GEOCHEMICAL AND GEOPHYSICAL REPORT

ON THE

TODD CREEK PROPERTY

TOC 3 -15 CLAIMS)

N.T.S. 104 A/04,05

SKEENA MINING DIVISION

Situated at coordinates: 56 16' 40" N
129 46' 00" W

NORANDA EXPLORATION COMPANY, LIMITED
(NO PERSONAL LIABILITY)

By: Robert J. Baerg
T.Wong

Jan.,1990

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1.0 Summary

The Todd Creek copper-gold property is located on the eastern flank of the Coast mountains approximately 45 km north of Stewart, B.C. Mineralization, consisting of copper-gold bearing quartz and sulphide veins was first documented by Newmont in 1959. Noranda staked the area of the showings in 1986 and has subsequently confirmed the presence of the copper-gold mineralization. Current areas of interest include:

1. South Zone: A northerly trending copper-gold mineralized fracture zone cutting feldspar porphyry volcanics. This zone was extensively tested by drilling in 1987 and 1988 and at present appears to have insufficient grades.

2. North Zone

The North Zone mineralization consists of several north-northwest trending, vertical to steeply west dipping, 0.1 to 2m wide quartz-chalcopyrite-pyrite-hematite veins and breccia zones. The veins, which are commonly banded and brecciated, have been traced for up to 320m.

In 1988 the "A" zone was tested with 9 drill holes and a Mise-a-la- Masse survey. Drilling and geophysics indicate that this zone is discontinuous/poddy along strike and down dip. The zone ranges from >1m to 32m wide.

3. Fall Creek Zone

1988 followup of a 1987 Cu - Au soil anomaly on the south side of Fall Creek located a new mineralized zone. The zone consists of hydrothermally altered felsic to intermediate volcanics which locally host north to northwesterly trending quartz-pyrite-chalcopyrite +/- barite veins. The zone has been traced, by surface mapping and geophysics, at least 400m horizontally and 350m vertically and is open in all directions.

Surface samples have returned values to 24.20 gmt Au. Four drill holes completed in 1988 tested a small part of this zone.

The 1989 work program focused entirely on the Fall Creek Zone. The purpose of the program was to expand on the known mineralized zone, henceforth designated the F1 Zone, and to identify additional zones within the area of hydrothermal alteration. The I.P. survey in fact identified at least 6 zones, including the known mineralization, with anomalous chargeabilities and coincident Cu-Au soil geochem. The alteration zone containing the anomalous I.P. and soil geochem is now up to 450m wide and 900m long and is open along strike in both directions. It is recommended for 1990 that these anomalous zones be tested by diamond drilling and that the survey area be expanded to the north and south in order to define or close off the mineralized area.

2.0 Introduction:

The Todd Creek property is located on the eastern side of the Coast Mountains of British Columbia, within the Skeena Mining Division. The property was staked to cover several Cu-Au occurrences which were first documented by Newmont Mining Corp. in 1959. 1989 fieldwork consisted of Induced polarization, Magnetic and geochemical surveys on the Fall Creek Zone.

3.0 History:

The South and North Zone showings were originally discovered in 1959 by prospectors Ole Olsen and Fred Hasselberg Jr., in the employ of Newmont Mining Corporation. Newmont conducted a limited trenching and drilling program on the zones in 1960 with inconclusive results.

On the South Zone, a zone of chalcopyrite-pyrite stringers and hematitic quartz breccias, Newmont drilled 5 randomly spotted packsack drill holes.

