RUSTY SPRINGS PROSPECT
YUKON TERRITORY

1978 EXPLORATION SUMMARY

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090414

for
Rio Alto Exploration, Ltd.
Calgary, Alberta

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 $ 170,800.00

D.B. Craig 25 Jan 79

Resident Geologist or
Resident Mining Engineer

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

B. R. BAXTER
Supervising Mining Recorder

for Commissioner of Yukon Territory

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INTRODUCTION

The Rusty Springs Prospect is located in northern Yukon Territory along the Artic Circle approximately 20 miles east of the Alaska border. The prospect was discovered and claim staked in 1975 by geologists associated with Rio Alto Exploration Ltd. of Calgary. This report describes the exploration activity and results during the 1978 field season -- the third season of exploration on the property.

The prospect is underlain by middle Devonian carbonates and consists of strong geochemical anomalies and abundant float containing zinc, lead, copper and silver. Although the terrain is generally hilly, there are relatively few outcrops. The bedrock source of the mineralized float has not yet been discovered although in one area there is a good possibility that it is incorporated in a fault zone. Additional work is needed in order to determine the nature of the suspected fault, and to discover the bedrock sources of the float.

The character of the geology of the Rusty Springs Prospect and the similarity of this prospect to other prospects and mines, both in the Yukon and elsewhere suggests that this property is of the stratabound type, unrelated to nearby igneous activity, and with the potential for large tonnage.

SUMMARY OF PRIOR YEAR'S WORK

The first active exploration at Rusty Springs was conducted during the summer of 1976. During that field season geologic mapping, geochemistry, trenching and prospecting were carried out on the claim group. The results of this work indicated that mineralized float was more widespread than originally anticipated. A geologic map was constructed which indicated an anticlinal structure with Middle Devonian dolomite exposed in the core. These dolomites were recognized as the host for the mineralized float, and were observed to be brecciated, locally silicified, and fetid, with abundant pyrobitumen (Chernoff, 1976).

A total of eight localities were found which contained mineralized float. This float was usually in dolomite breccia and quartz and consisted of both oxidized and unoxidized lead, zinc, and copper minerals with occasionally appreciable silver content. Chernoff (1976) recommended that extensive hillside stripping should be undertaken in 1977 in order to expose bedrock and to define the geologic occurrence of the ore minerals by direct observation. If this work was successful in defining targets, shallow drilling could be done to define extent of the observed mineralized outcrops.

During the 1977 field season additional prospecting, geochemical sampling and drilling was conducted on the property. The drilling was concentrated in two areas -- the Tim Show located near the base camp and the Orma Show, located about 4400 feet (1340 meters) to the east. Five holes were drilled in the vicinity of the Tim Show with negative results; that is, the source of the high soil geochemistry and mineralized float

was not found by drilling. Six holes were drilled in the vicinity of the Orma Show with mixed, but encouraging results. A well mineralized fault zone was interested in DDH-8 which returned assays from 0 to 123' averaging 33.27 oz. Ag/ton, 4.72% Pb[redacted], 2.36% Cu[redacted], and minor zinc. Core recoveries were very poor (less than 25%) so the assays are only representative of the recovered material. Additional drilling in the area failed to duplicate the above results, but this is understandable in light of the poor recoveries in unconsolidated fault gauge and better understanding of the fault attitude gained in 1978.

All of the assembled geologic data, as well as much of the drill core and some mineralized float was studied by Gary Schoel of the University of Western Ontario. It was his conclusion that the nature of the mineralization in open-spaced filling, combined with the known local and regional geology suggested a stratabound, carbonate-hosted occurrence similar in many ways to Mississippi Valley types of deposits (Schoel, 1978)

OBJECTIVES OF 1978 PROGRAM

On the strength of the accumulated data obtained in 1976 and 1977, Rio Alto's management decided to conduct a program in 1978 with the following specific objectives (memo from R.W. Hodder, 1978):

> There will be a continued collection and consolidation of data on size, shape and grade of metal occurrences on the property designed to provide detail through a geologic map, systematic drilling on lines across presently known showings, and wildcat drilling in areas of defined interest lacking outcrop. The specific goal is to enhance known showings by actual measurement, and to discover new showings.
>
> The afore mentioned work builds on the present geologic model of a carbonate-hosted Pb/Zn/Ag/Cu occurrence in karsted limestone in the upper part of the Ogilvie formation, beneath a possible unconformity between the Ogilvie formation and overlying shale.
>
> Work will include expansion and refinement of the geologic model for the immediate area of interest in the Rusty Springs anticline, and extension of the concept to other favourable areas within the claim group where the upper part of the Ogilvie formation could be exposed as reached by a realistic drilling programme. This work will key on the stratigraphy, the presence of any primary or secondary base metal minerals, brecciation, dolomitization of the limestone, quartz veinlets and silicifation.

In order to achieve the above objectives, Mr. David Hansen from the University of Western Ontario was hired as a geologist to supervise and carry out the required work. Two small drills were available as was helicopter support, base camp, geologic helpers, etc. The drilling goal was 8000 feet of drilling in ayproximately 40 holes on a grid pattern.

RESULTS OF 1978 PROGRAM

GEOLOGY

During the field season, David Hansen continued the accumulation of field data from outcrops, float, and drill core. An updated geologic map is included with this report. Hansen is presently preparing a detailed geologic report as part of his Senior Thesis at the University of Western Ontario. At this point, however, several observations are worth noting.

- The major structural element at Rusty Springs appears to be a dome rather than on anticline. This is supported by both outcrop pattern and observed dips.
- The dome is bisected by a north-south trending low angle(?) fault. The surface trace of this fault is coincident with the uphill limit of the anomalous geochemical values at the Orma showing, and is represented by "red mud", sand, and badly broken core fragments (for example drill holes 6, 7, 8, 78-1, 78-2, 78-3, 78-4, 78-12, 78-104). A diagramatic east-west cross section thru hole number 8 (1977) is shown as Figure 1. On a regional scale the fault is represented topographically by a marked linear north-south depression which is recognizable on air photos. No direct evidence was seen to suggest that the fault is a thrust fault. Based on Chernoff's mapping, however, in which he mapped thrust faults to the west, it may be that this fault has similar origins. No actual displacements have been noted. Slickensides in Carroll Creek approximately on strike with the fault or in the footwall are horizontal. The strikes of the faults and vein structures in Carroll Creek are all parallel to the thrust(?) fault, but all have

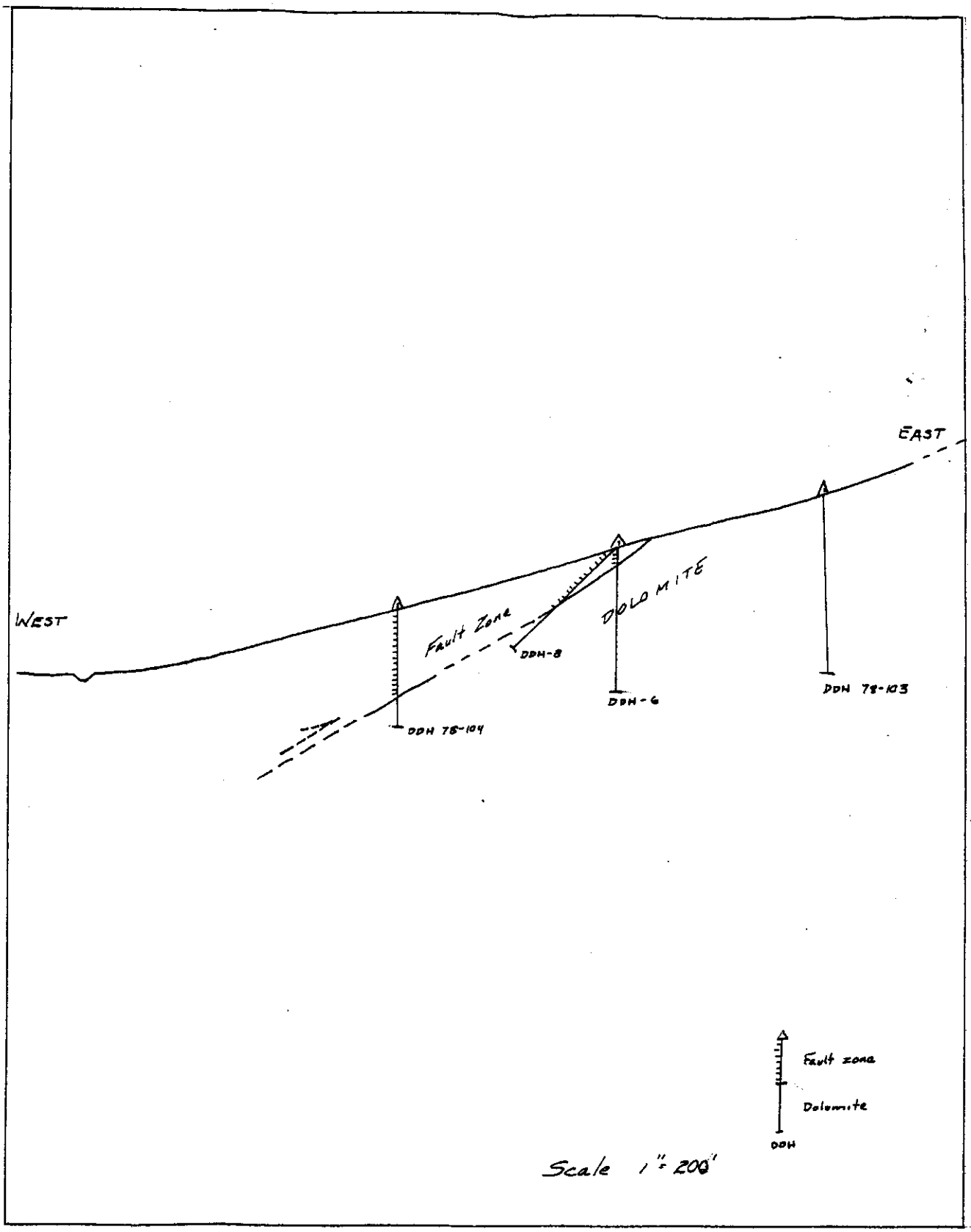


Fig. 1 East-West Cross Section thru Orma Show indicating probable footwall of low angle (thrust?) fault zone.

a steeper dip.

- Reef-building organisms are abundant on the west side of the dome, indicating the possibility of reef development nearby. No actual reef mass was observed by this writer, however. Identification of minor evaporites by David Hanson in float and core on the east side of the dome suggests the possibility of back reef lagoon development for short periods of time.

GEOCHEMISTRY

During 1978 an additional 800 samples were collected on two separate grids. These grids were established on the east and west sides of the dome to cover the separate groupings of mineralized float located in the two areas. The western grid is called the Mike grid; the eastern grid the Orma grid. Both grids with the geochemical results are shown on the plates included with this report.

The geochemical samples were taken from approximately twelve to eighteen inches (30 cm. - 46 cm.) below the surface. Of necessity, the samples contained a large amount of organic material. This factor may have had some effect on the total metal content of the samples, making them somewhat higher than samples taken from purely mineral soil. However, the distribution and consistancy of the samples is such that the values are considered reliable indicators of relative metal content in the soils from each grid.

A clear and distinct anomaly is evident on both grids. The nature of the anomalies is different on each grid, however. The Orma grid anomaly is characterized by high copper, lead, silver and very little zinc. The Mike grid anomaly is characterized by high zinc, with relatively less copper, lead, silver. The uphill edge of the Orma geochemical anomaly appears to be coincident with the projected trace of the footwall side of the north-south thrust fault (?) described earlier in this report. At the Mike grid, the uphill edge of the geochemical anomaly,appears to be related to the

contact between the chert and the dolomite. In this locality the chert occurs at the top of the Ogilvie formation. This would suggest that the mineralized horizon on the west side of the dome (Mike grid) is located in strata at the top of the Ogilvie carbonates, is zinc rich, and may or may not be related to the chert horizon.

Geochemistry appears to be an effective tool in identifying the general areas of specific interest, but as in most geochemical work, an exact correlation between soil chemistry and bedrock chemistry is difficult to establish. Therefore, drill holes based on geochemistry alone may be disappointing. In most cases additional pre-drilling data (such as geophysics) is necessary in order to optimize drill hole locations.

DRILLING

Thirty diamond drill holes were completed during 1978 with a total drilled footage of 6035 feet. The hoped-for footage of 8000 feet was not achieved due to bad ground conditions and the relatively low power of the Hydra-wink drills. Fault zones and vuggy areas containing "sand" would tend to bind the drill rods; the problem was heightened by the accompanying loss of circulation in these zones.

The drill holes were located so as to intersect zones thought to be favorable as mineral hosts. Grid patterns were established with this in mind, the plan being that lithology could be correlated from hole to hole and a geologic model would evolve.

Three principal areas were tested. The first group of holes (78-1,2,3,4) were located to test the strong geochemical response noted at the south end of the Orma Show. Poor core recoveries in what is thought to be the surface trace of a low angle fault zone characterize the results in this area. Assays from the fault zone indicate some mineralized intervals exist. For example, DDH 78-2 contains 17.72% Pb and 8.47 oz. Ag/ton from 58 to 64 feet and the sludge from 78-3 contains about ½ ounce/ton Ag from 40' to 90'.

The second group of holes included two rows of holes at right angles to the strike of the rocks at the Orma Show. These rows (DDH 78-5 thru 12 and DDH 78-101 thru 104) were designed to provide information on the geology and to intersect possible stratiform mineralized intervals whose subcrop areas would correspond to the strong geochemical anomaly. This target is indicated diagramatically

in Figure 2. The geology appears to be correlatable from hole to hole (see Plates) but no mineralized intervals were intersected in the drilling other than in drill holes 78-12 and 78-104, both of which intersected mineralized fault gouge in what is projected as the low-angle thrust (?). Again, very poor recoveries in the fault zone precluded meaningful assays.

The third major group of holes was drilled on the Mike grid near the top of the hill marking the west side of the dome. Ten holes (78-13 thru 22) were drilled in this zone to determine the nature of the geology and to intersect the bedrock source of the high geochemical values in this area. Most of the holes collared in chert and drilled thru the chert into dolomite breccia. With the exception of DDH 78-13, all holes encountered zinc, lead, and copper--usually as oxides -- in the upper portions of the holes. Smithsonite and malachite were common but not in economic concentration. In areas of poor or no core recovery, sludge samples were collected, if possible. In some cases these were mineralized as in hole 78-16 (53' - 54.5', Cu .21%, Pb 24.58%, Zn 2.41%, Ag 7.79 oz/ton) and hole 78-17 (28' - 43', Cu .35%, Pb 2.03%, Zn 2.21%, Ag 11.37 oz/ton). As in the other areas, poor core recoveries in the zones of most interest make interpretation difficult.

Two drill holes were drilled on the flats near the base camp at the end of the drill season. DDH 78-23 penetrated a thin section of dolomite and chert before going into limestone (basal Olgivie?); no mineralization was encountered in this hole. Hole 78-24 was drilled after David Hanson left camp. It was reported to be barren of mineral values and was not logged.

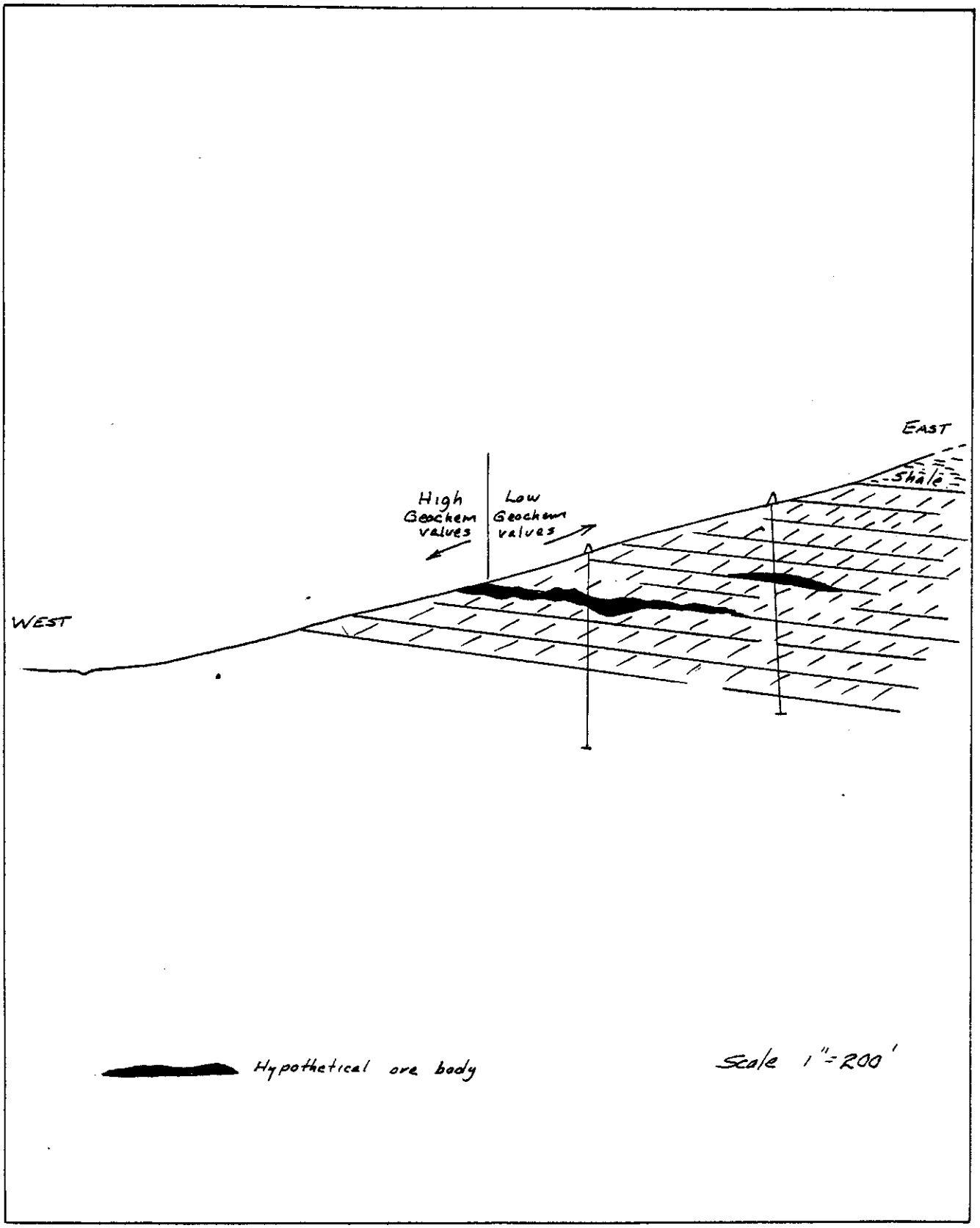


Fig. 2 Diagramatic cross section thru Orma grid area showing hypothetical stratiform ore deposits which were targets of 1978 drill program.

METALLURGY

Two bulk samples were collected from the Orma grid in September by Paul White and helpers. One sample consisted of galena float from the north portion of the grid near the previously located galena boulder (approx. 1100N-400W). The second sample consisted of greenish-yellow oxidized material from the vicinity of DDH 6,7 and 8 (000N- 000W) on the Orma Show. This sample was reportedly excavated by hand from a deep trench. Both samples weighed several hundred pounds.

Chemex Labs in Vancouver assayed each of the sacks of the sulfide (galena float) sample with results as follows:

Sample No.	%Cu	%Pb	%Zn	oz/ton Ag	Weight/lbs
1	0.83	51.1	0.02	17.98	133.5
2	0.93	43.2	0.02	33.72	102.0
3	0.11	44.8	0.01	18.16	35.25
4	0.13	48.6	0.01	26.46	107.5
5	0.11	48.9	0.01	28.42	90.0
6	0.15	48.1	0.02	29.72	79.0

Also, each sack of "oxidized" material was assayed with the following results:

Sample No.	%Cu	%Pb	%Zn	oz/ton Ag
1938 A	2.24	24.8	0.06	59.04
1938 B	2.44	24.7	0.07	63.20

All samples were given to Bacon Donaldson of Vancouver for metallurgical testing. In particular, the cyanide leachability of the "oxidized" sample was of particular interest. The testing has not been completed, but some preliminary results obtained by phone indicate that:

- the galena float sample is comprised of a mixture of galena

and tetrahedrite,

- the "oxidized" sample is actually a mixture of oxides and finely divided tetrahedrite,
- the oxidized sample does not respond to leaching of silver values -- probably due to interference by other elements,
- a preliminary flotation concentrate contained 1630 ounces of silver per ton, but only 35.4% of the silver was recovered. Additional flotation tests are continuing.

DISCUSSION OF RESULTS

Although several of this year's drill holes on the Mike grid intersected sufficient mineral to explain the geochemical anomaly. they did not intersect the source of the float, much of which was fairly massive and high grade. The possibility exists, of course, that the upper part of the Ogilive contains numerous small clots of high grade zinc and other base metals randomly distributed in non-commercial quantities through the rock. Alternatively there may be an economic concentration somewhere in the vicinity.

A cursory review of several geologically similar mineral deposits which are now mined out indicates the extremely erratic distribution of mineral values within the host rock. A sketch of the Gilman Mine in Colorado is included as Figure 3. This mine, which closed this year, had a total production of approximately ten million tons; the "zinc" ore averaged about 12% zinc, 2% lead, and 1 ounce silver per ton. The "copper-silver" ore averaged 3.5% copper and 18.7 ounces per ton silver. Approximately one third of the deposit was "copper-silver" ore. The scale of Figure 3 is approximately one inch equals 1300 feet. By mentally enlarging this figure to the scale of the enclosed plates, it becomes readily apparant that there is plenty of untested ground within the Mike and Orma grids which could host a similar sized or larger ore deposit.

The Orma Show consists of two types of mineral occurrences. Large pieces of galena-tetrahedrite float are common near the north end of the grid system. Further to the south and coincident with the presumed fault trace and highest geochemical values is found the

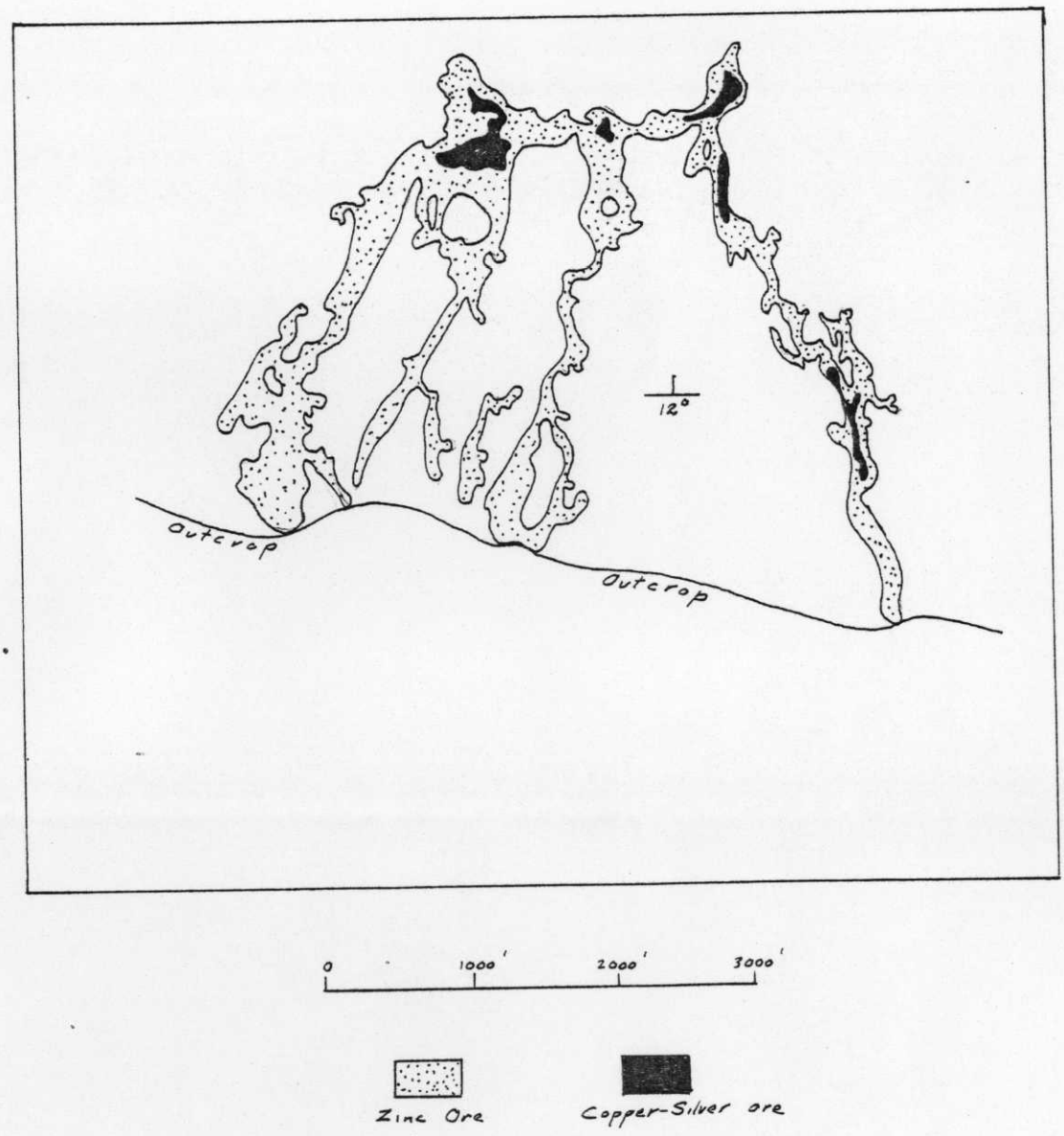


Fig. 3 Principal ore bodies of the Gilman Mine, Colorado (after Radabaugh, et al., 1968) Shown to illustrate irregular distribution of ore bodies in carbonates.

