

NORTHGATE EXPLORATION LIMITED

ORTELL LAKE - YUKON

A JOINT VENTURE PROPOSAL

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NORTHGATE EXPLORATION LIMITED

ORTELL LAKE - YUKON

A JOINT VENTURE PROPOSAL

Colum Byrne
April 25, 1978

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Approximate Area of
TRENT ZONE

DISCOVERY ZONE

NADALEEN ZONE

North

West



PANORAMIC VIEW - Looking from W. to N. to E. from Bow River Claims

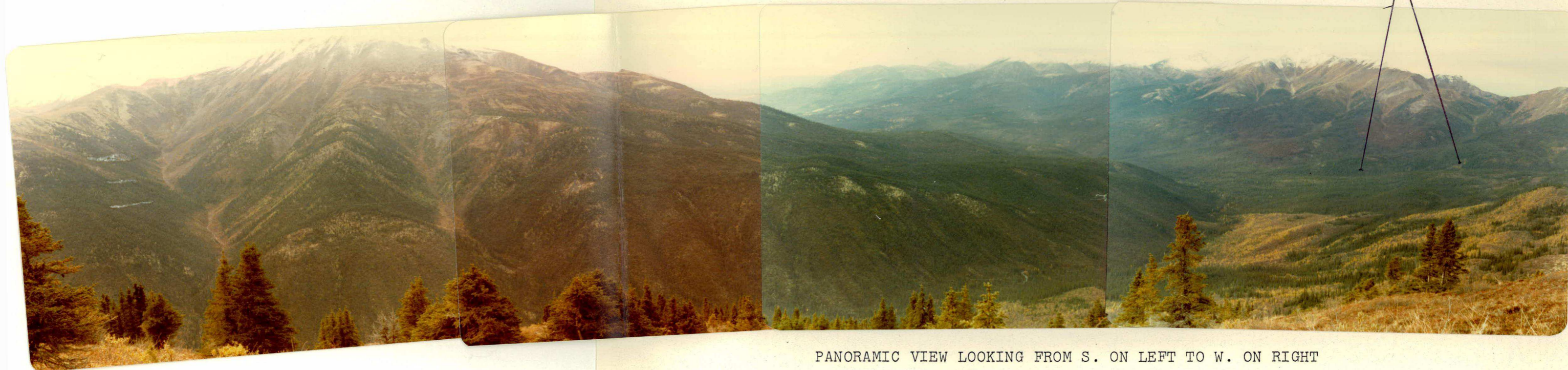


TRENT ZONE GOSSAN

Highhawk Claims

Envoy Claims

Area of main anomalies
and Dead Zone



PANORAMIC VIEW LOOKING FROM S. ON LEFT TO W. ON RIGHT

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INTRODUCTION

During 1976, McIntyre Mines discovered and staked several carbonate-hosted Pb-Zn-Ag showings in Proterozoic rocks which have been regionally thrust over Palaeozoic sediments. The discovery of the showings, which all lie close to the toe of the thrust, precipitated a staking rush in the fall of 1976 and the total ground taken up would cover a total strike length of about 80 km. One of the tie-on blocks, staked by a consortium of four companies is located between two main McIntyre blocks and covers a strike length of about 15 kilometers along the fault (see Fig. 1).

During 1977, McIntyre completed an extensive exploration program including 15,756 ft. of diamond drilling on three of the showings on their CRAIG claims. On the adjacent LEAH claims, the four company consortium completed a program of soil sampling, prospecting and mapping and defined several areas of interest. In August 1977, Northgate and its subsidiary, Westfield Minerals Limited, jointly optioned (60%-40% respectively) the LEAH claims and in September 1977, carried out an intensive program of fill-in soil sampling, prospecting and mapping. Results were sufficiently encouraging and definitive that a follow-up program including diamond drilling was planned for 1978 to test an extensive and highly anomalous overburden covered zone in the centre of the claim group. This anomalous zone has coincident Pb and Zn values ranging up to 2,660 p.p.m. and 10,200 p.p.m. respectively. Silver values up to 8.4 p.p.m. occur within the general zone and, although they are generally scattered, they compare very favourably with samples taken across one of McIntyre's outcropping mineralized showings. In addition to the geochemical anomaly, a vegetation dead zone, locally indicative of near surface massive metal sulphides, occurs on the margin of one of the anomalies. Although there is no outcrop in the general area, boulders of mineralized float have been found within the zone and favourable source and host rocks are interpreted to underly the area.

THE PROPERTY

The claim group is about 160 km. E.N.E. of Mayo and consists of 215 contiguous mineral claims covering a strike length of about 15 km. along the fault. Of the 215 claims, 208 are referred to as the LEAH group recorded on October 28, 1976 and 7 referred to as the SANDY claims which were fill-in claims staked between the LEAH and McIntyre's CRAIG and recorded on July 4, 1977. These claims are divided among the four companies as follows:

Bow River Resources Ltd.	55 claims
Hecate Gold Corporation	48 claims
Envoy Resources Limited	48 claims
Highhawk Mines Ltd. (N.P.L.)	64 claims

Their location is shown on Fig. 1. All claims have been transferred to Northgate Exploration Limited. In this report, the SANDY and LEAH claims are collectively referred to as the LEAH claims.

GEOLOGY

Regional

The claim block lies along the strike of the Dawson Thrust, a regional thrust fault system which strikes generally E-W and extends for over 400 km. In the area of interest, mineralization is associated with a dolomite within a Hadrynian sequence locally referred to as the "Grit Unit", which has been thrust over Palaeozoic sediments. In the claim area the "Grit Unit" consists of argillites, limestones, dolomite, serpentinite and related volcanic and volcanoclastic rocks and relatively minor grits and conglomerates. The structurally underlying Palaeozoic sediments consist mostly of limestones and shales. Of particular significance within this sequence is the Upper Devonian Canol Formation, a black shale unit which contains significant amounts of Pb-Ag and is considered to be the source rock for much of the mineralization in the district. Within the Canol Formation itself, there is a zone enriched in Ag which is referred to as the Ag zone. If movement of the thrust fault has placed a suitably receptive rock type (porous quartzite or dolomite) over the Canol Formation, then the right conditions exist for the remobilization of Pb-Ag along the fault line and emplacement in the receptive host.

Local

The geology of the CRAIG and LEAH claims area is shown on Map 1, Figures 3 and 4 are generalized drawings used by A. Birkland in his M.E.G. talk; Figure 5 is an idealized cross-section by S. Blusson of the G.S.C. Blusson's stratigraphic section is shown as Fig. 6 and his regional geology is shown on Fig. 2.

Correlations and interpretations shown on Map 1 are tentative because of insufficient mapping. Localities referred to in the following notes are shown on Map 1.

Within the CRAIG claims, there are several mineralized zones recognized by McIntyre, three of which have been diamond drilled. The host dolomite is truncated at Loc. A and probably against just E. of the Trent Zone. Stratigraphically above the host dolomite is a red-orange weathering carbonate unit with related serpentinite and volcanics. This is locally a marker unit and can be traced through to the Hecate claims but the underlying host dolomite does not appear to continue much past the Trent Zone. A mineralized dolomite does, however, occur within the LEAH group and this may be stratigraphically equivalent with the host dolomite on the CRAIG claims. A sandy limestone at Loc. C, is shown on the map as Palaeozoic but may represent a facies equivalent of the dolomite.

At Loc. A, Palaeozoic limestone was initially mapped by McIntyre as a strike continuation of the dolomite because of similar outcrop appearances and it was not, I understand until after drilling had commenced and detailed prospecting was being done that the limestone was found to be fossiliferous. This is mentioned here just to illustrate that correlation using outcrop appearances from ridge to ridge can be misleading and the geology as shown is somewhat interpretive.