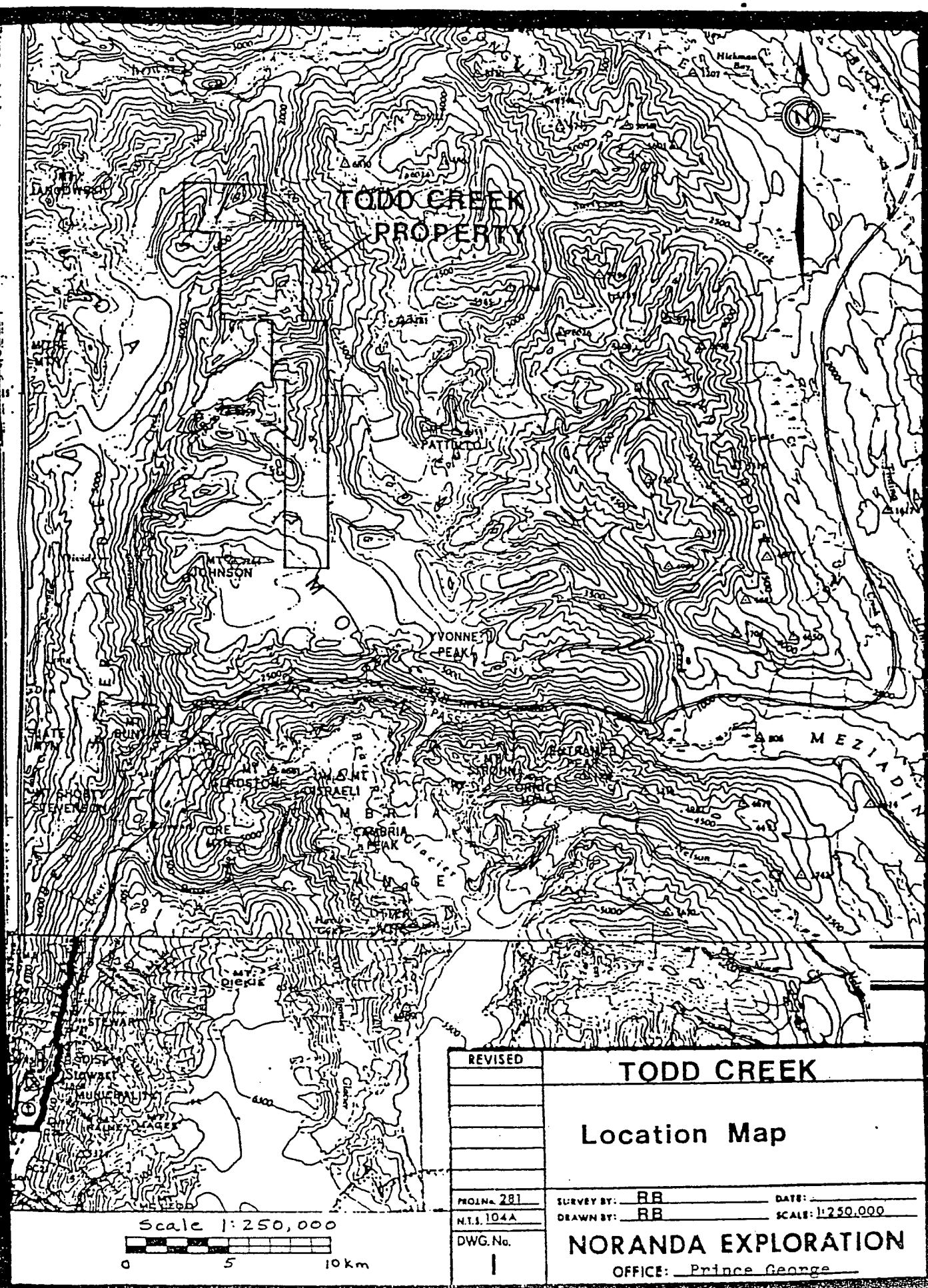
In 1969, the South Zone showing was staked for Kerr Addison Mines by Wilf Christians. Kerr Addison, who recorded no work on the property, subsequently transferred title to Christians, who in turn sold the claims to C.S. Powney. During 1970-1972, several trenches were blasted and sampled. In 1981, J.R. Woodcock Consultants staked the North Zone and a large altered area further north. From 1981-1984, Woodcock and Riocanex conducted extensive geological and geochemical programs on their claims. In 1985, Woodcock dropped everything except two units, which they currently hold.

In 1986, Noranda Exploration Company Limited staked the TOC 1-10 to cover the known showings and gossans along Todd Creek. TOC 11 and 12 were added in 1986 and TOC 13-15 in 1987.

In 1988 an extensive program of prospecting, geological mapping, drilling and a minor amount of geophysics was completed on the property.