"oxidized" greenish-yellow sandy minderalized float and outcrop(?). This material appears to have been pulverized -- probably within the proposed low-angle fault zone. Whether or not both occurrences at the Orma grid are related to the fault is not known. However, it is reasonable to speculate that a pre-fault ore deposit has been faulted and parts of that ore body have become incorporated into the fault gouge which is exposed at the Orma Show.

Based on the preliminary results from the metallurgical work being conducted by Bacon Daonaldson, it would appear that the fine sulfides within the fault zone at the Orma Show would respond very well to I.P. geophysical methods. This system works best where conductive minerals are disseminated in a non-conductive matrix; this appears to be the case at the Orma Show. Also, the lack of zinc at the Orma area suggests that any bedrock massive zone would likely be conductive and respond to EM systems.

Due to the high zinc content at the Mike Show, and our lack of knowledge concerning the nature of the Mike mineralization, it is difficult to know what geophysical tool, if any, would be appropriate in this area. My bias would lean toward the I.P. system since a mixed galena-sphalerite ore would likely respond, if the target was of commercial size. Due to terrain differences and widely varying and unknown overburden thicknesses, I doubt that gravity systems would be effective in this area.

Clearly one of the biggest problems encountered during the field season was the inability to recover core or adequate samples from

the mineralized zones. Until this problem can be rectified, additional drilling in the Orma grid area is probably not justified. Drilling with air (non core) within the fault zone may work satisfactorily. Reverse circulation techniques may be necessary. These alternatives to conventional drilling should be investigated and possibly tested prior to commiting to any new large drill program.

An alternative to drilling within the Orma area would be trenching, combined with a certain amount of outcrop stripping. A dozer with backhoe attachment would be adequate. This piece of equipment could also be used to prepare the airstrip for summer use. A considerable amount of sampling would be possible with this method, and the geologic character and mineral distribution within the fault zone would become well defined. The principle drawback (other than cost) is that a limited depth would be exposed for sampling purposes. Drilling would be required at some later date in order to sample the third dimension.

REFERENCES

Chernoff, M.N., 1976 — Geology of the Rusty Spring Mineral Prospect, Porcupine Ranges, Yukon Territory. Report to Rio Alto Exploration, Ltd.

Radabaugh, R.E., et al., 1968 — Geology and Ore Deposits of the Gilman District, Eagle County, Colorado. In - Ore Deposits in the United States, J.D. Ridge, editor; volume 1, pp 641-664.

Schoel, Gary, 1978 — Geology and Genesis of the Rusty Springs Zn-Pb-Cu-Ag Prospect, Porcupine Range, Yukon Territory, Senior Thesis, University of Western Ontario.

1978 Drill Logs

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-1
Dates Drilled: MAY 28 - JUNE 5/78
Driller: Kendrick
Logged By: D HANSEN

Location: OR 75 4W
Elevation: 1945'
Angle: -70°
Azimuth: 240°

Range	Strat. Column	Assays	Description
-102'			
			obdn: of bx'da!
			Qtz boulders, ironstone - goss
			v. poor recvy
			core was not separated by footage.
			blocks
		102'	

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-2
Dates Drilled: JUNE 7-8/78
Driller: Kendrick - Opperman
Logged By: D HANSEN

Location: OR 65 1W
Elevation: 1945'
Angle: -90°
Azimuth:

Footage	Strat. Column	Assays	Description
73'			
			obd'n consisting of gossan, qtz & bx dol boulders (0-40')
		Core	42' yell coating of jarosite on dol lt gr bx dol
		Cu .02% Zn .0.% Pb TR Ag .03 oz/T	
		Cu .02% Zn .0.% Pb .02 Ag .01 oz/T	49' ½" of anglesite
			50-58' qtz vns & poss dol - poor recy
		Cu .01% Zn TR Pb .01 Ag TR	
		Cu .25% Zn .04% Pb 17.72 Ag 8.47 oz/T	60-72' lt gr dol & gph't seams
			70' lt gr fi gr'd bx dol
			70-80' same vugs increasing filled with blk sooty mtl. or calc xl

Drill Hole: 78-2

ɔiage	Strat. Column	Assays	Description
160	/		pl gr med grn dol
	/ɔ		v. vuggy - calc
	ɔ/		hvy py in sutures
170	/ ɔ		
	ɔ /		
	/	173'	

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-3
Dates Drilled: JUNE 9-10/78
Driller: Kendrick Opperman
Logged By: D HANSEN

Location: OR 45 1.1 W
Elevation: 1960'
Angle: -90°
Azimuth: -

age	Strat. Column	Assays	Description
75'			
			abdn 0-11' Fe stn dol
			1% core recvg
			Scrivage blocks not properly recorded
		SLUDGE	
		Cu .13% Pb .40 Zn .17 Ag .36 oz/T	
		Cu .12% Zn .14 % Pb .14 Ag .50 oz/T	
		Cu .11% Zn .13 % Pb .06 Ag .34 oz/T	
		Cu .13% Zn .14 % Pb .11 Ag .98 g/T	
		Cu .4% Zn .6 % Pb .13 Ag .60 g/T	
		Cu .12% Zn .13 % Pb .09 Ag .66 g/T	
		Cu .2% Zn 2.4% Pb .19 Ag .58 g/T	
EO			

Drill Hole: 78-3

Page	Strat. Column	Assays	Description
		SLUDGE	Obdn: dol · Fe stnd scree
80		Cu .20% Zn .41% Pb .15 Ag .56	1% core recovery
		Cu .21% Zn .46% Pb .10 Ag .44	
90			
00			
10			
20			dk gr dol bx · mod (gr · bgs)
			calc in fcts
			v bx dol qtz vn calc ; bit in fcts
			graphite
30			
			lt gr med grn dol vugs ;
			xl qtz
			v. little bx slightly porous
40			
			lt gr dol vugs ~ 1/4"
			bx dol med gr ; sutures ; fct of
			Mn stn ; calc ; gp !
50			lt gr dol med grd calc in vugs
			py in sutures
			strongly saturated bx lt gr dol
60			

Drill Hole: 78-3

ɔinge	Strat. Column	Assays	Description
160	/		graphitic 'dirty' sutures
	/		decreasing py
	* /		lt gn med grd vuggy dol-calc
	* /		brx dol lt gn mtx-dk gn
170	□ /		py in brx areas
	/ □ *		Some gpit
		175	

RIO ALTO EXPLORATION LIMITED

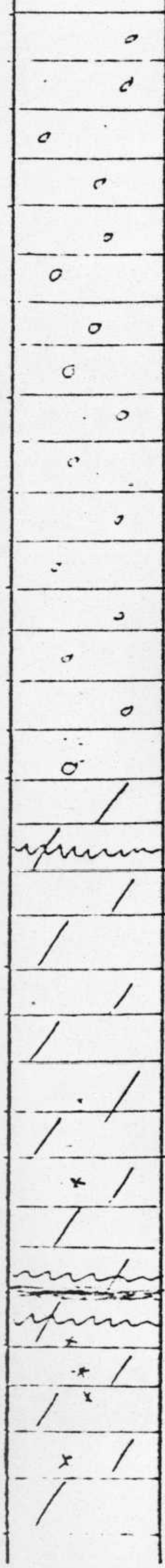
Drill Hole: 78-41
Dates Drilled: JUNE 11-15/78
Driller: Kendrick - Opperman
Logged By: D HANSEN

Location: OR 3.2S 145W
Elevation: 1960'
Angle: -90°
Azimuth: -

ge	Strat. Column	Assays	Description
8'			obdn: 0-121' very poor core recvy
			goss, qtz, bx dol, frags recvd

Drill Hole: 78-4

nge	Strat. Column	Assays	Description
0			Obdn: goss, qtz, bx dol
90			
00			
10			
20			fi grd gr-bge mot dol Sutures c̄ red-brwn Fe stain small qtz X/s
30			Same increasing vugs: Mn & Fe stned v porous calc Xl
40			wh-bge bx dol Fe stn in fractures & sutures botryodal hematite in qtz vn med grd gr dol gpht in fcts
50			bx dol calc mtx gr dol med gr same bx gpht in fcts
0			



Drill Hole: 78-4

Footage	Strat. Column	Assays	Description
160			med gr dol v calcic
			gpht & 'scaly' mtl in sutures. Sct
			hvy calc bkhs of py (dis thruout
170			med grd bx dol hvy calc
			dis py
			med grd dol pg to 1/4" &
180			in sutures
			v bx dol calc mtx
			v.v.s. grd py
190			
			v. bx vuggy - Sct dol
			hvy calc & grapht 'scaly' mtl & py
			in vugs
200			mostly wh - gr vuggy dol
			& calc xl some bx (dk gr clasts)
			1/4" py blebs
210			some but no bx v. vuggy calc
			little py
220			
			v. bx dol clasts wh mtx dk
			little dis py
			calc vugs
230			
			intermittent large py blebs in Scts
240			v bx dol

Drill Hole: 784

ɔinge	Strat. Column	Assays	Description
240			v bx do/
250			vugs o S qpht
			vuggy (calc x1) mcr-bx wh do/
260			
			Increasing bx qpht:py in
			Sutures set hvy blebs of py
		268	
270			

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-5
Dates Drilled: JUNE 17 - JUNE 1975
Driller: Kendrick-Opperman
Logged By: D HANSEN

Location: OR
Elevation: 1875'
Angle: -90°
Azimuth: -

[illegible]ge	Strat. Column	Assays	Description
[illegible]7'			
			obdn 0-78' gr-bge Si-ac dol (recr) calc in vnlys & frac all frac-or Fe stained poor recvy

Drill Hole: 78-5

Age	Strat. Column	Assays	Description
80			cbds: cont'd
90			
00			qtz vn c py Xls med-dk gr fi grd dol few sets c calc
10			same, py in sets
			hvy Fe stn calc in vugs
			little bx
20			med-dk gr fi grd dol
			few sms c calc
30			gr-bge dol Fe stn little py gpht in sets
			calc hvy py-gpht in sets
			lgt gr dol few vugs; sct c calc
40			little py in sets
			barren coarse Xl qtz vn, v hvy dis py
			in dk gr dol
			lt-med gr dol few vugs; sets calc
50			py in suture
			med gr dol calc in sets
			some py dis thin sutures
60			

Drill Hole: 78-5

...iage	Strat. Column	Assays	Description
160			dk gr dol increasing Cak in Sets
			increasing py in dis blebs; in vns; etc
170			1/2" cS porous bge dol : open vugs
			lt gr dol py in dis blebs in Set
			v hvy Sc med-dk gr dol Calc vns
180			dis py in sutures & Sc (some to 1/4")
		187	

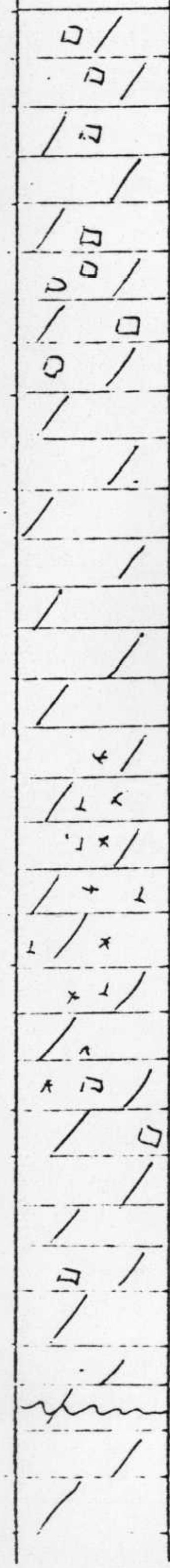
RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-6
Dates Drilled: JUNE 21 - 25/78
Driller: Kendrick - Opperman
Logged By: DH - D Wickham

Location: OR 16N 4E
Elevation: 1875
Angle: -90°
Azimuth: —

ge	Strat. Column	Assays	Description
00'			
			Obda: a:sc' gr dol, fe stn
			increasing dis py towards btm
			gr mot dol, hvly dis py
			dk gr dol, hvly dis py
			wh dol, hvly dis py esp in fels
			dk gr dol, hvly dis py (porcine rock)
			dk gr dol, dis py
			lt gr dol (mot) hvly py
			dk gr dol bx, dis py
			v si gn dk gr dol
			dis py in blebs

Drill Hole: 78-6

Footage	Strat. Column	Assays	Description
			dk gr dol dis py in blebs
80			gr dol (mot) some py in Sct
			vugs c̄ calc s̄ bit
90			dk gr bnd dol c̄ hvy py in
			bands ⊥ to core
			v. fi grd dol ,,, py blebs
100			lt gr dol, calcun py blebs
			vuggy c̄ calc
			wh dol, Fe, Mn stn in frcs
			bge-gr mot dol
110			mnr calc vns s̄ bit
			lt gr mot dol vugs c̄ cal
120			mnr Fe stn
			bge gr dol (bx) calc mtx, stc c̄ bi
			bge mtx
130			hvy bit in frc
140			lt gr dol some py (dis)
			vugs of calc s̄ bit
			med py in frc
150			lt gr dol
			hvy py in sutre s̄ in dk gr dol
			wh dol vuggy : calc
160			some bit

Drill Hole: 78-6

tage	Strat. Column	Assays	Description
160			wht dol vugs & cal
170			
180			blk mtl in suture
			wh-lt gr dol vugs & calc
190			
200	*	200	bx gr dol; wh mtx

RIO ALTO EXPLORATION LIMITED

Drill Hole: DDH 78-7
Dates Drilled: June 25-27/78
Driller: Kendrick - Opperman
Logged By: DH - D Wickham

Location: OR 15.9 4.7E
Elevation: 1875
Angle: -45°
Azimuth: 330°

Range	Strat. Column	Assays	Description
RC2'			
0	o o o		obdn 0-55' consisting of dol, gos & muds no core recy
10	o o		
20	o o o o		
30	o o o		
40	o o o		
50	o o o		
60	/ /		lt gr met dol, blk bit mtl in vugs with calc
70	/ / /		red gossan 1" wh dol with blk mtl in sutures
80	o o / / o o /		lt gr dol dol sets silic. with bit & py

Drill Hole: 78-7

Page	Strat. Column	Assays	Description
80			lt gr-wh dol
			bnd siltstone blk & dis py
			bx wh dol gr-blk mtx vlt py
90			bnd blk dol dis py ; qpht
			vugs - calc ; Mn stn
			wh dol
00			many stc
			gr dol vugs calc
10			
			wh bx dol blk mtx
20			
			bit in sec
			wh bx dol blk mtx & dis py
30			
			lt gr dol
			med dis py in dk dol mtx
40			lt gr dol med dis py
			blk dol hvy py (dis blebs)
50			clasts of wh dol "mtx supported"
			blebs of py to 1/2"
60			

Drill Hole: 78-7

Stage	Strat. Column	Assays	Description
160			gr bx dol hyg dis py
170			wh dol calc-vugs trace py
			brn blk, dol med dis py sil grd
180			bge dol mod (wh) vugs: blk calc
190			Lt gr dol vugs-calc
200		202	

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-8
Dates Drilled: JUNE 28-29/78
Driller: Kendrick - Opperman
Logged By: DH. D Wickham

Location: OR 16, 2.6E
Elevation: 1855
Angle: -90
Azimuth:

..nge	Strat. Column	Assays	Description
203'			
			cbdn 0-12'
			lgt gr dol, vugs of calc s Mn stain
			mnr Fe stn frcs
			mnr Fe stn qtz vn
			lt gr dol, stc ws blk mtl
			mnr Fe stn frc, calc in vugs, some py
			wh dol vuggy calc
			gr dol, vuggy calc
			some calc vns
			hvy py
			bx gr dol, wh calc mtx, dis py
			hvy dis py
			wh dol s gr med dol hvy dis py

Drill Hole: 78-8

Page	Strat. Column	Assays	Description
80			wh dol mot dk gr - lt dis py
			gr bx dol wh dol scale mtx.
90			med dis py; hvy py in stvgs
			vugs & calc
			qtz in stg, vugs & small vn
00			gr dol py ass & dker dol
			bx dol cal mtx some clear calc. xls
			gr bx dol v. calcic dis py
			semi py & xline
10			
20			vugs & calc
			lt gr dol many ste 'sooty'
			hvy py
30			mnr calc vn
			wh dol ste & py & blk sooty mt
			gr dol dis py
40			wh dol lt dis py
			gr dol hvy py in stg @ 160'
50			
			crscrving bx
0			

Drill Hole: 78-8

tage	Strat. Column	Assays	Description
160			gr bx dol med to hvy py in stg it dis py thru out
170			
180			gr bx dol wh mtx vugs : calc v vuggy + mat wh
190			blk mud bnd gr dol med dis py
200			v. blk mud · graphitic c py med dis py : blk sooty mtl in sutures
		203	

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-9
Dates Drilled: JUNE 29 - JULY 1/78
Driller: Kendrick - Oppe-man
Logged By: DH - D Wickham

Location: OR 16 / IV 2.6E
Elevation: 1855'
Angle: -45°
Azimuth: 320°

nge	Strat. Column	Assays	Description
213'			
			0-18' obdn bx dol
			lt gr dol ē calc uns, vuggy ē calc mnr Fe stn on frcs
			lt gr dol, vugs of calc, frcs Fe stnd
			lt gr bx dol mnr bit with calc frc
			bx dol increasing bit
			gr dol calc in frc with Fe stn
			bx dol ē calc; mass py mtx bit in frc
			frc of qtz ± calc, hvy Fe stn ± py along frcs
			gr bx dol - vuggy
			gr bx dol ē cal in vugs ± frc
			py in sutures

Drill Hole: 78-9

Page	Strat. Column	Assays	Description
80			lt gr dol vuggy ē calc
			lt dis py
90			vuggy lt gr dol ; botryoidal hematite
			in vugs - calc increasing py
00			lt gr dol hematite as above
			Sooty mtl, bit ŝ mass py
			lt gr dol
10			
			stc ē py ŝ fi gnd blk mtl
20			
			vugs, stc ŝ frc ē mass py ŝ calc
30			
			lt gr dol vugs py-calc
			bot. hematite
			lt gr mot dol vugs as above
40			
			mott py with dk gr dol
			some ē wh dol qtz in vugs
50			
0			

Drill Hole: 78-9

Footage	Strat. Column	Assays	Description
			wh dol vugs c calc
160			mnr py in frc
			qtz in frc & some vugs
170			
			little py esp in sts in near
			blk sooty mtl
180			wh dol small vugs py in sts
			trace dis py
190			
			wh-gr dol veggy c cal
200			mass py in sts
			hvy Fe stns in vugs some py
210			
	213		

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-10
Dates Drilled: JULY 3-78
Driller: Kendrick - Oppenman
Logged By: D HANSEN

Location: OR 16N 1.1C
Elevation: 1850'
Angle: -90°
Azimuth:

nge	Strat. Column	Assays	Description
195'			
			obdn no recvy
			v vuggy lt gr med gnd dol vugs of calc
			v bx dol med gr, mtx lt gr qtz Xls in vn
			vuggy dol hvy py in vugs Xline py
			v bx dol hvy dis py in dk gr mtx pl gr dol, vuggy calc, dis py throut
			v vuggy pl dol strong Fe stn Xline calc
			Sct dol calc in Sct ↓ vugs
			v bx dol lt dis py
			lt gr vuggy dol some bx calc in vugs lt dis py in mtx
			lt gr (mott) bx vuggy dol little to no py some Fe stn

Drill Hole: 78-10

ge	Strat. Column	Assays	Description
			ltgr mod dol some Fe stn some qtz xl ; calc xl in vugs ~~Hbpy~~
			v. vuggy bx gr dol
			qpht ; pby blebs in v bx dol same as 80' it dis py
			qpht py in bx dol - large open vugs 2" calc xl
			hvy qpht py
			v. vuggy ltgr dol hvy blebs py to mass py hvy qpht
			large blebs py in Sec it gr mod dol vug calc Some dis py ; qpht
			v v. hvy (mass) py in vugs (@ 3")
			v 'weathered' vuggy bx dol calc xl in vug some qtz xl

Drill Hole: 78-10

ıage	Strat. Column	Assays	Description
160	* /		
	/ +		bge bx del (mat)
	* /		hvy qtz xl & Fe stn
170	/ *		ltgr-dkgr bx del v. vuggy calc
	* /		
	/ *		
	* /		
180	/ *		pm core recvy
	* /		bx set del strong Fe stn
			'sandy' weathered py
	* /		
190	* /		lt gr bx del v.v. vuggy calc
	* /		Some lt py & Fe stn
	/ +	195	Sand caused hole to collapse

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-11
Dates Drilled: JULY 5-6 1978
Driller: Kendrick-Opperman
Logged By: D HANSEN

Location: OR 16N 22W
Elevation: 1840'
Angle: -90°
Azimuth:

ge	Strat. Column	Assays	Description
3'			
			obdn: weathered Fe stn vuggy dol
			gr·bge bx dol vuggy
			med-crs gnd "sandy" dol
			qtz vn (xl's to ½")
			mostly v.crs gnd dol v.porous
			Fe stn on fcts v vuggy
			mot gr·bge-gr dol med gnd
			vuggy lt-dk bx mot dol
			dis by xl sp. on sutures
			less bx dis by expan bx areas
			calc vns & vuggy
			v bx dol lt gr clasts dk gr mtx
			dis by blebs

Drill Hole: 78-11

...ge	Strat. Column	Assays	Description
			v bx dol
			dis py blebs
			less bx - more vugs · calc xl
			py med-hvy in sts
			calc vn v bx v dk mtx wh clast dol
			hvy py in dk mtx v vuggy - calc xl
			v bx dol py in sutures
			pr core rcvry v. c. grd dol
			vugs; weathered to brn sand
			brn sandy dol
			weathered mot gr-brn dol
			calc in vugs
			hvy cal
			rods seized due to sand
		MIXED SAND ASSAY from sand that caused rods to seize	
		Cu 92 ppm	
		Pb 504 "	
		Zn 192 "	
		Ag 2.6 "	

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-12
Dates Drilled: JULY 6 - 7/78
Driller: Kendrick - Oppeman
Logged By: D HANSEN

Location: OR 16.1N 4.9W
Elevation: 1835'
Angle: -90°
Azimuth:

ge	Strat. Column	Assays	Description
51'			
			vbda: dol bx scce
			lt gr bx dol
			vuggy/ calc
			lt gr mot bx dol
			calc in vugs/ sets or Fe stn
			V bx dol dk gr clasts or mtx
			or bx dol Fe stn
			v bx dol dk gr clasts calc in sets
			poor core recvy
			no core recvy
			qtz vn
			V bx dol vuggy or (Fe) mtx