North of the main thrust in the area of Loc. D, black shales are exposed on the edge of a steep hill. Associated with these are anomalous Ag values in the soil samples (up to 27.5 ppm). These shales are probably Canol Formation.

Immediately E. of the LEAH claims on McIntyre's SIAN claims there is a small inlier of Palaeozoic rocks which is probably an overturned synformal structure.

GEOCHEMISTRY

The results of the soil sampling are plotted on Maps 3,4 and 5 and the main anomalous zone has been redrawn on Figs. 7,8 and 9. In the area of the Dead Zone, additional soil samples were taken along a grid, the base line of which was parallel to the photo lineament. The results of these are shown on Figs. 11, 12 and 13. For comparison a series of soil samples were collected over McIntyre's Trent Zone, these are shown on Fig. 10. In comparing the results it should be remembered that the mineralized dolomite outcrops as a low ridge and a gossan is well developed over the Trent Zone.

The main features of the soil geochemistry are:

1. Dead Zone Area

Well defined and large Pb-Zn anomalies occur in the overburden covered area in the centre of the claim group. (Loc. E & F on Map 1). The Ag values were initially considered to be disappointing but, when compared with results over the Trent Zone, they are certainly comparable, apart from one sample which was taken on mineralized outcrop. McIntyre's soil sampling in this area gave a maximum Ag value of 2.6 ppm.

2. Silver Anomaly

North of the fault, there is a large zone with anomalous Ag values corresponding, presumably, with the Canol Formation, the easterly strike continuation of which is interpreted to underly the main Pb-Zn anomalies referred to above.

3. Minor Pb-Zn Anomalies

Several Zn-Pb anomalies occur along the line of outcrop of the dolomite on the Highhawk and Envoy ground corresponding to Loc. G on Map 1. Several small showings have been located along this dolomite but they are not considered to be of any economic significance at this time.

MINERALIZATION

General

When McIntyre commenced drilling, the main target was the carbonate hosted Pb-Zn-Ag mineralization within the Hadrynian "Grit Unit". This was presumed to be Mississippi-Valley type mineralization, possibly remobilized. More recent mapping, geochemistry, prospecting and reinterpretation has indicated that the Palaeozoic Canol Formation may be the source rock for at least the Pb-Ag mineralization. In the CRAIG claims, the Canol Formation shales, although not outcropping immediately N. of the West Zone are projected to structurally underly the dolomite beneath the plane of the thrust (see Fig. 4 & 5). The shales do, however, outcrop at the toe of the thrust N. of the discovery and Trent Zones and are projected to structurally underly the main anomalous zone on the Highhawk-Envoy ground.

Other deposits related to Canol Formation shales are:

McMillan Pass, Tom Deposit: Within the black shales there are barite hosted Ag-Pb-Zn deposits. Total tonnage is about 30 million tons at a grade of about 12% Pb + Zn with 3 oz. Ag per ton.

Plata Deposits (Dynasty-Cyprus Anvil): Located half way between Ortell and McMillan Pass, galena and tetrahedrite occur in veins in faults adjacent to the Canol Formation and cutting both Precambrian and Palaeozoic sediments. Only trenching has been done to date.

Keno Hill Camp: High grade, quartzite hosted Pb-Ag mineralization is considered to be derived from Canol Formation.

Other Local Deposits:

- (a) Rod claims (McIntyre)-steel galena in Canol shales
- (b) Edina - Pb-Ag in shales close to the main thrust
- (c) Prism Resources - several Pb-Zn-Ag showings and overburden covered geochemical anomalies in either carbonate or shales. A \$500,000 program is budgeted for 1978.
- (d) CRAIG claims - Scott and Gemini Pb-Zn-Ag showings in shale and the Azure and Nadaleen zones within the carbonates between the Trent and the West Zones.

If the Canol Formation is accepted as the source of the Pb-Ag (and Zn?), then the mineralization at Keno Hill, CRAIG, Plata and McMillan Pass etc. represent concentrations by remobilization into some favourable structural and/or chemical trap. At Keno Hill, the mineralization occurs within fractures within the competent quartzite: the fracturing being related to a regional thrust. At the CRAIG claims, the process of dolomitization coupled with fracturing of the relatively competent dolomite has resulted in a rock sufficiently porous for the emplacement of sulphides. In addition to the porous nature of the rock, there are abundant minor occurrences of sphalerite and/or galena along the dolomite outcrops to suggest some Mississippi Valley type of mineralization. There could therefore be a source of Zn-Pb within the dolomite that has been locally enriched by Pb-Ag (and Zn?) from the Canol Formation.

Local Features of Mineralization

As mentioned above, sphalerite and/or galena occur at numerous places along the known dolomite units. At the West Zone, the Trent Zone and, I understand, at other localities on the SIAN claims, the outcropping sulphide mineralization has resulted in a "dead zone" or "kill zone" - areas where vegetation growth has been retarded or killed by highly acidic metal bearing ground water. The mineralization at McIntyre's West Zone is just below tree line on the edge of a steep ridge (see photos). The Trent Zone however is in a relatively flat area and the "dead zone" is formed down slope of the outcropping gossans. In Northgate's main target area on the Envoy ground, a similar "dead zone" exists within the main geochemically anomalous areas on the line of a photo lineament which may represent a fault. The area, however, is overburden covered and there is no outcrop. Moderate concentrations of galena-sphalerite have been found in small boulders of dolomite float near the "dead zone"

PROPOSED PROGRAM

The following program had been planned by Northgate and was budgeted at \$200,000.

Within the central anomalous zone:

- (a) I.P. to locate sulphide zones
- (b) S.P. to assist in location of zones
- (c) VLF-EM as a mapping tool to assist in locating contacts between dolomite-argillites-grits
- (d) diamond drilling

Remaining areas:

Prospecting and additional mapping

McINTYRE'S RESULTS

Diamond Drilling

On the CRAIG claims, a total of 15,756 ft. of diamond drilling was completed on the West Zone (19 holes), Discovery Zone (6 holes) and Trent Zone (4 holes). Two other mineralized zones within the same dolomite unit (Azure and Nadaleen Zones) and two areas of mineralization (Scott & Gemini Zones) within the shales were not tested. In addition, several soil geochemical anomalies remain to be prospected and tested.

West Zone

Grid drilling has indicated about 1,000,000 tons with an average grade of 8% Pb, 13% Zn and 3 oz. Ag/ton. Several other scout holes intersected economic grade outside of this main zone and if the mineralized zone is extrapolated to a depth of half its strike, it is possible that there could be in the order of 10,000,000 tons.

Discovery Zone

Three of the six scout holes encountered significant intersections.

Hole #19	1.5% Pb	22.2% Zn	0.78 oz. Ag over 20 feet
Hole #23	6.2% Pb	11.2% Zn	1.58 oz. Ag over 15 feet
Hole #27	6.0% Pb	8.9% Zn	1.83 oz. Ag over 11 feet

Results from the other holes are unknown but presumably, are low.

Trent Zone

One hole intersected 6.6% Pb, 34.8% Zn and 2.05 oz. Ag over 9 feet and 1.6% Pb, 20.3% Zn and 0.35 oz. Ag over 22 feet. The remaining holes apparently failed to intersect any comparable widths of similar mineralization but indicated a "mineralized zone with an apparent width of 200 feet carrying lesser values of Pb and Zn". The outcropping gossan in this area is a very open siliceous boxwork and pitted core was recovered in the drilling. It is assumed that there had been considerable leaching.

Geophysics

Magnetics, S.P. and H.E.M. surveys were completed over at least part of the West Zone. Only S.P. gave a clear response relating to the sulphides. The H.E.M. and magnetics gave no response.

