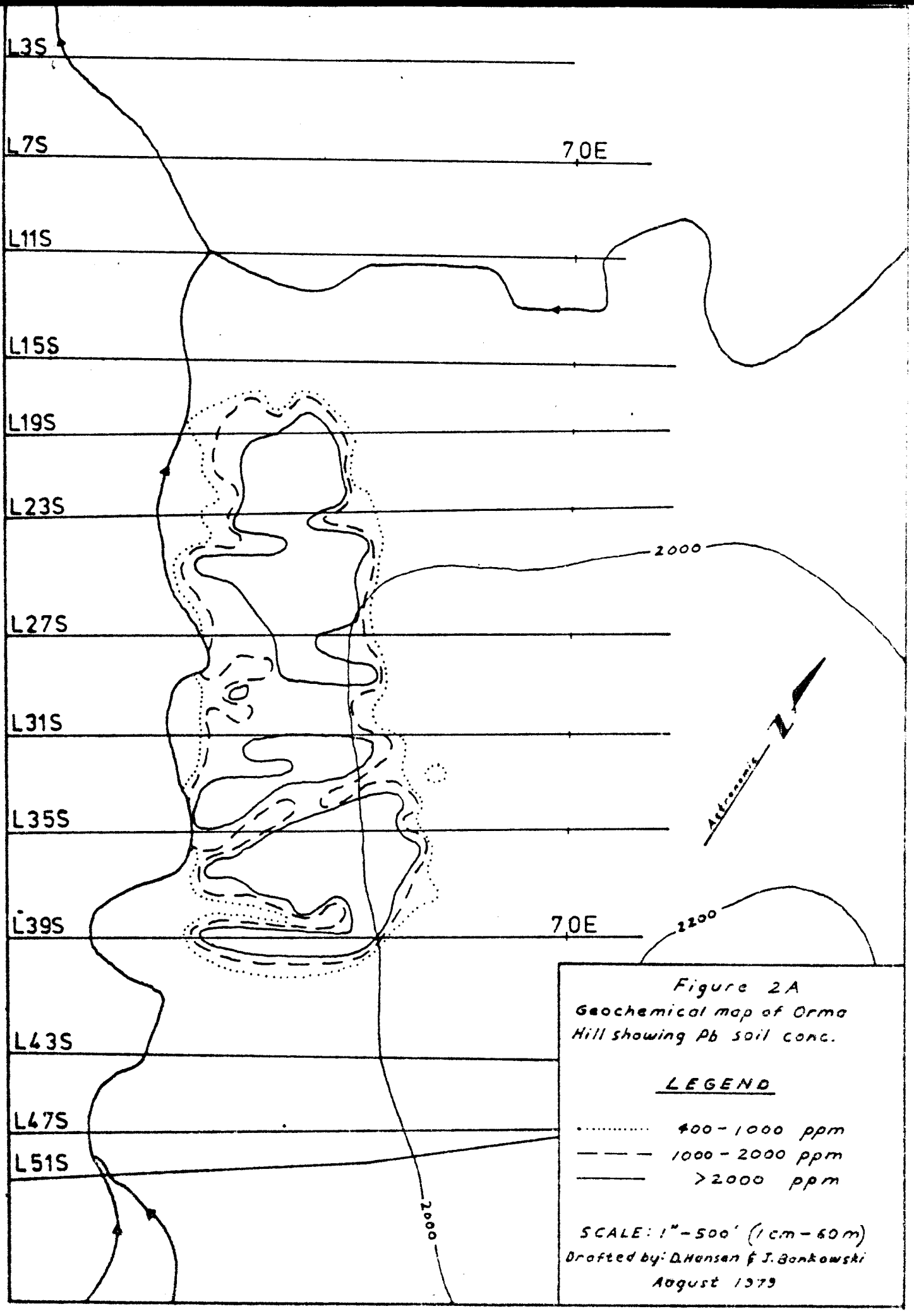


Figure 2A
Geochemical map of Orma Hill showing Pb soil conc.

LEGEND

400 - 1000 ppm
1000 - 2000 ppm
>2000 ppm

SCALE: 1" - 500' (1 cm - 60 m)
Drafted by: D. Hansen & J. Bonkowski
August 1979

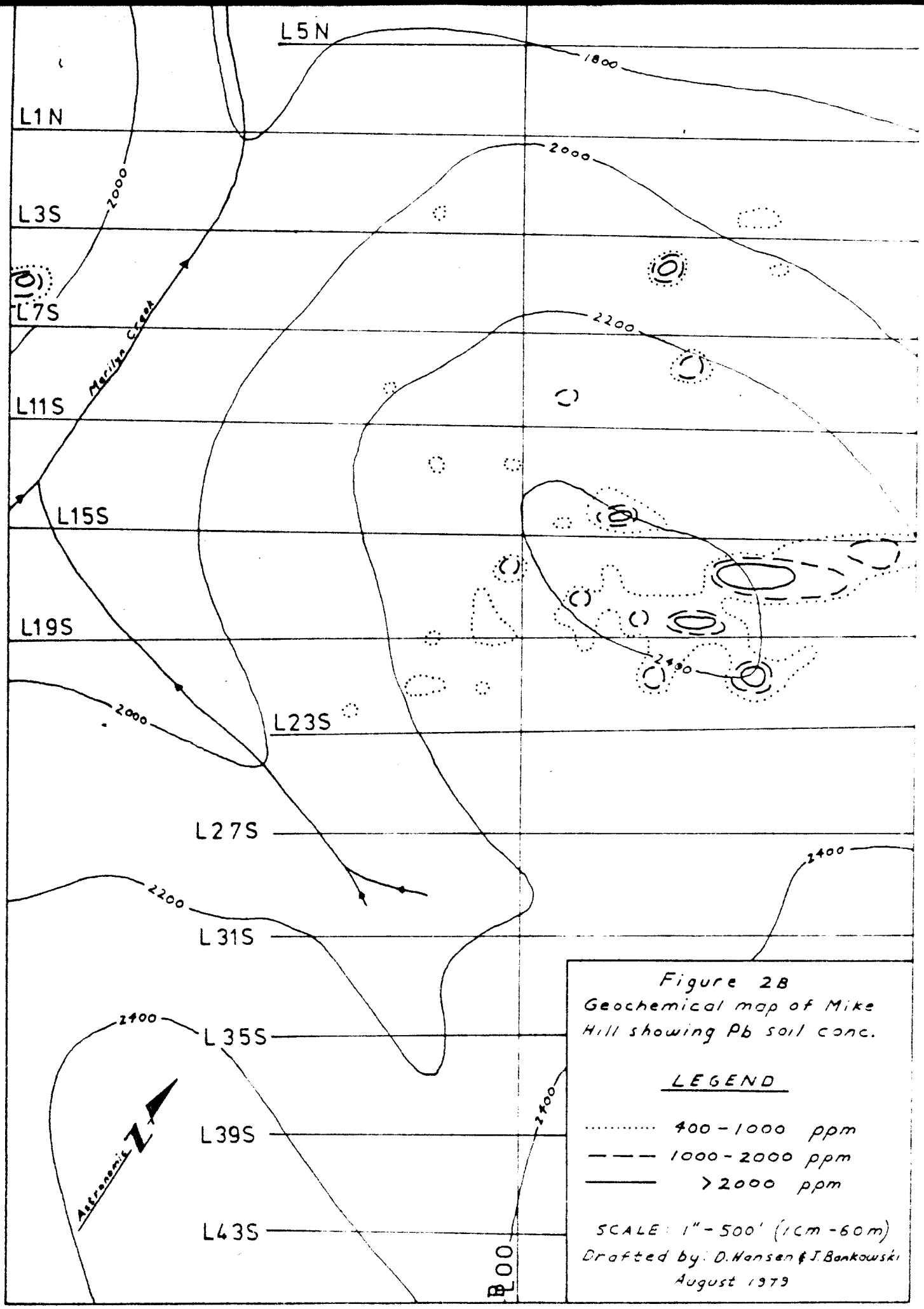


Figure 2B
Geochemical map of Mike Hill showing Pb soil conc.

LEGEND

..... 400 - 1000 ppm
– – – 1000 - 2000 ppm
——— > 2000 ppm

SCALE: 1" - 500' (1cm - 60m)
Drafted by: D. Hansen & J. Bankowski
August 1979

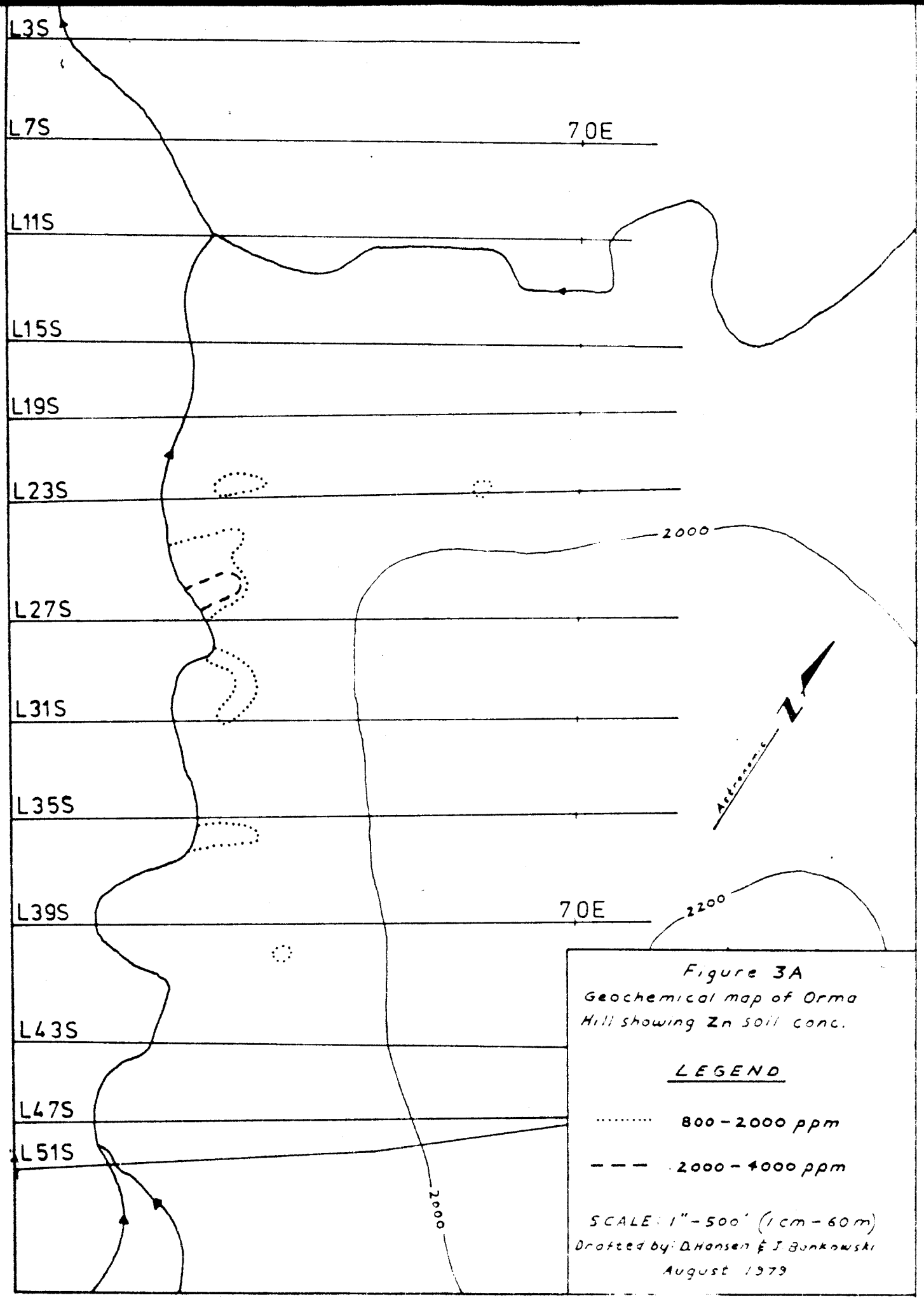


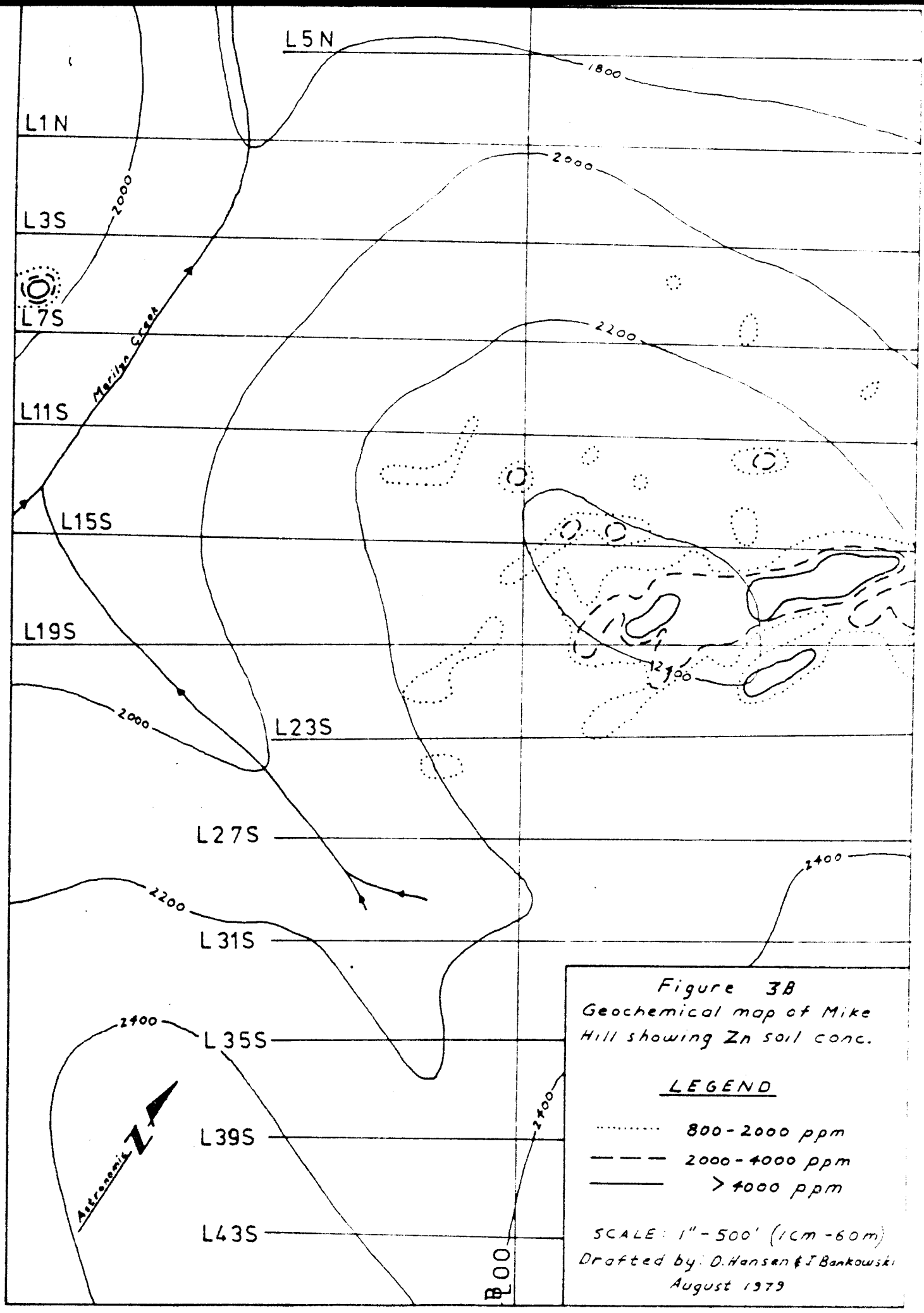
Figure 3A
Geochemical map of Orma Hill showing Zn soil conc.

LEGEND

..... 800 - 2000 ppm

– – – 2000 - 4000 ppm

SCALE: 1" - 500' (1 cm - 60 m)
Drafted by: D. Hansen & J. Bunkowski
August 1979


L5N
L1N
L3S
L7S
L11S
L15S
L19S
L23S
L27S
L31S
L35S
L39S
L43S
B00
1800
2000
2200
2400
Marilyn Creek
Astronomic N
Figure 3B
Geochemical map of Mike Hill showing Zn soil conc.
LEGEND
800 - 2000 ppm
2000 - 4000 ppm
> 4000 ppm
SCALE: 1" - 500' (1cm - 60m)
Drafted by: D. Hansen & J. Bankowski
August 1979

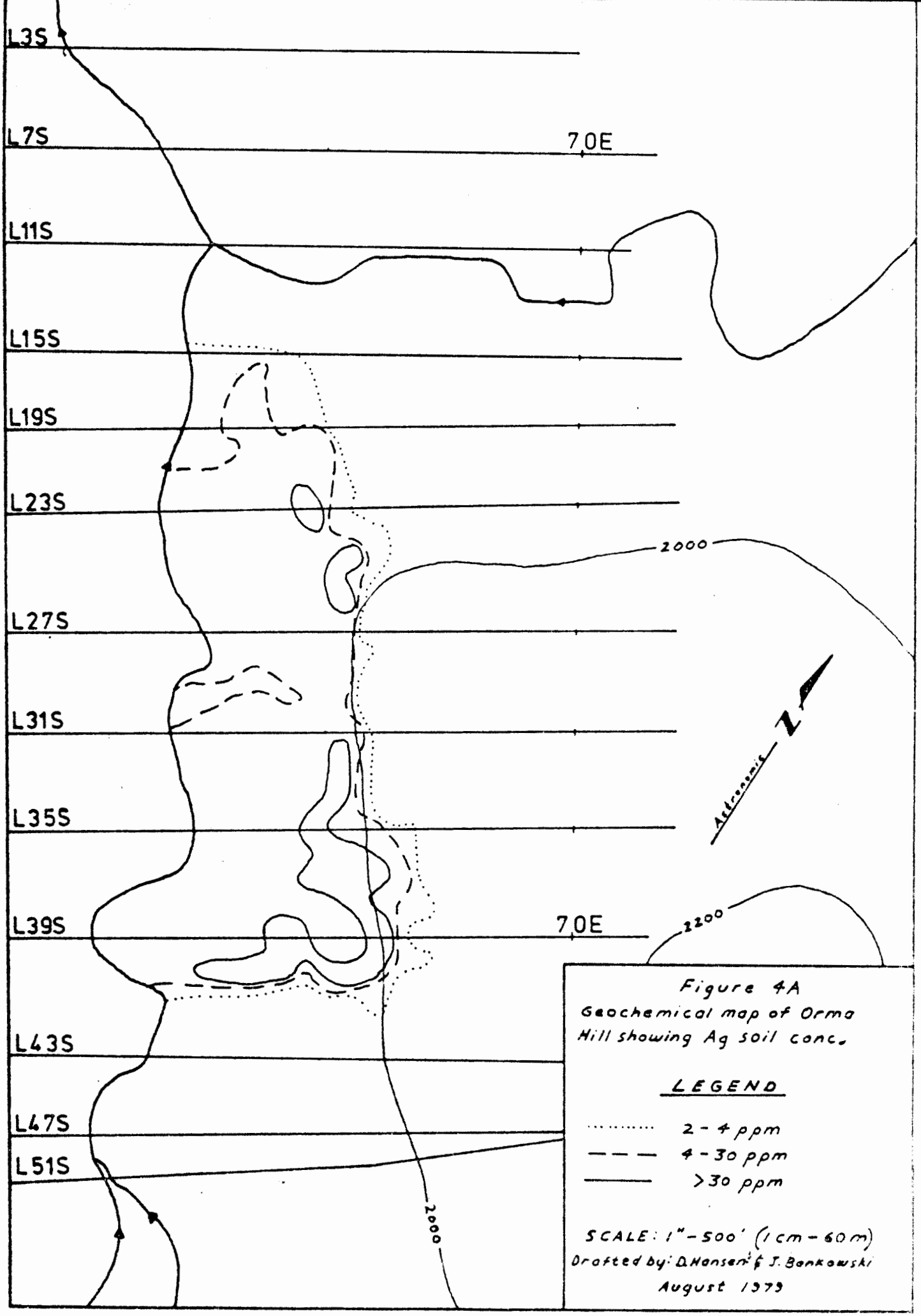


Figure 4A
Geochemical map of Orma Hill showing Ag soil conc.