Drill Hole: 78-12

Page	Strat. Column	Assays	Description
50			Qtz in v weathered 'ironstone'
			poor core recvy
			wh do' or stain on Set
90	Cu		NATIVE Cu
			qtz clasts in 'ironstone' do'
			v weathered bx do'
			V poor core recvy
00			luy Fe stn
10			
20			
			increasing porosity & Fe stn
30			
40			
			SAND RODS SEIZED
50		151	
0			

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-13
Dates Drilled: JULY 16 - 20/78
Driller: Kendrick
Logged By: D HANSEN

Location: M1 16 S 14E
Elevation: 2280'
Angle: -70°
Azimuth:

-ge	Strat. Column	Assays	Description
062'			
			gr bx dol (Soz)
			cut by qtz & calc
			gr bx dol
			10% cru xv
			gr bx Sos dol
			qtz & calc in fct
			gr mono dol
			Soz - gr vuggy bx dol cut by fe stn qtz
			dip ~20°
			qtz in
			gr mono dol cut by qtz
			coral
			30% core recy

Drill Hole: 78-13

...nge	Strat. Column	Assays	Description
80			30% recvy
			gr bx vuggy dol cut by qtz XI
			cons Fe stn
90			5% recvy
			gr bx dol & qtz
			Fe stn in fres
00			v bx foss dol
			increasing Fe stn
10			
			Fe stn (or-blk) vugs
			vuggy bx dol
20			Corals & brachs
			lt py
			strong Fe stn
30			bx dol Fe stn vug-gy
40			qtz vn
			foss dol
			Strong Fe stn vugs - cals & dol XI
50			
			vugs of calc & qtz
			'Cave' rods dropped 1'
0			

Drill Hole: 78-13

tage	Strat. Column	Assays	Description
160			gr fos dol
			sandy cave 6"
			blk Xline dol
170			pl gr dol
180			
			qtz Xline vn
190			v. poor core recvy
			pl dol (gr) cut by qtz vn
200			gr (bx?) fos dol
			qtz in vugs
210			Amphipora?
			gr bx fos dol
220			
			increasing vugs
230		Core	
		Cu .1%	
		Pb TR	
		Zn TR	
240		Ag TR	

66 253

Drill Hole: 78-13

age	Strat. Column	Assays	Description
240		See preceding assay.	gr bx fos dol - vuggy
250			
260			
	262		

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-14
Dates Drilled: JULY 22 - 25/78
Driller: Kendrick
Logged By: D HANSEN

Location: Mi 21S 6E
Elevation: 2380
Angle: -90°
Azimuth:

Footage	Strat. Column	Assays	Description
123'			
			blk bx ch s bx dol
			little to no mtx
			4% core rcvy to 48'
			blk bx dol
			mtx wh c py blebs
		Sludge: Cu .01%, Pb .01, Zn TR, Ag TR	vugs of dol qtz
		Core: Cu .01%, Pb TR, Zn TR, Ag TR	red Fe stn in frt
			small qtz vn
			bx dol
			lt gr clay
			core rcvy 20%
			bx dol
		see 80-83'	

Drill Hole: 78-14

Page	Strat. Column	Assays	Description
0		includes 78-80'	bx ch (Fe stn mtx) some bx dol
		SS Cu 220 ppm, Pb 52, Zn 184, Ag .8	
		SS Cu 152 ppm, Pb 48, Zn 168, Ag .8	
90	Cu	SS Cu 264, Pb 60, Zn 352, Ag 2.4	increasing yellow Fe stn Malachite Stain in dol
		SS Cu 148, Pb 44, Zn 152, Ag 1.6	mtx weathered & Fe stned
	Cu		Azurite stn
00		SS Cu 192, Pb 120, Zn 368, Ag 4.2	bx dol Fe stned mtx
	Cu	SS Cu 276, Pb 204, Zn 944, Ag 2.6	Malachite & Azurite
			12½% carc xvg
	Zn		Smithsonite & qtz
0		SS Cu 188, Pb 208, Zn 720, Ag 2.0	
		SS Cu 188, Pb 140, Zn 800, Ag 1.2	Malachite - Azurite in xl qtz
	Cu		
20		SS Cu 208, Pb 164, Zn 1232, Ag 1.4	
		123	
30			
40			
50			
0			

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-15
Dates Drilled: JULY 26 - 29/78
Driller: KENDRICK
Logged By: D HANSEN

Location: M1 195 6E
Elevation: 2410'
Angle: -90°
Azimuth:

ge	Strat. Column	Assays	Description
5E'			
			pl gr dol core rcvy 3.49
			bx dol ē coral
			calc in fct
			argi |laccous dol regions poss py
			Fe stn in mtx ś vugs
			or Fe stn in fcts
			increasing bx
			gr bx dol calc in vugs ste-Fe stnd
			qtz in fct ē smith.
			bx dol
			calc ś qtz in fct
			fos ś stc vugs of yellow carbonate ?
			bx dol ē corals
			fcts filled with 'cdd' red colour (Fe ?)
			v. bx dol fcts with wh dol ś xl qtz
			v. vuggy, fos, stc-Fe stnd
			bit in vugs

Drill Hole: 78-15

Footage	Strat. Column	Assays	Description
		75 Core	
80		Cu .01 % Pb TR Zn .08 % Ag TR	bx dol
			Zone of pink stn
			Fe stn dol
90			
			v Sct dol - Fe stn
	Zn		small vug of calc & smith
100			
	Zn		vug of calc & smith
			Coral
			bx dol gy & wh clasts
110	Zn		qtz vn & smith
			bx dol Sct & dol & qtz
120			v bx dol - Fe stnd
		1' Core Cu .33 Pb .04 Zn 6.48 Ag 1.8	Sccs
130			
			pcss smith
140			bx Scs porous dol
			vugs v. Fe stnd
150			pink stn
	Zn		smith in Sct & calc

Drill Hole: 78-15

Range	Strat. Column	Assays	Description
160			bx dol
			Cave- rods dropped
170			bx dol
			Smith in vugs
			bx dol
180			
			Smith in vugs
			bx dol
190			Smith in vugs
		Core Cu .04% Pb TR Zn .08% Ag .02 opt	Smith in vug & fct
			vuggy Zn rich
200			Oc Fe stn 1' S.S.
			15% core recy bx dol
			bx sandy dol
			Az, Mal, Smith in vugs & in fcts
210			
			vuggy bx dol
			Fe stnd poor recy
			Large vugs of smith
220			30% core recy
			bx dol fcts - dol & calc
230			
			Smith coating
			gossan
240			NO CORE RECOVERY TO END OF HOLE
258		258	

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-16
Dates Drilled: JU-130-AUG 3178
Driller: KENDRICK
Logged By: D HANSEN

Location: M1 175 6E
Elevation: 2420'
Angle: -90°
Azimuth:

ge	Strat. Column	Assays	Description
60'			
			gr Sos dol
	/		
	/		
	/ Zn		Smith stn
	/ *		Vuggy bx dol
	/ + Zn		Zn stn
	* /		
	/ * Zn		Smith in Fct
	* /		
	* /		
	/ +		lt-med gr Sos bx dol
	* / Zn		1.5" vn of Smith & in vugs
	* /		
	/ *		bx Sos dol calc in Fct
	* /		
	/ *		
	* /		
	/ * Zn		Smith in Fct & calc
	* /		
	/ *		
	* /		
	/ * Zn	SLUDGE 530'-541.5'	Smith in Fct
	* / Pb	Cu .21	Galena in sludge
	* /	Pb 24.58	v vuggy calc, qtz, dol xl in vugs
	/ *	Zn 2.41	
	* /	Ag 7.79 OZ/T	
	/ * Zn		Little Zn, bx Sos dol med gr
	* /		
	/ *		
	* /		
	/ *		
	T / Cu Zn		Smith & mal in Fct
	* /		

Drill Hole: 78-16

Page	Strat. Column	Assays	Description
			bx fos dol
50	/ *		
	* /		
	/ * Zn		Smith in Sol
	* /		
90	* /		
	/		v. fos dol coral some breaks
	/		
	/		
00	/		
	/		
	/		
10	/		
	/ Zn		Smith in vugs & calc
	/		
	/		
	/ * /		bx dol frets & calc
20	* /		
	* /		
	/ *		
	* /		
30	/ *		
	* / Zn		Little smith some coral
	* /		
	/ *	Core	
40	* /	Cu .02% Zn .06%	
	/ * Zn	Pb TR Ag .01 oz/T	Smith & calc
	* /	Cu .01% Zn .23%	
	/ Zn	Pb .01% Ag .01 oz/T	hvy Smith in vs & is
50	/	Cu .03% Zn 3.15%	Amphipora (?)
	/ * Zn	Pb .01% Ag TR	
	* /	Cu .01% Zn .32	hvy smith
	/ Zn	Pb .01% Ag .01 oz/T	
60			

Drill Hole: 78-16

Footage	Strat. Column	Assays	Description
		Core	
160		Cu .01% Zn .03% Pb .01% Ag TR	bx Fes dol Sct-calc
	Zn	Cu .01% Zn .01% Pb .02 Ag .01 oz/T	Smith in Sct " " "
170	Zn	Cu .01% Zn .02% Pb TR Ag .01 oz/T	
	Zn	Cu .01% Zn .13% Pb TR Ag .01 oz/TR	" " "
180		Cu .01% Zn .02% Pb .02 Ag .01 oz/T	v. bx Fes dol
	Zn	Cu .01% Zn .03% Pb TR Ag .01 oz/T	little Smith
190			bx dol clast dk gr calc mtx
			vuggy Fes some Zn throughout
200			
			breaks in bx Fes dol
210			
220			
	Zn		Smith in Sct
			py xl's in qtz vn
			coral - breaks
230			
			coral breaks calc vn
240	Zn		Smith in Sct

Drill Hole: 78-16

Footage	Strat. Column	Assays	Description
240	Zn		Smith in Sct
	Zn		" " "
250	Zn		" " "
			Scs - coral bracks
260			
270			
	Zn		Smith on dol XI in Sct
	Cu		Az. stn
280	Zn		Smith in calc un
			Scs dol : bracks cont'l
290			calc un
			Scs dol
300			
310			Amphipora (?)
320	Zn		Smith in calc un

Drill Hole: 78-16

Footage	Strat. Column	Assays	Description
320			Smith in v bx dol
	× Zn		
	×		v. few sos
	×		bx dol calc & dol mtx
330	+		
	×		some Fe stn
	×		
	×		
	×		
340	×		increasing Fe stn
	×		
	+		
			qtz vn & py
	×		bx dol Fe stn
350	+		mod dol gr-wh
	×		strong Or (Fe) stn
360		360	

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-17
Dates Drilled: AUG 2/78 - AUG 5/78
Driller: KENDRICK
Logged By: D HANSEN

Location: M1 1758E
Elevation: 2415'
Angle: -90°
Azimuth:

Footage	Strat. Column	Assays	Description
-200'			
0			Qtz 'obdn' 5% core rcvy
10	Pb Gal	SLUDGE: Cu .24% Zn 24% Pb 2.70 Ag 2.15 oz/T	galena & jarosite in qtz
			mal in sludge
20	Zn	Cu .24% Pb 2.7 Zn .24 Ag 2.15 oz/T	Smith in qtz 1% core rcvy
			bx dol Fe stn
30		Cu .41% Pb 1.63% Zn 4.6% Ag 9.4 oz/T	qtz vn 10% rcvy
	Zn, Cu	Core: Cu .14% Pb .93% Zn .09% Ag 5.08 oz/T; Cu .19% Pb 2.23 Zn .22 Ag 10.63 oz/T	Azi-calcite
	Zn		Smith on qtz frag 5% core rcvy
40	Zn	Cu .46% Zn 1.8% Pb 2.23 Ag 14.07 oz/T	" " "
			"
			no core rcvy
50			
60			
70			
		Core	sandy red dol
		Cu .02% Zn .15% Pb .03 Ag .15 oz/T	fos dol coral brachs
80	Zn		(Smith) Zn & calc in fol
83			

Drill Hole: 78-17

...inge	Strat. Column	Assays	Description
80			no core recy
			bx vuggy fos dol qtz in fet
90			
			decreasing fos
			bx dol fem fos fe stn
100			vug dol xl
110			
		Core Cu 0.2 % Pb 0.01 % Zn 0.9 % Ag 0.1 g/t	
			crinoidal dol
120	Cu		mal in fet
			vuggy c fe stn
130			qtz vn
			bx dol (fos)
			vuggy strong fe stn
140			
			'cave' : sand
150			bx dol some fos
160			

Drill Hole: 78-17

Footage	Strat. Column	Assays	Description
160			br dol some fos
			calc in vn
			not as voggy
170			
180			
			Amphipora?
190			
200			

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-18
Dates Drilled: AUG 4-6 '78
Driller: KENDRICK
Logged By: D HANSEN

Location: M1 17S 4E
Elevation: 2420'
Angle: -90°
Azimuth:

Footage	Strat. Column	Assays	Description
0-318'			
		Core	
0	x /	Cu .01 % Pb .04 % Zn .01 % Ag TR .02/T	bx fos dol gn Fe stn fct
	/ *		
	* /	Cu .01 % Pb .05 % Zn .01 % Ag .01 .02/T	
	/ *		
10	* /	Cu .01 % Pb .04 % Zn TR Ag .01 .02/T	
	/ *		
	* /	Cu Pb .01 TR Zn TR Ag .01	
	/ *		
20	* /	Cu .01 % Pb .01 Zn .01 Ag TR	
	/ *		coral
	* /	Cu .01 % Zn .05% Pb .01 Ag .01 .02/T	
	/ *		
30	* / Zn	Cu .01 % Zn .4 % Pb .01 Ag .01 .02/T	little Zn (Smith) in vugs & fcts
	* / Zn		" " " " "
	* / Zn	Cu .01 % Zn .4 % Pb .01 Ag .01-.02/T	" " " " "
	* /		
40	~~~~	Cu .01 % Zn .01 %	fos, sutured fct br dol
	* / Zn	Pb .01 Ag TR	some Smith
	/	Cu .01 % Zn .01 %	crinoidal fragg
	/	Pb .02 Ag .01 .03/T	vuggy
50	/	Cu .01 % Zn .01 %	qtz in fct
	/	Pb .01 Ag .01 .03/T	
	/	Cu .01 % Zn .01 %	
	/	Pb TR Ag .01 .02/T	
60	Pb / Zn	Cu .01 % Zn .04 %	galena in vug Smith in calc vn
	/	Pb .13 Ag .01 .03/T	
	/	Cu .01 % Zn TR	crinoidal dol
	/ *	Pb .01 Ag .01 .03/T	mostly calc in fct some qtz
70	/	Cu .01 % Zn .01 %	
	x / Zn	Pb TR Ag .01 .03/T	Smith in bx dol
	* /	Cu .01 % Zn .02 %	
	/ *	Pb .03 Ag .01 .03/T	
80			

Drill Hole: 78-18

Footage	Strat. Column	Assays	Description
80	Zn	Cu .01% Zn .02% Pb .03 Ag .01 oz/T	bx cinc dol Smith, calc, qtz in vns
	Zn	Cu .01% Zn .1% Pb .03 Ag .01 oz/T	Smith ē · qtz
90		Cu .01% Zn TR Pb .01 Ag .01 oz/T	bx gr dol wh dol - calc matr
	Zn	Cu .01% Zn TR Pb .01 Ag .01 oz/T	Little Zn Scs dol
100		Cu .01% Zn TR Pb .01 Ag .01 oz/T	brachs · cinc's
		Cu .01% Zn .01% Pb .04 Ag .01 oz/T	
110		Cu .01% Zn .01% Pb TR Ag .01 oz/T	Scas sutures
	Zn	Cu .01% Zn TR Pb TR Ag .01 oz/T	Smith in qtz vn
120		Cu .01% Zn .01% Pb .02 Ag TR	Scs dol
	Zn	Cu .01% Zn .01% Pb .01 Ag .01 oz/T	smith in Amphipora(?) s in Sct vuggy bx dol calc in Sct
130		Cu .01% Zn TR Pb .01 Ag TR	V. Scs dol mostly brachs
	Zn	Cu .01% Zn .03% Pb .01 Ag .01 oz/T	
140		Cu .01% Zn .01% Pb .01 Ag .01 oz/T	
		Cu .01% Zn TR Pb .01 Ag .01 oz/T	coral
150	Zn	Cu .01% Zn TR Pb .01 Ag .01 oz/T	qtz in Sct & smith brachs
	Zn	Cu .01% Zn TR Pb .02 Ag .01 oz/T	Smith in brachs
160			

Drill Hole: 78-18

Footage	Strat. Column	Assays	Description
		Core	
160		Cu .01% Zn TR Pb TR Ag TR	gr Sos dol
		Cu .01% Zn TR Pb .01 Ag .01 oz/T	
170		Cu .01% Zn TR Pb TR Ag TR	
		Cu .01% Zn TR Pb .01 Ag TR	
180	Zn	Cu .01% Zn .01% Pb TR Ag TR	Smith in calc un Sos dol
		Cu .01% Zn TR Pb TR Ag TR	
190	Zn	Cu .01% Zn TR Pb .01 Ag TR	Smith in pg un py xl's
		Cu .01% Zn .02% Pb .02 Ag TR	
200		Cu .01% Zn .01% Pb .02 Ag .01 oz/T	Sos dol (mostly breaks)
		Cu .01% Zn .01% Pb .01 Ag .03 oz/T	Scts of calc
210	Zn	Cu .01% Zn TR Pb TR Ag .01	Smith in calc un Vuggy calc
		Cu .01% Zn TR Pb .01 Ag TR	
220	x	Cu .01% Zn TR Pb .01 Ag TR	bx Sos dol
	x	Cu .01% Zn TR Pb .02 Ag TR	
230	x	Cu .01% Zn TR Pb TR Ag TR	graph seam
	x ⊥	Cu .01% Zn TR Pb .01 Ag TR	bx Sos dol hvy calc un
240	⊥		

Drill Hole: 78-18

Footage	Strat. Column	Assays	Description
240	* / * /	Cu .01% Zn TR Pb .01 Ag TR	bx Sos do'
	L L *	Cu .01% Zn TR Pb .02 Ag TR	clear calcite Smith in calc-qtz vn
250	Zn * / * /	Cu .01% Zn .01% Pb TR Ag TR	Amphipora?
	/ /	Cu .01% Zn TR Pb .01% Ag TR	Sos gr do' clear calc
260	/ / Zn	Cu .01% Zn TR Pb .01% Ag TR	Smith in calc vn
	x / *	Cu .01% Zn TR Pb TR Ag TR	bx do' (Sos) calc in Sets
270	* / / * Zn	Cu .01% Zn .01% Pb TR Ag TR	Smith in calc vn
	/ / x	Cu .01% Zn .3=% Pb .01 Ag .01 oz/T	bx Sos do'
280	x / / x	Cu .01% Zn .01% Pb .01% Ag TR	calc in Sets
	x / /	Cu .01% Zn TR Pb TR Ag TR	
290	* / / *	Cu .01% Zn TR Pb TR Ag TR	
	x / / x	Cu .01% Zn TR Pb Ag TR	bx Sos do'
300	x / / x	Cu .01% Zn TR Pb TR Ag TR	
	x / / x	Cu .01% Zn TR Pb TR Ag TR	
310	/ / x	Cu .01% Zn TR Pb TR Ag .01 oz/T	
	x / Pb	Cu .01% Zn TR 3,E Ag .01 oz/T	
320			

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-19
Dates Drilled: AUG 7 - 9/78
Driller: Kendrick
Logged By: D HANSEN

Location: Mi 155 4E
Elevation: 2405'
Angle: -90°
Azimuth:

otage	Strat. Column	Assays	Description
0-123'			
0			gr bx dol vuggy
			Calc & Fe stn in fct
10			
20			
30			qtz xl & vug
	Zn		Smith coating on dol
			some fos in bx dol
40	Zn		Smith coating
50			
60			gr mot fos bx dol
			stc
			qtz vn
70			gr fos bx dol
	Zn		Smith
80			

Drill Hole: 78-19

ootage	Strat. Column	Assays	Description
80			gr mat fgs bx do' to 120'
90			
100			
110			
120	Zn		Smith & V bx do'
	123		sand & cave
130			
140			
150			
160			

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-20
Dates Drilled: AUG 10 - 12/78
Driller: KENDRICK
Logged By: D HANSEN

Location: M1 13S 0.1W
Elevation: 2350
Angle: -60°
Azimuth: 240°

Footage	Strat. Column	Assays	Description
0-200'			
0			no core recy
10			
20	Zn		gr fos dol few fct Smith in fct
30			gr fos dol some bx Core recy 10%
40			
50			
60			
70			gr bx fos dol some calc vugs
80			

Drill Hole: 78-20

Stage	Strat. Column	Assays	Description
80			gr bx fos dol
90			2" of red-purple stn ontx
100			gr vuggy mot fos dol some Fe stn in fct
110			bx fos dol
120			increasing bx decreasing fos
130			
140			gr fos dol vuggy calc
150			strong orange rust stn in fct
160			bx mot dol some fos

Drill Hole: 78-20

Footage	Strat. Column	Assays	Description
160			bx mat do'
			some fos
			increasing pen resist
170			
	Zn		Smith coating on do'
180			
	Zn		Smith in calc vn
190			
			sand brn calcic
200			gr bx do'

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-21
Dates Drilled: AUG 13-15/78
Driller: KENDRICK
Logged By: D HANSEN

Location: M1 1358e
Elevation: 2345'
Angle: -60°
Azimuth: 330°

Footage	Strat. Column	Assays	Description
0-213'			
0			gr dol few vugs & fct little qtz vn
10			
20			bx dol qtz in fct
	Zn		Smith in qtz
30	Cu Cu Zn Cu		strong Mal & Az & Smith in Fe stn qtz vn
			bx dol qtz in fct Fe stn
40	Zn		mar Zn in fct bx dol mtx - qtz
50			honeycomb coral (Favosites?) gr bx dol pass crinoids fct & sax mtx cal vugs of dol xl
60			Fe stn in fct
	Zn		Smith in crinoid fragts
70			qtz vn & ox Fe bx dol
			vugs cube nucleus dol xl coating gr bx fgs dol
80			

Drill Hole: 78-21

Footage	Strat. Column	Assays	Description
80			gr Scs bx do'
	Zn		Smith in Sct with qtz ± in do'
90			
	Zn		" in calc vugs
100			scat Zn throughout
			brachs
110			
	Zn		Smith in Sct
120			
	Cu	core 2"	Xl qtz un ē Smith, Mal's
	Zn	← Cu 1.04% Pb 1.0% Zn 14.2% Ag 22.0 g/T	Az
			bx dol increasing calcic mtx
130			V. angular clast
	Zn		Smith ass ē calc
140			
			bx dol calc mtx
150			qtz un
			bx dol
			crinoids?
160	Zn		Scat Zn coating ass ē calc

Drill Hole: 78-21

Footage	Strat. Column	Assays	Description
160			bx Sos dol
			calc in Set
170	Zn		Smith in qtz vn
			increasing bx
180			qtz & calc in mtx
			dk gr mtx bx dol
190			with lt gr-wh dol clast
			floating in mtx
200			as above
210			
		213	

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-22
Dates Drilled: AUG 16 - 19/78
Driller: KENDRICK
Logged By: D HANSEN

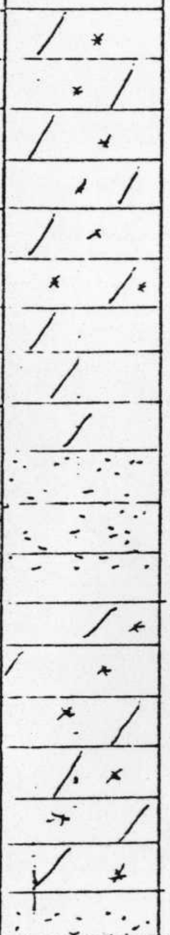
Location: M1 17S 10E
Elevation: 2390'
Angle: -90°
Azimuth:

Stage	Strat. Column	Assays	Description
0 - 208			
0			gr fos dol 5% rcvy
		Core	
		Cu .02%	
10		Pb TR	
		Zn .04%	
		Ag TR	
	*		
20			gr bx dol, crinoids, red Fe stn
	* / Zn		Smith in Set 80% rcvy
		Cu .01% Zn .02%	2% rcvy - dol
		Pb TR Ag TR	
		Cu .02% Zn .05%	bge sandy dol 20% rcvy
30		Pb .03 Ag TR	
		Cu .01% Zn .03%	
		Pb .02 Ag TR	bge - dolic sand
		Cu .01% Zn .05%	
40		Pb .03 Ag TR	
	*		red bge sandy bx dol 100% rcvy
	*	Cu .01% Zn .05%	Fe stn in Set
		Pb .03 Ag .01 opIT	
		Cu .01% Zn .05%	
50		Pb .03 Ag TR	
		Cu .02% Zn .13%	
		Pb .03 Ag .01 opIT	
		Cu .03% Zn .23%	
60		Pb .04 Ag .01 opIT	
		Cu .02% Zn .09%	
		Pb .02 Ag TR	
		Cu .01% Zn .17%	
70		Pb TR Ag TR	bge-gr sandy bx dol 60% rcvy
		Cu .01% Zn .08%	yell-or Fe stnd
		Pb .01 Ag .01 opIT	
		Cu .01% Zn .04%	
80		Pb .01 Ag TR	

Drill Hole: 78-22

Footage	Strat. Column	Assays	Description
		Core	
80		See preceding	gr bx dol
			Cinnamon stn in fct
		Cu .01% Zn .04% Pb .03 Ag TR	
90		Cu .01% Zn .01% Pb .01 Ag TR	gr bx dol vugs of Xline dol
		Cu .01% Zn .02% Pb .01 Ag TR	
100		Cu .01% Zn .02% Pb TR Ag .01 oz/T	fct - wh dol Silica 100% recov poss fos
	Zn	Cu .02% Zn .06% Pb .01 Ag .02 oz/T	Some Smith in fct
110		Cu .01% Zn .02% Pb .02 Ag .01 oz/T	dk gr bx dol cut by qtz vns Some Fe stn
		Cu .01% Zn .02% Pb TR Ag TR	
120			
			rd-brn bx dol, sacc!, hvy Fe stn in fct
	Zn		med gr bx dol wh dol calc in fct Some Sm
130			hvy Fe stn zone
			1½" of Amphipora (?)
			not dol
			Slickensides coated with blk Fe stn
140			
	Zn		vug of wh dol & Smith 100% recov
			dk gr mat dol cinch's?
150			hvy Fe stn vugs of dol Xls
160			gr bx dol

Drill Hole: 78-22

Footage	Strat. Column	Assays	Description
160			gr bx dol crinoidal
			frags of wh dol, calc, Fe stns
			increasing or-brn Fe stn
170			
			dk. gr arg dol
			50% recy
180			gr fos (brach) dol v. lt Fe stn
			5' gr sand
			gr bx dol hvy Fe stn 5% recy
190			gr bx dol wh dol mtx
			3-5% recy
200			
			Sand
210			

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-23
Dates Drilled: AUG 20-22/78
Driller: Kendrick
Logged By: D HANSEN

Location: MI 1.08 N 22 E
Elevation: 1740
Angle: -90°
Azimuth:

Footage	Strat. Column	Assays	Description
0-128'			
0			river gravy. 14% recvy
			wh vuggy dol
			blk mtl on xls. dol
10			chert
			Si grd sil dol s/ch 100% recvy.
20			dip ~20°
			bx dol clasts - dol's lmst
			clast ringed by qtz, calc & or stn
			dk gr - med gr mat lmst bx
30			
			vn of Fe stn calc-qtz
40			
			Si grd gr lmst dip ~15°
			& wh 'dols' of calc
			breccia
50			some bx lmst in Set
			strong or stn in Set
			bx lmst in 2" Set clasts - angular
60			calc 'appears' to be bx in Set & blk lmst dip 16°
			alt bnds blk. gr lmst
70			bx lmst calc mtx
			qtz vn
			or stn in Set
80			

Drill Hole: 78-23

tage	Strat. Column	Assays	Description
80			Fos Bio lmst
90			gr lmst Few Sct cal
00			Some areas bx lmst
10			hvy bx lmst calc i Sc
			dk gr lmst Few Sct
20			
		128	
30			
40			
50			
0			

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-101
Dates Drilled: JULY 10 - 15/78
Driller: Opperman
Logged By: D HANSEN - D WICKHAM

Location: OR BL 76
Elevation: 2175'
Angle: -90°
Azimuth:

Footage	Strat. Column	Assays	Description
0 - 212'			
0			abdns dol frags
10			gr bx dol calc mtx
20			gr crinoidal dol Mn stn in ste vugs - calc mnr Fe stn
			gr dol calc & Mn stn in sta
30			buff bx dol calc mtx - sandy
			gr bx dol - some bit & crinoids
40			gr mot dol mnr yfz & calc vn Fe stn in sta & sol
50			gr bx dol calc mtx, bit in Set mnr Fe stn
60			dk gr dol - bit vuggy - calc
70			
80			

Drill Hole: 78-101

Footage	Strat. Column	Assays	Description
80			gr bx dol calc mtx
			mtx supported
			clast supported bx dol
90			
100			gr dol mot dk gr Fe stn - Sct
			Calc in Sct
110			Some bx
	Cu		Mal - Az stn
			dol weathered & sand
			Sandy zone pink tinge
120			gr bx dol vugs & Sct of calc & dol XL
			sty coatings
		Sludge Samples	sandy zone pink tinge
			bx dol
130		SS Cu 40 ppm Pb 56 Zn 20.6 Ag 2.4	
			br sand
		SS Cu 16 ppm Pb 30 Zn 456 Ag 2.8	20% ccuy
			gr sand
140		SS Cu 12 ppm Pb 44 Zn 316 Ag 2.8	
			bge to gr sandy dol
			dk gr sand dol
		SS Cu 16 ppm Pb 32 Zn 552 Ag 2.8	
150			
		SS Cu 28 Pb 44 Zn 128 Ag 2.6	lt gr bx sandy dol
160			dk gr bx dol sand

Drill Hole: 78-101

Footage	Strat. Column	Assays	Description
160		ss Cu ε ppm Zn 40 Pb 240 Ag 2.ε	dk gr bx dol
			lt gr sand
			lt gr-or fos dol
170			no core recy
180			
			goss 15% recy
			bge sandy dol
190			gr dol
			fcr. or (Fe) stn
			gr bx dol (fos)
200			
210			
			no core recy to end of hole
220			

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-102
Dates Drilled: JULY 18-21 78
Driller: Opperman
Logged By: D HANSON

Location: OR BL 5E
Elevation: 2160'
Angle: -90°
Azimuth:

Stage	Strat. Column	Assays	Description
-99'			
0			obdn ! -
			bx gr dol some ch Sneg
			xl qtz
10			
20			
30			
40			
		Cu 1060 ppm Pb 356 Zn 5352 Ag 3.2	
		Core Cu 2280 ppm Pb 520 Zn 3352 Ag 8.4	dk br sand some dol Sneg
50			
		Core Cu 640 Pb 268 Zn 4320 Ag 2.2	lt gr bx dol - sandy
		SS Cu 580 ppm Pb 264 Zn 4368 Ag 2.4	bge to or sand some dol Sneg
		SS Cu 500 ppm Pb 304 Zn 4512 Ag 4.0	bge sandy dol
60		SS Cu 268 ppm Pb 248 Zn 3424 Ag 3.8	Eo. gr vuggy dol
			or sand
70		SS Cu 248 ppm Pb 216 Zn 3472 Ag 3.6	gr bx dol
		SS Cu 244 Pb 200 Zn 3264 Ag 3.2	gr to or sand
80		SS Cu 224 Zn 3336 Pb 200 Ag 3.6	
		← 83'	

Drill Hole: 78-102

Footage	Strat. Column	Assays	Description
80	/ *		gr dol · bx
	. /		Fe stn in fct
	/ *		
90	* /		Flesh colored dol · bx
	/ *		
	* /		
	/ *		
100	/	99	Rod stuck in sand
110			
120			
130			
140			
150			
160			

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-103
Dates Drilled: JULY 24 - 29 1978
Driller: Opperman
Logged By: D HANSEN

Location: GRID 3E
Elevation: 2100'
Angle: -90°
Azimuth:

Footage	Strat. Column	Assays	Description
1-258'		Cu, Pb, Zn in % Ag in OZ/TON	
		Core	
0		Cu .01 % Pb TR % Zn TR % Ag TR OZ/T	qtz Xls & vugs — v. por rcvy
10		Cu .01 Zn TR Pb .01 Ag TR	gr bx dol (some gr-br-g^ zones)
		Cu .01 Zn TR Pb TR Ag .02	
		Cu .01 Zn TR Pb TR Ag .03	
20	Ba	Cu .01 Zn .01 Pb .01 Ag .09	Barite Xls in fct
		Cu .01 Zn TR Pb .01 Ag .02	↓ bx porous vuggy wh dol & Xl qtz increasing Fe stn
30		Cu .02 Zn .08 Pb .01 Ag .06	hvy yell-or Fe stn in bx dol
		Cu .06 Zn .19 Pb TR Ag .06	
	XXXXX	SLUDGE	goss
40		Cu .02 Zn .03 Pb TR Ag TR (Cu .04 Zn .08 Pb .02 Ag TR)	g^ vuggy dol
		Cu .02 Zn .04 Pb .01 Ag TR	gr clay open vugs & Xl qtz
		Cu .03 Zn .26 Pb .01 Ag .01 (Cu .04 Pb .02 Zn .19 Ag TR)	goss - red sand
50		Cu .03 Zn .24 Pb .04 Ag .01	
		Cu .03 Zn .06 Pb TR Ag TR (Cu .03 Pb .02 Zn .18 Ag TR)	br sandy dol
		Cu .01 Zn .07 Pb TR Ag .01	gr br " "
60		Cu .01 Zn .18 Pb .01 Ag .01 (over)	anhydrite g^ dol & goss

Drill Hole: 78-103

...inge	Strat. Column	Assays	Description
		Core: see preceding page SLUDGE: Cu .03 %, Pb .02 %, Zn .20 %, Ag TR	
80	xxx		gr dol to gos
			E red? min cud be ruby jack
		Core: Cu .01 % Zn TR, Pb .08 Ag .02 SH	bge sand to bge dol
		Core: Cu .01 % Zn TR, Pb .09 Ag .01 SLUDGE: Cu .01, Pb .02, Zn .06, Ag R	
90			gr sandy dol
		Core: Cu .01 % Zn TR, Pb .18 Ag TR	
100			
			speckled dol or red & lt gr
		Core	
		Core: Cu .01, Pb TR, Zn TR, Ag .01 C3/T	
110			
120			'rusty' dol
			gr dol
130			strong green-purple mot dol
			dip 20°, coral
140			rusty & gr & lt gr speckled dol
			gr dol
			coral & brachs ... lt py
150			V. Sos - increasing py
			pyrite

Drill Hole: 78-103

Footage	Strat. Column	Assays	Description
		Cu, Pb, Zn in % Ag in oz/T	
160		Core	dol bx · dk gr-blk clasts in brn
			clasts inside of gr clasts (bx in bx
		Cu .01% Zn .02 %	in bx) poss fos vuggy
		Pb .01 & Ag .01 oz/T	py XI some bx py in dk gr.
			mtx dol
170		Cu .02% Zn .02	'weathered' py
		Pb TR Ag .01	poss skeletal fnags
		Cu .01 Zn .01	dk gr dol some py
		Pb TR Ag TR	
180		Cu .01 Zn .01	v. hvy py - vn
		Pb TR Ag .01	
		Cu .01 Zn TR	v hvy py diss in dk gr dol
		Pb TR Ag .01	
190		Cu .01 Zn TR	py in large blebs
		Pb TR Ag .01	
		Cu Zn TR	v. bx ltgr. wh dol
		Pb .04 Ag .02	Fe stn (oc) in fcts
		Cu .01 Zn TR	med gr dol
200		Pb .02 Ag .01	mot dol ltgr:wh
		Cu TR Zn TR	calc in fcts - vuggy
		Pb .01 Ag .01	oc stn (fe)
		Cu .01 Zn TR	mixed bnds ltgr:wh, dk gr.
210		Pb TR Ag TR	ē contrasting clasts
		Cu .01 Zn TR	py occ with dk dol
		Pb TR Ag .01	calc in fct
		Cu .01 Zn TR	
		Pb TR Ag TR	
220		Cu .01 Zn TR	ltgr 'speckled' bx dol
		Pb TR Ag .01	
		Cu .01 Zn TR	wh clasts - dk mtx ē py diss + blebs
		Pb TR Ag .01	
230		Cu .01 Zn TR	dk gr dol - wh 'speckled'
		Pb TR Ag .01	hvy py blebs
		Cu .01 Zn TR	v. mot bx dol
		Pb TR Ag .01	
240			

243

Drill Hole: 78-103

Footage	Strat. Column	Assays	Description
		Core see preceding pge	
240		Cu .01% Zn TR Pb TR Ag .01 g/T	lt gnbzdol Sct · silled with lt+dk gndol
250		Cu .01% Zn TR Pb TR Ag .01 g/T	
			no core recvd
		258	

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-104
Dates Drilled: AUG 1 - 6/78
Driller: Opperman
Logged By: D HANSEN

Location: OR BL 3W
Elevation: 1925
Angle: 60°
Azimuth: 60°

Footage	Strat. Column	Assays	Description
0-163'		Cu, Zn, Ag in %; Ag in oz/T	
		Core	
0			obdn: mixed pebbles mostly qtz (c lt py) & weathered dol 14% recvy
10		Core: Cu .03%, Pb .01%, Zn .04%, Ag .03 oz/T	
20		SLUDGE SAMPLES: Cu .02%, Pb .04, Zn .10, Ag .22 oz/T	
30		Sludge: Cu .02, Pb .03, Zn .11, Ag .18	granulated qtz-dol 50% recvy
40		Cu .01% Zn .16, Pb TR Ag .03 oz/T; Cu .01 Zn .13, Pb TR Ag .18; Cu .01 Zn .06, Pb TR Ag .18	c weathered; bx vuggy dol & qtz gravel 20% recvy
50		Cu .01 Zn .18, Pb TR Ag .01; MISSING; Sludge: Cu .01, Pb .02, Zn .15, Ag .21	dk gr dol sand; yell or Fe stn to goss; gr bx dol Fe stn
60		Cu .01 Zn .19, Pb TR Ag .26; Cu .02 Zn .05, Pb TR Ag .01; Cu .02 Zn .05, Pb TR Ag .02	qtz frag; 3% recvy
70		Cu .05, Pb TR, Zn .23, Ag .01; Sludge: Cu .06, Pb .05, Zn .20, Ag .02	dk gr bx dol c Fe stn
80		Cu .05, Pb .33, Zn .26, Ag .02; Sludge: Cu .05, Pb .06, Zn .15, Ag .01 (E3)	goss 10% recvy

Drill Hole: 78-104

Footage	Strat. Column	Assays	Description
		Cu, Pb, Zn in % Ag in oz/T	
		78 ← Cu .05 Pb TR Zn .31 Ag .03 — SLUDGE SAMPLES	
80	xxxxx /		goss
	/ x	Cu .05 Zn .08 Pb .01 Ag .03	dk gr bx dol ē dk crimson goss
	/	Cu .04 Zn .05 Pb .16 Ag TR	
	/	Cu .04 Zn .01 Pb .23 Ag .03	
90	* /		gr bx? dol sandy
	/ Pb	Cu .01 Zn .01 Pb TR Ag TR .58	Jacosite in fct
	/		
	/	Cu .01 Zn TR Pb .34 Ag .01	
100	/		gr vuggy dol 25% rcvy
	/	Cu .01 Zn .02 Pb .04 Ag TR	
	/		
	/	Cu .03 Zn .05 Pb .11 Ag .01	
110	xxxxx xxxxx		goss
	* /	Cu .10 Zn .27 Pb .30 Ag .32	
	* * x x		gr bx dol
	/ x	Cu .02 Zn .01 Pb .21 Ag .01	goss
120	* /		bx bx dol
	/ *	Cu .01 Zn TR Pb .02 Ag .01	Odd dendritic Mn? growths on fct
	/		gr bx dol
	/		strong Fe stn end of sandy units
	/ *		gr bx dol calc mtx
130	/ *		
	/ x		dk salt & pepper mtx with clasts
	/		
	/		
140	/		mostly pl. vuggy dol
	/		
	/		
	~~		graph on stk
	/ x		gr-wh bx dol
150	/ *		
	/ *		increasing vugs
	* □		py in fct
	x /		
160	/ x		

163

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-105
Dates Drilled: AUG 11 to 16 / 78
Driller: Oppeman
Logged By:

Location:
Elevation:
Angle:
Azimuth:

Footage	Strat. Column	Assays	Description
0-258'		Cu Zn Pb in % Ag in oz/T	
0	Cu	Core: Cu .03, Pb TR, Zn .02, Ag TR Sludge Sample: Cu .40, Pb .40, Zn .07, Ag .24	dk gr bx dol & crinoids & mal. wh dol mtx 10% rcvy
10			dk gr bx lmst & crinoids wh dol mtx 50% rcvy
		Cu .06 Zn .01 Pb .01 Ag .01 oz/T Cu .04 Zn .03 Pb .02 Ag .01 Cu .34 Pb .13 Zn .05 Ag .03	br sand & qtz-lmst frag
20			dk gr bx lmst
		Cu .02 Zn .04 Pb TR Ag .02 Cu .02 Zn TR Pb .03 Ag TR Cu .26 Pb .10 Zn .04 Ag .03	med gr bx lmst 100% rcvy wh calc mtx
30			med gr dol bx 20% rcvy
		Cu .01 Zn .01 Pb .01 Ag TR	
			br sand 100% rcvy
40		Cu .01 Zn .01 Pb .01 Ag .01	qtz vn med gr bx lmst & crinoid 50% rcvy
		Cu .01 Zn .03 Pb TR Ag .01	red-br sandy dol-lmst
		Cu .01 Zn .14 Pb .02 Ag .01	gr bx lmst
50			red br sandy dol hvy Fe stn
		Cu .01 Zn .12 Pb .01 Ag .01	
		Cu .02 Zn .01 Pb .03 Ag .09	mot red-purple & gr lmst 100% rcvy
60		Cu .02 Zn .02 Pb .01 Ag TR	gr dol grn tinge Fe stn 100% rcvy
70		MISSING	
			bge dol Fe stn
80		Cu .01 Zn .01 Pb TR Ag TR	

Drill Hole: 78-105

Footage	Strat. Column	Assays	Description
80			blue-grn dol Fe stn in SS
			100% rouy
90			
100			
			2" of brecks
			dip ~ 55°
110			hvy Fe stn
120			Sas gr lmst
130			brecks
			brecks
140			gr lmst ⊂ ½" py blebs 80% rouy
			gr mot lmst some py & brecks
150			dis py goethite
			dk gr-blk lmst ⊂ py
160			

Drill Hole: 78-105

Footage	Strat. Column	Assays	Description
160			dk gr bix lmst ē py
			9" os wh dol
			dk gr lmst to dol
170			6" clast of lt gr bx dol py w edges
			lt gr bx dol, vuggy calc ē gphy zones
			increase bx py in Sct
			gtz vn gr mel bx dol
180			gtz in Sct
			lt gr bx dol
			small vugs calc
190			
			bit in vug
200			dk gr dol bx wh dol mtx
			finely dis py in Sets
			lt gr bx dol. dk gr dol in Sct
210			diss blebs of py
			mel lt gr bx dol
220			vuggy dk gr dol in Sct
			dk gr bx dol wh mtx
230			diss calc, diss py, gphy in Sct
			lt gr mel bx dol
			cals in Sets
240			

Drill Hole: 78-105

Footage	Strat. Column	Assays	Description
240			
			11 gr mat bx dol
			Sew calc vugs
250			
		258	

RIO ALTO EXPLORATION LIMITED

Drill Hole: 78-106
Dates Drilled: AUG 17-23/78
Driller: Opperman
Logged By: D HANSEN

Location: OR 5.45 0.2E
Elevation: 1990'
Angle: -90°
Azimuth:

Footage	Strat. Column	Assays	Description
0-178'		Cu Pb Zn in % Ag in oz/T	
		Core: Cu .01 % Pb TR Zn .02 Ag TR — Sludge 0-13': Cu .2% Pb 1.35% Zn .05% Ag 1.5 oz/T	Fe stn qtz 1% mcy
0			
10			Strong Fe stn qtz (or-blk) 10% mcy
		Cu .01 Zn TR Pb TR Ag .01	
20		Cu .01 Zn TR Pb TR Ag TR	
		Cu .02 Zn TR Pb .04 Ag .01	yelkw clay
30		Cu .03 Zn TR Pb .06 Ag .06	red goss
		Cu .01 Zn .01 Pb .01 Ag .01	gr mot bx dol calc in fct
40		Cu .01 Zn TR Pb .01 Ag .01	
		Cu .01 Zn TR Pb .01 Ag .01	lt gr bx dol
50		Cu .01 Zn TR Pb .01 Ag .01	vugs of dol xl & chalky coating
			bit & dol xl in fct
60			dip 34°
		+ Zn Cu	pass auc calcite
70			lt gr mot bx dol
80			

Drill Hole: 78-106

Footage	Strat. Column	Assays	Description
80			gr wh mot dol
			vugs of powdery calc
90			
100			as above
110			
120			gr fi gnd bedded dol
			gr bx dol calc in vugs
130			gr mot bx dol
			dk gr dol clasts wh mtx (mosaic)
140			mot bx dol calc mtx
150			blk arg dol ± py XL
			gr vuggy bx dol ± dol XL
160			some py in SC

Drill Hole: 78-106

Footage	Strat. Column	Assays	Description
160	x /		gr vuggy bx dol
	/ x		
	x /		py in solvres
170	/ x		
	/		med gr bx dol
	x /		wh dol in Sct
	/ x		
180	/		
	x /		increasing vuggy dol
	/ x		lt py diss in Sct
	x /		
190	/		
	/ x		H py in Sct
	/		
	/ x		
	/	196	

PAUL S. WHITE & ASSOCIATES LTD.

P.O. BOX 4550
WHITEHORSE, YUKON Y1A 2R8

WHITEHORSE OFFICE
Mile 922, Alaska Highway
(403) 633-2235

ROSS RIVER OFFICE
Lot 95, Ross River
(403) 969-2230

27 DECEMBER 1978

STATEMENT OF SUPERVISION OF 1978
RIO ALTO EXPLORATIONS LTD. 1978
RUSTY SPRINGS Y.T. EXPLRATION.

THIS DECLARATION IS TO CERTIFY THAT I, PAUL S. WHITE, PROFESSIONAL MINING ENGINEER, OF THE CITY OF WHITEHORSE IN THE YUKON TERRITORY, DID BETWEEN THE DATES OF 1 April 1978 and 1 October 1978, PERFORM OR DIRECT AND PERSONALLY SUPERVISE THE WORK DESCRIBED IN THE ATTACHED REPORT BY FREDERICK M. BECK, CONSULTING GEOLOGIST, ENTITLED " RUSTY SPRINGS PROSPECT YUKON TERRITORY * 1978 EXPLORATION SUMMARY", and that THE WORK DESCRIBED THEREIN IS ACCURATELY REPRESENTED BY THE AFORESAID BECK. I FURTHER CERTIFY THAT I PERSONALLY CONTRACTED THE PERFORMANCE OF THE CORE DIAMOND DRILLING IN THE AMOUNT OF APPROXIMATELY 6200 LINEAL FEET OF DRILLING IN SIZES AQ (5000 Feet) AND BQ (1200 FEET).

RECEIVED DEC 28 1978 MINING RECORDER LAND AGENT DAWSON, Y.T. I.A. & N.D.

CERTIFIED AT WHITEHORSE YUKON THIS
27th day of DECEMBER A.D. 1978.

PAUL S. WHITE P. ENG.