On the West Zone, 5 S.P. anomalies were detected, one of which was related to the main showing. None of the remaining anomalies were tested and at least one is a possible continuation of sulphide mineralization.

Scott and Gemini Zones

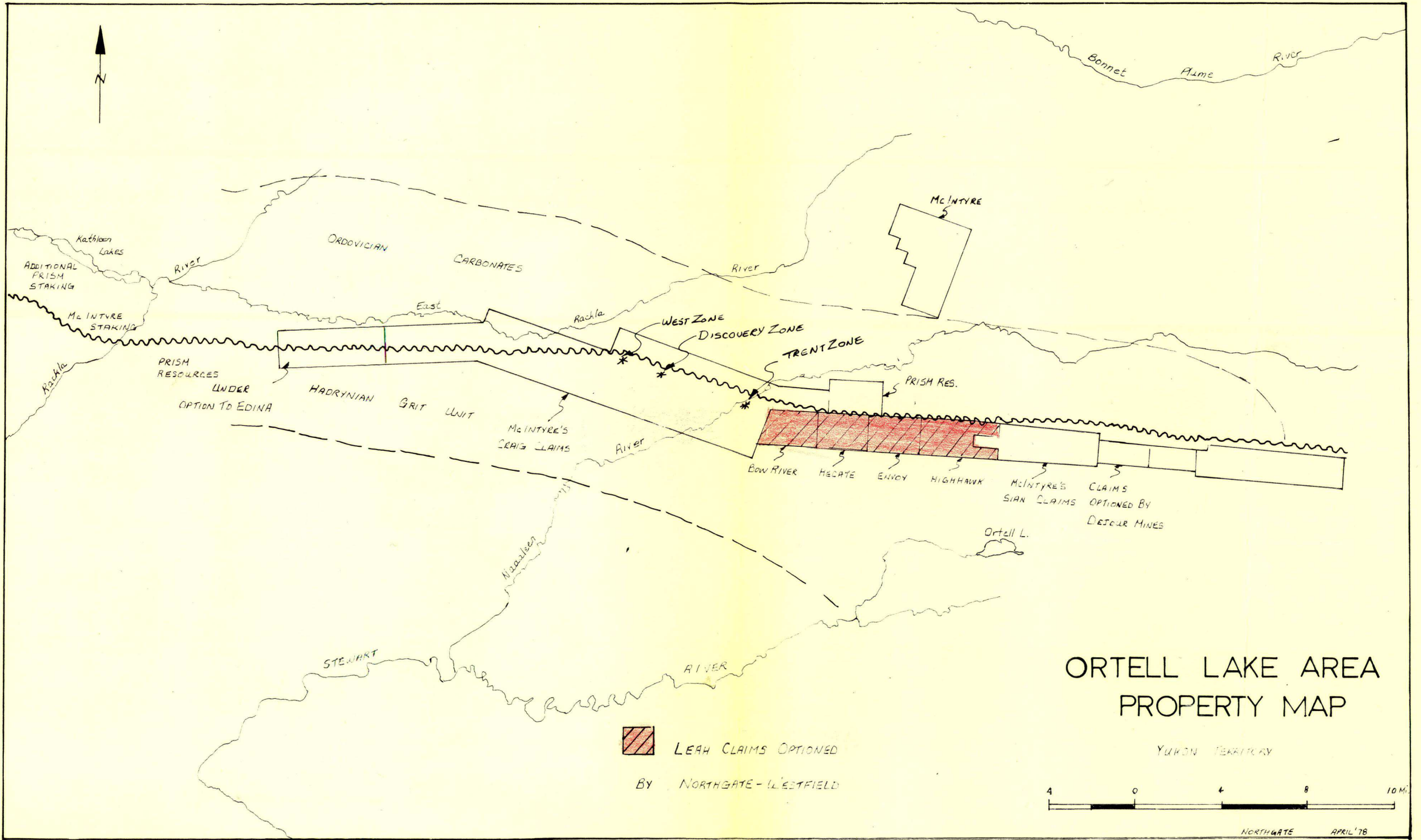
The Scott zone was located as follow-up to one anomalous soil or stream sediment sample of 1,960 p.p.m. Pb, 1,920 p.p.m. Zn and 6.8 p.p.m. Ag. Follow-up prospecting etc. located shale hosted mineralization, a grab sample of which assayed 66% Pb, 0.6% Zn and 21.8 oz. Ag/ton. Similar samples have been collected from the Gemini Zone.

DISCUSSION

Exploration to date on the four claim groups has outlined several geochemical anomalies and located numerous small Pb-Zn showings. In the centre of the claim group is an overburden covered area in which two large geochemical anomalies have been outlined. These anomalies were of sufficient interest that a target-definition and diamond drilling program was planned for 1978.


Considering only the central anomalous zone, the following points are relevant:

1. Well defined, large geochemical anomalies (maximum values 10,200 p.p.m. Zn, 2,660 p.p.m. Pb and 8.4 p.p.m. Ag).
2. The values of the geochemical anomaly compare very favourably with samples collected from the Trent Zone especially considering that there is a large area of outcropping mineralization at the Trent Zone.
3. There is a vegetation dead zone coincident with the edge of the geochemical high and on the line of a fault. This dead zone is similar in size to the one at McIntyre's Trent Zone.
4. From minor float and interpretation of the known geology, the zone is underlain, at least in part, by dolomite.
5. The dolomite striking into the area from the E. is mineralized over a considerable strike length.
6. The Canol Formation, considered to be the source rock for the Pb-Ag mineralization, outcrops to the W. of the central zone and is interpreted to underly the anomalous zone beneath the plane of the fault.
7. Well defined cross cutting photo lineaments, probably representing faults, cut the area and part of the main anomaly and dead zone lie along the line of one lineament. Such cross cutting features increase total porosity and would increase the possibility of sulphide emplacement.