LEGEND

..... 2 - 4 ppm
— — — 4 - 30 ppm
——— > 30 ppm

SCALE: 1" - 500' (1 cm - 60 m)
Drafted by: D. Hansen & J. Bonkowski
August 1979

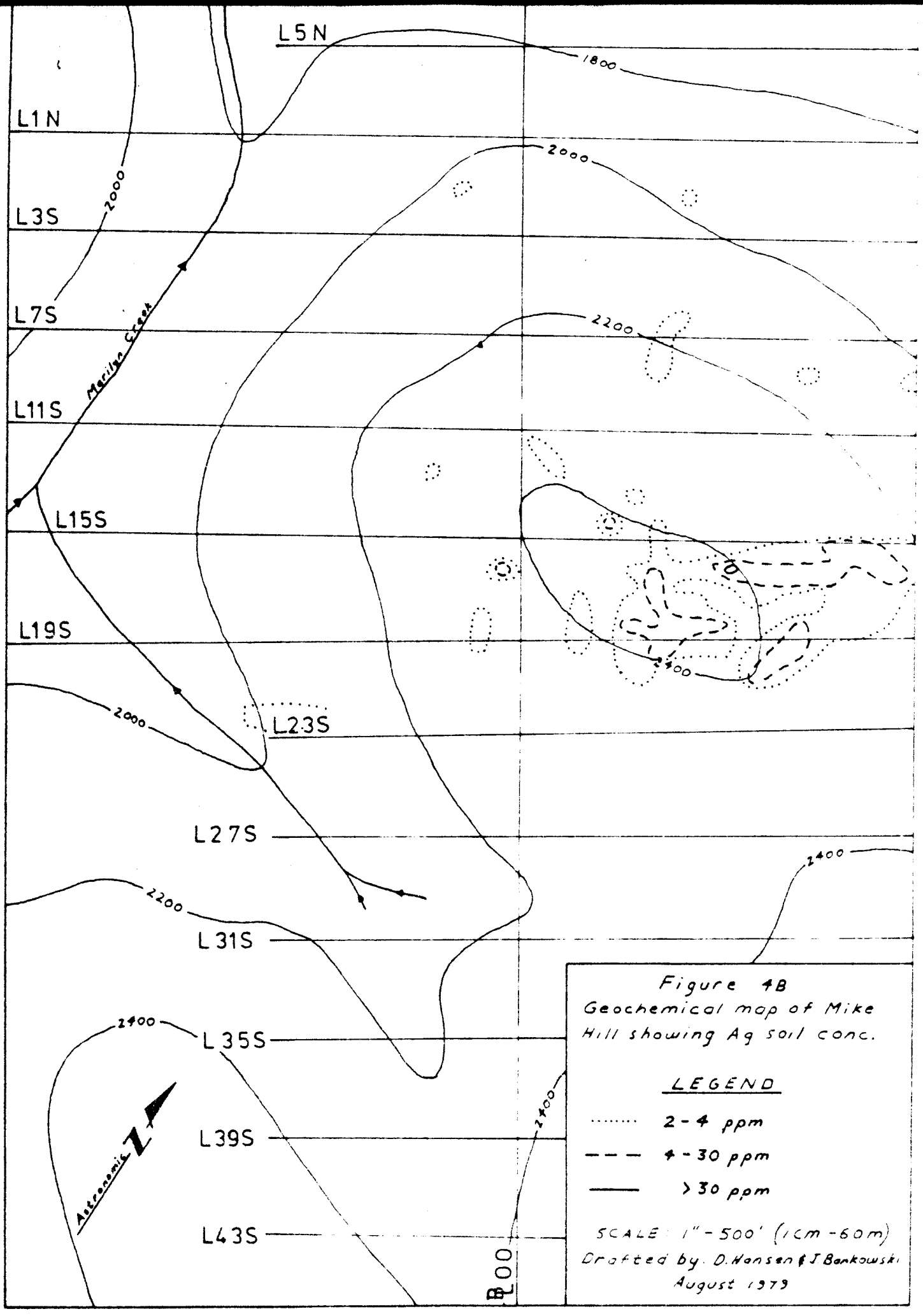


Figure 4B
Geochemical map of Mike Hill showing Ag soil conc.

LEGEND

..... 2 - 4 ppm

– – – 4 - 30 ppm

——— > 30 ppm

SCALE: 1" - 500' (1cm - 60m)

Drafted by: D. Hansen & J. Bankowski

August 1979

8. A GEOLOGICAL DISCUSSION OF THE INDUCED POLARIZATION (Pfe) MAP (Preliminary Draft)

8.1 Correlations with Known Geology

One of the regions predicted by Hansen (1979) to contain a zone of potential mineralization was on the hill to the west of North Mike Hill. Extra lines were cut to incorporate this region and both gravity and I.P. were conducted over the area. During the field season, R. Englund, geophysicist, advised the geological crew that there was an anomalous induced polarization effect in the area from 11S 22E to 15S 22E. Exploration at these points found vuggy dolostone and calcite rhombs to 5 inches (12.7 cm) in length. Minor tetrahedrite, galena and sphalerite were found 400 feet (122 m) away, at the U11r Showing. A large showing, the Joe Showing, was discovered 100 feet (30.48 m) from the U11r. The Joe Showing consists of galena and sphalerite associated with quartz. Three hundred and fifty feet (107 m) northeast of the Joe Showing is another I.P. anomaly, which extends to approximately 8W. The Jackson Showing occurs 100 feet (30.48 m) upslope from this anomaly.

An I.P. anomaly centred at 1N 5E, extending to Baseline and 5N, includes the mineralized showings Tim and Tip. DDH 5 (1977) approximately 100 feet (30.48 m) from the edge of this anomaly intercepted pyrite, galena and sphalerite from 134 feet (40.8 m) to 152 feet (46.3 m), at which point excessive water pressure from an underground artesian system caused the hole to be terminated. An I.P. anomaly at line 7S 13E occurs approximately 500 feet (152 m) downslope from the Mike Showing.

An anomalous silver value exists in the soil at line 43S 45E between the two I.P. highs at line 35S 46E and 55S 38E. To the south of the open-ended I.P. feature at 55S 38E, anomalous silver values occur in soil at 68S 42E. If a line was drawn across these two I.P. anomalies and continued to the south, it would intercept the plumbojarosite and ruby sphalerite found at the David Showing.

On Orma Hill, there is a large anomaly from 3S to 27S at approximately 68E. Two drill holes, DDH 78-5 and 78-6, each within 200 feet (61 m) revealed heavily disseminated pyrite in the dolostone to a depth of 200 feet (61 m). The southern end of this anomaly occurs 600 feet (183 m) west from the large Galena Boulder Showing.

There was no significant induced polarization response in the Orma and Rowan Showings. The oxidized material at the Orma Showing is composed of a mixture of oxides and finely divided tetrahedrite (Bacon et al, 1978). This material should have responded to the I.P. effect; however, the preliminary draft of the I.P. map is flat in this area. Another unusual region occurs on top of the north part of Mike Hill. Galena has been found on this hill at the New Showing, Reef Showing, New Galena Showing, etc. as well as in core of DDH 78-16. Plumbojarosite (and possibly finely divided tetrahedrite) occurs at the Andrea Showing. It was expected that some I.P. anomaly would be seen in this zone; however, no effect was detected.

8.2 An Hypothesis to explain one of the I.P. Anomalies

The preliminary Induced Polarization (PFe) Map shows a strong I.P. feature trending from line 3S, 40E to 50E, to 55S, 40E to 60E. As previously discussed, the southern end of this geophysical high corresponds to anomalous soil values and to the David Showing farther to the south. An hypothesis which could explain this I.P. anomaly considers possible fault movements in the area. Measurement of slickensided surfaces on Bruce Hill as well as drill core correlations indicate that Orma Hill and the creek valley to its west have been affected by several northerly-striking faults, dipping to the west. A normal fault with the western side downthrown would explain this anomaly.

G. Garcia (1977) proposed that faulting and the resultant brecciation provided the channelways and reservoirs for metal deposition in Orma Hill. Another idea suggested uses karsting and solution collapse to provide the necessary porosity for the metal concentrations. The hypothesis explaining the I.P. anomaly suggests that fault movement after deposition of the sulphides split this mineralized body and caused relative movement in a manner as indicated by Figure 5.

The mineralized material would be fault brecciated and exposed to the air, causing the extreme oxidation seen on Orma Hill. Galena, less soluble than copper, would not oxidize quickly as indicated by the relatively fresh galena at the Galena Boulder Showing. The malachite and azurite at the Rowan Showing came from tetrahedrite exposed after this fault movement. Where tetrahedrite was in contact with galena at the Orma Showing, secondary plumbojarosite was formed in a manner as suggested by Hansen (1979).

The down-dropped side should contain fresh sulphides in the regions outlined by the I.P. (PFe) map (preliminary draft). If the gravity survey indicates that the region is anomalous, exploration and drilling should be considered for this zone.

Figure 6 considers the other possible fault movements. A normal fault dipping to the east or a thrust fault would have to invoke a second mineralized deposit farther down the stratigraphic section. To date, there has not been any indication of a second mineralized deposit. Stratigraphic considerations rule out the fourth case - that of a thrust fault dipping to the east.

It appears that, should the gravity survey results reinforce the I.P. anomaly, the best hypothesis to explain this potentially mineralized zone is that of movement along a normal fault dipping westward.

9. SUMMARY

(1) Seventeen new mineralized showings were discovered in theorized favourable locations, reinforcing the geological model as proposed by Hansen's A Geological Model of the Rusty Springs Prospect, Porcupine Ranges, Yukon Territory (1979).