Association of Professional Engineers of the Yukon Territory
PAUL S. WHITE
ENGINEER

STATEMENT OF EXPENDITURES
1978 RUSTY SPRINGS PROJECT

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 AS LISTED ON PAGES 1-7 INCLUSIVE OF THE SCHEDULE ATTACHED HERETO TO THE SUM OF $400,000.00 (FOUR HUNDRED THOUSAND DOLLARS) AND HAVE CAUSED TO BE EXPENDED UNDER MY SUPERVISION AND DIRECTION A FURTHER SUM OF $50,000.00 (FIFTY THOUSAND DOLLARS) BY RIO ALTO EXPLRATIONS LTD. FOR A TOTAL 1978 EXPENDITURE OF $ 450,000.00 (FOUR HUNDRED FIFTY THOUSAND DOLLARS) ON DIAMOND DRILLING, LINE CUTTING, SOIL SAMPLING , GEOLOGICAL MAPPING, PROSPECTING, SUPERVISION AND OVERHEAD DURING THE PERIOD 1 April 1978- 1 September 1978 inclusive ON THE FOLLOWING MINERAL CLAIMS LOCATED ON MAP SHEETS 116 K 8 and 116 K 9 in the DAWSON MINING DISTRICT OF THE YUKON TERRITORY, CANADA:

RIO 1-104 M.C.	inclusive	YA 2826- 2855, 10160-10203
NATE 3-14 M.C.	inclusive	YA 2902- 2913
CARB 1-16 M.C.	inclusive	YA 2886-2901
HG 1-146 M.C.	inclusive	YA 10944-11000,29401-29489
JP 1-54 M.C.	inclusive	YA 29490-29543
MOOSE 1-48 M.C.	inclusive	YA 10820-10867

THE WORK DESCRIBED IN CONSULTING GEOLOGIST FREDERICK M. BECK's Report ENTITLED "RUSTY SPRINGS PROJECT-YUKON TERRITORY" IS THE SUBJECT OF THE ENCLOSED EXPENDITURES AND THE DRILL CORE OBTAINED IS STORED ON THE SUBJECT PROPERTY AT THE RUSTY SPRINGS CAMP.
THE FOLLOWING PERSONNEL PERFORMED THE SUBJECT WORK:

MORLEY BARKER - LINE CUTTER
ANGUS MCINTYRE- " "
ALEX DRIVER - " "
MIKE WOODS - " "
DEAN WHITE - PROSPECTOR
DAVID WICKHAM- SOIL SAMPLER
PAUL POSCENTE - SOIL SAMPLER
PETER GAMMEL - SOIL SAMPLER
SUSAN WOODS -COOK
JILLIAN LIND - COOK
JEAN WHITE - COOK
JOE JACKSON - CAMP ATTENDANT

JOE BARR- HELICOPTER PILOT
HOWARD DAMRON- HELICOPTER PILOT
ARNOLD KENDRICK- DRILLER
PETE OPPERMAN - DRILLER
MARK GERRARD- DRILL HELPER
MIKE CAOUETTE- DRILL HELPER
DAVID HANSEN- GEOLOGIST
FRED BECK- GEOLOGIST
R. TERMUENDE- GEOLOGIST
PAUL S. WHITE- ENGINEER & PROGRAM MANAGEMENT.

CERTIFIED AT WHITEHORSE YUKON THIS
27 th DAY OF DECEMBER A.D. 1978

Association of Professional Engineers of the Yukon Territory
PAUL S. WHITE
ENGINEER

PAUL S. [redacted] P. ENG.

LIST OF EXPENSE CHEQUES PAID BY PAUL S. WHITE MANAGEMENT ON BEHALF OF

RIO ALTO EXPLORATIONS LTD.

1978 RUSTY SPRINGS PROJECT

CHEQUE NO.	DATE	RECIPIENT	CODING	AMOUNT
135	31/3/78	CANAMET SALES LTD...	D	$ 77.00
136	1/4/78	General Enterprises Ltd.	c	48.79
144	10/4/78	J. White Expediting	c	300.00
146	24/4/78	WORKMEN'S COMPENSATION	c	183.50
152	29/4/78	Yukon Tire	c	29.00
154	17/5/78	White Pass Petroleum	c	2747.73
155	18/5/78	Northern Metallic Sales Ltd.	c	268.45
157	19/5/78	Northern Systems	c	181.00
158	19/5/78	Receiver General Canada-Radio	c	36.00
160	19/5/78	Elden Explorations Ltd.	c	303.10
163	19/5/78	Food Fair Ltd.	c	729.48
162	19/5/78	Whitehorse Esso	c	86.60
161	19/5/78	City of Whitehorse-Traffic	c	28.00
164	19/5/78	Yukon Tire	c	22.00
165	19/5/78	DCW trading Post	c	60.98
166	20/5/78	Whitehouse Motel	c	1400.00
167	20/5/78	Ursula Oltmann-Truck Rental	c	200.00
168	22/5/78	Northward Airlines-PSW	c	84.25
169	23/5/78	Norcrown Airlines	c	1210.00
170	25/5/78	Yukon Tire	c	138.50
171	26/5/78	Yukon Freight Lines	D	76.00
173	26/5/78	Burns Meats	C	801.91
174	16/5/78	Food Fair	c	391.58
175	27/5/78	A. Kendrick-Expense	D	154.87
176	29/5/78	Advance to MBW Linecutter	c	750.00
177	29/5/78	" " "	c	250.00
178	29/5/78	" " "	c	750.00
179	1/6/78	Northern Metalic Sales Ltd.	D	636.60
180	1/6/78	D.R. Hameyer Enterprises	D	33.50
181	1/6/78	Northward Airlines - Freight	C	177.60
182	1/6/78	Automarine Electric-Freight	c	191.28
183	2/6/78	David Wickham-Expense	c	142.45
184	2/6/78	Northern Metalic Sales Ltd.	c	35.90
185	2/6/78	T.Andre Mobile Welding -Freight	c	252.00
186	4/6/78	Monte Carlo- Grocery	c	307.30
187	5/6/78	Klondike Motors Ltd.-Propane	c	58.00
188	5/6/78	Receiver Genral of Canada-Fees	c	53.75
189	5/6/78	White Pass Petroleum	c	2897.86
190	7/6/78	Yukon Freight Lines	D	230.69
191	9/6/78	Nelson's Hardware	c	34.67
192	9/6/78	Von Lengerke @ Assoc.-Prints	c	189.68
193	9/6/78	Northern Metalic Sales Ltd.	c	51.02
194	9/6/78	Northern Safety Supplies Ltd.	c	416.93
195	10/6/78	Yukon Fibre Glass Ltd.- tank	c	550.00

Rio Alto Rusty Springs 1978 Project- List of Expense Cheques-Continued

Cheque No.	Date	Recipient	Coding	Amount
196	13/6/78	White Pass Petroleum	c	$ 2823.63
197	13/6/78	White Pass Petroleum	c	26.52
198	13/6/78	Receiver General- Fees	c	255.00
199	15/6/78	Northern Metalic Sales Ltd.	c	12.85
200	10/6/78	Woolworth's	c	36.69
201	16/6/78	Arctic Safety Supply	c	127.76
202	16/6/78	Nelson's Ltd.	c	48.04
203	16/6/78	General Enterprises Ltd.	c	314.39
204	16/6/78	Norgetown Laundry - RWT-PSW	c	32.50
205	16/6/78	Burn's Meats	c	133.78
206	19/6/78	Yukon Freight Lines- Pump	c	71.70
207	19/6/78	Beaver Lumber	c	247.18
208	19/6/78	Fred's Plumbing & Heating	c	207.73
209	19/6/78	Woolworth's	c	113.97
210	19/6/78	Supervalu Foods	c	65.28
211	20/6/78	Benelle Motel-PP & PG	c	61.00
212	20/6/78	Northward Airlines	c	84.25
213	20/6/78	White Pass Petroleum	c	360.54
214	22/6/78	Automarine Electric	D	49.90
215	22/6/78	K & R Electric	D	80.45
216	22/6/78	Imperial Oil Ltd.	D	29.70
217	22/6/78	Burns Meats	c	99.45
218	22/6/78	A. Kendrick Drilling	D	250.00
219	22/6/78	Canamet Sales Ltd.	D	964.44
220	22/6/78	CPAIR- freight	D	68.90
221	22/6/78	J.White- Food Fair reimburse.	C	63.61
222	26/6/78	Beaver Lumber	C	65.87
225	29/6/78	J. Jackson- Advance	C	123.20
224	27/6/78	MBW Surveys-Marline	M	5000.00
223	29/6/78	Beaver Lumber	C	22.04
226	30/6/78	Duncan Sheet Metal	c	273.00
227	30/6/78	Canadian Propane	c	2103.18
228	30/6/78	Northern Safety Supply	c	680.81
229	1/7/78	Finning Tractor	D	98.41
230	1/7/78	Whitehouse Motel-telephone +	C	200.00
231	1/7/78	A.Leary- Piper Cub expenses	c	300.00
232	6/7/78	Ross River Store	c	274.53
233	7/7/78	Ross River Store	c	67.48
234	7/7/78	Kendrick Drilling	D	1724.90
235	7/7/78	S.Opperman (Piet)	D	500.00
236	7/7/78	P.Opperman	D	2539.35
237	7/7/78	M. Caouette	D	3125.70
238	7/7/78	M. Gerrard	D	1261.40
239	7/7/78	D. Wickham	C	1250.00
240	7/7/78	TransNorth Turbo Air Ltd.	C	4382.75

Rio Alto Rusty Springs 1978 Project- List of Expense Cheques-Continued

Cheque No.	Date	Recipient	Coding	Amount
241	7/7/78	Transwest Helicopters Ltd.	C	$ 8840.70
242	7/7/78	Receiver General-Winter Road	C	816.60
243	7/7/78	Atlas Travel- Crew Expense	C	428.50
244	7/7/78	Yukon Explosives Ltd.	C	60.00
245	7/7/78	Stirling Expediting Ltd.	C	25.00
246	7/7/78	Tintina Expediting Ltd.	C	1.62
247	7/7/78	Jean White-Cooks Wages & Expense	C	1199.30
248	12/7/78	Imperial Oil Ltd.	D	142.68
249	12/7/78	Northern Metalic Sales Ltd.	D	362.58
250	12/7/78	Beaver Lumber	C	14.35
251	12/7/78	Burns Meats	C	324.22
252	12/7/78	Nelsons Ltd.	C	49.50
253	12/7/78	Food Fair	C	713.84
254	12/7/78	General Enterprises Ltd.	C	69.03
255	12/7/78	White Pass Petroleum	C	2723.63
256	12/7/78	Jillian Lynn - Cook	C	1509.68
257	12/7/78	Hougen's Ltd.	C	311.88
258	14/7/78	Imperial Oil Ltd.	D	17.25
259	14/7/78	Yukon Maps - Gallery Mac's	C	18.25
260	15/7/78	CPAIR -Freight	D	18.20
261	16/7/78	T.A. Mobile Welding	D	70.00
262	17/7/78	Mike Woods- Truck Freight	C	200.00
263	17/7/78	Yukon Freight Lines Ltd.	D	465.68
264	17/7/78	Whitehorse Assay Office	C	2661.25
265	17/7/78	Mike Woods- Truck freight	C	200.00
266	18/7/78	Food Fair	C	974.64
267	18/7/78	White Pass Petroleum	C	1209.74
268	18/7/78	Archer Cathro and Associates	M	939.30
269	15/7/78	Eldorado Hotel	C	88.55
270	18/7/78	DCW Trading Post	C	2848.87
271	20/7/78	D. Wickham- Dawson Expense	C	200.00
272	20/7/78	MBW Surveys - Marline advance	M	2000.00
273	21/7/78	General Enterprises Ltd.	D	75.00
274	21/7/78	Western Tech Industries	C	352.00
274A	21/7/78	Paul S. White& Associates-Marline	M	10000.00
275	21/7/78	Mike Woods- Truck freight pay	C	240.00
276	23/7/78	Yukon Airways Ltd.	C	789.00
277	23/7/78	Workmens Compensation Board	C	75.00
278	23/7/78	Trade Winds Aviation	C	247.50
279	23/7/78	Transwest Helicopters	C	6749.90
280	23/7/78	Canadian Longyear Ltd.	D	19665.81

Rusty Springs 1978 Project- List of Expense Cheques- Continued

Cheque No.	Date	Recipient	Coding	Amount
281	23/7/78	Total North Communications	C	$ 90.00
282	23/7/78	Van Helden Agencies	D	1500.00
283	23/7/78	Trans North Turbo Air Ltd.	C	2278.25
284	23/7/78	Kilrich Industries Ltd.	C	89.00
285	23/7/78	Frac Fluids Inc.	C	1927.24
286	23/7/78	Yukon Airways Ltd.	C	1124.95
287	23/7/78	Wink International Drilling	D	174.70
288	23/7/78	EDA Instruments Inc Marline	M	553.00
290	23/7/78	HB Resources	D	18000.00
291	24/7/78	Paul S. White and Associates	D	20000.00
292	24/7/78	J. White= Expediting Expenses	C	250.00
167A	24/4/78	PSW Expense	C	100.00
169A	24/4/78	MBW Surveys- Line cutting	C	1000.00
167B	5/5/78	PSW Expense	C	250.00
RA 1	17/5/78	MBW Surveys-Line Cutting	C	1000.00
RA 2	17/5/78	Kendrick Drilling Advance	D	2000.00
RA 3	16/5/78	Murdochs Watch Repair	C	74.00
RA 4	27/5/78	Macs Fireweed Books	C	19.45
RA 5	14/5/78	Welcome Inn Expense	C	108.35
RA 6	1/6/78	Jacobs Industries Ltd.	D	13.00
RA 7	10/6/78	Nelsons Ltd.	D	80.72
RA 8	16/6/78	Igloo Sporting Goods- Packs	C	179.90
M1	28/6/78	Paul S. White and Associates	C	10000.00
RAX 272A	20/7/78	Paul S. White and Associates	D	10000.00
293	24/7/78	Food Fair	C	275.42
294	24/7/78	Burns Meats	C	335.47
295	25/7/78	City Whitehorse Traffic	C	5.00
296	27/7/78	Yukon Chamber of Mines	C	115.00
297	28/7/78	Midnight Sun Drilling	D	105.00
298	28/7/78	Whitehorse Esso	C	29.70
299	29/7/78	Yukon Airways Ltd	C	831.70
300	29/7/78	Yukon Airwyas Ltd.	C	25100.95
301	31/7/78	J. White- Expediting Expenses	C	200.00
302	1/8/78	Burns Foods	C	315.26
303	31/7/78	Horwoods Dept store	C	140.79
304	31/7/78	Food Fair	C	363.34
305	31/7/78	General Enterprises Ltd	C	400.00
306	1/8/78	Jacobs Industries Ltd.	D	22.00
307	2/8/78	Northward Airlines Ltd.	C	19.04
308	2/8/78	Canmet Sales Ltd.	D	121.83
309	4/8/78	CPAIR	D	36.45
310	8/8/78	White Pass Petroleum	C	2491.83

Rio Alto Rusty Springs 1978 Project- List of Expense Cheques Continued

Cheque No.	Date	Recipient	Coding	Amount
311	1/8/78	Kendrick Drilling	D	$ 1852.00
312	1/8/78	P. Opperman	D	1128.70
313	1/8/78	S. Opperman (Piet)	D	500.00
314	1/8/78	M. Caouette	D	1449.60
315	1/8/78	M. Gerrard	D	1244.40
316	1/8/78	S. Woods	C	1000.00
317	1/8/78	D. White	C	2000.00
318	1/8/78	J. Jackson	C	1000.00
319	8/8/78	MBW Surveys Marline	M	2500.00
320	14/8/78	Food Fair	C	614.19
321	15/8/78	Yukon Airways Ltd.	C	11412.60
322	14/8/78	K & R Electric	D	23.75
323	14/8/78	Yukon Tire Centre	C	55.25
324	16/8/78	White Pass Petroleum	C	2580.82
325	18/8/78	PSW Cash for Dawson Expense	C	500.00
326	19/8/78	Monte Carlo Ltd. Meals	C	91.01
327	20/8/78	Whitehouse Motel	C	50.00
328	22/8/78	Yukon Airways Ltd.	C	760.00 ~~11412.60~~
329	21/8/78	M. Caouette	D	250.00
330	21/8/78	M. Gerrard	D	250.00
331	21/8/78	M. Caouette	D	1335.50
332	21/8/78	M. Gerrard	D	1290.20
333	24/8/78	Jacobs Industries	D	27.00
334	21/8/78	M. Gerrard Expenses	D	66.90
RAX	31/8/78	Whitehouse Motel	C	313.50
335	25/8/78	White Pass Petroleum	C	2723.63
336	26/8/78	Kendrick Drilling	D	8172.10
337	26/8/78	E. Bennett-Advance Kendrick	D	250.00
338	26/8/78	A. Kendrick	D	500.00
339	26/8/78	A. Kendrick	D	500.00
340	28/8/78	PSW- Exodus Expenses	C	500.00
341	28/8/78	S. Woods	C	500.00
342	28/8/78	J. Jackson	C	500.00
343	28/8/78	P. Opperman	D	2000.00
344	28/8/78	P. Opperman	D	1797.80
345	30/8/78	S. Woods	C	1000.00
346	30/8/78	J. Jackson	C	1000.00
348	31/8/78	D. Wickham	C	582.06
349	8/9/78	Yukon Salvage	C	56.95
350	8/9/78	Receiver General-Marline	M	920.00
351	7/9/78	Whitehorse Star Stationary	C	17.90
352	7/9/78	Trade Winds Aviation	M	320.00
353	7/9/78	CPAIR Freight	D	45.86
354	7/9/78	CNTEL	C	521.70
355	7/9/78	Frontier Freightlines	C	162.77
356	7/9/78	Frontier Freightlines	C	94.60

Rio Alto Rusty Springs 1978 Project-List of Expense Cheques-Continued

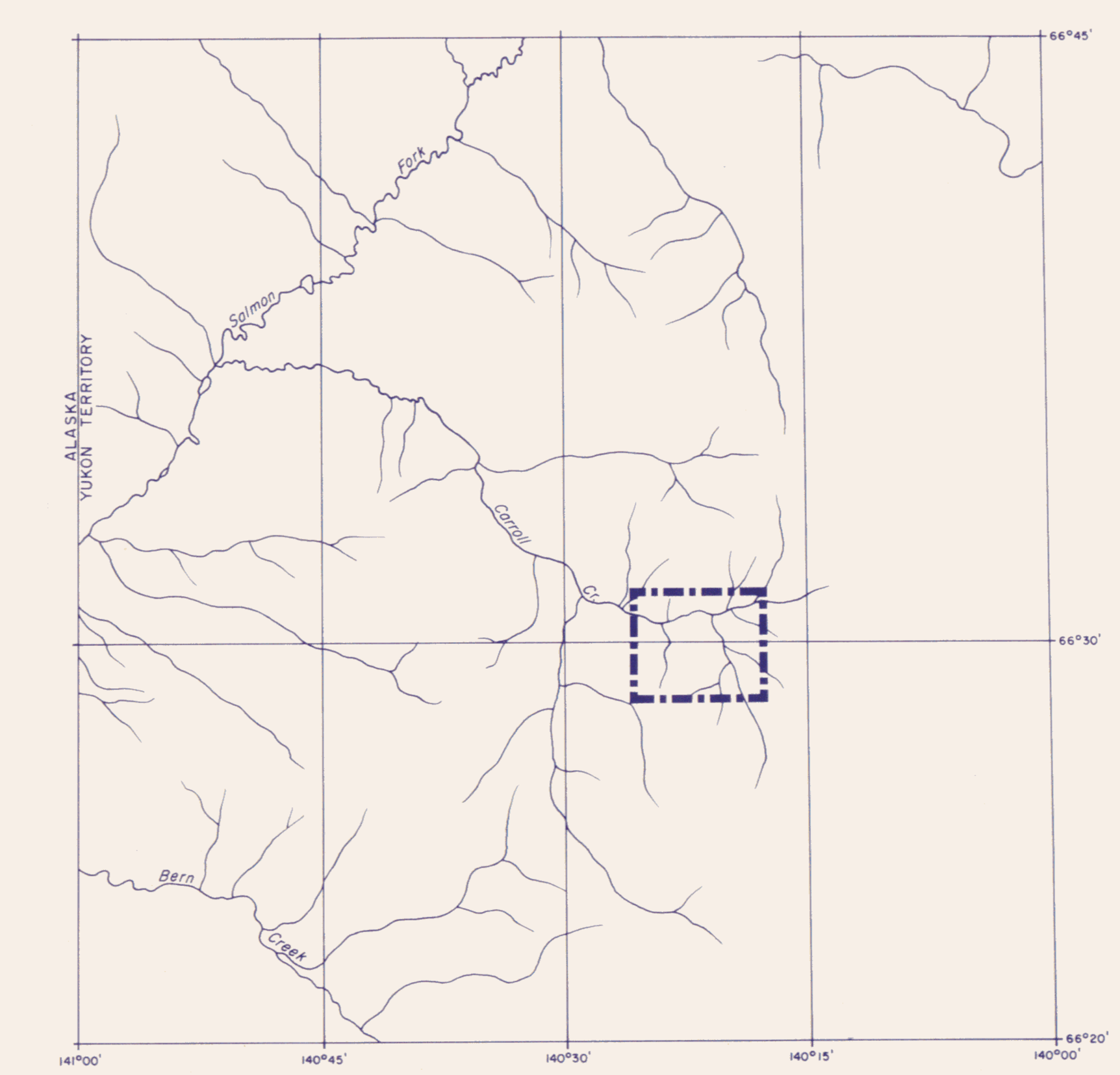
Cheque No.	Date	Recipient	Coding	Amount
357	7/9/78	Whitehorse Assay Office	C	$ 999.00
358	7/9/78	Wink International Drilling	D	567.62
359	7/9/78	J. & J. Emporium	C	61.10
360	7/9/78	DCW Trading Post	C	487.37
361	7/9/78	EDA Instruments	M	553.00
362	7/9/78	Frac Fluids Inc	C	2078.45
363	7/9/78	Yukon Airwyas Ltd.	C	19536.00
364	13/9/78	CPAIR (Hansen)	C	169.00
365	7/9/78	M. Caouette	D	2036.75
366	15/9/78	J. Cunningham	C	175.00
367	15/9/78	Receiver General of Canada	C & D	8551.02
368	17/9/78	Porter Creek Texaco	C	12.00
369	21/9/78	Von Lengerke & Associates	C	31.75
370	1/10/78	Whitehouse Motel	C	200.00
371	2/10/78	H. Damron Expenses	C	20.00
372	2/10/78	J. & J. Emporium	C	54.00
373	7/10/78	Cordilleran Engineering	C	745.00
374	7/10/78	Tintina Expediting	C	60.00
375	7/10/78	DCW Trading Post	C	794.00
376	7/10/78	Wink International Drilling	D	207.35
377	7/10/78	Workmens Compensation Board	C	75.00
378	7/10/78	Total North Communications	C	76.34
379	7/10/78	CNTEL	C	317.68
380	7/10/78	Yukon Explosives	C	101.38
381	7/10/78	Yukon Airways Ltd.	M	819.00
384	7/10/78	Tradewinds Aviation Ltd	AM	873.00
382	7/10/78	Trans North Turbo Air	M	1612.47
383	7/10/78	Yukon Airways Ltd.	C	6891.40
385	7/10/78	TransWest Helicopters ltd	C	3825.35
386	7/10/78	Whitehorse Assay Office	C	4125.65
387	7/10/78	E. Tizya	C	100.00
388	7/10/78	E. Tizya	C	100.00
389	7/10/78	E. Tizya	C	100.00
390	7/10/78	E. Tizya Contribution Old Crow	C	200.00
391	12/10/78	E. Caron Diamond Drilling	C	400.00
392	17/10/78	B. Ennis Contract Drafting	M	500.00
393	20/10/78	Canadian Longyear Ltd.	D	21144.85
394	24/10/78	Robert Ambrose-Fuel Bladders	C	3000.00
395	26/10/78	Ross River Community	D	150.00
396	26/10/78	Trans North Turbo Air RR	C	55.00
397	26/10/78	CNTEL	C	131.81
398	26/10/78	Bank of NS Chargex	CD	841.08
399				
400	30/10/78	Rio Alto Fees to Receiver Gen	C	9160.00
401	15/9/78	M. Gerrard Final	D	551.73
402	7/11/78	J. White- A. Kendrick drill	D	250.00
403	15/11/78	Whitehorse Esso- Dodge	C	163.75
405	16/11/78	D. Robertson- Services	C	360.00