ORTELL LAKE AREA PROPERTY MAP

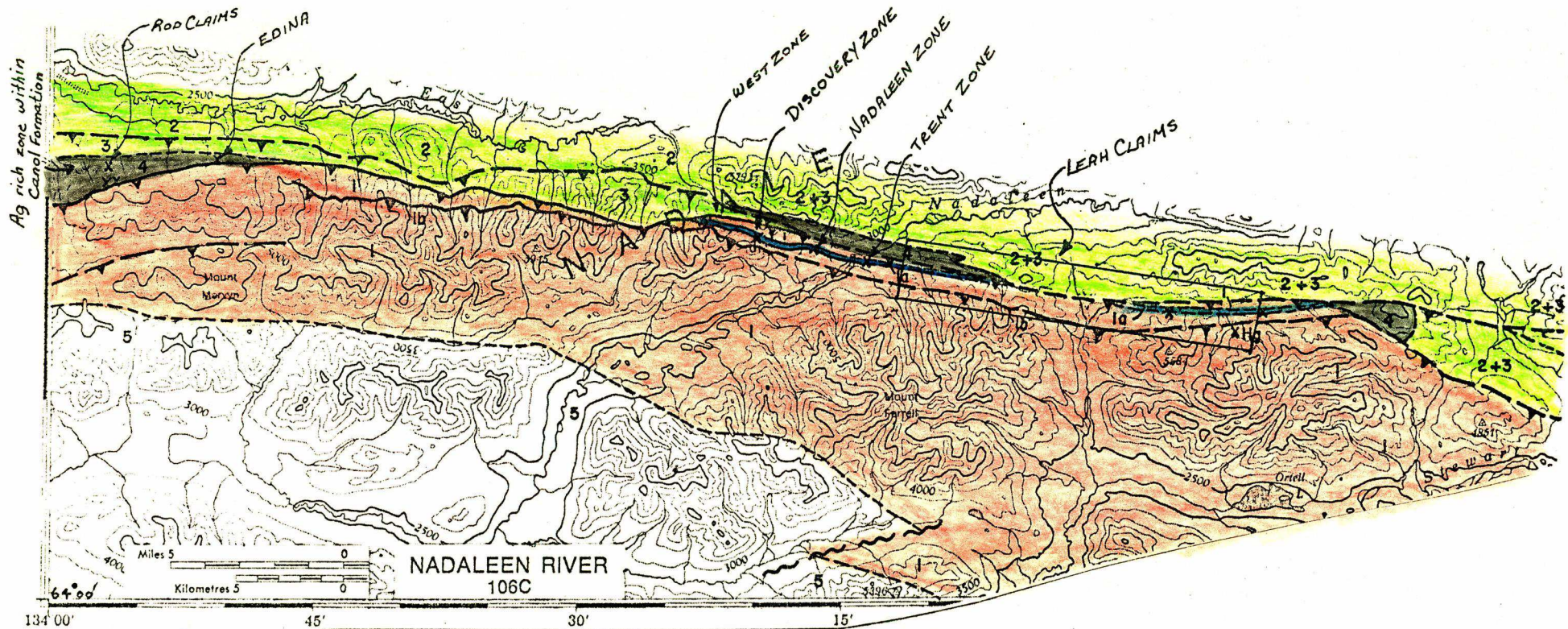
YUKON TERRITORY

 LEAH CLAIMS OPTIONED
BY NORTHGATE - WESTFIELD



NORTHGATE APRIL '78

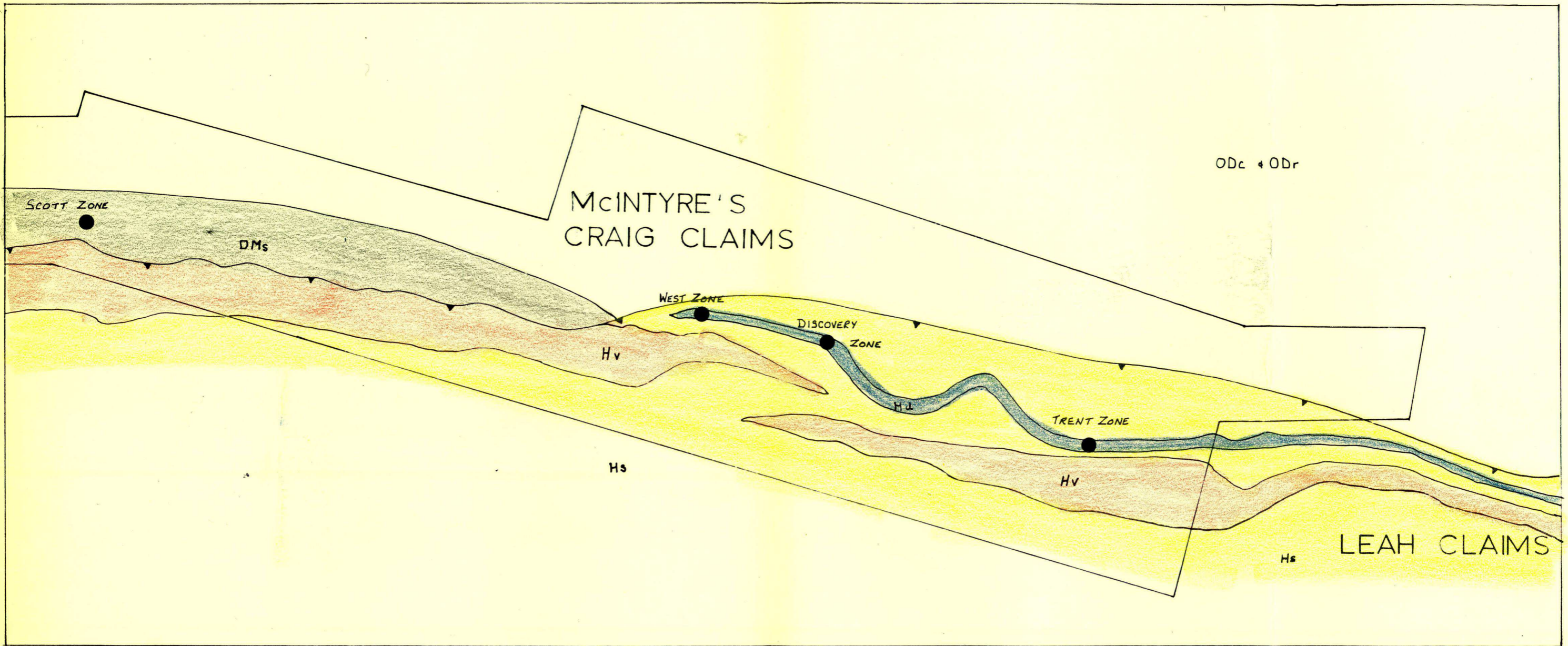
FIGURE 1



- UR
6 Black shale, limestone, quartzite
- ? uD-P
5 "Lower Schist" and "Keno Hill Quartzite":
Black slate, phyllite, siltstone, quartzite;
diabase sills
- uD-M
4 Black pyritic shale, chert wacke and conglomerate, bedded barite } Canol Formation
- O-D
2/3 2. Light grey dolomite. 3. Road River Formation:
black shale and chert
- HI
1 "Grit" Unit: varicoloured slate, feldspathic quartzite and conglomerate, micritic limestone.
1 a, vuggy dolomite 1 b, faulted and altered basic volcanics, zones of ankerite, serpentine and non-bedded chert.

REGIONAL GEOLOGY - S.L. BLUSSON
GSC 78-1A

FIGURE 2



- Hd Dolomite
- Hv Volcanic, Serpentine Jmt
- Hs Argillites + other Clastics

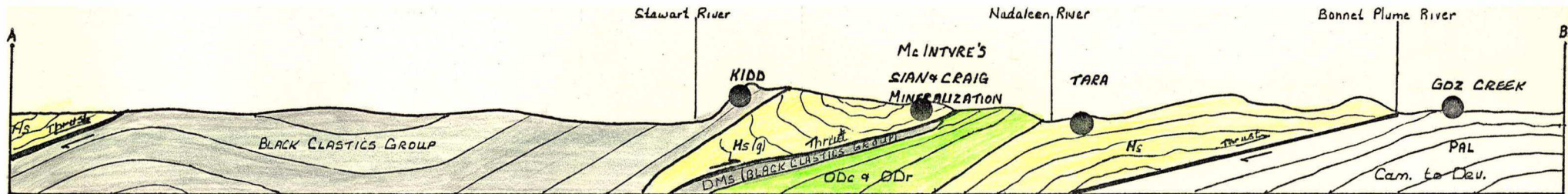
GEOLOGICAL SKETCH MAP

McIntyre Craig Claims

FIGURE 3

Scale 1:75000

(after McIntyre Mines)