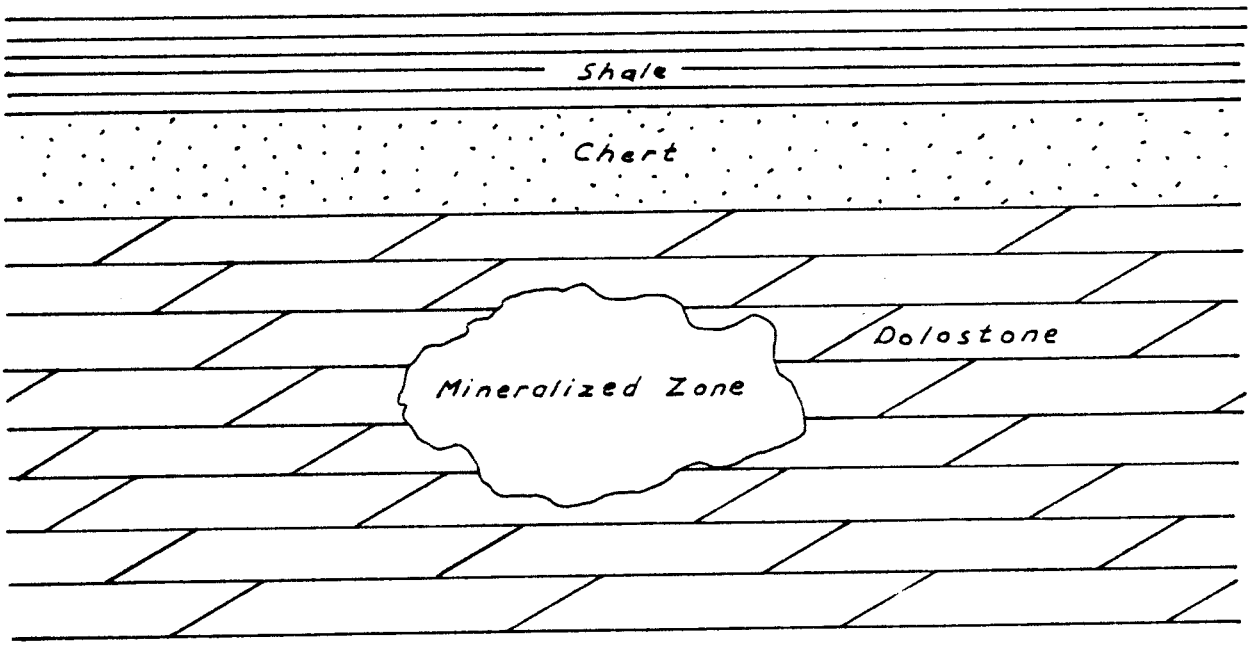


Figure 5a : Hypothetical cross section through Orma Hill prior to faulting

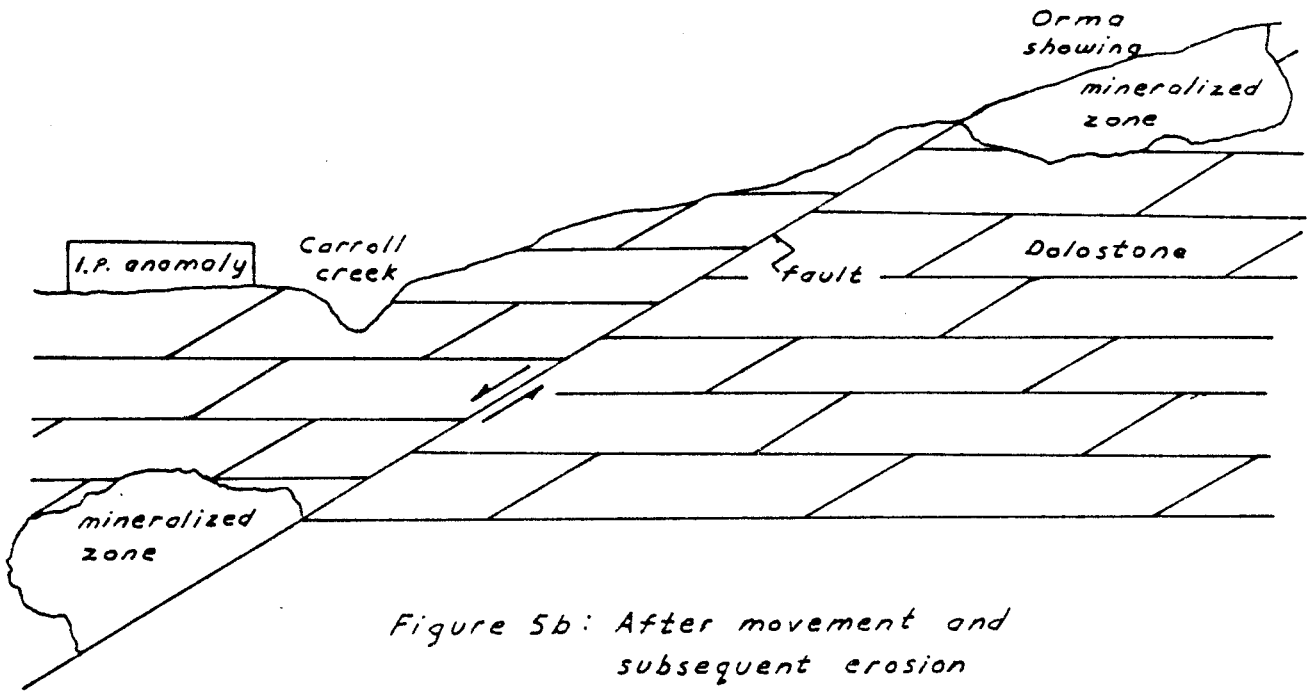


Figure 5b : After movement and subsequent erosion

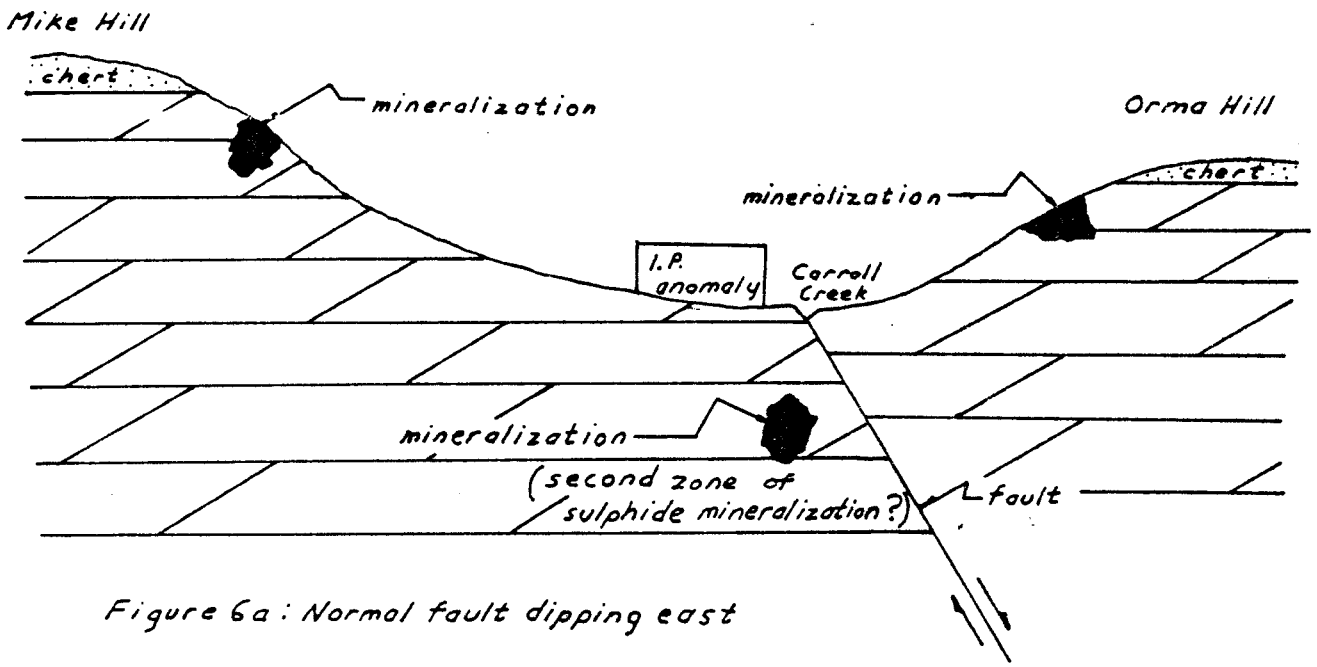


Figure 6a : Normal fault dipping east

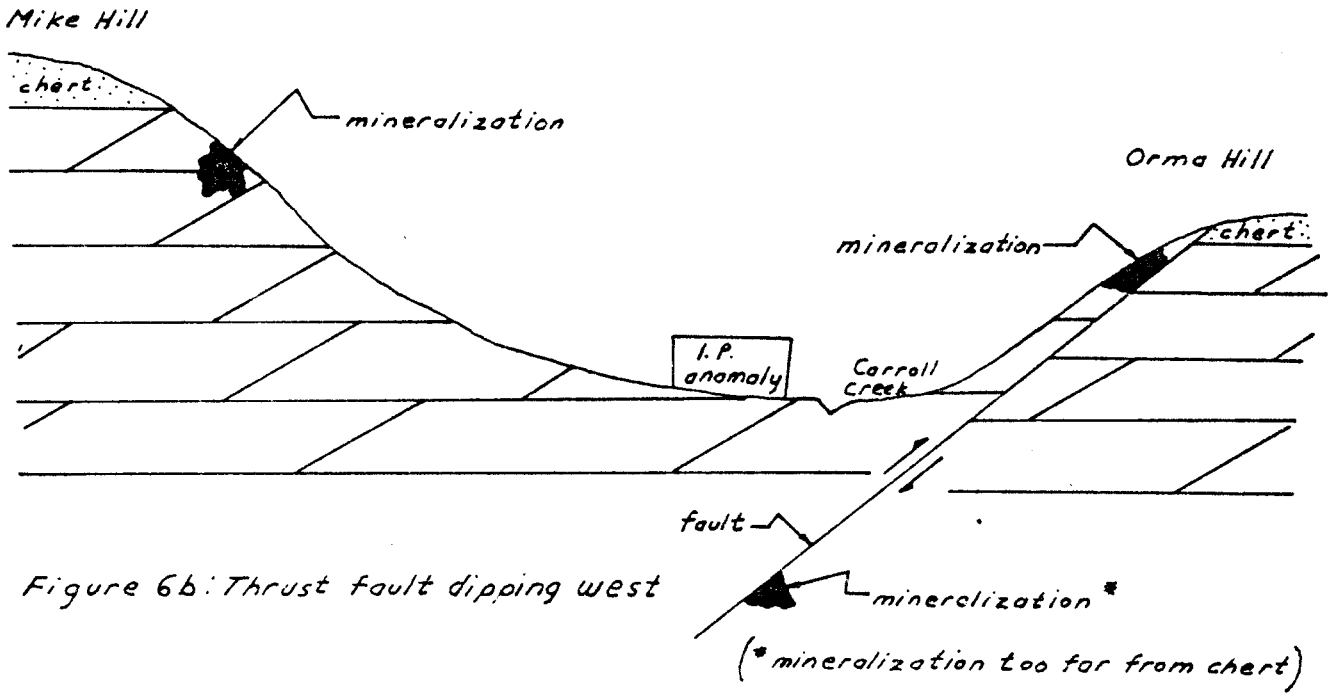


Figure 6b : Thrust fault dipping west

(2) The quantity of mineralization in the new showings, as well as the results of the soil sampling, indicates that the greatest concentrations of metals occur on Orma Hill, the northern portion of Mike Hill and around the Joe Showing.

(3) Most of the I.P. anomalies as indicated by the preliminary draft, are enhanced by known showings nearby.

(4) No anomalies were seen in samples collected in the Canol Shales west of camp.

(5) An hypothesis concerning relative fault movement has been proposed to explain the strong I.P. feature seen to the west of Orma Hill.

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APPENDIX A

A DETAILED DESCRIPTION OF THE MINERALIZED SHOWINGS OF THE RUSTY SPRINGS PROSPECT

(a) Showings Found Prior To 1978

TIM SHOWING (1)
Co-ordinates: L4+50N - 5E

Mineralization of this showing consists of galena, tetrahedrite altering to malachite + (azurite) and amber sphalerite altering to smithsonite, in a matrix of white, crystalline quartz and calcite as open-space filling of a porous dolostone host. The host rock is a grey, porous, vuggy and fractured dolomitized limestone which is silicified in the area of mineralization. Tetrahedrite altering to malachite + (azurite) is seen in blebs up to one inch (2.5 cm) in diameter, usually within white crystalline quartz, as is cubic galena averaging ¼" x ¼" (6 mm x 6 mm) and amber sphalerite approximately 90% altered to smithsonite.

Figure A illustrates a generalized relationship seen within a mineralized open-space filling from this showing.

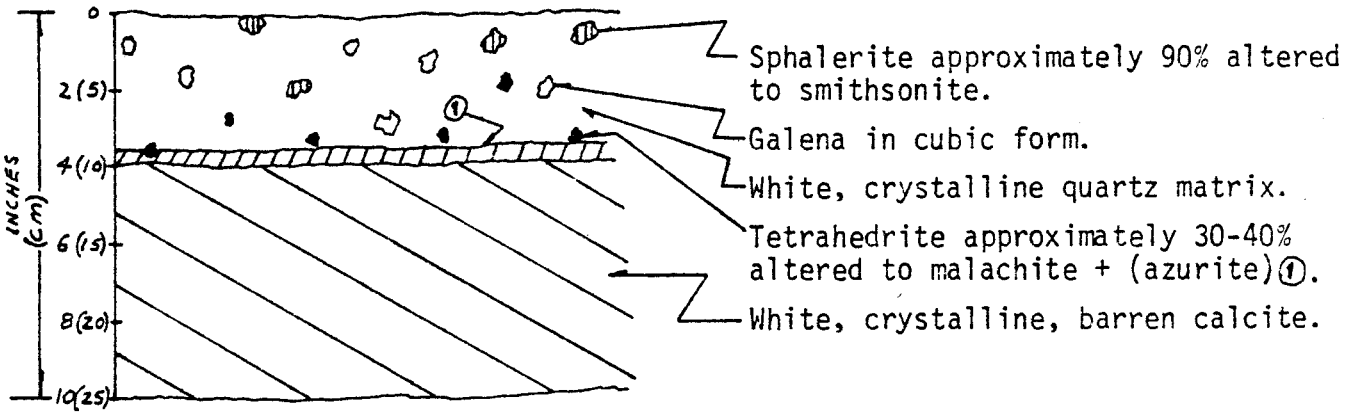

Figure A - Generalized Section

Colonial coral was also seen at this location. The mineralization occurs as talus blocks averaging 4" x 4" (10 cm x 10 cm) with no outcrop present. The size of the showing is approximately 150 x 100 feet (45 x 30 m).

TIP SHOWING (2)
Co-ordinates: L4N - 4E

The mineralization at this showing consists of galena, pyrite, tetrahedrite altering to malachite + (azurite) and amber sphalerite altering to smithsonite within a matrix of white, crystalline quartz and calcite as open-space filling in a porous dolostone host. The host rock is a grey, porous, vuggy and fractured dolomitized limestone locally silicified in the general area of mineralization. Tetrahedrite, approximately 30% altered to malachite + (azurite) is seen in blebs averaging ½" x ½" (1.3 x 1.3 cm) and is in close spatial relationship with amber sphalerite approximately 50% altered to smithsonite in blebs up to one inch (2.5 cm) in diameter. Pyrite is also seen closely related with the sphalerite and tetrahedrite in fine-grained disseminated form.

The sphalerite, tetrahedrite and disseminated pyrite usually occur within white, crystalline calcite. Pyritohedrons up to one inch (2.5 cm) in diameter were also noted in the calcite. Galena in cubic form averaging ¼" x ¼" (6 x 6 mm) is seen in white, crystalline quartz.

The area of mineralization is approximately 100 x 200 feet (30 x 60 m) and occurs as talus blocks.

BRUCE SHOWING (3)
Co-ordinates: L9N - 26E

The mineralization at this showing consists of tetrahedrite altering to malachite + (azurite) and amber sphalerite altering to smithsonite in a matrix of white crystalline quartz and minor calcite as open-space filling in a porous dolostone host. The host rock is a grey, porous, vuggy and fractured, dolomitized limestone which is locally silicified in the general area of mineralization. Quartz is the predominant mineral in the matrix and is extremely crystalline, with individual crystals up to 4" x 1" (10 cm x 2.5 cm). White, crystalline calcite comprises a small part of the matrix but is more common and massive along the periphery of mineralization in blocks up to 6" x 6" (15 cm x 15 cm). Tetrahedrite is seen approximately 10% altered to malachite + (azurite) in blebs up to 2" x 2" (5 cm x 5 cm) within the quartz matrix. Amber sphalerite approximately 10% altered to smithsonite in massive form up to 8" (20 cm) in diameter is also found in the quartz matrix. Well-developed, light brown, dolomite crystals lining vugs and fracture surfaces are common.

Some small vugs were seen to be lined with dolomite crystals and small amounts of pyrobitumen. Colonial coral is also abundant in the general area.

The showing is approximately 100 feet x 50 feet (30 m x 15 m) in size and occurs as talus blocks.

GALENA BOULDER SHOWING (4)
Co-ordinates: L24S - 63E

The mineralization at this showing consists of massive galena occurring as open-space filling of a porous dolostone host. The host rock is a grey, porous, vuggy and fractured, dolomitized limestone. The galena occurs as massive blocks up to 3' (1 m) in diameter within a coarse, iron-stained sand derived from the erosion of the pre-existing host dolostone. The galena is composed of coarse-grained anhedral to subhedral crystals denoting more rapid cooling than the cubic form galena found elsewhere on the property. Blocks of extremely leached, gossanned dolostone with a specific gravity of approximately 1.5 are common, as are blocks of botryoidal hemotite up to 1" (2.5 cm) thick. Abundant white, crystalline, barren quartz is also present.

The showing is approximately 50' x 100' (15 m x 30 m) in size.

ORMA SHOWING (5)
Co-ordinates: L35S - 62.5E

Mineralization at this showing consists of tetrahedrite altering to malachite + (azurite) and substantial plumbojarosite in a matrix of white, crystalline quartz occurring as open-space filling in a porous dolostone host. The host rock is a grey, porous, fractured and vuggy, dolomitized limestone which is heavily leached and silicified in the general area of mineralization. Tetrahedrite, approximately 50-60% altered to malachite + (azurite), is most abundant. Plumbojarosite is seen in close spatial relationship with the malachite, giving the rock a greenish-yellow oxide appearance. Plumbojarosite mineralization is more abundant here than anywhere else on the property and in general, this area has the heaviest and most abundant economic mineralization seen to date within the Prospect.

Large blocks, up to approximately 10" x 10" (25 x 25 cm) of white, coarse-grained quartz containing numerous pyritohedrons averaging ¼" (6 mm) in diameter are common, as are blocks of hematite up to 4" (10 cm) thick. Some botryoidal hematite was noted lining the surface of a block of quartz. Small pieces of gypsum and anhydrite averaging 1-2" (2.5-5 cm) in diameter were found at 39S-60.5E and 38S-59.5E respectively, indicating a small evaporitic basin at that location.

The mineralized float is found within a coarse, iron-stained sand formed from the leaching and erosion of pre-existing dolostone. This showing is Cu, Pb and Ag rich and Zn poor, with an area of approximately 225' x 225' (70 m x 70 m). A bulk sample of oxidized material collected from 0-0 on the Orma grid in September of 1978 by P. White and helpers yielded the following results:

Sample	% Cu	% Pb	% Zn	Oz/ton Ag	Weight
1938 A	2.24	24.8	0.06	59.04	315 lbs
1938 B	2.44	24.7	0.07	63.20	

MIKE SHOWING (6)
Co-ordinates: L11S - 9.5E

The mineralization at this showing consists of tetrahedrite altering to azurite + (malachite) in a matrix of white, crystalline quartz as open-space filling of a porous dolostone host. The host rock is a grey, porous, vuggy and fractured, dolomitized limestone which is locally silicified in the area of mineralization. The tetrahedrite is approximately 60% altered to azurite + (malachite) in blebs up to 1" x 1" (2.5 cm x 2.5 cm) predominantly occurring in a narrow horizon 18" - 20" (45 cm x 50 cm) below the surface. The showing consists of talus blocks and is approximately 150' x 300' (50 m x 100 m) in size.

TETRAHEDRITE SHOWING (7)
Co-ordinates: L12.5S - 60E

Mineralization at this showing consists of slickensided, massive tetrahedrite, 5-6" (12-15 cm) wide occurring as a fracture filling and also as disseminated tetrahedrite in a white, crystalline quartz matrix both as open-space filling of a porous dolostone host. The host rock is a grey, porous, vuggy and fractured, dolomitized limestone. The showing occurs as outcrop and is approximately 20' x 20' (6 m x 6 m) in size.

PYRITE SHOWING (8)
Co-ordinates: 12.5S - 59E

The mineralization at this showing consists of blebs, pyritohedrons and cubes of pyrite in a matrix of white, crystalline quartz occurring as open-space filling in a porous dolostone host. The host rock is a grey, porous, vuggy and fractured, dolomitized limestone. The pyrite blebs are massive and up to 2" x 2" (5 cm x 5 cm) while the pyrite cubes and pyritohedrons average approximately ¼" x ¼" (.6 cm x .6 cm) in size. The showing occurs as outcrop and is approximately 20' x 20' (6 m x 6 m) in size.

ROWAN SHOWING (9)
Co-ordinates: L41S - 62.5E

The mineralization at this showing consists primarily of tetrahedrite altering to malachite + (azurite) with subordinate amounts of plumbojarosite and rare galena in a matrix of white, coarse-grained quartz, occurring as open-space infilling of fractures and vugs in the dolostone host. The host rock is a grey, porous, vuggy and fractured dolomitized limestone which is locally leached and silicified in the area of mineralization. Tetrahedrite predominates and is approximately 50-60% altered to malachite + (azurite). Minor plumbojarosite is seen intimately associated with the malachite and gives the rock a greenish-yellow appearance. Galena is also present but is rare. The tetrahedrite, plumbojarosite and galena occur along with abundant quartz and much infilling of vugs in the dolostone host is seen to consist entirely of crystalline quartz.

This showing is Cu-Ag rich and Zn poor.

The size of the showing is approximately 140' x 340' (40 m x 100 m) with mineralization occurring as float in a coarse, iron-stained sand. No outcrop is seen.

The following are the results of a bulk sample, predominantly of galena, taken in 1978 at the Rowan Showing:

*	Cu	.32%
	Pb	52.1%
	Zn	.01%
	Ag	14.2 oz/ton

* Weight of sample = 62 lbs

(b) Showings Found in 1978

GALENA CORAL SHOWING (10)
Co-ordinates: L10.5S - 2.5W

The mineralization at this showing consists of galena and smithsonite in a fossiliferous dolomitized limestone. The host rock is a grey, vuggy dolostone with abundant rugose corals. Galena occurs as fracture fillings and in vugs in the dolostone. One sample contained galena completely infilling the calyx of a coral.

This showing measures 6' x 6' (2 m x 2 m).

AZURITE SHOWING (11)
Co-ordinates: L15.5S - 7E

The mineralization at this showing consists of tetrahedrite altering to azurite + (malachite) in a white, coarse-grained quartz matrix within a dolostone host. The grey, porous, vuggy and fractured, dolomitized limestone hosts these minerals. The tetrahedrite is 50% altered to azurite + (malachite) and is contained within a matrix of white crystalline quartz which infills vugs and fractures in the dolostone.

The size of the showing is 30' x 20' (9 m x 6 m).

BEK SHOWING (12)
Co-ordinates: L77S - 26E

The mineralization at this showing consists of lemon yellow barite and hemimorphite crystals lining fractures and vugs in a dolostone host. The host rock is a grey, porous, vuggy and fractured dolomitized limestone. Barite occurs as well-developed crystals .12" (6 mm) long, lining fracture and vug surfaces within the dolostone host.

This mineralization can be traced for 60' (20 m) in outcrop. This outcrop contains the best-developed barite crystal found at the Rusty Springs Prospect.

JENNIFER SHOWING (13)
Co-ordinates: L15S-13.5E

The mineralization at this showing consists of tetrahedrite altering to azurite and malachite in a matrix of coarse-grained white quartz occurring as fracture and vug fillings in dolostone. Mineralization is generally found 18-20" (46-51 cm) below surface.

The size of the showing is 20' x 20' (6 m x 6 m).

TALUS SHOWING (14)
Co-ordinates: L76S - 38E

The mineralization consists of ruby sphalerite in a white, coarse-grained quartz matrix. The quartz crystals terminate to the centre of vugs in grey porous dolomitized limestone. Only one sample was found in the talus slope.

MA SHOWING (15)
Co-ordinates: L3S - 13.5W

The mineralization at this showing consists of ruby sphalerite and smithsonite in a matrix of white, coarse-grained quartz filling vugs and fractures in the dolostone host. The host rock is a grey porous, vuggy and fractured dolomitized limestone.

The size of the showing is three feet (one metre) square.

(c) Showings Found in 1979

JOE SHOWING (16)
Co-ordinates: L5.5S - 20W

The economic minerals at this showing consist of anhedral patches of well-formed cubic crystals of galena, often in intimate association with masses of amber sphalerite altering to smithsonite. The host rock is a grey, highly silicified, porous, vuggy dolomitized limestone, with silicification increasing towards the mineralized zones. The most abundant sulphide is galena which occurs as infilling of vugs and fractures, intergrown with calcite, quartz, amber sphalerite and smithsonite. The galena, often with a cerussite coating, is found in shapeless masses up to 6" x 4" (15 cm x 10 cm) consisting of well-formed cubic crystals averaging .06" (1.6 mm).