Rio Alto Rusty Springs 1978 Project- List of Expense Cheques- Continued

Cheque No.	Date	Recipient	Coding	Amount
406	15/11/78	Cash PSW Expense	C	$ 150.00
407	18/11/78	General Enterprises Ltd.	C	95.95
408	21/11/78	General Enterprises Ltd	C	47.60
409	22/11/78	K & R Electric	D	189.00
411	23/11/78	R.E. Collons Contract Drafting	M	360.00
410	23/11/78	Von Lengerke & Associates	M	13.79
412	24/11/78	Yukon Honda	C	70.00
415	27/11/78	Bailey Richardson Insurance	C	299.00
416	27/11/78	Transnorth Turbo Air Ltd.	M	715.70
417	27/11/78	Bailey Richardson-GMC	C	81.00
420	27/11/78	Whitehorse Assay Office Ltd.	C	2494.75
419	27/11/78	Yukon Freight Lines	C	142.91
413	27/11/78	CN Telecommunications	C	205.96
404	15/11/78	N.R. Devitt- Accounting	C	1000.00
414	26/11/78	Terradex Corp.$674 US	M	808.80
418	27/11/78	Transwest Helicopters Ltd..	C	2824.00
421	9/12/78	R.E. Collins- Drafting	C	684.25
422	27/12/78	Yukon Honda-	C	93.41
423	27/12/78	D. Wickham- Final	C	402.48
424	27/12/78	P. Opperman - Final	D	463.05
425	27/12/78	P.S. White & Associates Ltd	C	506.59
Invoice Transfers		Yukon Resource Ventures Ltd.	D	13333.33
		Yukon Resource Ventures Ltd.	D	21500.00
		Paul S. White & Associates	C	13726.00
426		Yukon Resource Ventures Ltd.	D	10000.00

TOTAL 1978 Expenditures - RIO ALTO	$ 445,500.00
LESS: CODE M FOR MARLINE OIL EX. LTD. COSTS OF QUARTET LAKES PROGRAM	- 25,000.00
Less: COSTS OF SEPTEMBER 1978 BULK SAMPLING PROGRAM	- 17,500.00
TOTAL COST RUSTY SPRINGS 1978 Summer Program	$ 400,000.00

INDEX MAP



LEGEND

PERMIAN		
ss	Sandstone	
cong	Conglomerate	Jungle Creek Formation
arg dol	Argillaceous dolomite	
PENNSYLVANIAN		
lmst	Limestone	Ettrain Formation
PENNSYLVANIAN ? AND MISSISSIPPIAN		
blk sh	Black shale	Hart River Formation ?
DEVONIAN	Upper	
sil sh	Siliceous shale	Unnamed Shale Unit
	Middle	
bx ch	Brecciated chert	
sil dol	Siliceous dolomite	Ogilvie Formation
bx dol	Brecciated dolomite	
dol	Dolomite	

⊗	Mineralized showing
~~	Fault
◯	Outcrop
– – –	Inferred contact

GEOLOGIC AND TOPOGRAPHIC MAP

RUSTY SPRINGS AREA

YUKON TERRITORY

CONTOUR INTERVAL : 50 AND 100 FEET

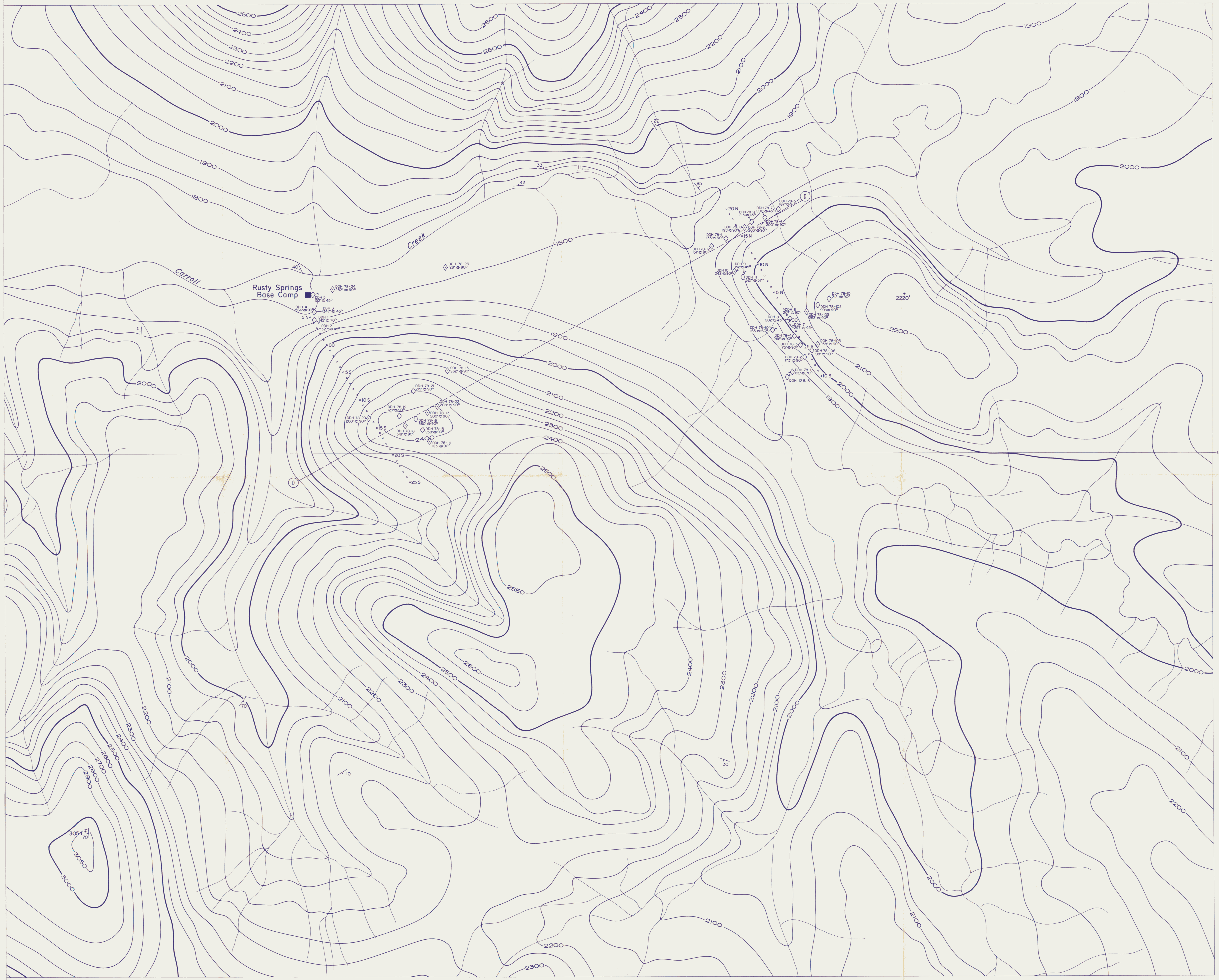
SCALE : 1 INCH TO 500 FEET

FEET 0 500 1000 1500 2000 2500 3000 FEET

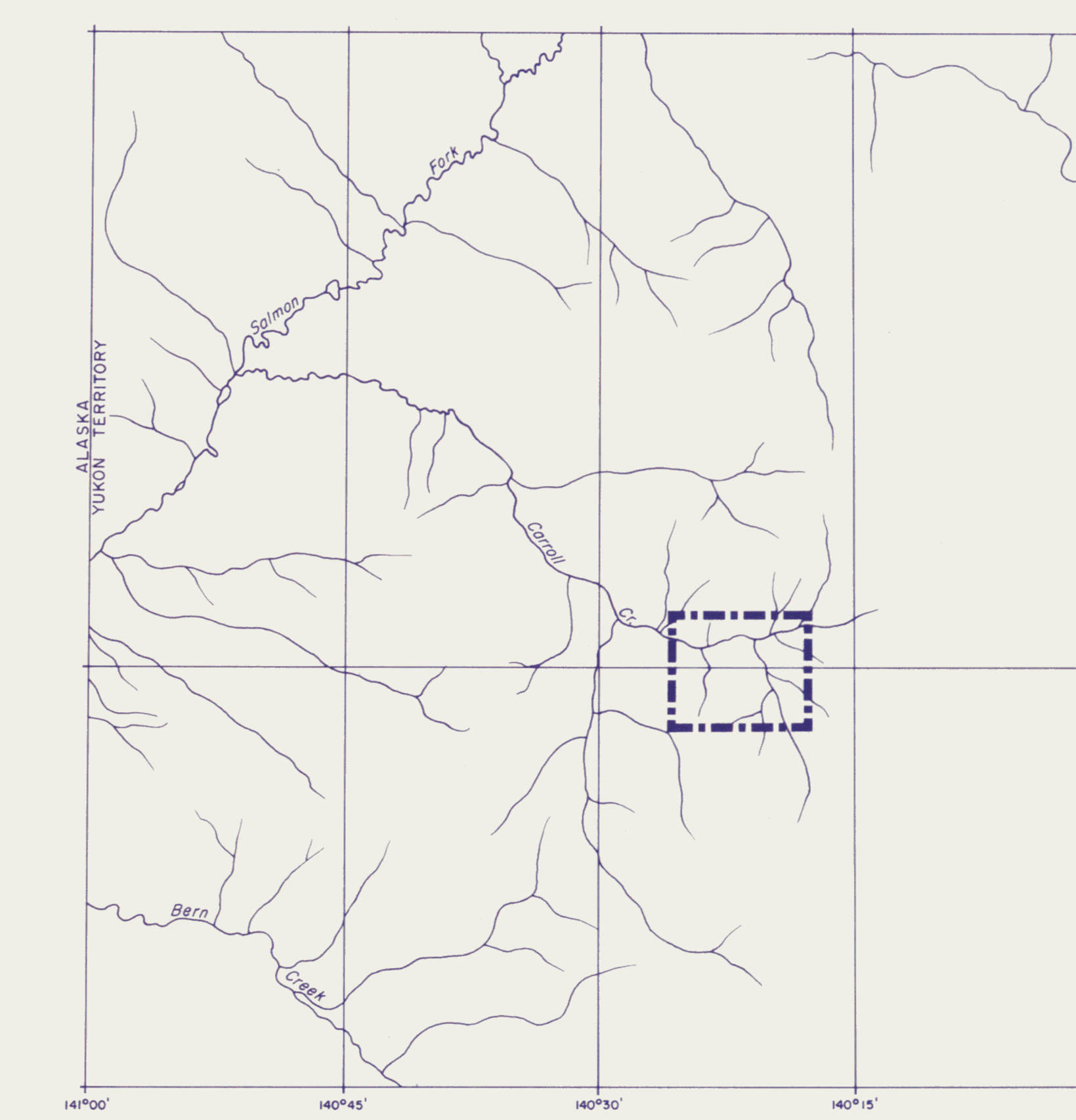
— Geology by —
DAVID HANSEN
Sept. 1978

— Prepared for —
RIO ALTO EXPLORATION LTD.

— Drafted by —
V. ZAY SMITH ASSOCIATES LTD.
CALGARY, ALBERTA
1978



INDEX MAP



LEGEND

DDH 78-1 Diamond drill hole

D — D' Location of geologic cross section through Mike and Orma shows (see accompanying illustration)

RUSTY SPRINGS AREA

YUKON TERRITORY

SHOWING:
DIAMOND DRILL HOLE LOCATIONS

CONTOUR INTERVAL : 50 AND 100 FEET

SCALE : 1 INCH TO 500 FEET

FEET 0 500 1000 1500 2000 2500 3000 FEET

Geology by
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Sept. 1978

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CALGARY, ALBERTA
1978

LEGEND

- qtz — Quartzite
- dol — Dolomite
- bx dol — Brecciated dolomite
- gos — Gossan
- btm — Bitumen
- DDH 78-105 — Diamond drill hole
- 258' — dk dol / lt gy dol — Facies change

GEOLOGIC CROSS SECTIONS
A-A', B-B' AND C-C'
THROUGH ORMA AND ROWAN SHOWS
RUSTY SPRINGS AREA, YUKON TERRITORY

VERTICAL AND HORIZONTAL SCALE : 1 INCH TO 100 FEET

For individual section locations, refer to Orma Base Map, Rusty Springs Area (Scale 1 inch to 100') showing total geochemical analysis in p.p.m. of Cu, Pb, Zn, Ag.

— Geology by —
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Sept. 1978
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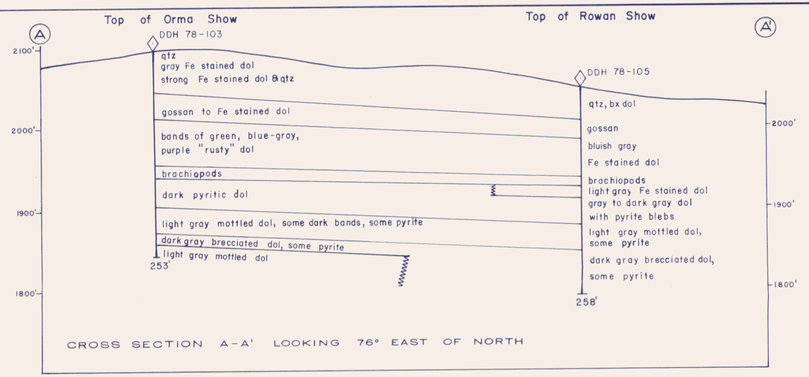
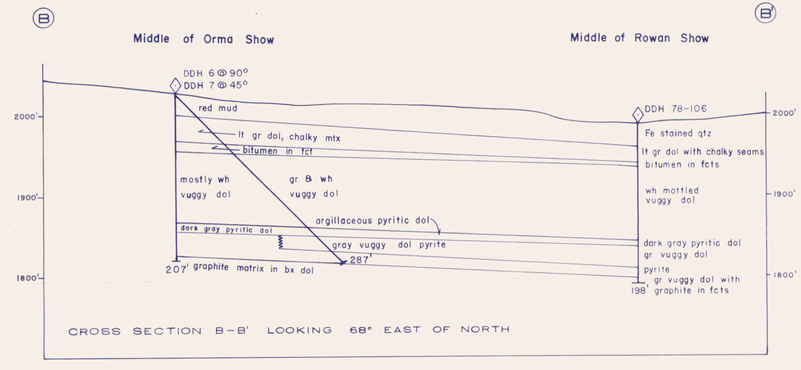
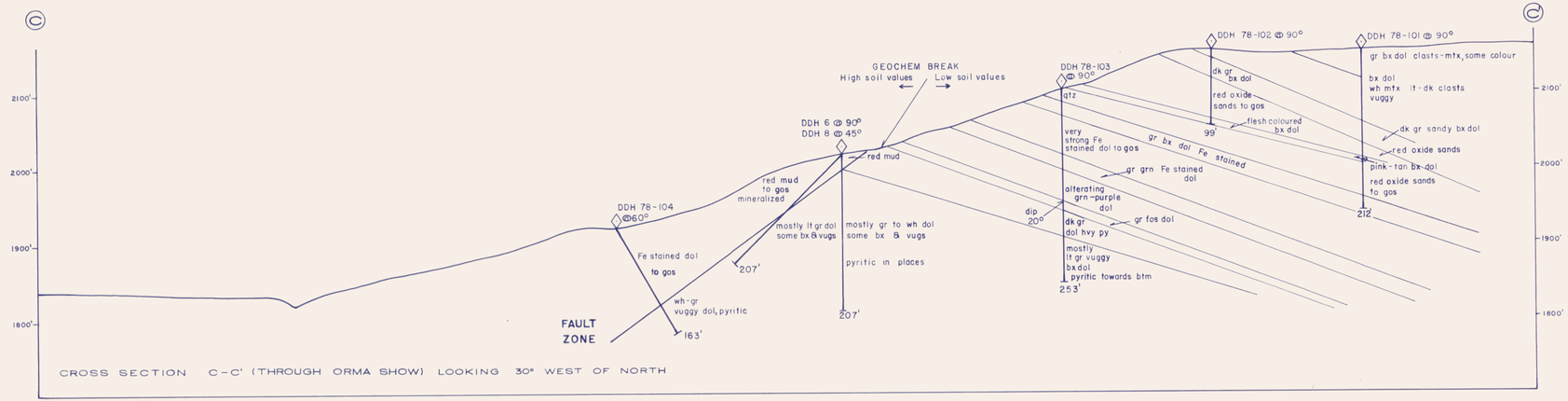
1978



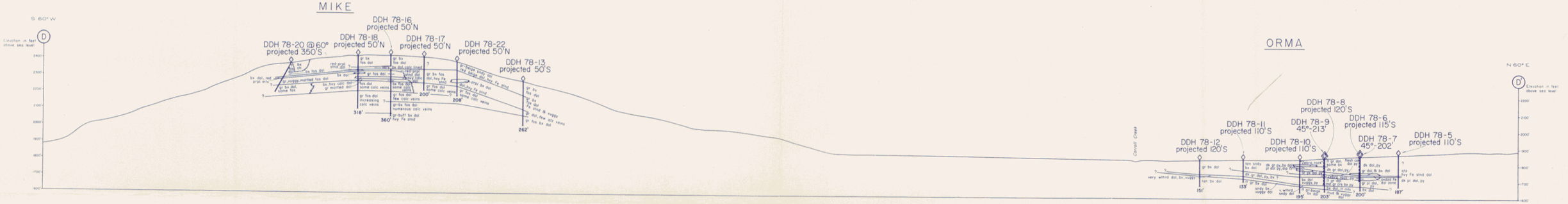
CROSS SECTION A-A' LOOKING 76° EAST OF NORTH



CROSS SECTION B-B' LOOKING 68° EAST OF NORTH



CROSS SECTION C-C' (THROUGH ORMA SHOW) LOOKING 30° WEST OF NORTH



GEOLOGIC CROSS SECTION

D - D'

RUSTY SPRINGS AREA

YUKON TERRITORY

Looking 30° West of North

VERTICAL AND HORIZONTAL SCALE : 1 INCH TO 500 FEET

For section location, refer to Rusty Springs Area Map (Scale 1 inch to 500') showing diamond drill hole locations.

— Geology by —

DAVID HANSEN

Sept. 1978

— Prepared for —

RIO ALTO EXPLORATION LTD.

— Drafted by —

V. ZAY SMITH ASSOCIATES LTD.

CALGARY, ALBERTA

1978

LEGEND

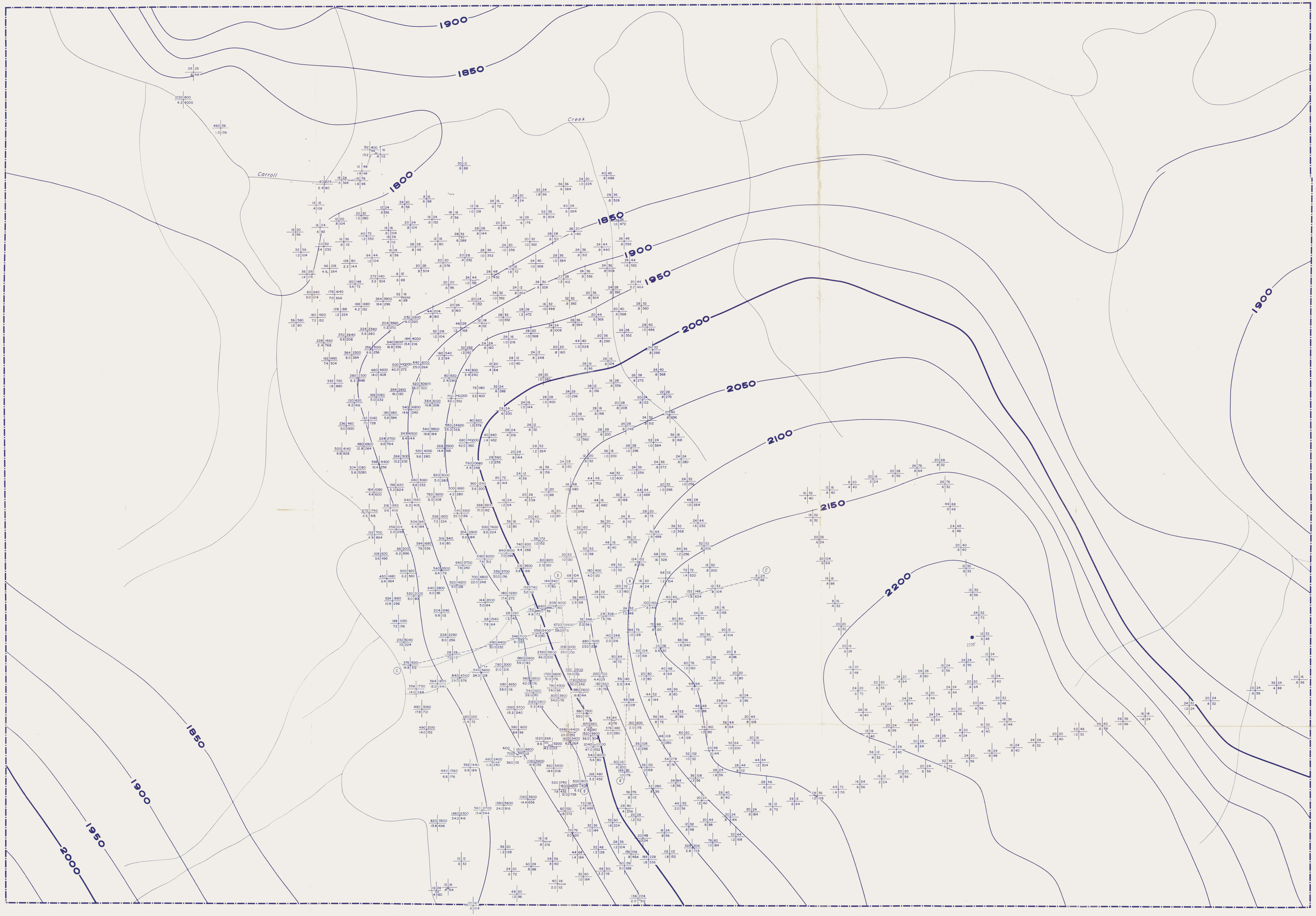
qtz	Quartzite
dol	Dolomite
bx dol	Brecciated dolomite
py	Pyrite, Pyritic
fos dol	Fossiliferous dolomite

◇ DDH 78-105'

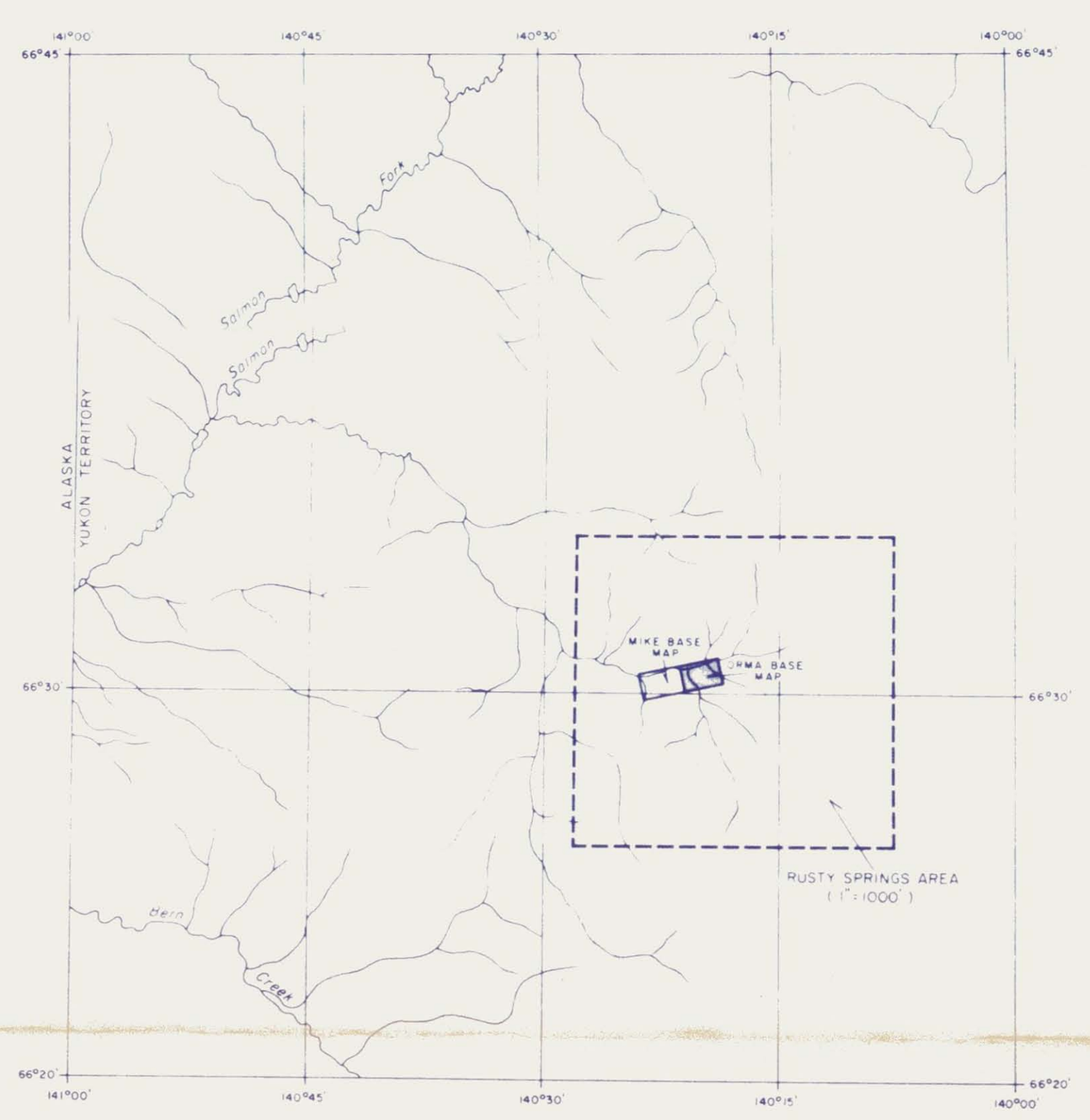
258'

Diamond drill hole showing total depth in feet

dk dol / lt gy dol — Facies change



INDEX MAP

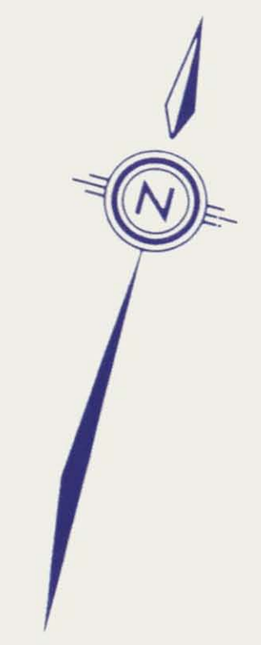


LEGEND

°12 S	Geochemical sample location
°540	Geochemical analysis in p.p.m.