Bonnet Plume Region

CROSS SECTION

● MINERAL DEPOSITS

DMS (BLACK CLASTICS GROUP) CANOL FORMATION

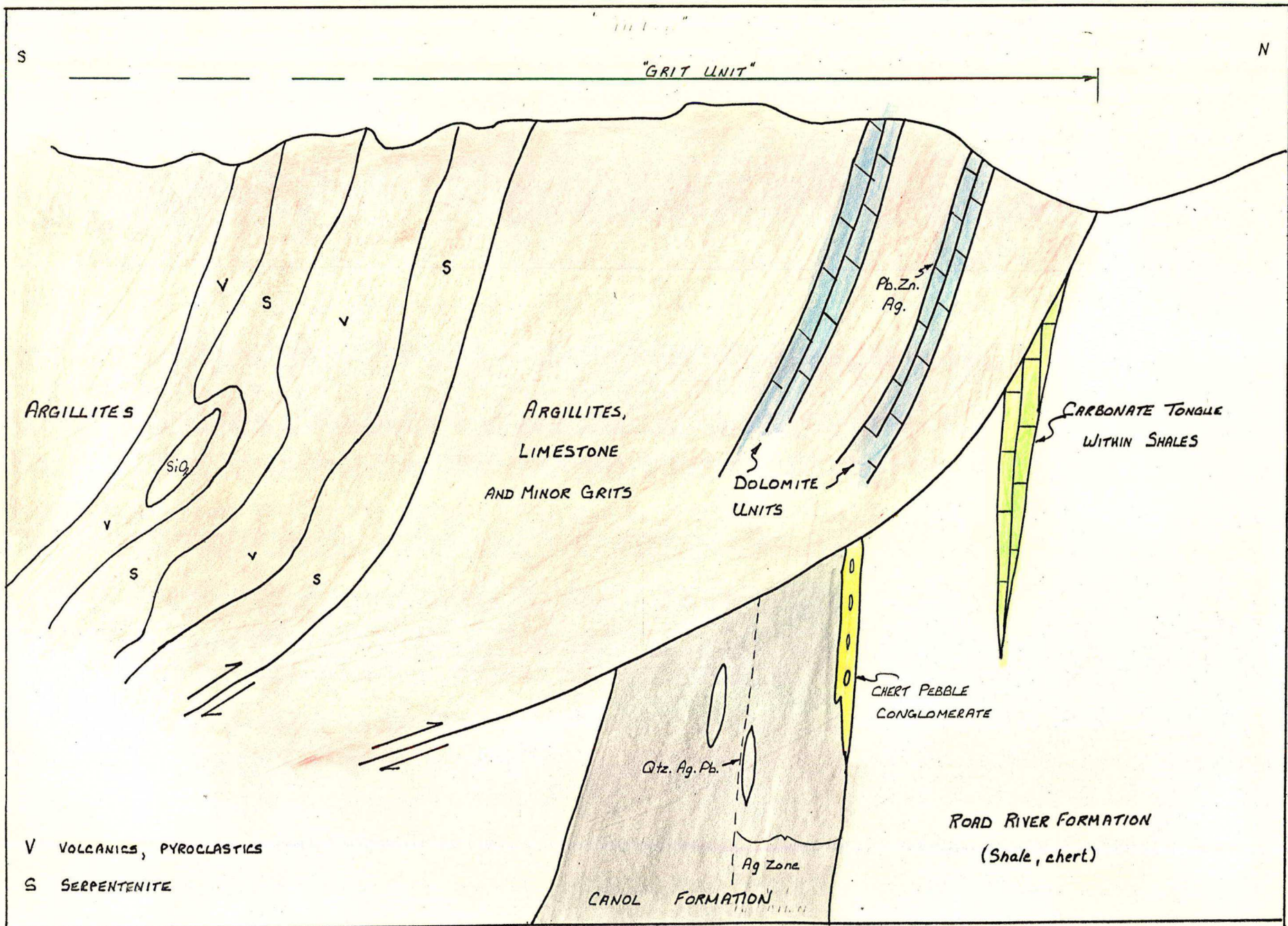
ODc & ODr ROAD RIVER FORMATION

Hs (g) PROTEROZOIC "GRIT UNIT"

Scale: 1:500 000

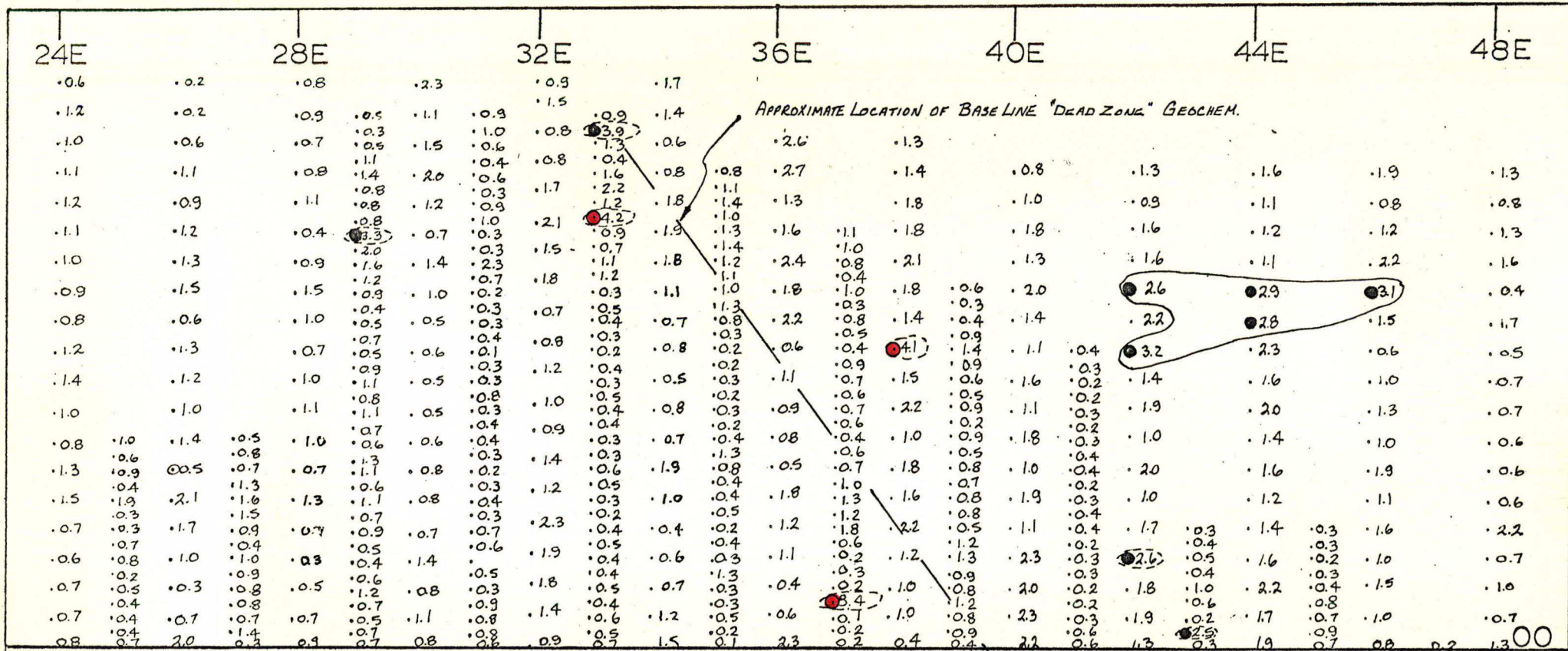
(AFTER McINTYRE MINES)

FIGURE 4



DIAGRAMATIC CROSS-SECTIONAL SKETCH NADALEEN RIVER AREA
(AFTER S. BLUSSON)