Some crystals display bent faces, indicative of anomalous silver content (F. Beck, 1979, pers. comm.) The galena is often intergrown with amber sphalerite. This sphalerite is about 90% altered to smithsonite leaving abundant sphalerite box-work structures. Before alteration, sphalerite would have been slightly more abundant than galena. Masses of white calcite displaying well-formed rhombohedral crystals are often seen in close spatial relationship with the galena and sphalerite. White quartz crystals, up to 2" (5 cm) long are common, intergrown with the sulphides. Well-formed dolomite crystals occur nearby, sometimes overlain by pyrobitumen, then calcite.

The showing is 150' x 75' (45 m x 22 m). An assay of the galena yielded 20.44 oz/ton silver and 79.92% lead.

ULLR SHOWING (17)
Co-ordinates: L6.5S - 21.5W

The mineralization at this showing consists of tetrahedrite altering to malachite + (azurite), galena and amber sphalerite altering to smithsonite. The host rock is a relatively tight, grey, dolomitized limestone with few vugs or fractures. The economic minerals occur with calcite and white quartz as fracture fillings in the dolomite host. The matrix of the fracture fillings consists of equal proportions of white quartz crystals .3" long (8 mm) and calcite. The mineralization occurs as small (.25", 6 mm) patches spread randomly through the matrix.

Colonial coral, Favosites Sp., is common at this showing. Mineralization is confined by an area 10' x 10' (3 x 3 m).

JACKSON SHOWING (18)
Co-ordinates: L5S - 7W

The mineralization at this showing consists of galena, sphalerite, smithsonite, tetrahedrite, malachite and azurite in a grey, porous, vuggy dolostone host. The mineralization occurs in a quartz matrix as fracture fillings. The sphalerite is greater than 90% altered to smithsonite, leaving abundant sphalerite box-work structures. The quartz matrix is coarse-grained.

Crystals are .2" x .06" (.5 cm x .2 cm) and the seams are .4" to .8" (1 to 2 cm) thick. The showing is 100' x 100' (30 m x 30 m) on a talus slope.

CHIVAS SHOWING (19)
Co-ordinates: L8S - 10W

The mineralization at this showing consists of smithsonite within a calcite and white, coarse-grained quartz matrix, infilling a grey, porous, vuggy, dolomitized limestone. No sphalerite box-work structures were noted.

The area of mineralization is 6' x 6' (2 m x 2 m) on a talus slope.

Soil Sample:	Cu	24 ppm
	Pb	160 ppm
	Zn	196 ppm
	Ag	1 ppm
Rock:	Cu	248 ppm
	Pb	140 ppm
	Zn	>10,000 ppm
	Ag	5.8 ppm

REEF SHOWING (20)
Co-ordinates: L13S - 10W

The mineralization at this showing consists of amber sphalerite altering to smithsonite, galena, tetrahedrite, azurite and malachite. These minerals occur as infilling of vugs in a grey, porous, vuggy, silicified dolostone. Small crystals of galena are found in white quartz and also intimately associated with sphalerite box-work structures. Several pieces of azurite, malachite and smithsonite on surface measured 2" x 4" (5 x 10 cm). Calcite is found associated with the mineralization as small (.25" x .25" - 6 x 6 mm) white crystals and as blocks up to 2" x 2" (5 cm x 5 cm) in the general area. Travertine, a lime-green cave-lining calcite displaying concentric growth rings, was also found in the general area. Sink holes averaging 1.5' (.5 m) in depth were seen locally. Favosites Sp. is abundant in the area.

The size of the showing is 300' x 300' (100 m x 100 m).

ANDREA SHOWING
Co-ordinates: L20S - 9E

The mineralization at this showing consists of tetrahedrite altering to malachite + (azurite), plumbojarosite and amber sphalerite altering to smithsonite. The host rock is a very porous and vuggy, leached, dolomitized limestone. The economic minerals at this showing are mostly supergene and have their origin as infilling of vugs and fractures within the dolostone host. Tetrahedrite is almost completely altered to malachite stain with no azurite noted. The malachite stain is intergrown with plumbojarosite which gives the rock an overall green-yellow colour. Rocks in the general area are heavily gossanned. Amber sphalerite is almost completely altered to smithsonite, leaving sulphide box-work structures.

The area of mineralization is approximately 6 x 6' (2 x 2 m). Mineralization is in small blocks of talus with no outcrop seen. Soil and rock samples at this showing yielded the following results:

		* ppm
Rock:	Cu	> 10,000
	Pb	> 10,000
	Zn	3456
	Ag	23.5
Soil:	Cu	1460
	Pb	8400
	Zn	> 10,000
	Ag	33.0
	Ba	> 10,000

MARILYN SHOWING (22)
Co-ordinates: L45S - 13.5W

The mineralization at this showing consists of barite crystals, calcite crystals, pyritohedrons and tetrahedrite altering to malachite + (azurite) in a dolostone host. The host rock is a grey, vuggy and porous dolomitized limestone. The tetrahedrite is found in a matrix of coarse-grained, white quartz and coarse-grained, white calcite infilling vugs and fractures in the host, and is relatively fresh with approximately 20% altered to malachite + (azurite). Pyritohedrons, averaging .25" (.6 cm), are also common in the quartz. Crystals of clear calcite and pale barite both averaging .25" x .125" (.6 x .3 cm) are common as vug fillings in the dolostone. Tetrahedrite from this showing assayed at 186 oz/ton silver.

The showing is 100 x 30' (30 x 10 m) in size. Minerals occur in talus, with no outcropping being present.

WHITE SHOWING (23)
Co-ordinates: L48S - 12.5W

The mineralization here consists of botryoidal hematite overlying and intergrown with layers of barite crystals. The host rock is a dark grey, porous, dolomitized limestone. The host rock is heavily iron-stained and heavily silicified with some infilling of vugs by quartz. Lemon-yellow barite crystals are more plentiful than the hematite. These crystals average .25" x .125" (.6 x .3 cm) although they can range to .4" x .25" (1 cm x .6 cm). Botryoidal hematite occurs up to .4" (1 cm) thick. The minerals form as fracture and vug linings in the dolostone host.

The mineralized area is approximately 10' x 14' (3 m x 4 m) in talus close to the chert-dolostone contact.

DON SHOWING (24)
Co-ordinates: L93.5S - 13.5E

The minerals at this location consist of botryoidal hematite lining fracture surfaces in the dolostone host. The host rock is a leached, porous, vuggy, grey, dolomitized limestone. The hematite forms botryoidal layers .06" to .4" (1.6 mm to 10 mm) thick with spheres .06" to .25" (1.6 mm to 6 mm). Mineralization occurs in a 25 x 25 foot (7.6 x 7.6 m) part of a talus slope with the largest mineralized block being 3' (1 m) in length.

MIA SHOWING (25)
Co-ordinates: L87-5S - 12.5E

The mineralization at this showing consists of botryoidal hematite underlain by crystalline barite, lining fractures and vugs in a dolostone host. The host rock is a leached, porous and vuggy grey dolomitized limestone. The minerals consist of green-yellow barite crystals approximately .3" (.8 mm) long, overlain by botryoidal hematite .2" to .4" (.5 cm to 1 cm) thick with spheres to .25" (.6 cm). The minerals occur as vug and fracture coatings. The host dolostone is silicified in the area of mineralization but is generally leached. The showing comprises an area 30' square (9 m square) in outcrop and talus.

CHRIS SHOWING (27)
Co-ordinates: L76.5S - 32.5E

The mineralization at this showing consists of barite crystals and sulphide box-works occurring as open-space filling of a porous dolostone host. The host rock is a dark grey, porous, vuggy and fractured dolomitized limestone which is partially silicified in the area of mineralization. Pale yellow barite crystals averaging ¼" x ¼" (.6 cm x .6 cm) are found on iron-stained fracture and vug surfaces. Gossanned sulphide box-works are seen in a white, crystalline quartz matrix and average approximately ½" x ½" (1.3 x 1.3 cm) in size. The showing occurs as talus blocks and is approximately 50' x 50' (15 m x 15 m) in size.

TARA SHOWING (28)
Co-ordinates: L52S - 64E

The mineralization at this showing consists of lemon-yellow barite crystals averaging ¼" x ¼" (.6 x .6 cm) overlain by botryoidal hematite 1/8" to 2" (3 mm to 5 cm) thick with spheres averaging 1/8" (.3 cm) in diameter lining vug and fracture surfaces in a porous dolostone host. The host rock is a grey, porous, vuggy and fractured, dolomitized limestone which is locally extremely leached and gossanned.

The specific gravity of some dolostone blocks was estimated to be as low as 1.5. The showing is composed of talus blocks and is approximately 150 x 100 feet (45 x 30 m) in size.

EAGLE'S NEST SHOWING (29)
Co-ordinates: L8N - 34.5E

The mineralization at this showing consists of tetrahedrite altering to azurite + (malachite) in a white, crystalline quartz and calcite matrix occurring as open-space filling in a fractured dolostone host. The host rock is a grey, moderately-fractured dolomitized limestone. The tetrahedrite occurs as small blebs averaging 1/8" - 1/4" (.3 - .6 cm) in diameter and is approximately 20% altered to azurite + malachite. The mineralized fracture fillings are small, averaging 1/16" - 3/4" (.15 - 2 cm) in width. Well-developed, light-brown dolomite crystals are abundant in the area.

The showing occurs as outcrop and is approximately 6' x 15' (2 m x 5 m) in size.

SOUTHERLY SHOWING (30)
Co-ordinates: L97S - .5W

Mineralization at this showing consists of pale-yellow barite crystals lining vugs and fractures in a grey, porous, vuggy dolomitized limestone. The barite crystals average .25" (6 mm) filling fractures in the dolomite.

The showing is 3' x 5' (1 m x 1.6 m) in size.

NEW SHOWING (31)
Co-ordinates: L17S - 1W

The mineralization consists of auricalcite, plumbojarosite, galena, tetrahedrite altering to malachite + (azurite), goethite and sphalerite altering to smithsonite, in a quartz matrix infilling fractures and vugs in a grey, porous, vuggy, dolomitized limestone. The matrix is white quartz with crystals to .4" (1 cm) in length. Weathered tetrahedrite is the most common sulphide found with minor plumbojarosite and auricalcite. Sphalerite box-work structures and galena are found separately in the quartz. The showing comprises 60' x 60' (20 m x 20 m) of a talus slope.

NEW GALENA SHOWING (32)
Co-ordinates: L14S - .5W

The minerals at this showing consist of galena, sphalerite and smithsonite in a quartz and calcite matrix infilling a tight, moderately-fractured grey dolomitized limestone. Galena masses .2" (.5 cm) appear in intimate association with sphalerite box-works and smithsonite in a matrix of white, coarse-grained calcite and quartz. The minerals infill small fractures, .4" (1 cm), in the dolostone.

This 42-square-foot (4 square metres) showing occurs in a talus slope.

QUARTZ BRECCIA (33)
Co-ordinate: L49S - 14W

Mineralization at this location consists of an outcrop 10' x 3' (3 m x 1 m) which contains a quartz breccia in a quartz and silicified dolomite matrix. Origin seems to be a collapse breccia of white, fine-grained anhedral quartz fragments, up to .8" (2 cm) in a matrix of relatively clean, fine-grained quartz and dark-grey, silicified dolostone. Rare goethite is seen in small (.4" x .4" - 10 x 10 mm) vugs.

This breccia occurs near the chert-dolostone contact.

APPENDIX B

B.1: LOCATION OF SAMPLES TAKEN FOR ASSAY

(All samples are soil samples unless otherwise noted)

Assay Number	Location
DRS 79-1	Chip sample, quartz, Bek Showing
-2	Chip sample, goethite, quartz, Bek Showing
-3	Bek Showing
-4	DON BL = 77S 35E, samples with D prefix: grid lines true north/south, stations at 80-foot intervals
-5	D2E 2.5N
-6	Hematite D2E 2.5N
-7	Shale 1600 feet north of iron formation
-8	Sandstone 2000 feet north of iron formation
-9	DBL 1.14S
-10	DBL 2S
-11	DBL 3S
-12	D1E 1S
-13	D1E 2S
-14	D1E 3S
-15	D1E 0.1N
-16	D1E 1.1N
-17	D1E 1.9N
-18	D1E BL
-19	D2E 1S
-20	D2E 2S
-21	D2E 3S
-22	D2E 4S
-23	D2E 1N
-24	D2E 1.9N
-25	D2E 2.9N
-26	D2E 4N
-27	D2E 5N
-28	D2E 6N
-29	D2E 6.9N
-30	20S 14W
-31	20S 15W
-32	19S 15W
-33	19S 16W
-34	20S 16W
-35	20S 17W
-36	20S 18W
-37	20S 19W
-38	20S 20W
-39	20S 21W
-40	20S 22W

Assay Number	Location
DRS 79-41	20S 23W
-42	19S 17W
-43	19S 18W
-44	19S 19W
-45	19S 20W
-46	19S 21W
-47	19S 22W
-48	19S 23W
-49	19S 24W
-50	19S 25W
-51	19S 26W
-52	21S 14W
-53	22S 14W
-54	23S 14W
-55	23S 13W
-56	23S 12W
-57	23S 11W
-58	22S 14W, iron-stained dolostone
-59	BL 31S
-60	31S 1W
-61	31S 2W
-62	31S 3W
-63	31S 4W
-64	31S 5W
-65	31S 6W
-66	30S 6W
-67	29S 6W
-68	30S 10W
-69	28S 6W
-70	27S 5W
-71	27S 6W
-72	26S 6W
-73	25S 6W
-74	24S 6W
-75	23S 6W
-76	23S 7W
-77	23S 8W
-78	23S 9W
-79	23S 10W
-80	20S 26W
-81	21S 26W
-82	22S 26W
-83	22S 27W
-84	22S 28W
-85	22S 29W
-86	23S 31W
-87	24S 31W
-88	24S 32W
-89	24S 33W
-90	25S 33W
-91	27S 33W
-92	27S 34W

Assay Number	Location
DRS 79-93	27S 35W
-94	BL 14S
-95	Small hill east of David Showing; see geochem map
-96	Ditto
-97	Ditto
-98	Ditto
-99	Ditto
-100	Ditto
-101	Ditto
-102	Ditto
-103	Ditto
-104	Ditto
-105	Ditto
-106	Ditto
-107	Ditto
-108	D1E 4S
-109	D1E 5.5S
-110	D1E 7S
-111	D1E 8S
-112	DBL 8S
-113	DBL 9S
-114	DBL 10S
-115	DBL 12S
-116	D1W 13S
-117	D2W 13S
-118	D3W 13S
-119	D4W 13S
-120	D5W 13S
-121	D5W 14S
-122	D5W 15S
-123	D6W 15S
-124	D6W 16S
-125	D7W 16S
-126	D7W 17S
-127	D8W 17S
-128	D8W 17S, iron-stained quartz
-129	D8W 18S
-130	D9W 18S
-131	D9W 19S
-132	D10W 19S
-133	D10W 20S
-134	D10W 21S
-135	D12W 21S
-136	Mia Showing, botryoidal hematite with barite crystals
-137	D12W 21.6S
-138	D12W 22.5S
-139	D13W 22.5S
-140	D13W 23.5S
-141	D12W 20S
-142	28S 35W

Assay Number	Location
DRS 79-143	29S 35W
-144	30S 35W
-145	31S 35W
-146	32S 35W
-147	33S 35W
-148	34S 35W
-149	35S 35W
-150	36S 35W
-151	37S 35W
-152	39S 35W
-153	40S 35W
-154	40S 34W
-155	40S 33W
-156	40S 32W
-157	40S 30W
-158	40S 29W
-159	40S 28W
-160	40S 27W
-161	40S 26W
-162	40S 25W
-163	41S 22W
-164	41S 21W
-165	42S 21W
-166	42S 20W
-167	42S 19W
-168	43S 19W
-169	44S 19W
-170	44S 18W
-171	46S 18W
-172	47S 18W
-173	47S 17W
-174	47S 16W
-175	47S 15W
-176	47S 14.5W
-177	21S 10E, plumbojarosite
-178	47S 14W
-179	47S 13W
-180	47S 12W
-181	46S 11W
-182	21S 10E
-183	51S 11W
-184	50S 11W
-185	50S 12W
-186	49S 12W
-187	48S 12W
-188	48S 11.5W
-189	47S 11.5W
-190	46.5S 11.5W
-191	46S 12W
-192	46S 13W
-193	45S 13W
-194	45S 14W

Assay Number	Location
DRS 79-195	46S 14W
-196	Marilyn Showing, tetrahedrite
-197	9S 9W
-198	9S 9W, smithsonite
-199	52S 11W
-200	53.5S
-201	55S
-202	56.5S
-203	58S
-204	59S
-205	59.3S 11W
-206	59.5S 10W
-207	61S 10W
-208	61S 11W
-209	62S 11W
-210	63S 11W
-211	64.5S 11W
-212	66S 11W
-213	70S 11W
-214	72S 11W
-215	75.5S 11W
-216	77S 11W
-217	78.5S 11W
-218	80S 11W
-219	82S 11W
-220	84S 11W
-221	88S 11W
-222	88S 14W
-223	91S 11W
-224	94S 11W
-225	96.5S 11W
-226	98S 11W
-227	97S 7W
-228	97S 3W
-229	93S 3W
-230	93S 0.5W
-231	98S BL
-232	98S 2E
-233	98S 4E
-224	98S 5E
-235	99S 7E
-236	100S 8E
-237	100S 10E
-238	99S 11E
-239	97S 12E
-240	97S 15E
-241	96S 17E
-242	95S 17.5E
-243	94S 17E
-244	94S 16E
-245	93S 15E
-246	92S 14E

Assay Number	Location
DRS 79-247	91S 16E
-248	11S 20W
-249	11S 21W
-250	11S 19W
-251	15S 23W
-252	15S 24W
-253	15S 25W
-254	15S 26W
-255	15S 27W
-256	13.3S 23.8W
-257	11S 24W
-258	11S 25W
-259	11S 26W
-260	11S 23W
-261	11S 23W
-262	9S 22W
-263	7S 21W
-264	7S 20W
-265	7S 19W
-266	7S 18W
-267	7S 17W
-268	7S 16W
-269	7S 15W
-270	6S 19.7W
-271	6S 19.7W
-272	5.5S 19.7W
-273	5S 19.7W
-274	6S 20.2W
-275	6S 20.7W
-276	6.5S 19.7W
-277	7S 19.7W
-278	6S 19.2W
-279	6S 18.7W
-280	1N 19W
-281	9N 33E
-282	9N 32E
-283	9N 31E
-284	9N 30E
-285	9N 29E
-286	9N 28E
-287	9N 27E
-288	9N 26E
-289	9N 16E
-290	9N 15E
-291	9N 14E
-292	47S 34E
-293	43S 36E
-294	43S 38E
-295	43S 40E
-296	43S 42E
-297	47S 40E
-298	47S 44E