Cu	Pb
Ag	Zn

(A) - - - (A') Location of geologic cross sections through Orma and Rowan shows. (see accompanying illustration.)



FOR LOCATION OF BASE MAP SEE TOPOGRAPHIC MAP, RUSTY SPRINGS AREA (SCALE 1" TO 1000')

Total
Cu, Pb, Zn, Ag
PARTS PER MILLION

ORMA BASE MAP

RUSTY SPRINGS AREA
YUKON TERRITORY

SHOWING
Geochemical analysis in p.p.m.
of

Cu, Pb, Zn, Ag

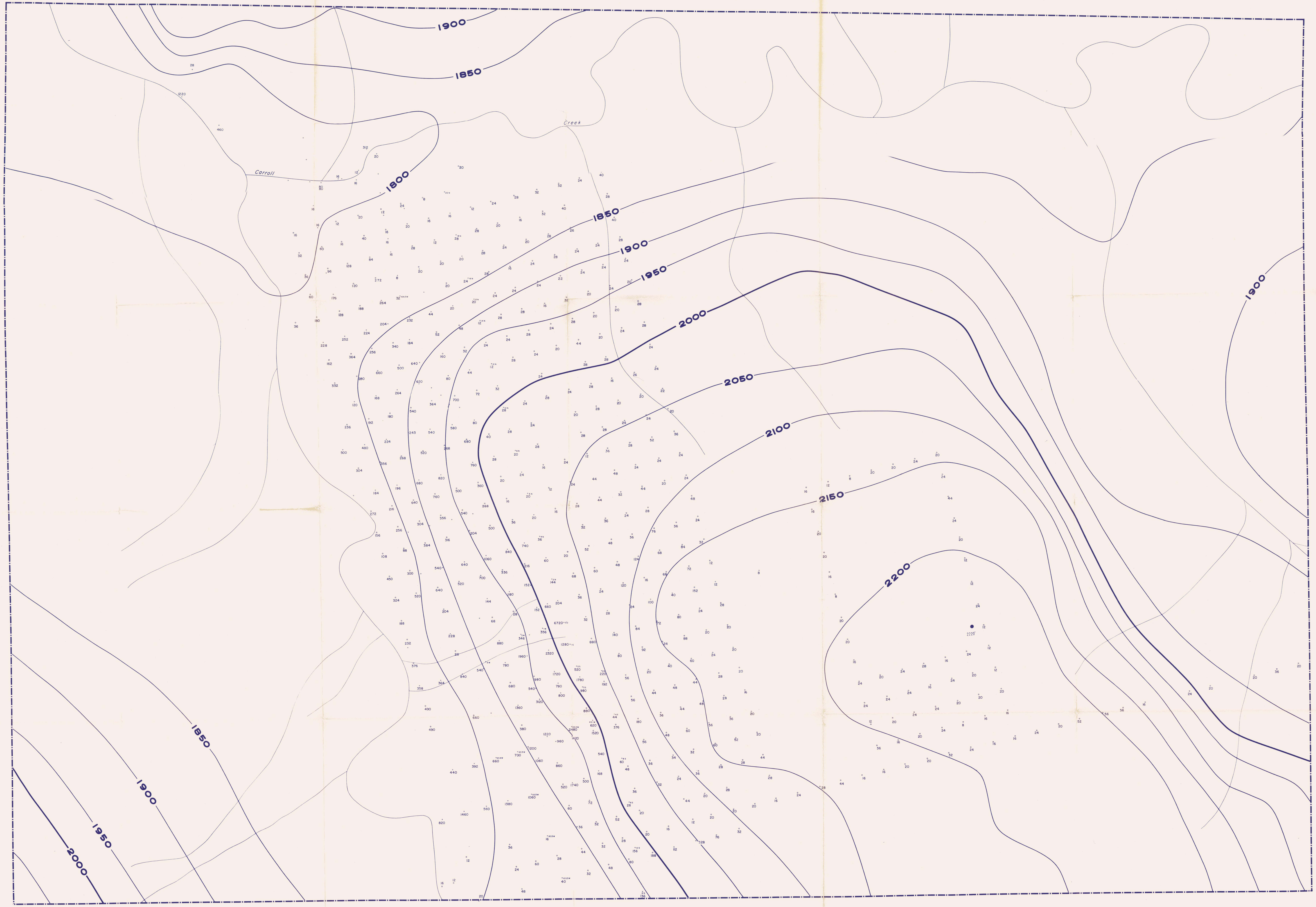
SCALE ONE INCH TO 100 FEET

FEET 0 — 100 — 200 — 300 — 400 — 500 — 600 FEET

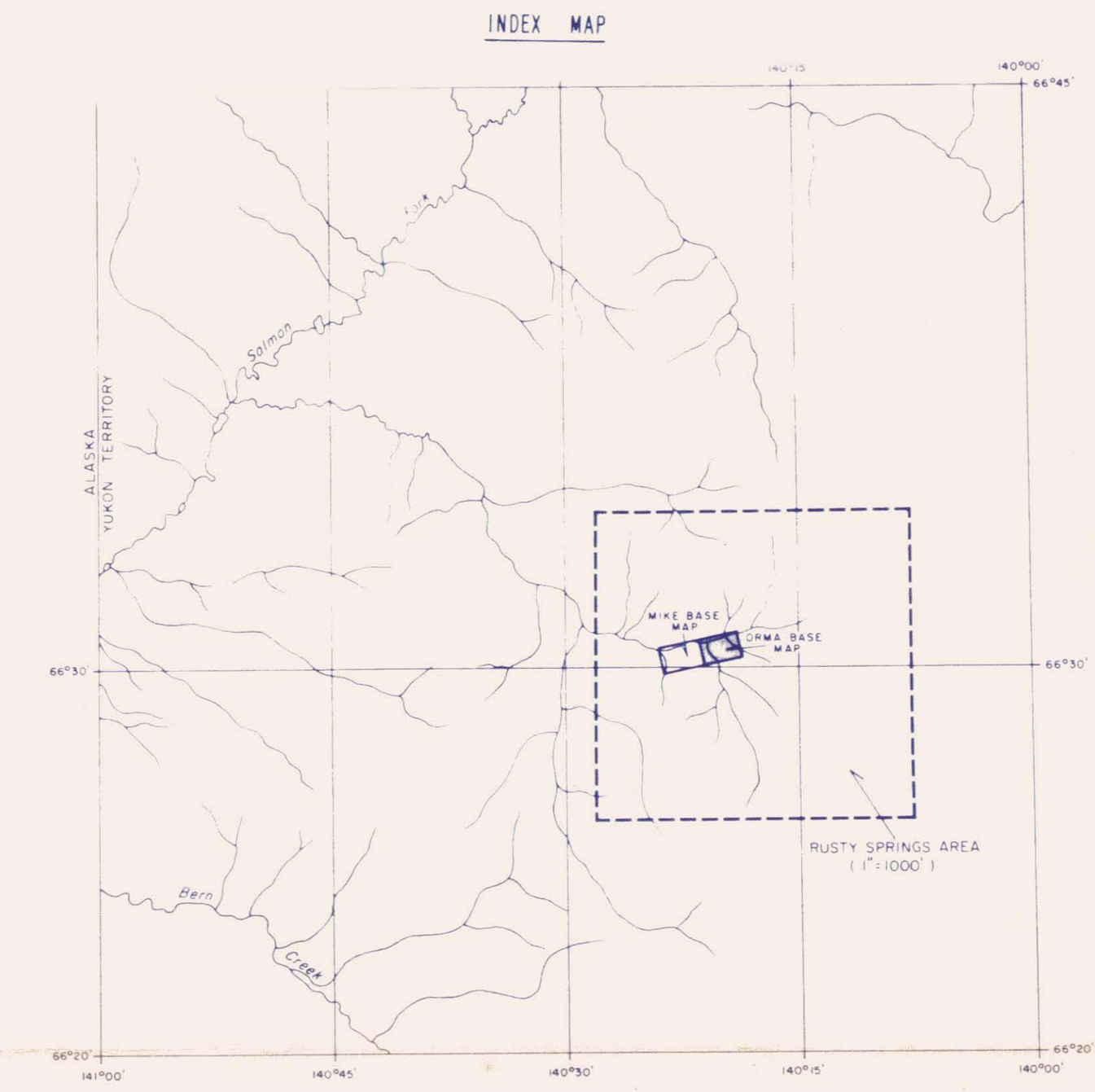
— *Geology by* —
DAVID HANSEN
Sept. 1978

— *Prepared for* —
RIO ALTO EXPLORATION LTD.

— *Drafted by* —
V. ZAY SMITH ASSOCIATES LTD.
CALGARY, ALBERTA
1978



INDEX MAP



LEGEND

° 12 S	Geochemical sample location
° 540	Geochemical analysis in p.p.m.

FOR LOCATION OF BASE MAP SEE TOPOGRAPHIC MAP, RUSTY SPRINGS AREA (SCALE 1" TO 1000')

Cu
PARTS PER MILLION

ORMA BASE MAP

RUSTY SPRINGS AREA
YUKON TERRITORY

SHOWING
Geochemical analysis in p.p.m.
of

Cu

SCALE ONE INCH TO 100 FEET

FEET 0 — 100 — 200 — 300 — 400 — 500 — 600 FEET

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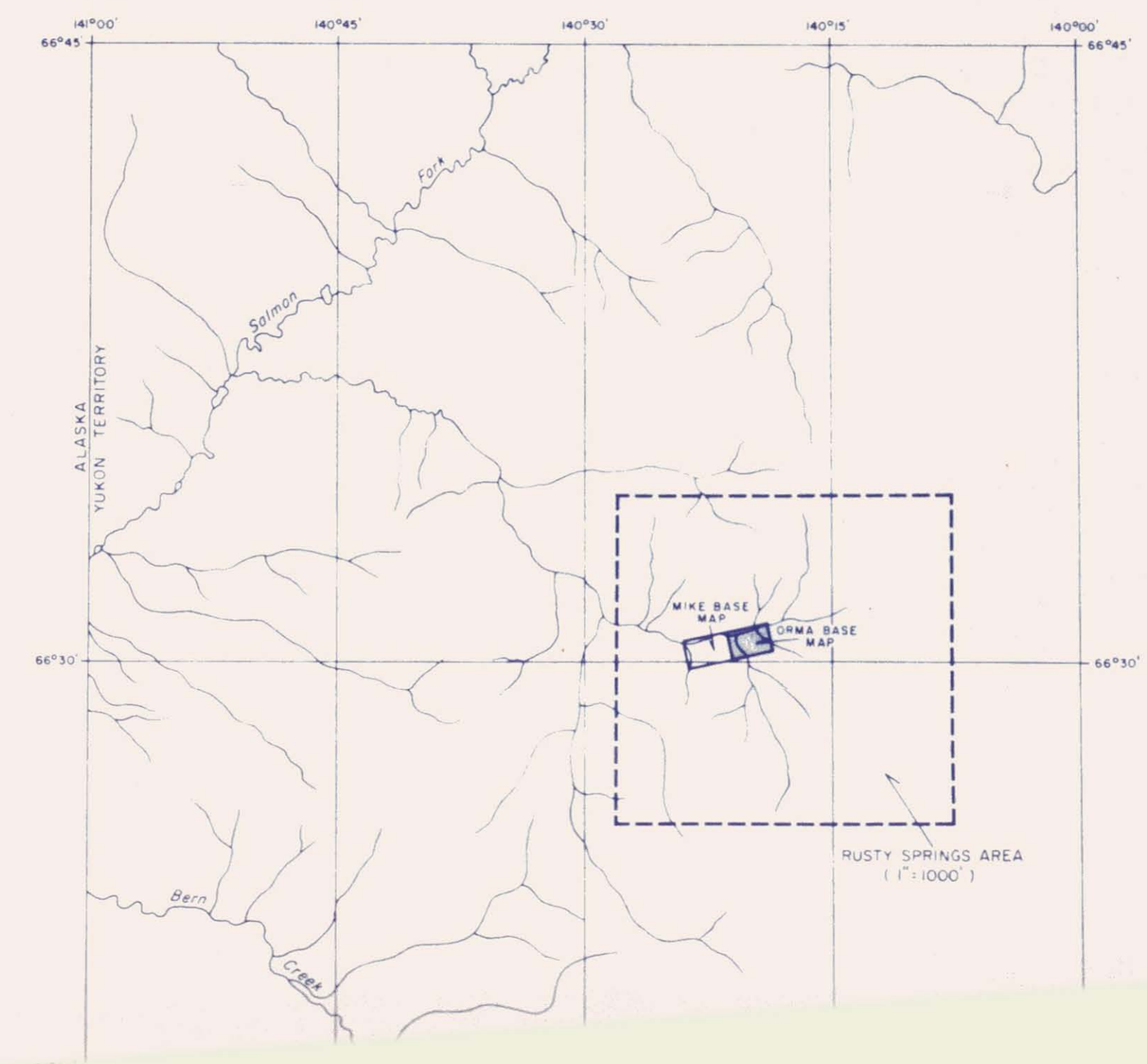
CALGARY, ALBERTA
1978

INDEX MAP



LEGEND

° 12 S	Geochemical sample location
° 540	Geochemical analysis in p.p.m.

FOR LOCATION OF BASE MAP SEE TOPOGRAPHIC MAP, RUSTY SPRINGS AREA (SCALE 1" TO 1000')

Pb
PARTS PER MILLION

ORMA BASE MAP

RUSTY SPRINGS AREA
YUKON TERRITORY

SHOWING
Geochemical analysis in p.p.m.
of

Pb

SCALE ONE INCH TO 100 FEET

FEET 0 — 100 — 200 — 300 — 400 — 500 — 600 FEET

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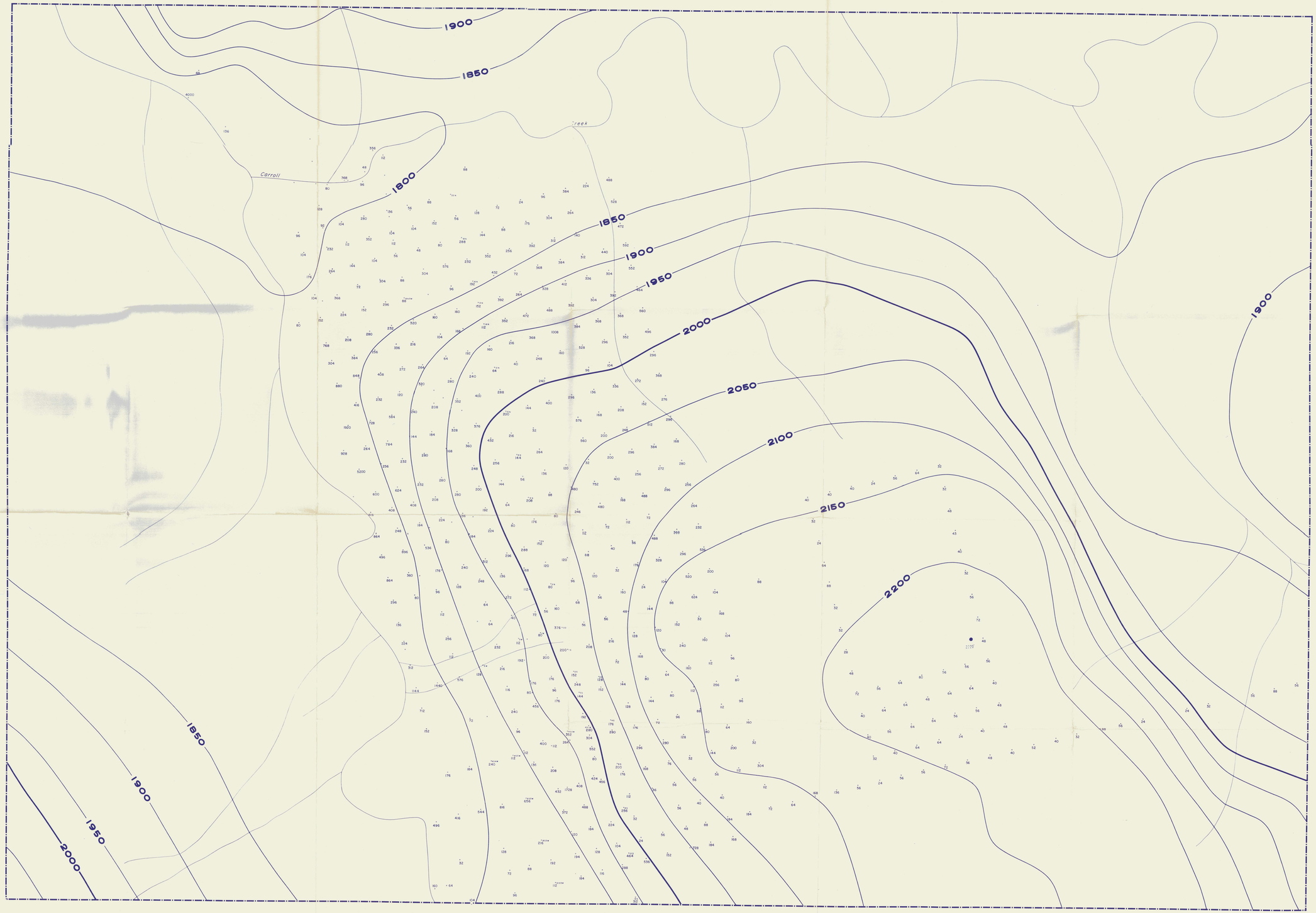
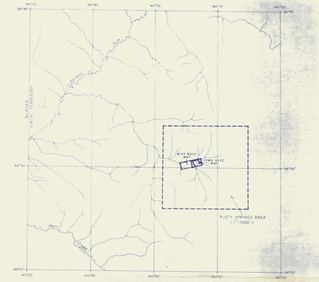


INDEX MAP



FOR LOCATION OF BASE MAP SEE TOPOGRAPHIC MAP, RUSTY SPRINGS AREA (SCALE 1" TO 1000')

LEGEND

+64 Geochemical sample location

*540 Geochemical analysis in p.p.m.