FIGURE 5

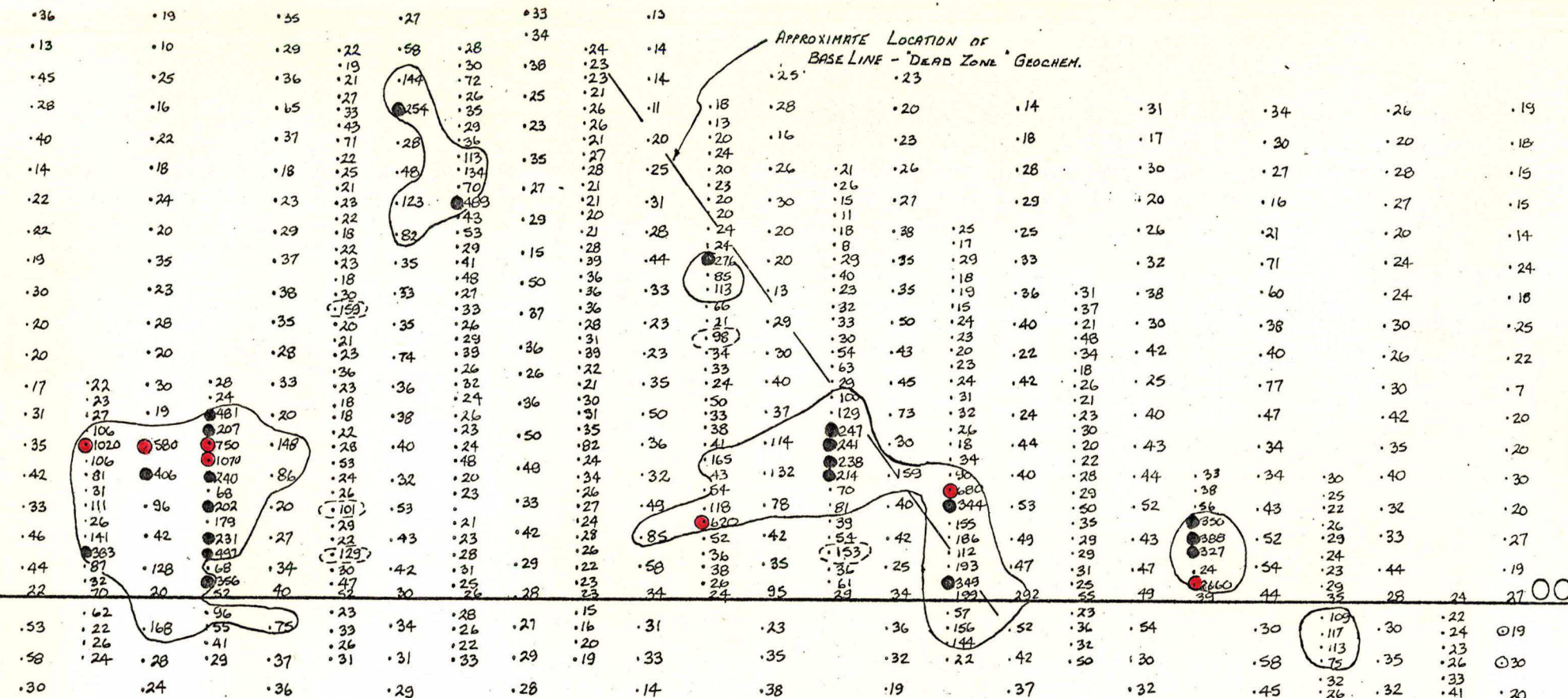


NORTHGATE EXPLORATION
 Ortell Lake Soil Geochemistry
 Ag PPM

~ Contour ≥ 2.5 ppm
 ● $\geq 2.5, < 4.0$
 ● ≥ 4.0
 (○) Spot High ≥ 2.5 ppm Scale 1:10,000

FIGURE 7

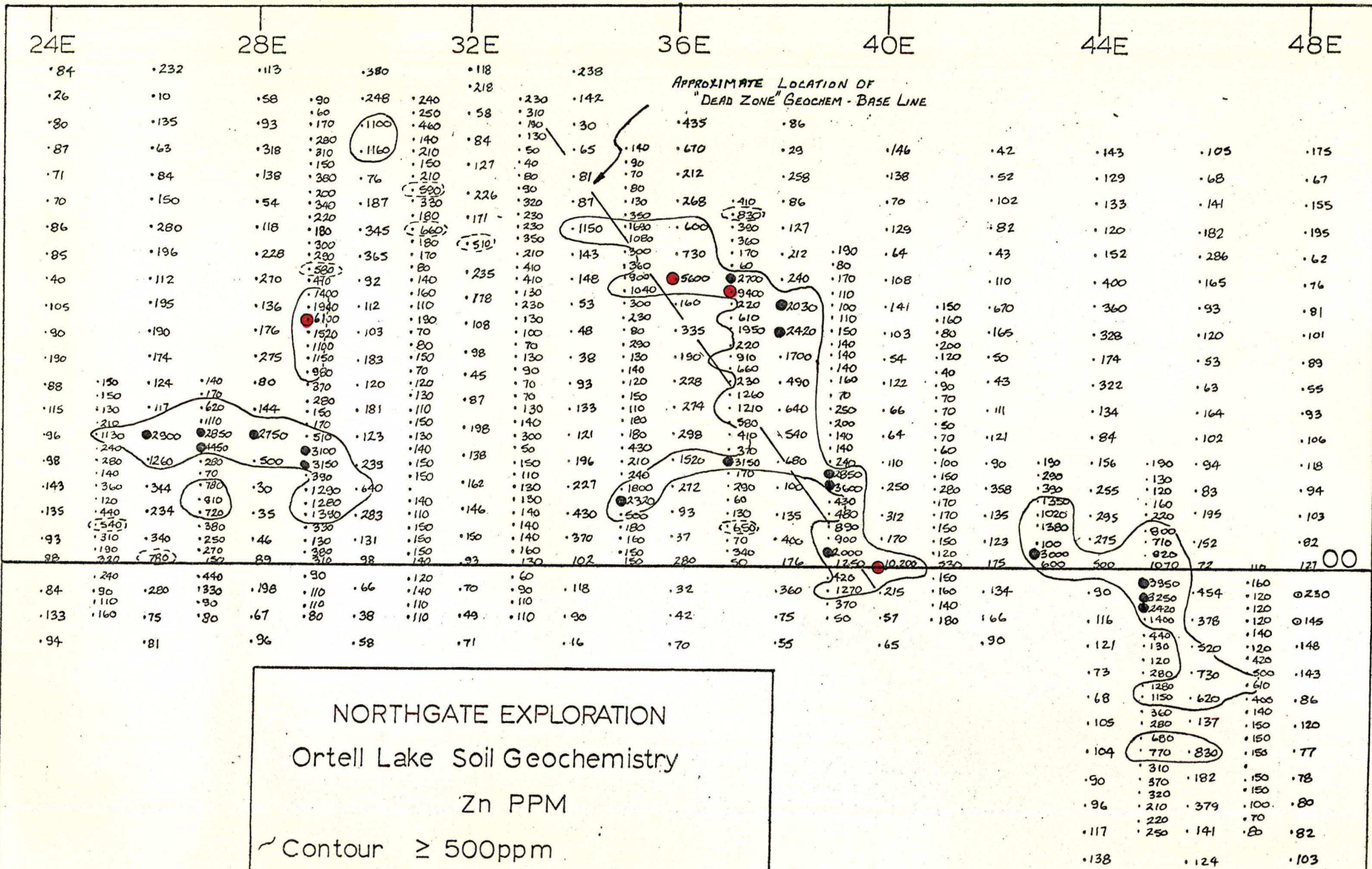
24E 28E 32E 36E 40E 44E 48E



NORTHGATE EXPLORATION
Ortell Lake Soil Geochemistry
Pb PPM

— Contour ≥ 75 ppm
 ● $\geq 200, < 500$
 ● ≥ 500
 ○ Spot High ≥ 75 ppm Scale 1:10,000

FIGURE 8



NORTHGATE EXPLORATION
Ortell Lake Soil Geochemistry
Zn PPM

~ Contour $\geq 500\text{ppm}$
 ● $\geq 2000 < 5000$
 ● ≥ 5000
 ○ Spot High $\geq 500\text{ppm}$ Scale 1:10,000