Assay Number	Location
DRS 79-299	3S 13W
-300	3S 14W
-301	3S 15W
-302	3S 16W
-303	3S 17W
-304	3S 18W
-305	3S 19W
-306	3S 20W
-307	3S 21W
-308	3S 22W
-309	3S 23W
-310	3N 15.4W
-311	3N 14W
-312	3N 11W
-313	4N 11W
-314	5N 11W
-315	5N 12.5W
-316	9N 34.3E
-317	73S 38.5E
-318	73S 40E
-319	73S 41E
-320	70.7S 41E
-321	70S 41.2E
-322	69S 41.2E
-323	68S 41.2E
-324	67.5S 41E
-325	66S 41E
-326	64S 41E
-327	63 41E
-328	61 41E
-329	59S 41E
-330	57S 41E
-331	55S 41E
-332	55S 40E
-333	55S 39E
-334	55S 38E
-335	55S 42E
-336	55S 43E
-337	55S 44E
-338	55S 45.5E
-339	55S 46.5E
-340	53.5S 43E
-341	52S 43E
-342	51S 45E
-343	48.5S 45E
-344	45.6S 45E
-345	44.3S 45E
-346	41.7S 44E
-347	40.3S 44E
-348	39S 46E
-349	39S 42E
-350	39S 38E

Assay Number	Location
DRS 79-351	37.7S 38E
-352	36.3S 38E
-353	35S 37E
-354	35S 36E
-355	34S 34.5E
-356	33S 33E
-357	32S 32E
-358	31S 30E
-359	31S 28E
-360	29.5S 27E
-361	28.5S 26E
-362	27S 25E
-363	27S 22E
-364	26S 21E
-365	25S 20E
-366	24S 19E
-367	7S 57E
-368	7S 58E
-369	7S 59E
-370	7S 60E
-371	7S 61E
-372	7S 62E
-373	7S 63E
-374	3S 62E
-375	3S 61E
-376	3S 60E
-377	3S 59E
-378	3S 54E
-379	3S 53E
-380	3S 52E
-381	3S 51E
-382	Headwaters of Salmon Fork
-383	3-4 miles south of Carroll Creek on Salmon Fork, in point bar in swamp
-384	Ditto
-385	Samples 385-394 in Canol Shale, 6 miles west of camp; goethite
-386	Iron ppt.
-387	In iron pocket
-388	Hematite in chert nodule
-389	Soil from below DRS 79-388
-390	Green stained quartz
-391	Iron ppt. from stream to west
-392	Graphite and quartz
-393	Iron concentration in chert nodule
-394	Iron ppt. near landing site
-395	55S 60E
-396	55S 61E
-397	55S 62E
-398	55S 63E
-399	55S 64E

Assay Number	Location
DRS 79-400	55S 65E
-401	55S 66E
-402	55S 67E
-403	55S 68E
-404	55S 69E
-405	55S 70E
-406	51S 68E
-407	51S 67E
-408	51S 66E
-409	51S 65E
-410	51S 64E
-411	51S 63E
-412	51S 62E
-413	51S 61E
-414	51S 60E
-415	47S 62E
-416	13S 6W
-417	16S 26W
-418	16S 28W
-419	17S 29W
-420	19S 31W
-421	19S 32.5W
-422	19S 34W

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GRAVITY & INDUCED POLARIZATION SURVEY
RUSTY SPRINGS PROSPECT AREA, Y.T.

SUMMARY

This report presents the results of the induced polarization and gravity survey work completed over the Rusty Springs Prospect, during the summer of 1979, for Rio Alto Exploration Ltd. There are several gravity and I.P. high anomalies, in the vicinity of known mineralized showings, that warrant further investigation by diamond drilling. Encouragement in these anomalous areas could well signal the discovery of several mineral deposits in Cu-Pb-Zn-Ag within this prospect.

Respectfully submitted,
C.A.AGER & ASSOCIATES LTD

Charles A. Ager, PhD, PEng
Geophysicist

September 15, 1979

090532

This report has been examined by the Geological [illegible] and recommended to be considered as representing the amount of

$ 40,600.00

J A Main

[illegible] Engineer

Considered as representation work under Section 56 (1) of the Quartz Mining Act.

B. R. BAXTER
Supervising Mining Recorder

for Commissioner of Yukon Territory

TABLE OF CONTENTS

LIST OF FIGURES

LOCATION, DATE OF WORK, CREW

Location: Rusty Springs Prospect
Porcupine Ranges, Yukon Territory
NTS 116K/8,9
66°31' N Latitude by 140°20' W Longitude

Date of Work:
Field Work: June 7 - July 29, 1979
Office Work: August 1 - September 15,1979

Crew: R. J. Englund, BSc, Project Geophysicist
George Penner, Geophysical Opperator
Jack Penner, Geophysical OPerator
Martin Faucher, Geophysical Operator
Kurt Dieckman, Geophysical Operator
Damon Berryman, Geophysical Operator
Lorna Collins, Field Assistant
Brian Englund, Field Assistant
Joe Jackson*, Field Assistant
Dave Hansen*, Field Assistant
Joe Bankowski*, Field Assistant
Tim Termuende*, Field Assistant
Dean White*, Field Assistant
C.A.Ager, PhD,PEng, Senior Geophysicist/Data Interpreter

* Rio Alto personnel

INTRODUCTION

At the request of Mr P.S.White, Yukon manager for Rio Alto Exploration Ltd, a comprehensive gravity and induced polarization survey was conducted over the Rusty Springs Prospect grid, Porcupine Ranges area, Yukon Territory (Figures 1 and 2). The intent of the work was to outline induced polarization and gravity high anomalies which could indicate the presence of massive to semi-massive Cu-Pb-Zn-Ag mineralization within the survey area. Prospecting, geological mapping, geochemical sampling and diamond drilling has indicated numerous occurrences of mineralization. The reader is referred to Hansen et al (1979) and White (1979) for details and references of previous work.

The Rusty Springs Prospect is located some 32 km east of the Alaska border and 6 km south of the Arctic Circle in the Yukon Territory. Access to the property is by air and winter road from the Dempster (Dawson-Inuvik) Highway.

The claims are in an area of moderate relief (1800-2600 feet) with fairly extensive overburden cover. The main camp is located on the northwestern part of the grid. Survey access is by foot and/or helicopter from the main camp. Grid lines are cut and picketed and well located on the topographic map, Figure 2.

The area is underlain by dolostone, chert and shale. A recent geology map prepared by Hansen et al (1979) is duplicated as Figure 13 for the sake of completeness for this report.

INSTRUMENTATION & SURVEY PROCEDURES

Gravity observations were made using three LaCoste & Romberg Model G gravity meters (serial #G199, #G237 and #G393) with reading accuracy of $\pm$ 0.01 mgal. Drift, latitude, Free Air, Bouguer slab and terrain effects were accounted for in the Complete Bouguer Gravity Map,

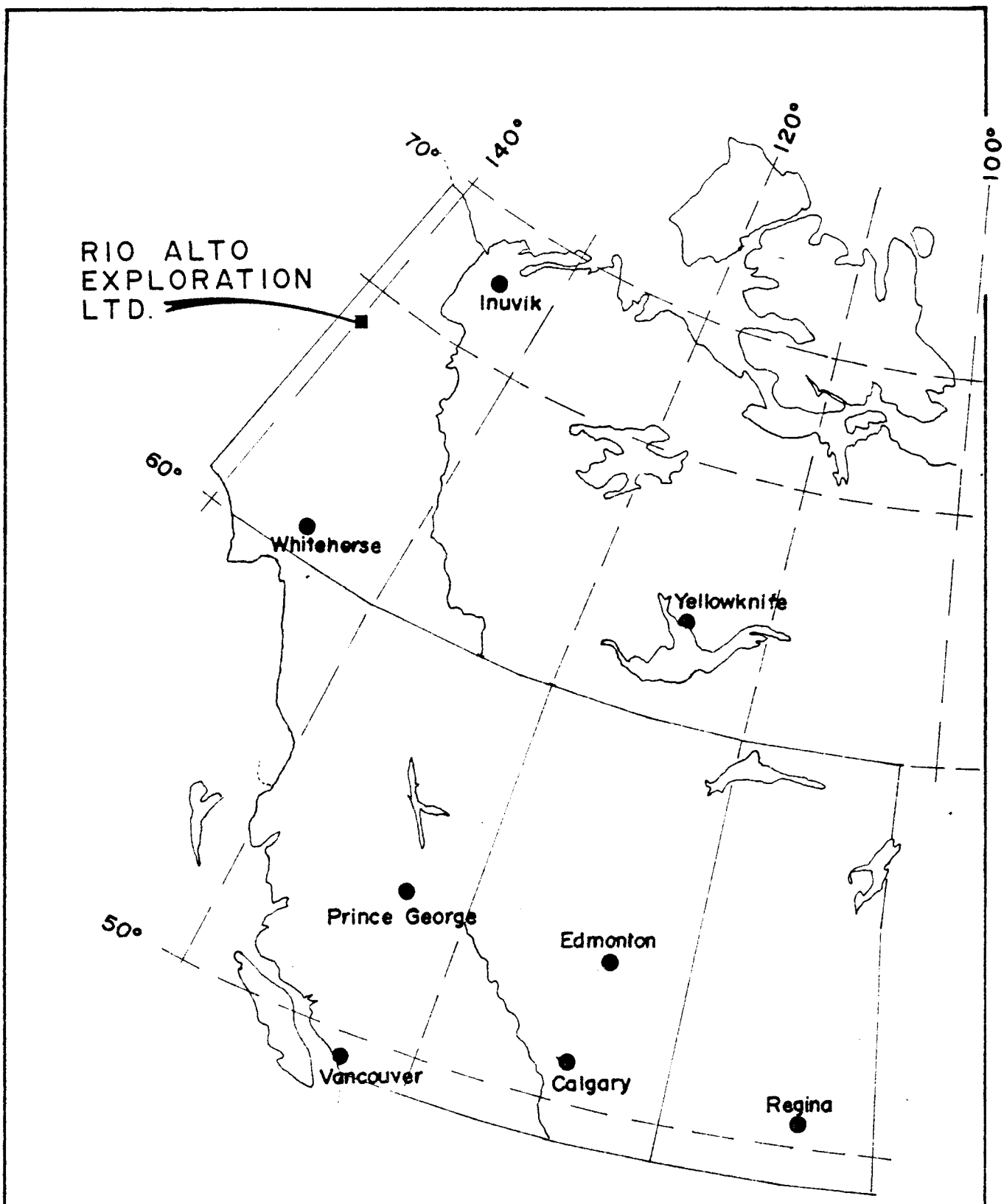


FIG. 1

0 200 500 mi

0 200 500 km

LOCATION MAP	
RUSTY SPRINGS AREA	
DATE SEPT. 1979	C·A·AGER & ASSOC· Surrey B·C· Canada

Figure 3. Bouguer density was 2.75 g/cc which corresponds to an elevation factor of 0.058942 mgal/foot. Terrain radius was 2100 feet.

Gravity station elevations were determined using standard levelling methods and an electronic level developed by Ager & Associates Ltd. Relative elevations are accurate to ±0.10 feet or better. Absolute elevations were determined by referencing all elevation work to station L13N+BL0 which was assigned an elevation of 1750.55 feet. Gravity bases are located on BL0 and BL2 at each cross line station point and observed gravity values are referenced to the main base, GB79-7, at location 8N+2.5E.

Grid positions were surveyed in by Morley Barker and are as shown on Figure 2. It should be noted that the south fork of Carrol Creek and the southeastern section of the grid map are considered correct only as to position of creek crossings - between line creek locations are estimated. Gravity stations are every 100 feet along lines spaced 400 feet apart.

Induced polarization equipment consisted of a Sabre Mark 2, 450 watt, frequency domain system. A dipole-dipole array was employed with a=200 feet, n=2 and a frequency span of 0.3 to 10 hertz. The effective depth of exploration is about 200 feet, except on detail lines where depths to 300 feet were mapped. Over some of the anomalous areas a=100,200 feet and n=1,2,3 dipoles were used for detailing. The P.F.E. and resistivity data are presented as plan maps, Figures 4 and 5, and as pseudo sections on Figures 6-11 inclusive.

THE GRAVITY MAP

As stated previously, gravity station interval is 100 feet along lines spaced 400 feet apart. This is a good grid for general prospecting of the property, but a finer station interval

and line spacing is necessary in order to accurately detail the anomalous areas for excess mass and depth calculations. The C.B. gravity map has very little regional gradient evident, highs and lows are directly correlated to rock densities, and it can therefore be interpreted directly:

1. Gravity Lows: Gravity values of less than about 1.0-1.5 mgals indicate areas of less dense rocks. On the Rusty Springs grid, in general, the shales are less dense than the dolostones. Hence, the gravity lows map the general position of the shales and the less dense sections of the dolostones.

2. Gravity Highs: Gravity highs map areas where the rocks are more dense than about 2.75 g/cc. These are shown as gravity values greater than about 2.5-3.0 mgals on Figure 3. The highest value in each closure is marked by a 'cross'. Gravity values greater than 3.0 mgals are included on the Composite Map (Figure 12). These zones are considered the best areas for massive mineralization to occur and are discussed in more detail under the 'Composite Interpretation' section.

3. Gravity Gradients: Gravity gradients generally map the transition or contact between two different rock units. On the Rusty Springs grid, they correspond to the shale-dolostone contact region. The gravity closure at L43S+3W is not considered to be a gravity high anomaly, but is, instead, interpreted as an 'apparent high' caused by shale-dolostone contacts on at least two sides of the feature.

THE INDUCED POLARIZATION MAPS

The Percent Frequency Effect (PFE) Map, Figure 4 gives the general distribution of chargeable rock units within the survey area at depth about 200 feet. PFE effects were not obtainable over much of the shale unit due to the 'noisy' environment of these rocks (low resistivity and high s.p. yield low signals). PFE high anomalies are normally caused by metallic sulphides such as pyrite, chalcopyrite,

galena, marcasite, etc. and certain clays and graphite. On the Rusty Springs Prospect, the PFE values are generally low (less than 5%) over the Mike Hill area. They increase to form a very large amplitude PFE anomaly in the pattern of an arcuate feature around the base of the hill,in the valley area, bordered by Carrol Creek on the north and the east. The 30-50% pfe zones could correspond to 6-10% sulphides if highly disseminated and substantially more if the source is massive. In this environment, 15% pfe is considered anomalous as will be discussed in more detail in the 'Composite Interpretation' section.

The Resistivity Map, Figure 5, maps the apparent resistivities of the rock units at depth of about 200 feet. Resistivity high areas indicate more resistive rocks which, on the Rusty Springs Prospect, indicate the more silica rich areas (greater than 20,000 ohm-feet). The intermediate values between 2,000-10,000 ohm-feet map the dolostone units containing less silica and less unhealed fracturing. The regions of resistivities less than 500 ohm-feet indicate zones of fracturing, alteration, overburden and/or mineralization. Gradient areas generally map rock boundaries and/or transition zones within the same rock unit.

The regions of anomalous pfe were detailed on lines 1N, 3S, 7S, 11S, 15S, 19S and 23S and are shown as pseudo sections on Figures 6 through 11 inclusive. The purpose of detailing is to provide more lateral and vertical information on an interesting I.P. feature. This gives more information on size, depth extent, and, consequently, economic potential of the target. The pseudo-sections will be discussed in the next section more specifically.

COMPOSITE INTERPRETATION

The combined results of the gravity and induced polarization work are presented on one map with the known mineralized showings, Figure 12. Here we see that a silica rich zone is mapped by the

resistivity high feature trending southeasterly from about BL0+1N through the Mike,Galena Coral,New Galena, New, Jennifer and Andrea showings towards the Talus,Chris,David and Bek showings off the survey area. Two other smaller zones are indicated at L15S+48E and L31S+41E. A fourth area is indicated west of L39S+69E.

A series of gravity high features flanks the resistivity anomaly on the northeastern side. These most certainly represent denser rock units in this area. The gravity high centered at L7S+7E is situated a few hundred feet north of the Mike showing. It has residual amplitude of about 1.0 mgal over an area some 1500 feet by 300 feet. The Tip showing has a residual gravity high in excess of 0.50 mgal centered at L9N+6E. Four other gravity high closures are located at L23S+10W, L23S+23E, L47S+31E and L61S+39E. Each of these is a 'flat' topped anomaly of unknown importance. A smaller feature centered at L43S+18E is a sharp anomaly of residual amplitude (from Figure 3) of about 1.0 mgal. It may be a feature like the anomaly at L43S+3W or it could indicate a massive sulphide zone. The most important gravity anomaly is elongated over the Orma,Rowan and Tara in the eastern part of the grid. It has residual amplitude of at least 1.5 mgals centered over the Orma showing at L35S+64E. A smaller gravity high of about 0.5 mgal is situated at L11S+62E. Its importance is amplified by the Pyrite and Tetrahedrite showings about 200 feet southerly from here. On L9N+30E a weak gravity high (Figure 3) is associated with the Bruce and Eagles Nest showings. The 0.5+ anomaly situated at L1N +14W is located just to the north of the Ma showing.

An extremely large amplitude pfe anomaly occupies a good portion of the region between the Mike and Orma showings. It is peripheral to the resistivity high feature and gives the distinct impression of a pyrite $\pm$ massive sulphides zoning anomaly around a silica rich core area. This feature has been detailed on several lines as follows:

L1N (Figure 6): At 6E, depth 200 feet, the pfe response is 33%. It is in a moderate resistivity gradient area, on strike with the

Tip and Tim showings, and has a gravity high residual on its northern extremity. Further east along the line, the pfe anomaly is shown to be open at depth between stations 21E and 40E.

L3S (Figure 7): The Ma showing (L3S+13.5W) is marked by a 'pant leg' shaped anomaly of limited depth extent (200 feet). It is associated with a gravity high residual to the north.