Zn
PARTS PER MILLION

ORMA BASE MAP

RUSTY SPRINGS AREA
YUKON TERRITORY

SHOWING
Geochemical analysis in p.p.m.
of
Zn

SCALE ONE INCH TO 100 FEET

— Geology by —
DAVID HANSEN
Sept. 1978

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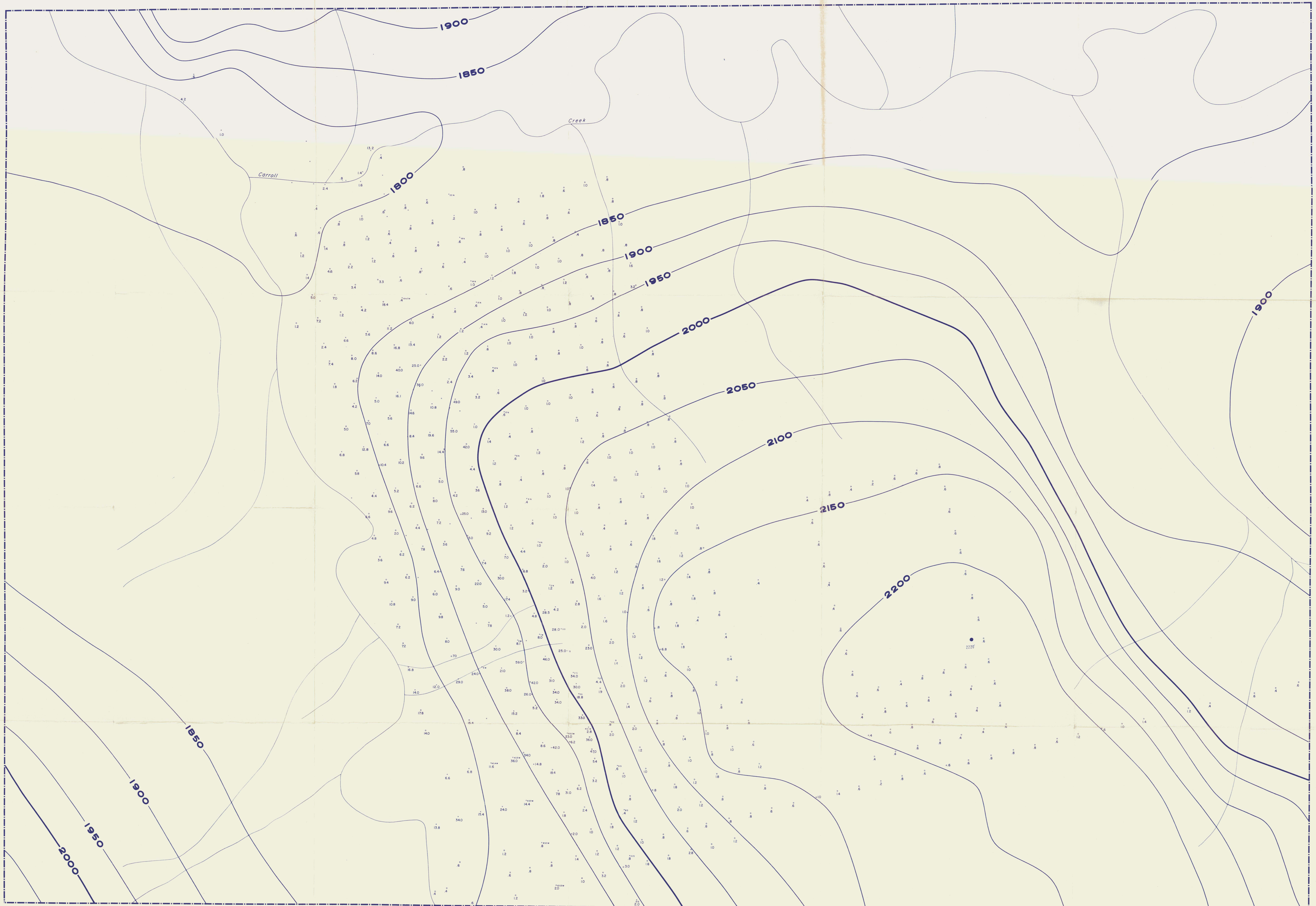

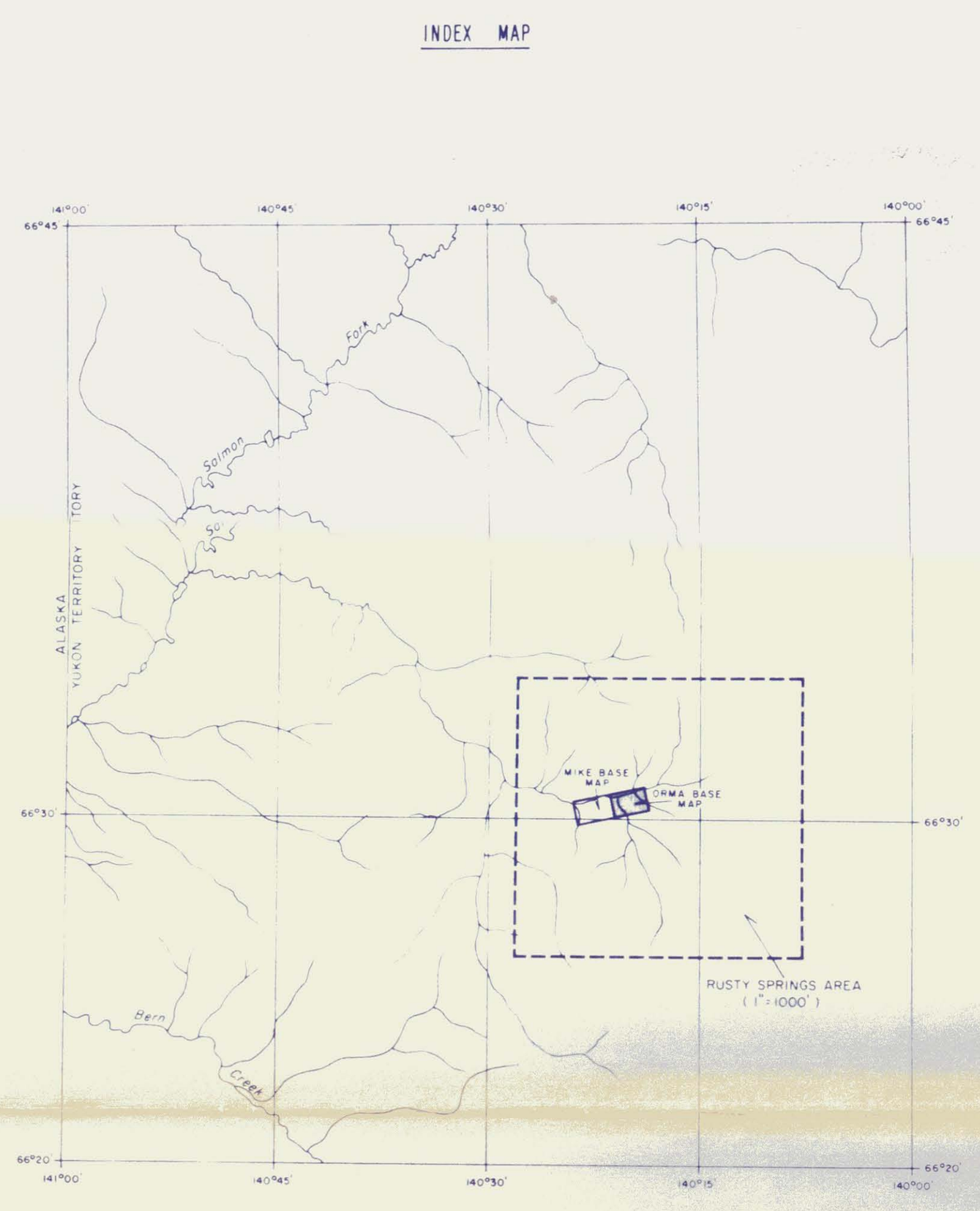

LEGEND

° 12 S	Geochemical sample location
° 540	Geochemical analysis in p.p.m.

FOR LOCATION OF BASE MAP SEE TOPOGRAPHIC MAP, RUSTY SPRINGS AREA (SCALE : 1" TO 1000')

Ag
PARTS PER MILLION

ORMA BASE MAP

RUSTY SPRINGS AREA
YUKON TERRITORY

SHOWING
Geochemical analysis in p.p.m.
of

Ag

SCALE ONE INCH TO 100 FEET

FEET 0 — 100 — 200 — 300 — 400 — 500 — 600 FEET

— *Geology by* —
DAVID HANSEN
Sept. 1978

— *Prepared for* —
RIO ALTO EXPLORATION LTD.

— *Drafted by* —
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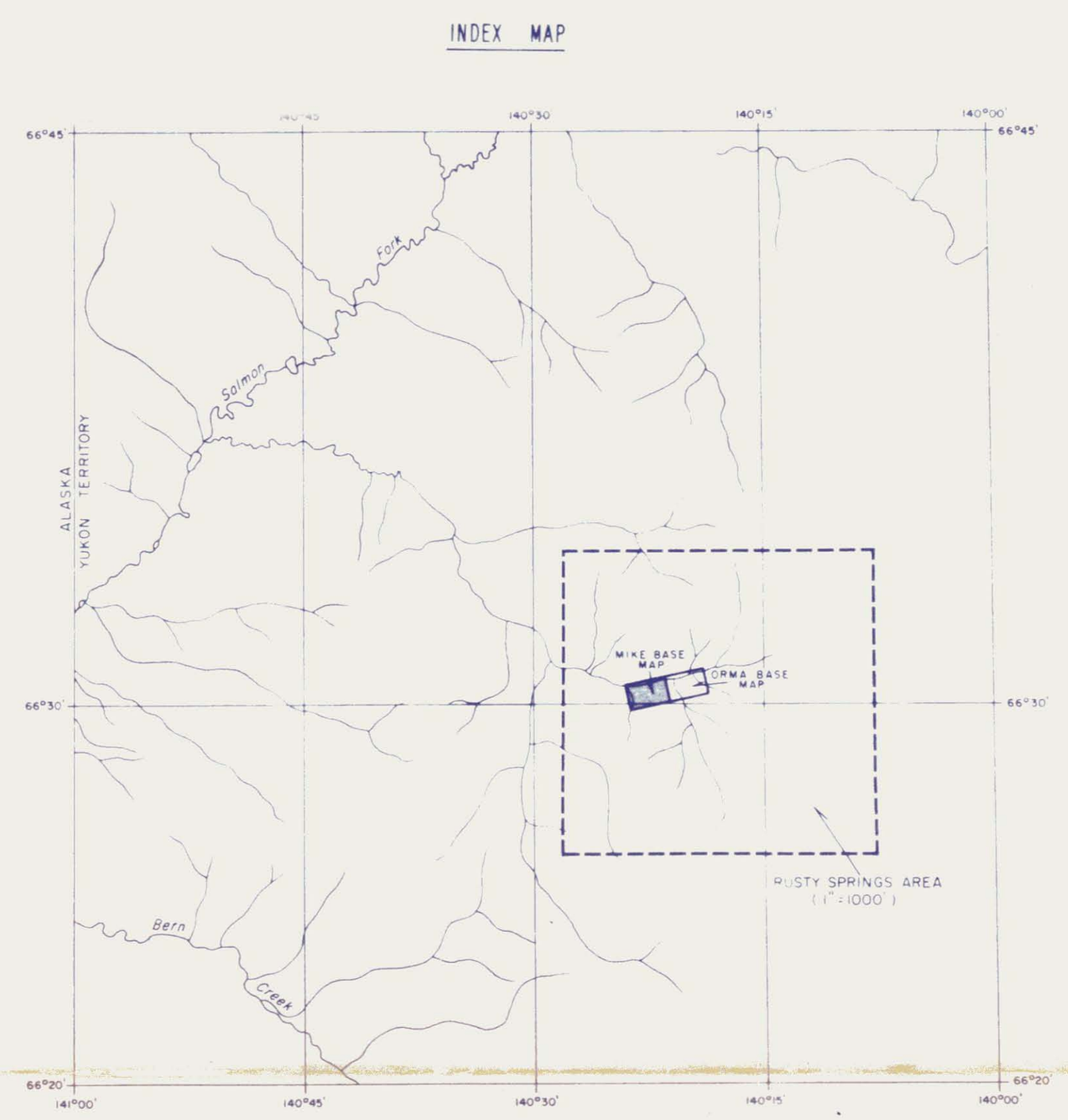
CALGARY, ALBERTA
1978



LEGEND

° 12 S	Geochemical sample location
° 540	Geochemical analysis in p.p.m.

Cu	Pb
Ag	Zn

FOR LOCATION OF BASE MAP SEE TOPOGRAPHIC MAP, RUSTY SPRINGS AREA (SCALE: 1" TO 1000')

Total
Cu, Pb, Zn, Ag
PARTS PER MILLION

MIKE BASE MAP

RUSTY SPRINGS AREA
YUKON TERRITORY

SHOWING
Geochemical analysis in p.p.m.
of

Cu, Pb, Zn, Ag

SCALE ONE INCH TO 100 FEET

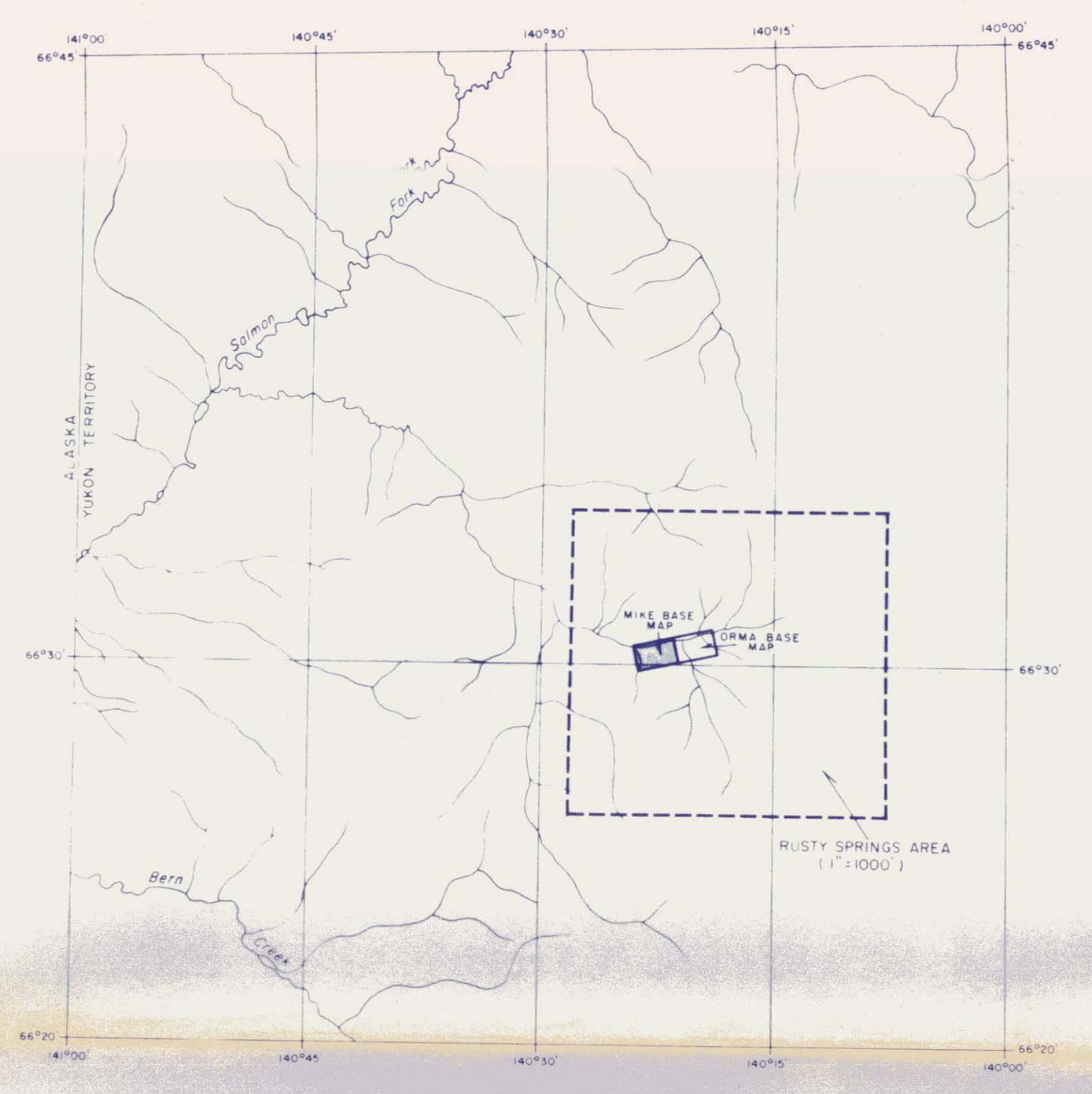
FEET 0 100 200 300 400 500 600 FEET

— *Geology by* —
DAVID HANSEN
Sept. 1978

— *Prepared for* —
RIO ALTO EXPLORATION LTD.

— *Drafted by* —
V. ZAY SMITH ASSOCIATES LTD.
CALGARY, ALBERTA
1978

INDEX MAP



LEGEND

° 12 S	Geochemical sample location
° 540	Geochemical analysis in p.p.m.

FOR LOCATION OF BASE MAP SEE TOPOGRAPHIC MAP, RUSTY SPRINGS AREA (SCALE : 1" TO 1000')

Pb
PARTS PER MILLION

MIKE BASE MAP

RUSTY SPRINGS AREA
YUKON TERRITORY

SHOWING
Geochemical analysis in p.p.m.
of

Pb

SCALE ONE INCH TO 100 FEET

FEET 0 — 100 — 200 — 300 — 400 — 500 — 600 FEET

— *Geology by* —
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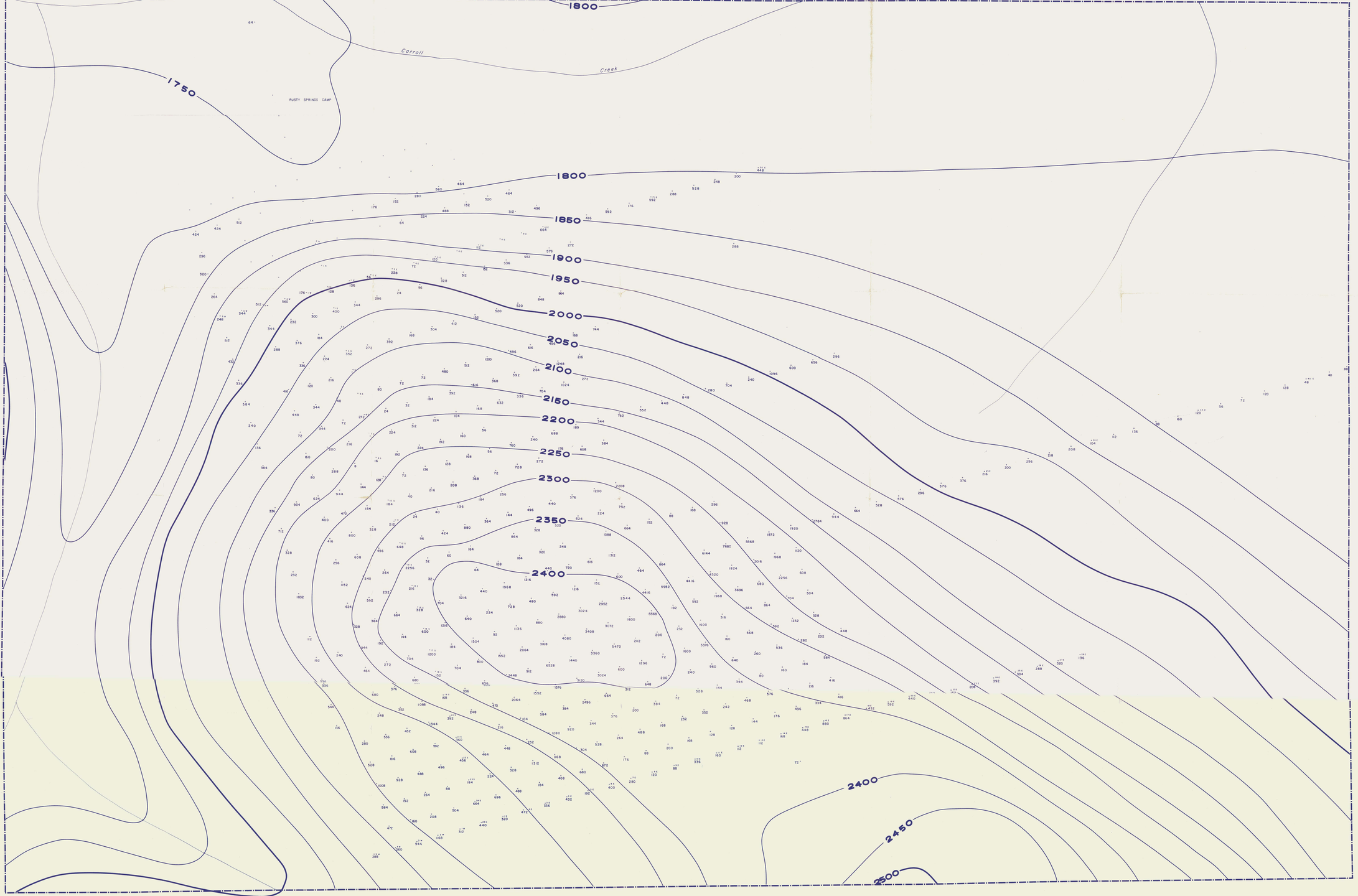
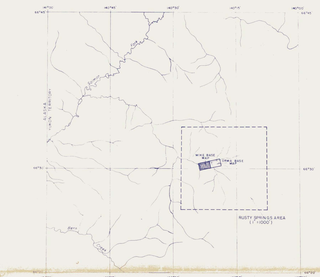
1978



INDEX MAP



LEGEND

Geochemical sample location

Geochemical analysis in p.p.m.

FOR LOCATION OF BASE MAP SEE TOPOGRAPHIC MAP, RUSTY SPRINGS AREA (SCALE 1" TO 1000')

PARTS PER MILLION

MIKE BASE MAP

RUSTY SPRINGS AREA
YUKON TERRITORY

SHOWING
Geochemical analysis in p.p.m.
of

Zn

SCALE ONE INCH TO 100 FEET

Geology by
DAVID HANSEN
Sept. 1978

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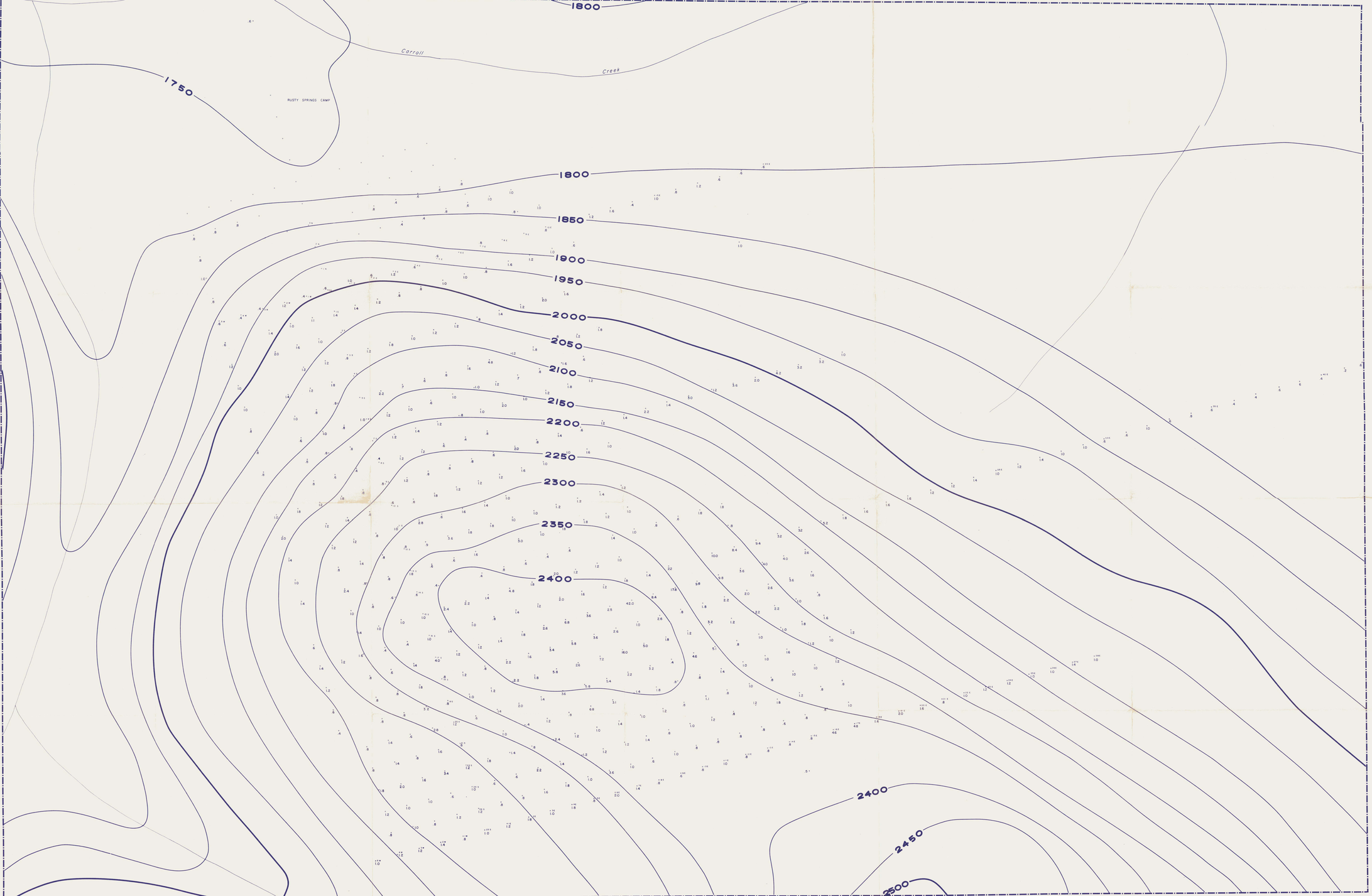

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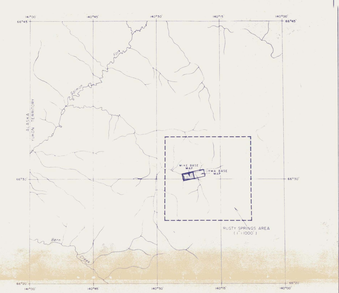

LEGEND

Geochemical sample location

Geochemical analysis in p.p.m.

FOR LOCATION OF BASE MAP SEE TOPOGRAPHIC MAP, RUSTY SPRINGS AREA (SCALE 1" TO 1000')

Ag
PARTS PER MILLION

MIKE BASE MAP

RUSTY SPRINGS AREA
YUKON TERRITORY

SHOWING
Geochemical analysis in p.p.m.
of

Ag

SCALE ONE INCH TO 100 FEET

FEET 0 200 400 600 800 1000 FEET

— Geology by —
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Sept. 1978

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