FIGURE 9



#1	#2	#3
1090	780	150
120	1200	190
170	2750	210
130	220	90
8600	490	140
10300	520	200
580	120	90
630	100	70
1000	50	120
300	160	90
490	240	30

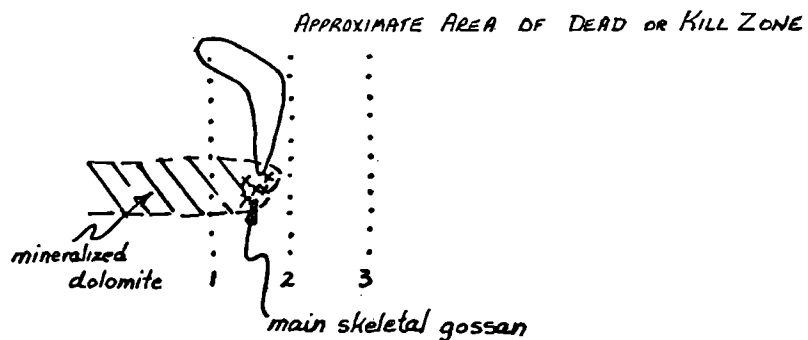
Zn ppm.

#1	#2	#3
33	28	20
23	910	28
21	520	28
10	720	10
311	77	20
11600	69	19
97	20	43
111	29	36
152	19	22
81	18	40
32	34	101

Pb ppm.

#1	#2	#3
0.6	0.7	0.6
0.4	1.4	0.4
0.6	1.0	0.5
0.3	1.9	0.4
1.2	1.4	0.6
12.1	0.3	0.7
0.6	0.8	0.7
0.4	0.2	1.1
1.0	0.6	0.7
0.7	0.5	0.4
0.5	0.6	1.4

Ag. ppm.