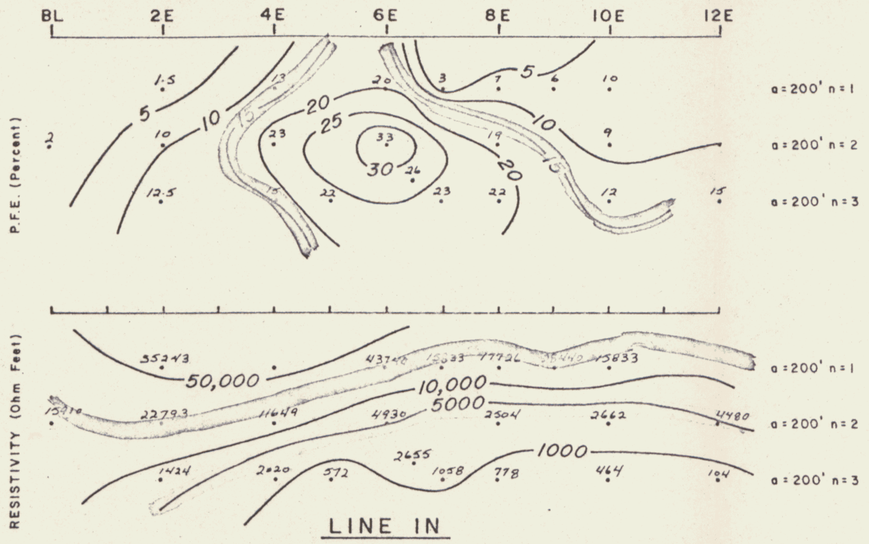
L7S (Figure 7): At 10W the Chivas showing corresponds to an assymetrical pant leg anomaly in pfe between 8W and 12W and could be interrelated to the Ma anomaly to the northwest.

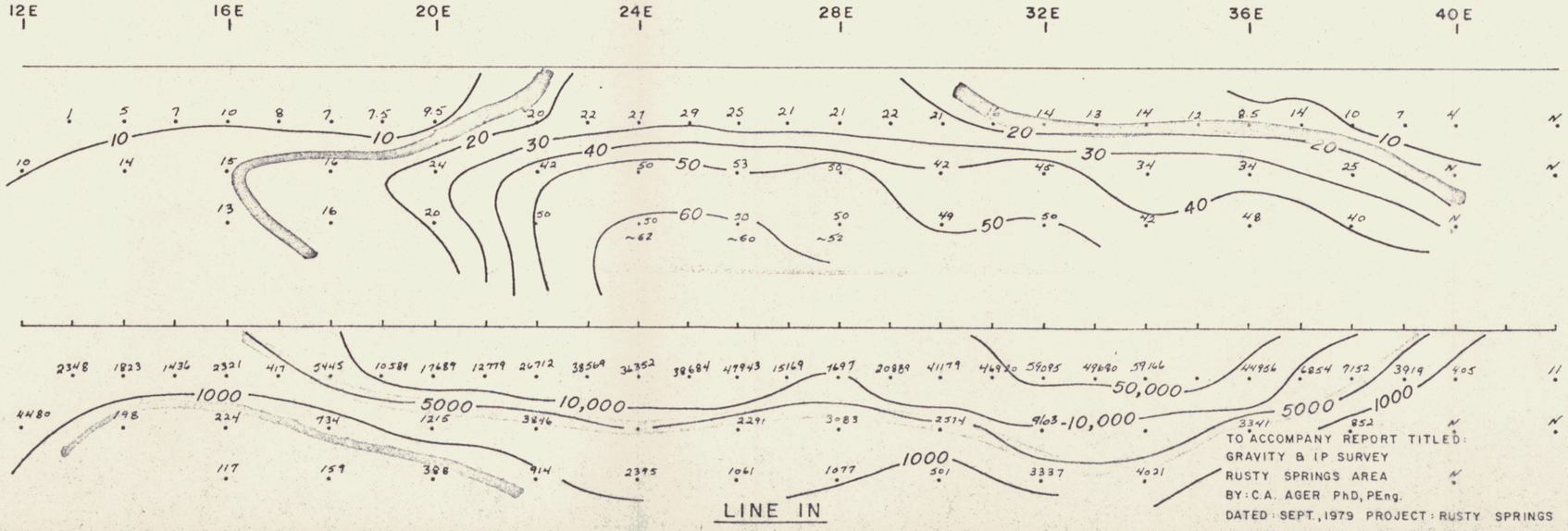
L11S, L15S (Figure 8): These two lines represent I.P. detail over the feature at about 22W. The pfe anomaly is narrow on L11S but broadens with depth at L15S. Here it corresponds to a low resistivity zone.

L15S (Figure 9): This detail line is plotted at 1"=100 feet and was run to test the I.P. response over the Pyrite-Tetrahedrite showing to the north. Here we observe a pfe high anomaly of 18% centered at 58E, at depth 200 feet, and open below 200 feet.

L19S (Figure 10): Here we see a very large amplitude pfe anomaly stretching from 34E to 52E which increases in intensity with depth. The values exceed 50% between 41E and 45E at 200 foot depth.This anomaly is interconnected and part of the same feature detailed on L1N as evidenced by the plan map, Figure 4.

L19S, L23S (Figure 11): These two lines were run to detail the I.P. effect in the vicinity of the Galena Boulder area where a pfe anomaly was noted on L15S-23S at about 67E. The feature is generally persistant from near surface to depths exceeding 300 feet.





TO ACCOMPANY REPORT TITLED:
GRAVITY & IP SURVEY
RUSTY SPRINGS AREA
BY: C.A. AGER PhD, PEng.
DATED: SEPT., 1979 PROJECT: RUSTY SPRINGS

ARRAY: DIPOLE - DIPOLE

200 0 200 400
Feet

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
CHARLES A. AGER

N.T.S. 116 K/8,9

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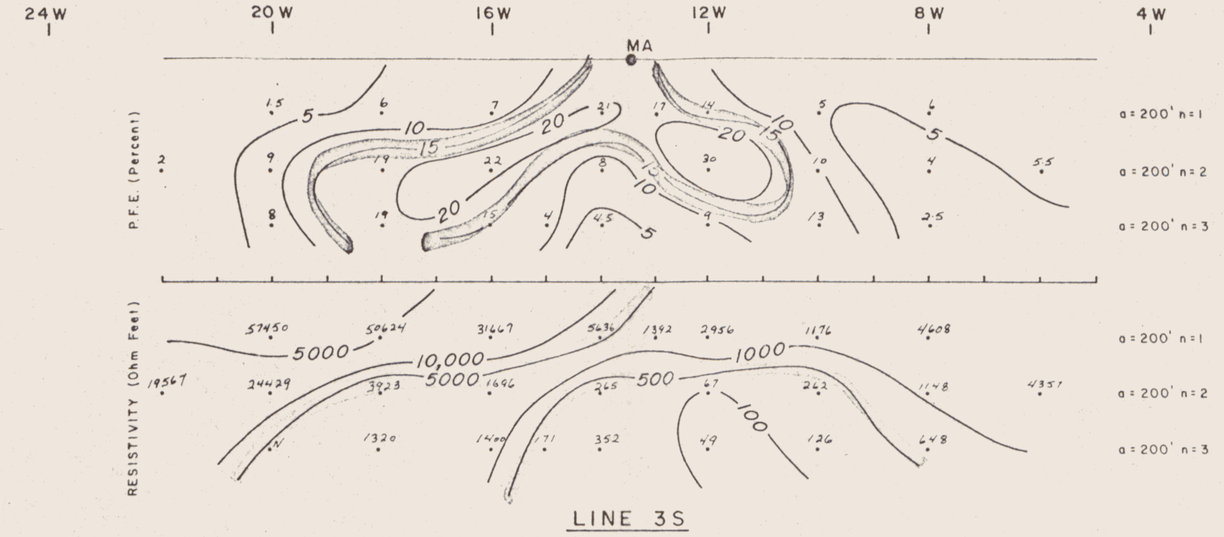
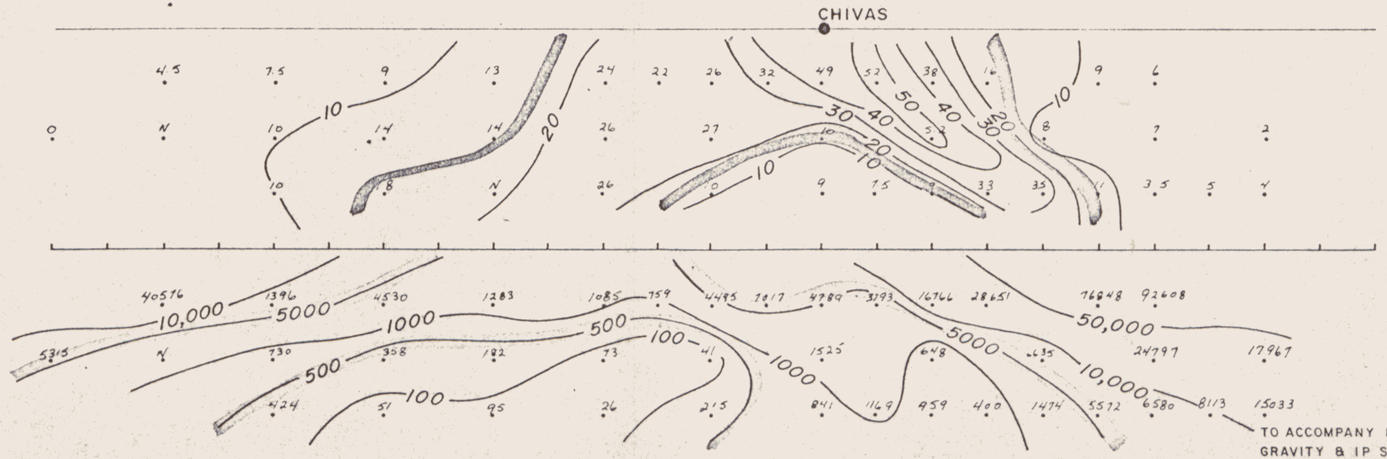
DETAIL, P.F.E. & RESISTIVITY

C.A. AGER & ASSOC. SURREY B.C. CANADA	DWN. BY: T.M. CHK. BY: DATE: SEPT. 1979	FIG. NO. 6



LINE 3S



LINE 7S

ARRAY : DIPOLE – DIPOLE

200 0 200 400
Feet

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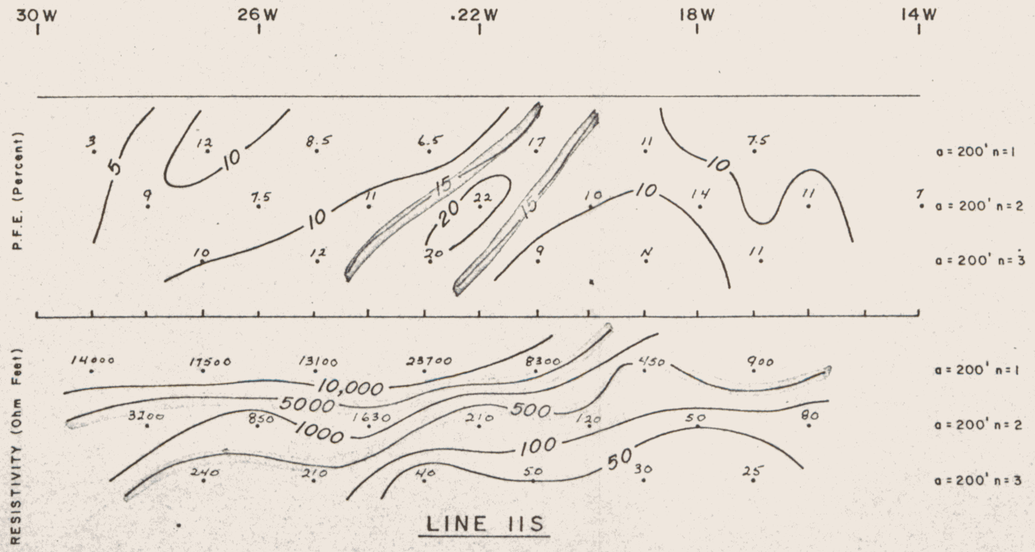
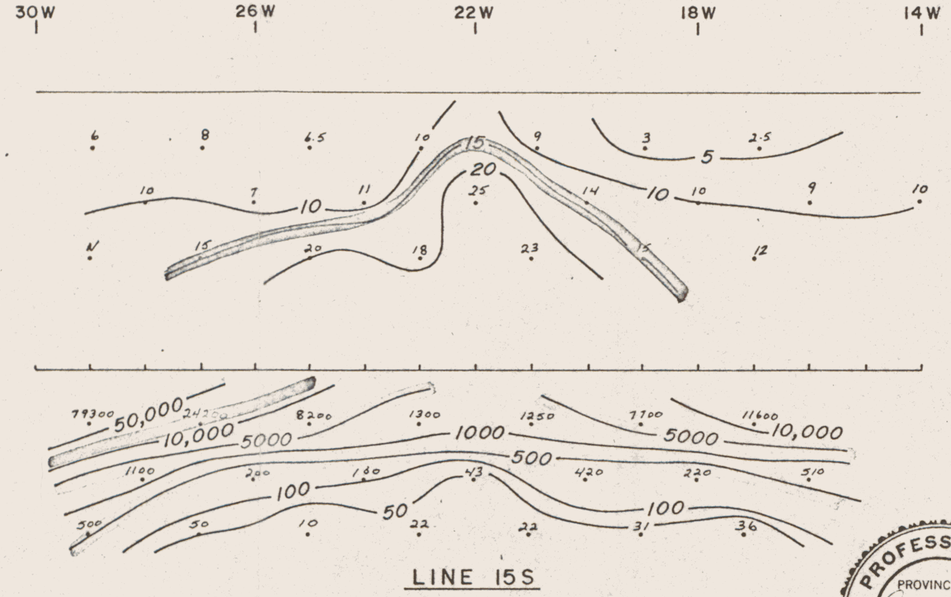
C.A. AGER & ASSOC. SURREY B.C. CANADA	DWN. BY: T.M. CHK. BY: DATE: SEPT 1979	FIG. NO. 7



LINE 11S



LINE 15S

ARRAY : DIPOLE - DIPOLE

200 0 200 400
Feet

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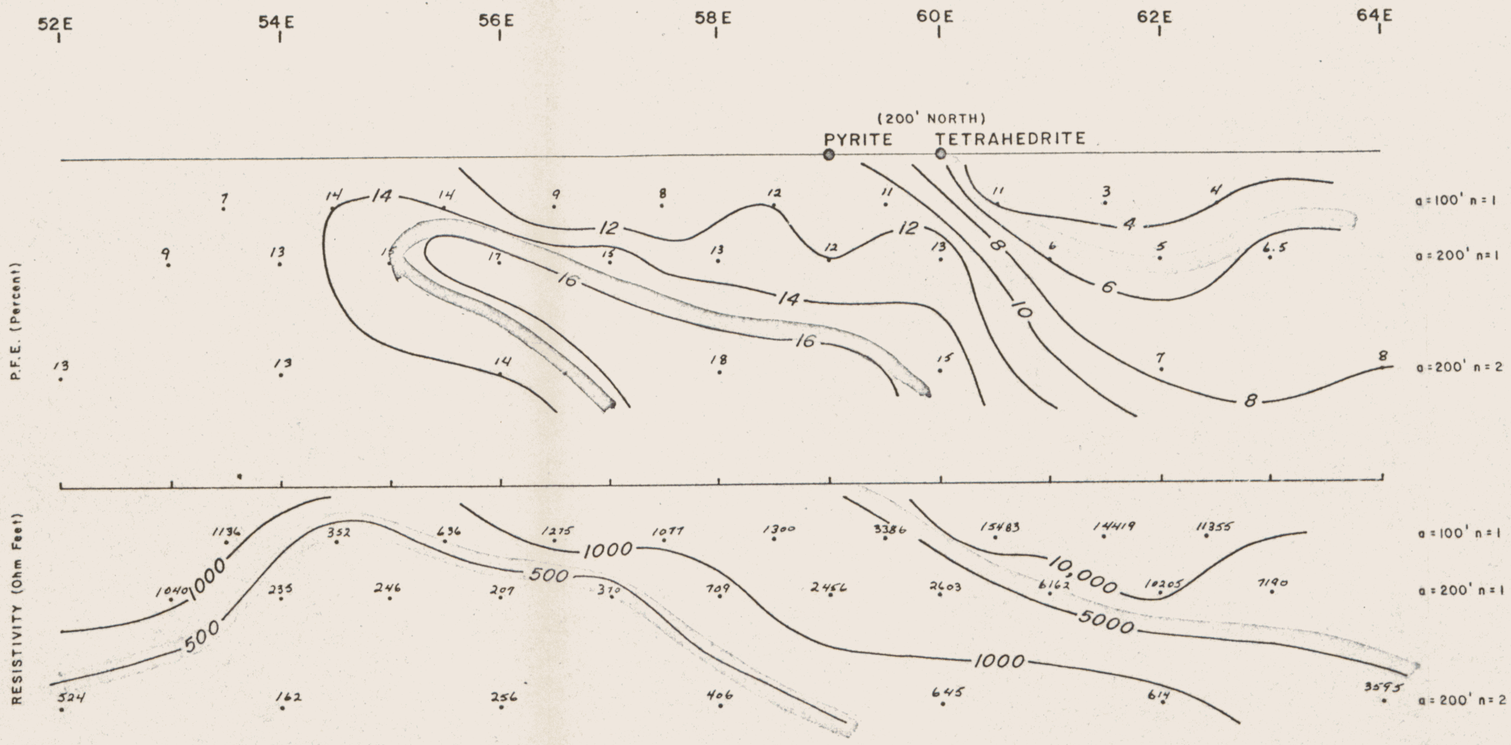
C.A. AGER & ASSOC. SURREY B.C. CANADA	DWN. BY: T.M.	FIG. NO.
	CHK. BY:	8
	DATE: SEPT. 1979	



LINE 15 S

ARRAY : DIPOLE – DIPOLE

100 0 100 200
Feet

N.T.S. 116 K/8,9

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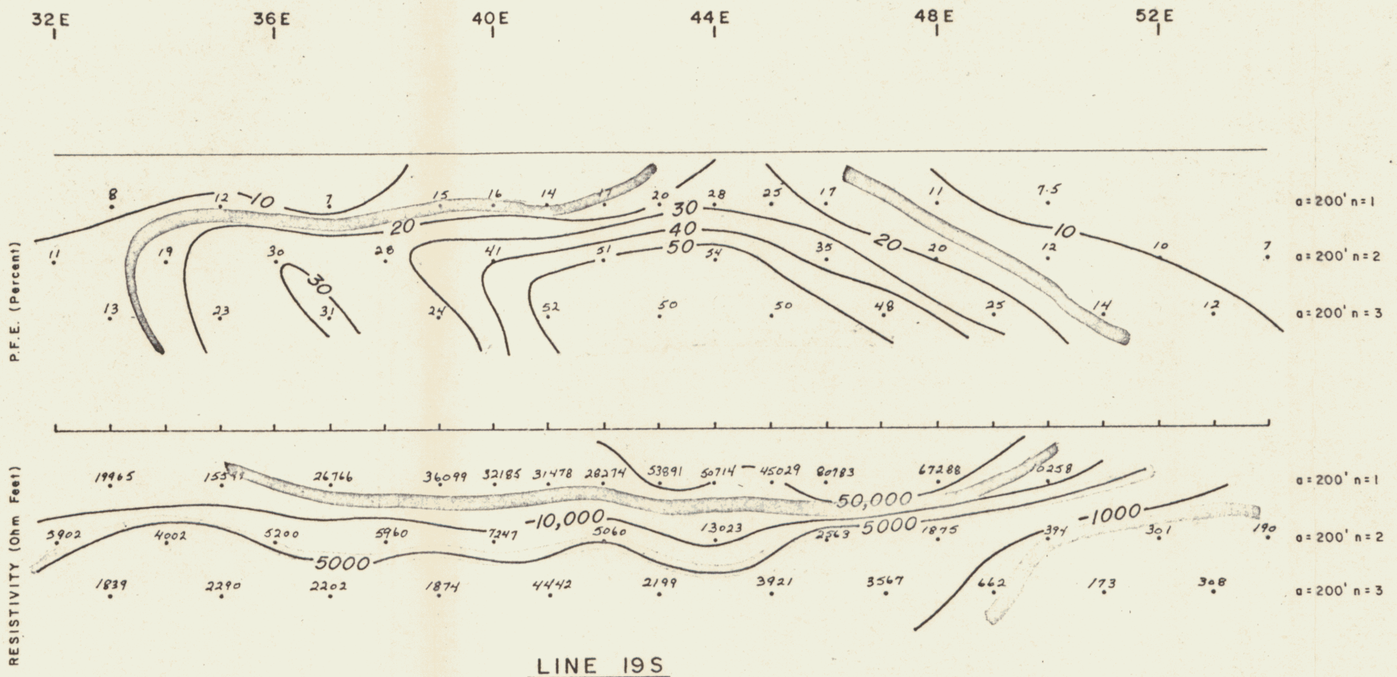
DETAIL
P.F.E. & RESISTIVITY

C.A. AGER & ASSOC. SURREY B.C. CANADA	DWN. BY: T.M.	FIG. NO.
	CHK. BY:	9
	DATE: SEPT. 1979	



LINE 19S

ARRAY : DIPOLE – DIPOLE

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PROVINCE OF BRITISH COLUMBIA
CHARLES A. AGER

200 0 200 400
Feet

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P.F.E. & RESISTIVITY

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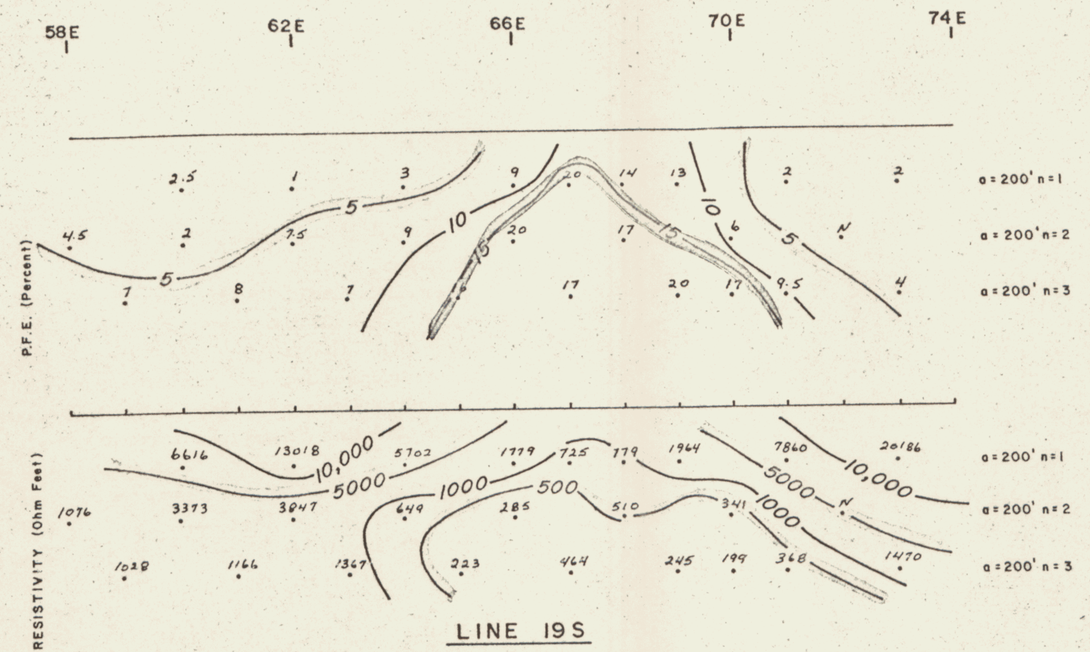
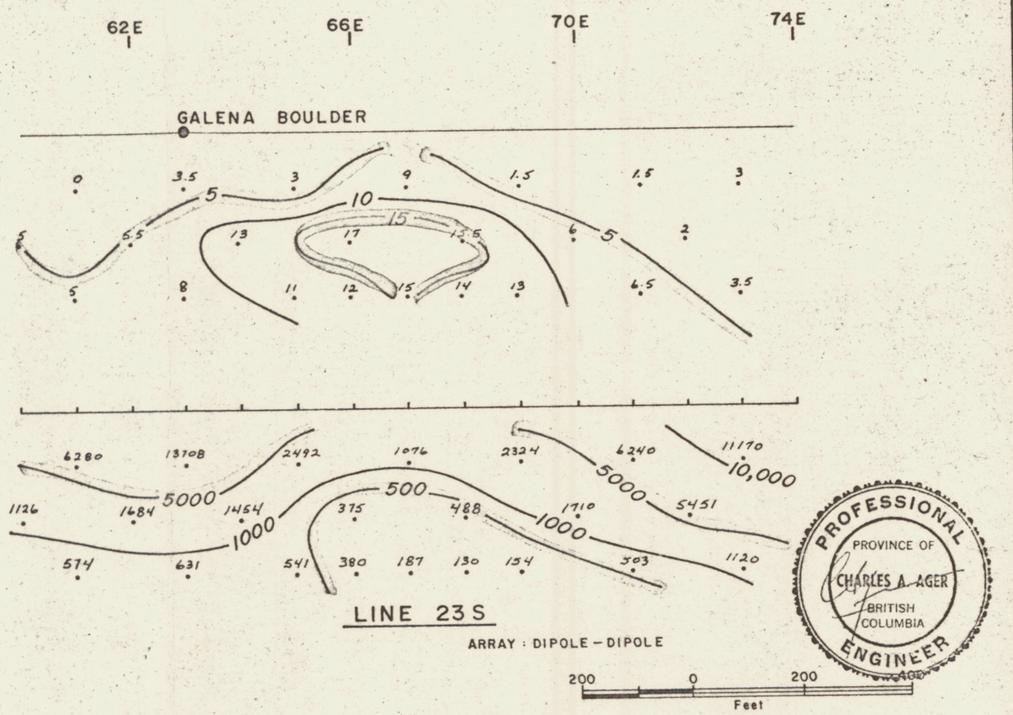
BY: C.A. AGER PhD, PEng.
DATED: SEPT., 1979 PROJECT: RUSTY SPRINGS

C.A. AGER & ASSOC. SURREY B.C. CANADA	DWN. BY: T.M.	FIG. NO.
	CHK. BY:	10
	DATE: SEPT. 1979	





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- RUSTY SPRINGS AREA -

DETAIL
P.F.E. & RESISTIVITY

C.A. AGER & ASSOC.	DWN. BY: T.M.	FIG. NO.
SURREY B.C. CANADA	CHK. BY:	11
	DATE: SEPT. 1979	

A most striking feature, present in both the resistivity and gravity data, is a linear 'fault like' structure that cross cuts the entire map area. It is shown as an 'inferred fault' on Figure 12, running from BL0+39S northeast through L31S+60E. It appears to truncate the Orma showing to the north.

RECOMMENDATIONS & CONCLUSIONS

The foregoing represents only a brief interpretation of the geophysical data. The Composite Map, Figure 12, is intended to present the highlights of the gravity and induced polarization work in terms of economic importance of each anomaly.

Simply stated, the best targets are coincident gravity-pfe high anomalies. In this environment they most probably are caused by massive sulphides. However, based on experience at Pine Point, Gayna River and other carbonate environments, individual gravity and/or pfe highs are also excellent targets.

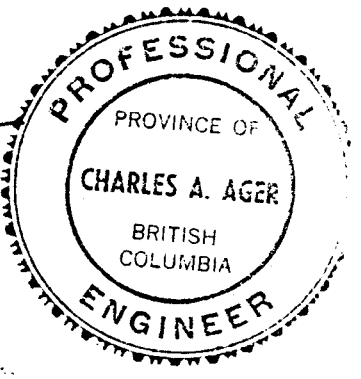
Virtually every pfe and gravity high feature on Figure 12 should be drilled. Deposits in this environment are known to be variable in size and geometry as well as geophysical response. The best anomalies are:

1. Orma-Rowan-Tara Gravity High
2. Mike (L7S+7E) Gravity High
3. L19S+43E PFE High
4. L 1N+24E PFE High
5. Ma-Chivas PFE $\pm$ Gravity High (L3S+13.5W to L5S+9W)
6. Tim-Tip Gravity $\pm$ PFE High (L5N+6E to L1N+6E)

Encouragement from these anomalies should provide sufficient evidence as to the usefullness of the I.P. and gravity data in outlining zones of mineralization within the Rusty Springs Prospect. In which case, further drilling of other geophysical anomalies is recommended together with more detailed gravity and I.P. work where warranted.

Respectfully submitted,
C.A.AGER & ASSOCIATES LTD

Charles A. Ager, PhD, PEng
Geophysicist
September 15, 1979



REFERENCES

Hansen, D, and Bankowski, J. (1979): Report of Geological Program, Rusty Springs Prospect, August 1979.

White, P.S. (1979): Report of 1978 Exploration of the Rusty Springs Mineral Prospect, Porcupine Ranges, Yukon Territory, March 21,1979.

CERTIFICATE OF QUALIFICATIONS

I, Charles A. Ager, do hereby certify that:

1. I am a practising geophysicist with offices at 15423 34th Ave, Surrey, B.C., Canada, V3S 4N7.

2. I have received the following university degrees:
   (a) 1968 BA (Honours Math/Physics)
   California State University, Sacramento, Calif.
   (b) 1972 MSc (Applied Geophysics)
   University of B.C., Vancouver, B.C., Canada
   (c) 1975 PhD (Applied Geophysics)
   University of B.C., Vancouver, B.C., Canada

3. I am a member in good standing of the following professional organizations:
   (a) B.C. Geophysical Society
   (b) Society of Exploration Geophysicists
   (c) Association of Professional Engineers of the Province of British Columbia

4. Since 1968 I have been engaged in exploration and mining geophysics over numerous projects in western North America and eastern Canada.

5. The geophysical field work and the interpretation of the results in this report were done under my direct supervision.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
CHARLES A. AGER

Charles A. Ager, PhD, PEng
Geophysicist
September 15, 1979

REPORT

OF

1979 EXPLORATION

OF

THE RUSTY SPRINGS MINERAL PROSPECT
PORCUPINE RANGES, YUKON TERRITORY

FOR

RIO ALTO EXPLORATION LTD.

BY
PAUL S. WHITE, P. ENG. (MINING)

October 10, 1979

Whitehorse, Yukon Territory

090532

CANADA

This report has been examined by the Geological Evaluation Unit and is recommended to the [illegible] to be [illegible] and as representing

$ 40,600.00

[illegible]

Consideration [illegible] exploration work under Section [illegible] Quartz Mining Act.

B. R. BAXTER
Supervising Mining Recorder

[illegible] Commissioner of Yukon Territory

LIST OF CONTENTS

REPORT ON RUSTY SPRINGS PROSPECT

FOR

RIO ALTO EXPLORATION LTD.

October 10, 1979

INTRODUCTION

A mineralized locality was staked by Rio Alto Exploration Ltd. ("Rio Alto") in 1975, and periodic additional staking was done in 1976 and 1977. The mineralized locality, known as the Rusty Springs Prospect, is located 280 km. north of Dawson City, 29 km. east of the Yukon-Alaska border, 8 km. south of the Arctic Circle, 150 km. west-northwest of Kilometer 240 on the Dempster Highway and 115 km. southerly from the settlement of Old Crow.

The location, access and climate are well described in a report titled "Geology of the Rusty Springs Mineral Prospect" dated September 30, 1976 by M. N. Chernoff, P. Geol. Mr. Chernoff also describes the physiography, regional geology, local surface geology and the 1976 Preliminary Prospecting Program, which resulted in an exploration program conducted from May to September, 1977, on portions of 140 mineral claims and 15 iron claims, all staked under the Yukon Quartz Mining Act prior to work commencement. In late November, 1977, an additional 200 claims were staked resulting in a total of 380 quartz claims and 15 iron claims held by Rio Alto at March 21, 1979. The 380 mineral claims are in good standing under the Yukon Quartz Mining Act until various dates to 1983 and 1984.

DESCRIPTION OF WORK TO FEBRUARY, 1979

The 1975 examination of the discovery locality, known as the "Tim Show", near Rusty Springs camp site was confined to basic prospecting in the discovery of float Cu, Zn, Pb, Ag minerals followed by staking of 96 quartz claims and 3 iron claims.

In the winter of 1976, a bulk sampling program with assays was performed on the Yeti iron deposit located a few kilometres east of the Rusty Springs discovery locality.

The summer of 1976 saw a preliminary program of basic prospecting, geological mapping, soil sampling and pitting and trenching which was the subject of the Chernoff report. A program of geological mapping, soil sampling, basic prospecting, diamond drilling and new staking at the aggregate cost of $275,000. was undertaken in 1977 between the dates of May 1, 1977 and November 15, 1977 by the Company under the direct supervision of P. S. White, P. Eng. The work is described in "Report of 1977 Exploration" by P. S. White, and included in the Appendices accompanying this Report as "Appendix "G".

A $500,000. expenditure was performed for 1978 and consisted of:

(a) Winter road tractor-train freight haul of fuel and material;

(b) Basic prospecting, soil sampling and mapping geology;

(c) Prospecting of sub-crop by two Hydra-Wink core drill (AQ and BQ core sizes) of 6,500 lineal feet to depths of approximately 300 feet;

(d) Post field program of follow up research a conceptual model to facilitate assessment of the potential economic worth of the deposit or deposits by company geologist, D. Hansen.

The 1978 program was financed by private placement of Company shares and the technical program design and geological supervision was to be conducted by personnel recommended by the Geology Department of the University of Western Ontario. A graduate geologist of that University, David Hansen, was assigned to the project by Dr. Robert W. Hodder, Chairman of the Geology Department of the University of Western Ontario, as Field Geologist and to perform a graduate thesis on the 1978 program during the 1978-79 academic season. The program commenced in May, 1978 and in June, 1978 Dr. Hodder recommended that more extensive senior supervision be conducted on site by Frederick M. Beck, Consulting Geologist.

SUMMARY OF PROPOSED 1979 PROGRAM

The Rusty Springs silver-base metal prospect was further explored between 15 May 1979 and 20 September 1979 after three previous seasons of prospecting, geochemistry, geological mapping and diamond core drilling.

In March, 1979, previously obtained project data was assembled for a report by P. S. White, P. Eng. as "Report of 1978 Exploration of the Rusty Springs Mineral Prospect, Porcupine Ranges, Yukon Territory". The report reviewed all previous data and recommended an expenditure in 1979 of $200,000. for a program to be conducted in the 1979 summer season for the express purpose of obtaining technical information from specific geological and geophysical surveys sufficient to fill any known voids in the extensive data available from the 1976-1978 seasons. The program was oriented towards the establishment of specific major drill targets for 1980 and to provide target justification sufficient to successfully solicit a major joint venture partner during the winter of 1979-1980 to properly finance the estimated $1,000,000. expenditure required to evaluate the aforesaid major core-drilling targets.

The Company obtained $200,000. as a portion of a multi-faceted offering of rights to existing shareholders in April-May, 1979, to conduct the Rusty Springs Program.

The main elements of the program were as follows:

1) Fuel haul by truck-air to Mile 150 Dempster Highway and Rusty Springs, conducted in March, 1979.

2) Basic prospecting and further geological mapping to evaluate and co-ordinate the known showings and to further validate the geological model of the prospect as a follow-up test to the Hansen-Beck 1978 Model theory.

3) Geophysical surveys over the Mike and Orma zones, and the adjacent areas as recommended by Beck, White and Dr. C. A. Ager of Vancouver, B. C. The selected geophysical modes were Induced Potential Surveys to be conducted over the Mike and Orma zones as recommended by Beck and augmented by White to cover the western edge of the Hansen model. 30 miles of I.P. were to be conducted commencing 7 June 1979, and gravity surveys were to be conducted as a follow-up reinforcement over areas of interest outlined by the rough plots of the I.P. work.

4) Certain hand-pitting and trenching were to be conducted as an aid in controlling the geo-physical data analysis.

5) Data was to be analyzed and compiled with existing data by November 1979 for solicitors of 1980 major joint venture financing.

DESCRIPTION OF 1979 PROGRAM

In March of 1979, approximately 10,000 imperial gallons of fuel were transported by truck to the Parkin Air Strip and stored in steel tanks through the extended courtesy of Aquitaine Co. of Canada Ltd. 3,000 gallons of JP-4 helicopter fuel were stored in rubber bladders on the Andrea temporary air strip and 1,250 gallons of stove oil were similarly stored at the Orma strip. 6,000 gallons of JP-4 were moved with a 10,000 gallon tank on loan from White Pass Petroleum Services of Whitehorse to Eagle Plains Lodge, Mile 231 of the Dempster Highway, and later moved to a more practical location at the operational base air strip at Mile 150 Dempster Highway.

In May, 1979, two company geologists, David Hansen and Joseph Bankowski reopened the Company's camp at Rusty Springs and began the field program of mapping, prospecting and soil sampling. MBW Surveys of Whitehorse, Y.T. performed the line cutting program necessary to accommodate the geophysical program over the 30 mile grid.

The geophysical program commenced on June 8, 1979 with induced potential surveys conducted by Ralph Englund and two crews over the project area. The initial results indicated direct correlation of I.P. response with known mineralized occurrences, with the exception of a large portion of the Mike Hill which is capped with a shale which masked any significant I.P. response. After reviewing the preliminary I.P. plots, P. S. White, P.Eng., requested the contractor to perform a gravity survey over the entire grid, to obtain some information from any shale areas and to obtain data over the balance of the prospect area in case no further geophysical work was to be performed in future years.

The geophysical crews were effectively doubled in strength and the surveys completed by July 27, 1979. The data was analyzed by Dr. Ager and Mr. Englund and consultations with White were concluded with presentation of the final reports on September 15, 1979. The report is titled "Gravity & I.P. Survey, Rusty Springs Prospect, by C. A. Ager, Ph.D., P. Eng., September 15, 1979" and is included as Appendix B to this report. In the report, major and minor I.P. and gravity survey targets were described and evaluated for possible drilling in 1980.