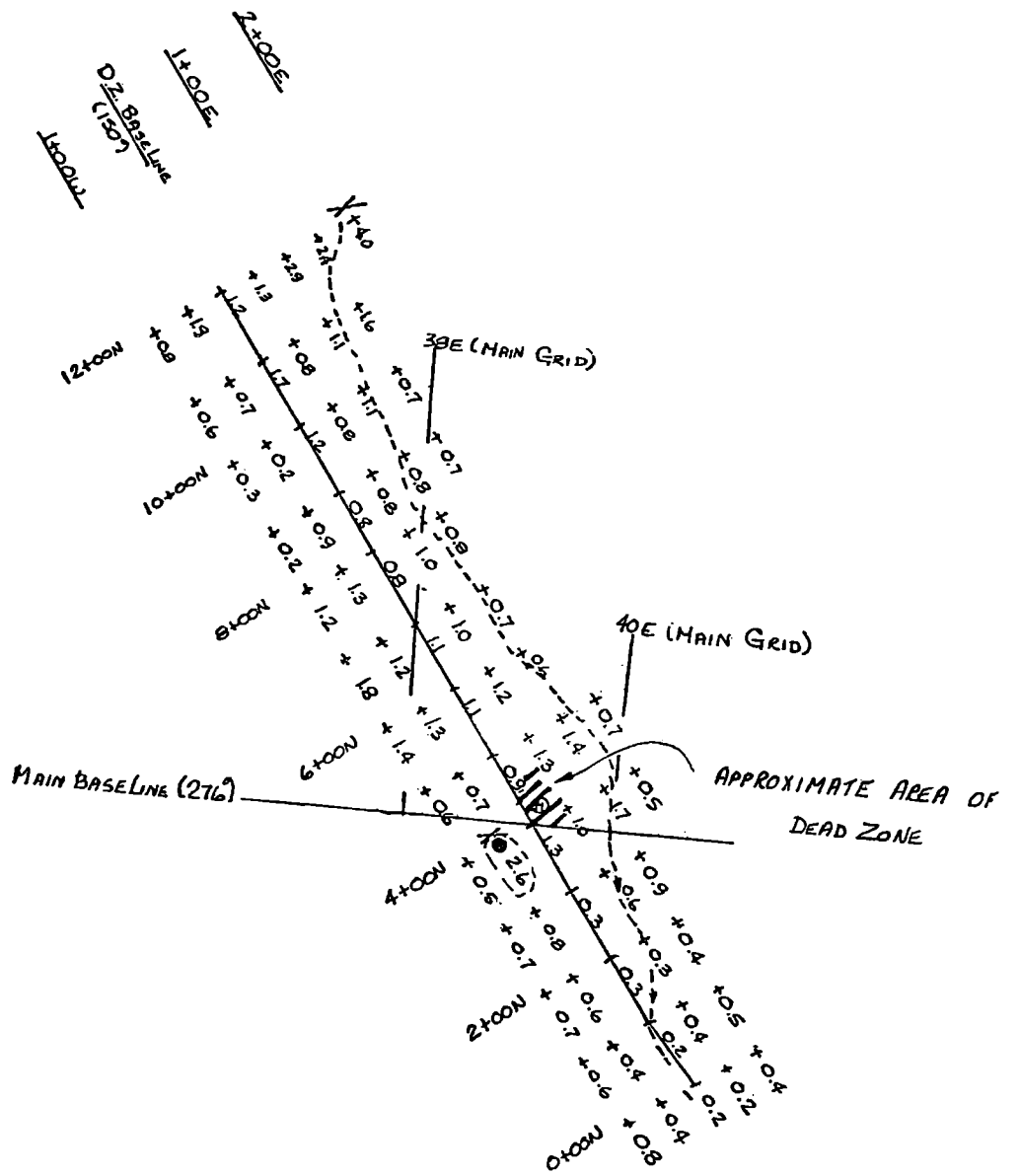
NORTHGATE - WESTFIELD JOINT VENTURE

ORTELL LAKE AREA

SOIL SAMPLES COLLECTED BY NORTHGATE ACROSS
MCINTYRE'S TRENT ZONE

Scale 1:10,000

FIGURE 10



NORTHGATE EXPLORATION
Ortell Lake Soil Geochemistry

DEAD ZONE Ag PPM

— Contour ≥ 2.5 ppm

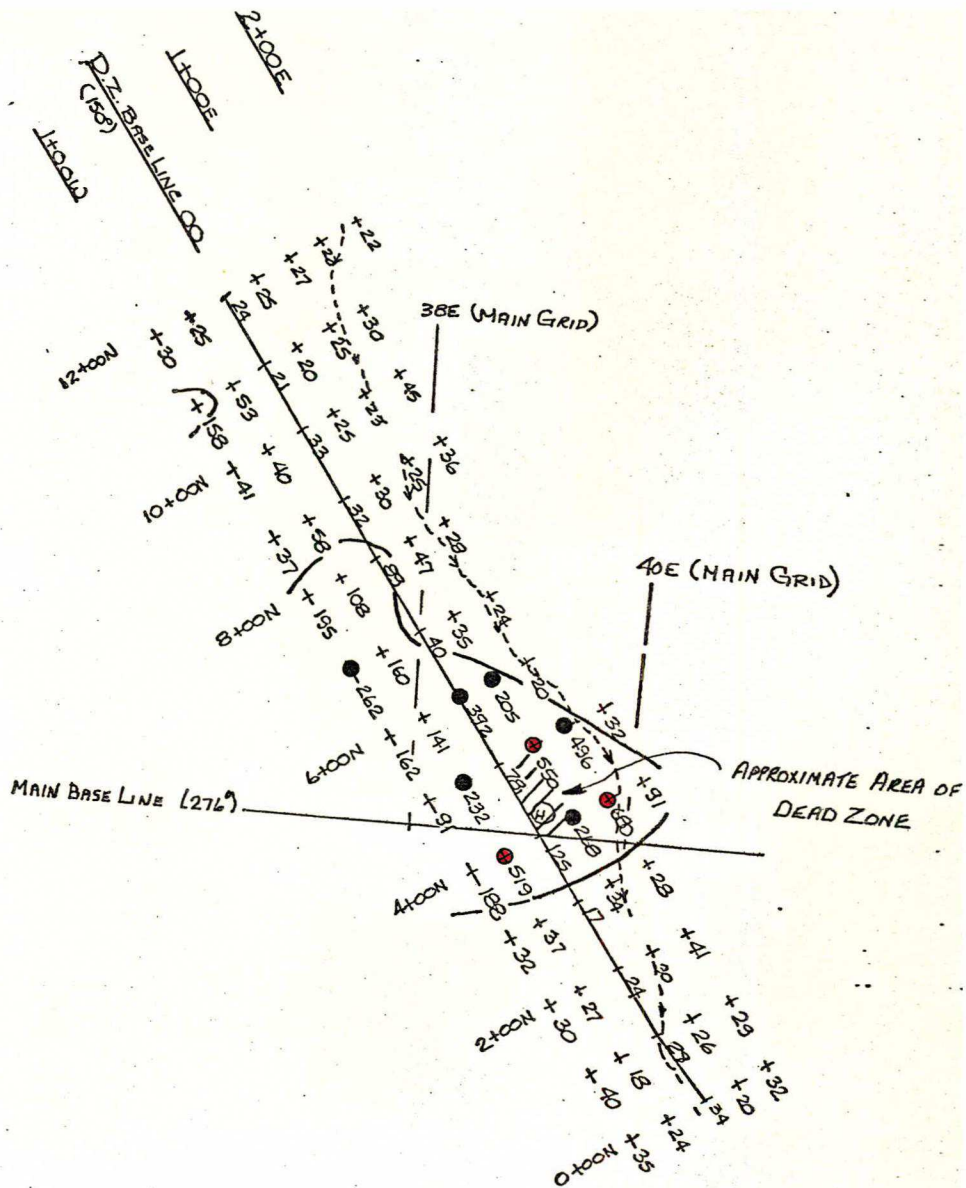
● $\geq 2.5, < 4.0$

○ ≥ 4.0

(X) Spot High ≥ 2.5 ppm

Scale 1:10,000

FIGURE 11



NORTHGATE EXPLORATION
Ortell Lake Soil Geochemistry

DEAD ZONE Pb PPM

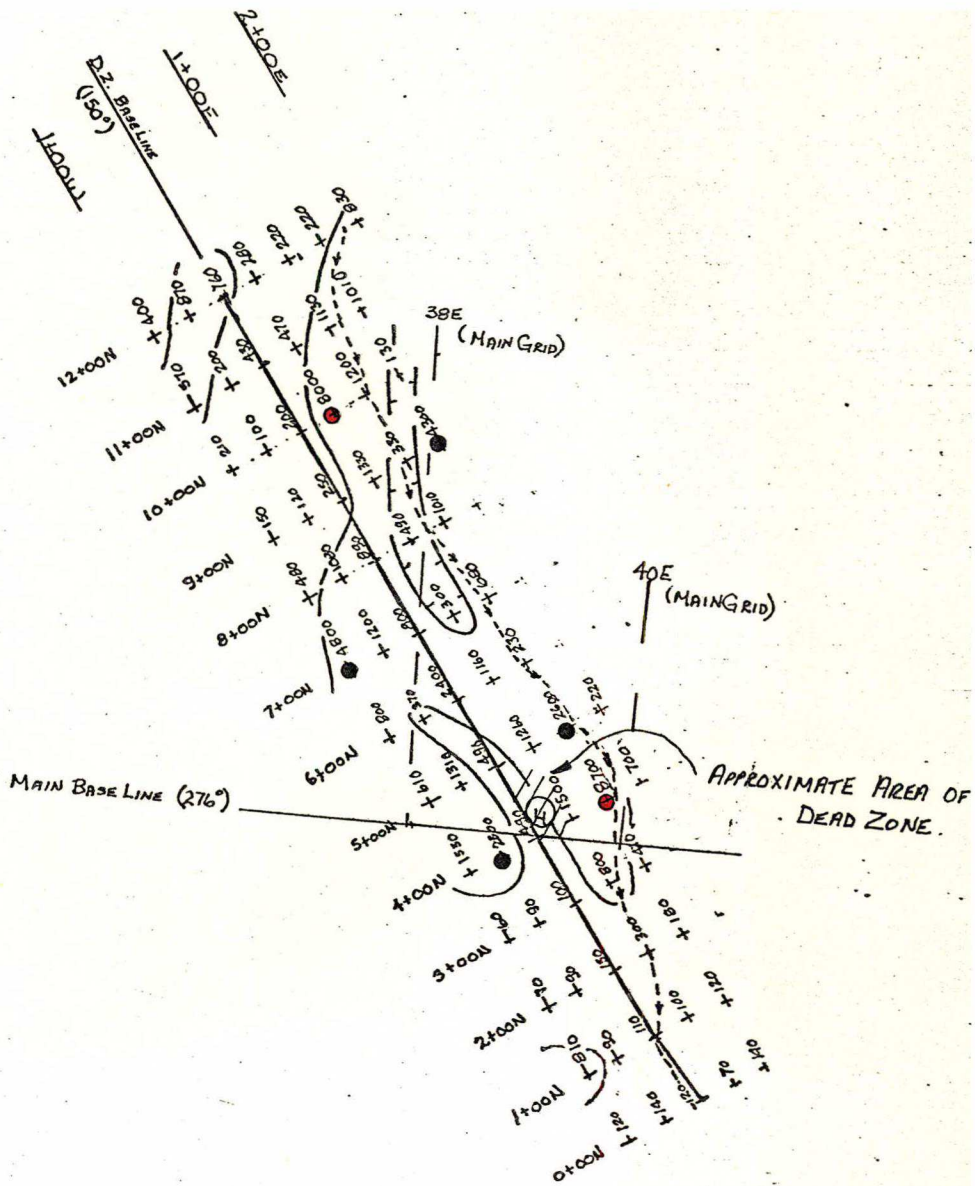
— Contour ≥ 75 ppm

● $\geq 200, < 500$

● ≥ 500

x Spot High ≥ 75 ppm Scale 1:10,000

FIGURE 12



NORTHGATE EXPLORATION
Ortell Lake Soil Geochemistry
DEAD ZONE Zn PPM

- ~ Contour ≥ 500 ppm
- $\geq 2000 < 5000$
- ≥ 5000
- x Spot High ≥ 500 ppm

Scale 1:10,000

FIGURE 13



NORTHGATE EXPLORATION LIMITED

SUITE 2602, ROYAL TRUST TOWER, P.O. BOX 27, TORONTO-DOMINION CENTRE, TORONTO, CANADA M5K 1A1 • TELEPHONE 362-2781 • TELEX 06-217766 • CABLE ADDRESS "NORGATE"

May 4, 1978

Mr. G. Simpson
Vice-President, Exploration
Cyprus Anvil Mining Corp.
330 - 355 Burrard Street
Vancouver, B.C.
V6C 2G8

*File in N.T.S.
106-C 2,3
WR*

Dear Glenn:

Enclosed is a report on the Ortell Lake property I mentioned on the phone.

It is essentially at the drilling stage and we had hoped to complete a drill program this season. You may possibly be interested in it for either this season or next.

Regards,

NORTHGATE EXPLORATION LIMITED

Colum Byrne

/eb

Encl.