The geological program was completed by August 1, 1979 in the field, and the summary report and inventory of all known showings was compiled in Whitehorse by D. Hansen and J. Bankowski at the office of P. S. White, P. Eng., under his direct supervision. The report is titled "Report of Geological Program, Conducted 15 May - 1 August 1979 for Rio Alto Exploration Ltd., - David Hansen, Joe Bankowski", and is included as Appendix A to this summary report. The Hansen-Bankowski Report describes the 33 known mineral showings, the location of all field samples taken to date, the Hansen model geological structure and the description of the 1979 Summer program and results. The report was completed by 31 August, 1979. Mr. Bankowski elected to perform his graduating thesis at the University of Western Ontario on the mineralogy of the Orma deposit and that report will be available in May, 1980.

In June-July 1979, preliminary agreement was reached between Rio Alto Exploration Ltd. and Sedimex KG of Munich, West Germany, to joint venture exploration, evaluation and possible mining of the Rusty Springs mineral deposits over the 1979-1982 periods. The availability of additional financing to the 1979 Rio Alto budget resulted in the performance of certain engineering and legal survey work to facilitate re-mapping of the Rusty Springs Base maps and

to aid in reduction of the gravity data. The new maps will be available for the 1980 program.

The property was visited, examined and programs reviewed July 27-August 1, 1979 by the following management and consultative personnel:

D. W. Hilland	- President, Rio Alto Exploration Ltd.
Ned Goodman	- Director, Canada Northwest Land Ltd.
Gunther Liedtke	- Company Officer & Geologist, Sedimex, K.G.
Frederick M. Beck	- Consulting Geologist
Dr. Stuart Blusson	- Geological Survey of Canada

A brief summary of F. M. Beck's visit is included as Appendix C to this report.

CREW LIST

Supervising Engineer & Exploration Manager:	Paul S. White, P. Eng.
Consulting Geologist:	Frederick M. Beck
Field Chief Geologist:	David Hansen, B. Sc.
Geologist:	Joe Bankowski, B. Sc.
Line Cutters:	Morley Barker
	Joe Jackson
	Michael Woods
Geophysical Crew :	Ralph Englund, B. Sc.
	George Penner
	Jack Penner
	Martin Faucher
	Kurt Dieckmann
	Damon Berryman
	Lorna Collins
	Brian Englund
	Joe Jackson
	Tim Termuende
	Dean White

Cook:	Andrea Ross	
Helicopter Pilots:	Howard Damron	)
	Kerry Guenter	) Hughes 500C
	David Thomas	)
	Rod Watt	(Bell 206)

RESULTS OF 1979 PROGRAM

1. Geological Program

The Hansen geological model was sustained and new showings were discovered by hand-pitting and trenching after soil sampling and induced potential surveys. 33 showings were inventoried and described, and located on a geological map. 17 showings were newly located.

Basic prospecting of claims acquired by the Company after 1977 was performed without encouraging results. Economic mineral potential at surface appears to date to be confined to the Upper Ogilvie formation which is apparently restricted in exposure to the 5 square mile area at Rusty Springs Camp and the Orma and Mike environs.

Traverses of Carroll Creek were conducted to aid in geophysical data interpretation, and a graduating thesis on the Orma deposit was undertaken by Joe Bankowski.

2. Geophysical Program

38.73 line miles of Induced Potential Survey were conducted over the Orma, Mike and Rusty Springs Areas, and 32.85 line miles of Gravity Survey were performed between 1 June 1979 and 1 August 1979. The results are described in Dr. C. A. Ager's report as Appendix B.

Despite better than average survey control from previous drilling trending and mapping, the variable rock densities (shale vs dolostone) gave some difficulty in performing the normal corrections to gravity field data. Dr. Ager's experience is that in Pine Point, and elsewhere, coincident gravity - I.P. highs are prime targets, but single Percent Frequency Effect (P.F.E.-I.P.) and/or gravity anomalies must be drilled to properly evaluate the mineral potential of such anomalies.

Three major geophysical targets which require investigation and verification for economic mineral potential are in order of decreasing priority:

1) Orma Deposit: 1,500' indicated strike length by 300-500' indicated width over known Orma, Rowan and Tara mineral occurrences. - Gravity Anomaly.
2) Mike Hill North: 1,200' indicated length by 500' indicated width over known mineral occurrence - Coincident I.P. and Gravity Anomaly.
3) Carroll Creek Flats: A major I.P. feature of high chargeability indicating major sulfide mineralization potential in possible siliceous environment, covering large area between Mike and Orma hills.

Dr. Ager concludes that the best anomalies located, with economic mineral possibilities are:

1. Orma-Rowan-Tara Gravity high.
2. Mike (L7S & 7E) Gravity high.
3. L19S & 43E P.F.E. high.
4. L1N & 24E P.F.E. high.
5. Ma-Chivas-P.F.E. $\pm$ Gravity high (L3S & 13.5 W to L5S & 9W).
6. Tim-Tip Gravity $\pm$ P.F.E. high (L5N & 6E to L1N & 6E)

Future drilling with equipment suited to good recovery from the Rusty Springs deposit is required by all the above anomalous locations.

3. Control and Legal Survey

Universal Transverse Mereator co-ordinates were established by electro-magnetic survey methods, and elevations (A.M.S.L.) were transferred to the prospect area from known mapping control stations.

The aerial photos were controlled to aid in remapping the Orma-Mike zone, and a legal survey was commenced over 24 mineral claims (Rio M-C's) in that area. The legal survey is scheduled to be completed in 1980 (May-June) and revised maps of the prospect are currently under preparation by V. Zay Smith & Associates Ltd.

RECOMMENDATIONS

1. A D-8 class bulldozer with winch, ripper and blade be transported to the prospect area overland during the winter of 1979-1980 to be left on site for the following purposes:

   a) Prepare winter airstrip for 1980 material airlift.

   b) Upgrade the Orma strip and/or construct a new 5,000 foot allweather air strip.

   c) Trench mineralized showings.

   d) Move drill equipment in 1980 season.

2. A program of exploratory and evaluation drilling be undertaken at 1 May 1980 at Rusty Springs, with large core (H or N) capability, of the following two program thrusts:

   1) Detailed shallow drilling step-out program at Orma as 20-30 metre step-outs from 0 + 00 (D.D.H. No. 8 - 1977) to evaluate commercial potential of known deposit and geophysical anomaly.

   2) Exploratory drilling of 5 anomalies to assess potential and/or verify geophysics data for possible ore bodies or geophysical re-evaluation.

Overall cost of program estimated at $1,000,000. plus for drilling, trenching, construction of air strips and support operations. See Appendix D - (Budget for 1980 Exploration Program at Rusty Springs, Y.T.)

CERTIFICATE OF EXPENDITURES

I, Paul S. White, Professional Mining Engineer, of the City of Whitehorse in the Yukon Territory, do herewith certify that I have expended the following funds in the total amount of $300,000.00, under my direct supervision and control, and a further sum of $51,029.67 expended by Rio Alto Exploration Ltd., under my indirect supervision and control between the dates of March 1, 1979 and October 15, 1979 on the following mineral claims:

Rio 1-104	Inclusive	
Nate 3-14	Inclusive	
Carb 1-16	Inclusive	
Yeti 1-12	Iron Claims	
Rio 1-3	Iron Claims	
HG 1-146	Inclusive	
JP 1-54	Inclusive	
Moose 1-48	Inclusive	all located on Map Sheets 116K8 and 116K9 Dawson Mining District, Yukon Territory

YUKON EXPENDITURES:

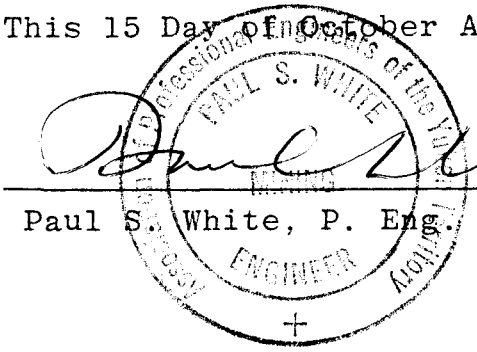
Line Cutting	$ 14,914.00
Fuel Facilities and Placement	30,850.00
Fixed Wing & Helicopter Support	49,797.03
Geophysical Program Costs	59,946.04
Geological Program Costs (including Freight Support)	75,000.00
Supervision and Management in Field	33,600.00
Subtotal Direct Field Expenditures:	$264,107.07

...cont'd

CERTIFICATE OF EXPENDITURES - continued

Subtotal Direct Field Expenditures	$264,107.07
Plus Project Management Costs (Rio Alto Exploration Ltd. - Calgary Administration)	$ 25,892.93
EXPENDITURE TOTAL 1979	$300,000.00

Certified at Whitehorse, Y.T.
This 15 Day of October A.D., 1979.



Paul S. White, P. Eng.

APPENDIX "D"

RUSTY SPRINGS PROJECT

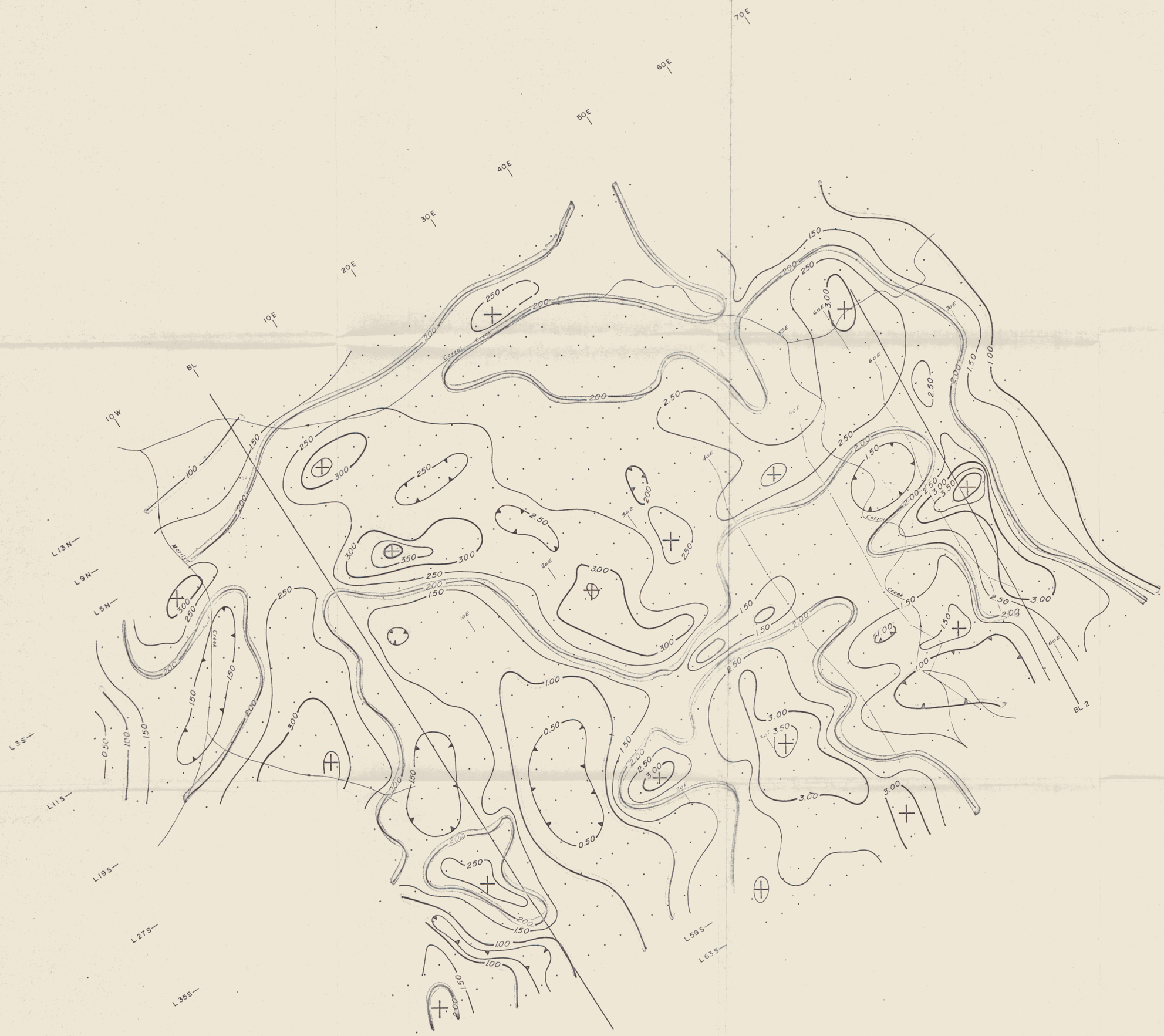
PROPOSED EXPLORATION BUDGET - 1980 PROGRAM

PHASE I: ACCESS AND FREIGHTING

- Reconnaissance, Permitting and Establishment of Base Camp Facilities - December 1979	$ 20,000.
- Purchase or Lease of Ripper, Blade and Winch Equipped Caterpillar Tractor - December 1979	150,000.
- Cost of Fuel, General Freight and Air Support for Tractor Access to Rusty Springs - January 1980	50,000.
- Performance of Airstrip Upgrading (Orma, Porcupine and/or New Airstrip) 500 tractor hours @ $50/hr - February, March, 1980	25,000.

PHASE II:

- Performance of Drilling at Rusty Springs - May 1 - September 1, 1980.	
a) Orma Deposit Drill Budget: 5000 Lineal Feet (25 holes @ 200 feet @ $75/foot)	375,000.
b) Mike, Carroll Creek et al Exploratory Drill - 5000 feet total with any surplus allotted to Orma if required (3000 feet @ $75/ft)	225,000.
- General Support Costs, Geological Supervision, Assay and Other Field Management Costs	100,000.
- Project Management, Travel and Administration, Office Overhead Costs, Minor Contingencies	100,000.
TOTAL 1980 PROGRAM BUDGET	$1,045,000.


70E
60E
50E
40E
30E
20E
10E
BL
10W
L13N
L9N
L5N
L3S
L11S
L19S
L27S
L35S
L43S
L51S
L59S
L63S
Carrol Creek
Morris Creek
Creek
BL 2
NOTE
Gravity Stations at 100' Intervals
ρ = 2.75 g/cc (E.F. = .058942 Mgal/Ft.)
500 0 500 1000
N.T.S. 116 K/8,9
RIO ALTO EXPLORATION LTD.
— RUSTY SPRINGS AREA —
COMPLETE BOUGUER GRAVITY MAP
CONTOUR INTERVAL : 0.50 MGAL.
TO ACCOMPANY REPORT TITLED:
GRAVITY & I.P. SURVEY
RUSTY SPRINGS AREA
BY: C.A. AGER PhD, PEng.
DATED: SEPT., 1979 PROJECT: RUSTY SPRINGS
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
CHARLES A. AGER
C.A. AGER & ASSOC.
SURREY B.C. CANADA
DWN. BY: T.M.
CHK. BY:
DATE: SEPT. 1979
FIG. NO. 3

ARRAY : DIPOLE – DIPOLE

500 0 500 1000

N.T.S. 116 K/8,9

RIO ALTO EXPLORATION LTD.

– RUSTY SPRINGS AREA –

P.F.E. MAP

CONTOUR INTERVAL : 5 & 10 Percent

TO ACCOMPANY REPORT TITLED:
GRAVITY & IP SURVEY
RUSTY SPRINGS AREA
BY: C.A. AGER PhD, PEng.
DATED: SEPT., 1979 PROJECT: RUSTY SPRINGS

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
CHARLES A. AGER

C.A. AGER & ASSOC. SURREY B.C. CANADA	DWN. BY: T.M.	FIG. NO.
	CHK. BY:	4
	DATE: SEPT. 1979	

ARRAY : DIPOLE - DIPOLE

500 0 500 1000

N.T.S. 116 K/8,9

RIO ALTO EXPLORATION LTD.

– RUSTY SPRINGS AREA –

RESISTIVITY MAP

CONTOUR INTERVAL : AS SHOWN
(Ohm Feet)

TO ACCOMPANY REPORT TITLED:
GRAVITY & IP SURVEY
RUSTY SPRINGS AREA
BY: C.A. AGER PhD, PEng.
DATED: SEPT., 1979 PROJECT: RUSTY SPRINGS

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
CHARLES A. AGER

C.A. AGER & ASSOC.
SURREY B.C. CANADA

DWN. BY : T.M.
CHK BY :
DATE : SEPT. 1979

FIG. NO. 5

N.T.S. 116 K/8,9

RIO ALTO EXPLORATION LTD.
– RUSTY SPRINGS AREA –

COMPOSITE MAP

TO ACCOMPANY REPORT TITLED:
GRAVITY & IP SURVEY
RUSTY SPRINGS AREA
BY: C.A. AGER PhD, PEng.
DATED: SEPT., 1979 PROJECT: RUSTY SPRINGS

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
CHARLES A. AGER

C.A. AGER & ASSOC. SURREY B.C. CANADA	DWN. BY: T.M.	FIG. NO.
	CHK. BY:	12
	DATE: SEPT. 1979	

EAGLES NEST
BRUCE
TETRAHEDRITE
PYRITE
GALENA BOULDER
ORMA
ROWAN
TARA
TIP
TIM
MIKE
JENNIFER
JACKSON
AZURITE
MA
GALENA CORAL
NEW GALENA
CHIVAS
ANDREA
JOE
ULLR
REEF
NEW
TALUS
CHRIS
DAVID
BEK
MARILYN
WHITE
QUARTZ
MIA
DON
SOUTHERLY

GEOLOGICAL MAP OF THE RUSTY SPRINGS PROSPECT

Geology by David Hansen and Joe Bankowski

LEGEND

- strike and dip
- fault with strike(s) and dip(s)
- swamp
- assumed geological boundary
- approximate geological boundary
- outcrop boundary
- 1 — Ogilvie Formation grey dolostone with some chert and siliceous dolostone includes 1a, 1b, 1c and 1d undifferentiated; 1a siliceous dolostone, 1b brecciated dolostone, 1c dolostone unbrecciated, 1d assumed dolostone possibly covered by river sediments.
- 2 — brecciated chert or brecciated chert with minor shale fragments (Upper Ogilvie with minor Unnamed Shale)
- 3 — mostly siliceous shale with minor chert boulders (Unnamed Shale with Upper Ogilvie)
- ②TIP — mineralized location: for mineral description see Geological Report 1979

SCALE: 1" = 500' (1 cm. = 60 m.)

Drafted by: David Hansen and Joe Bankowski, August, 1979.

FIGURE 13

P.S.W. MAY 1979