4.0 Location and Access:

The Todd Creek property is located in the Skeena Mining Division, approximately 45 km NNE of Stewart, B.C.(Figure #1). Highway #37A to Stewart passes 10 km to the south of the property. The property covers most of the western side of the Todd Creek valley and portions of the Todd Creek glacier. Access to the property has been via helicopter from Stewart, B.C.



REVISED

TODD CREEK

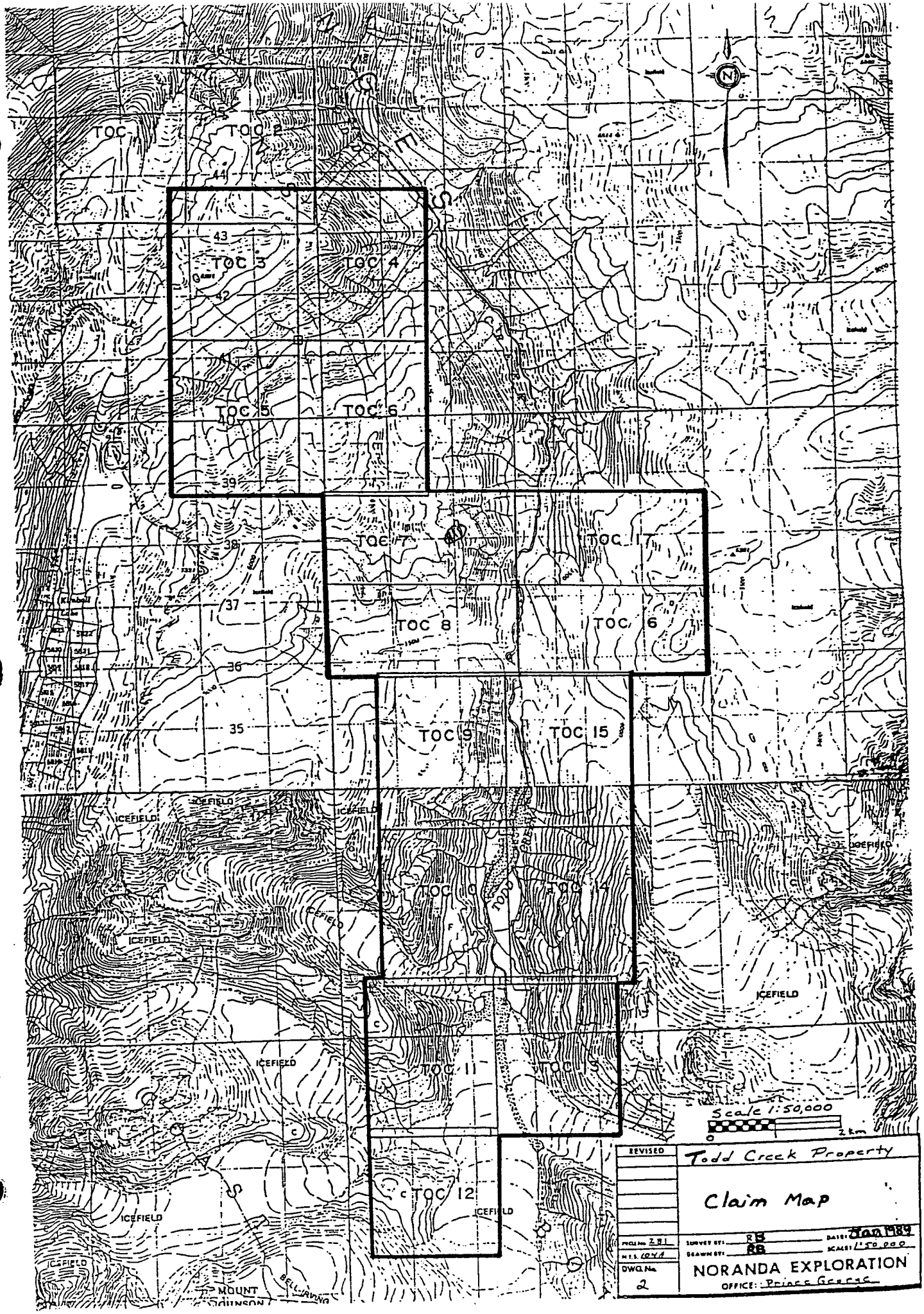
Location Map

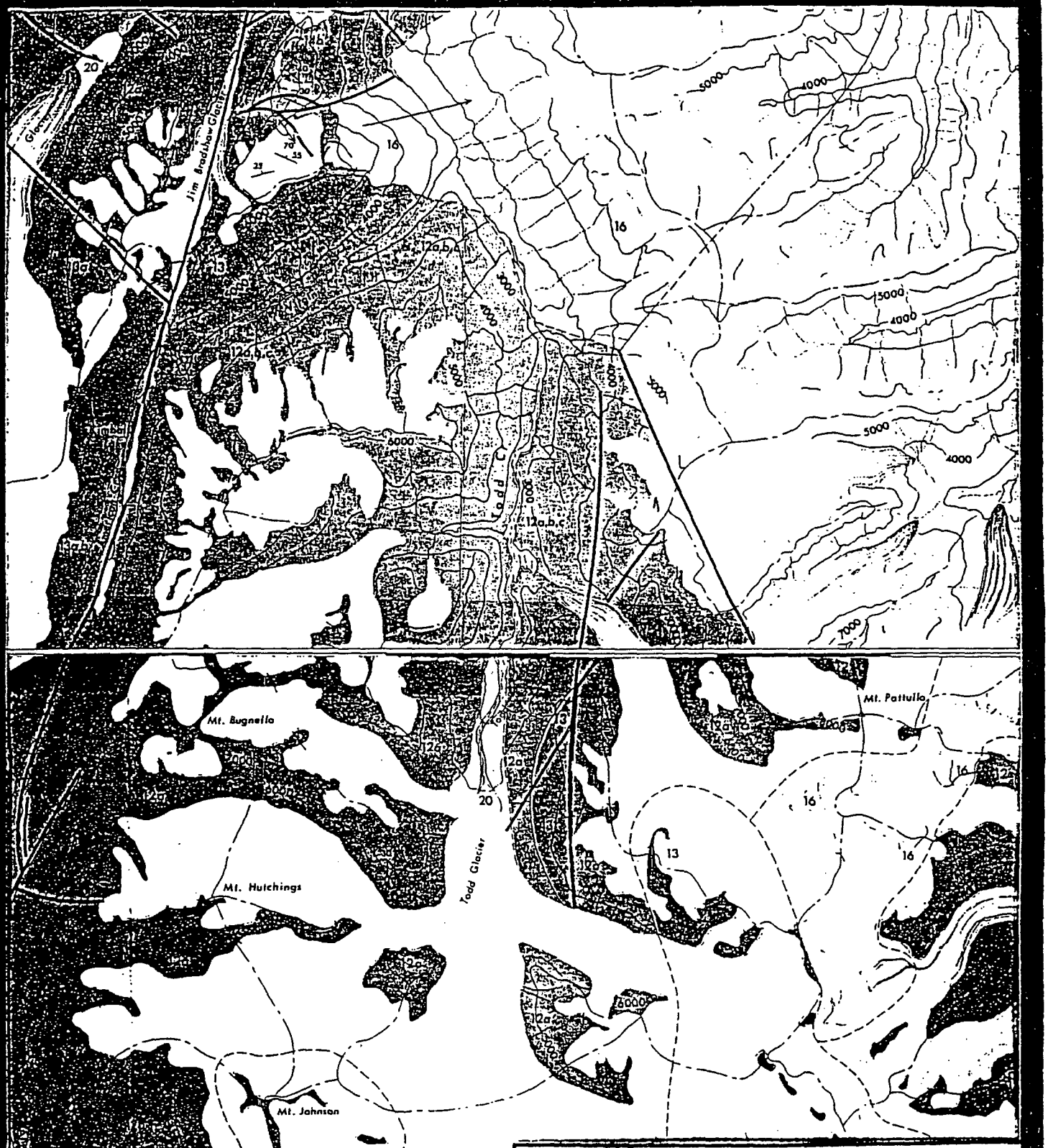
PROJ. No. 281
N.T.S. 104A
DWG. No. 1

SURVEY BY: RB
DRAWN BY: RB
DATE:
SCALE: 1:250,000

NORANDA EXPLORATION

OFFICE: Prince George


TOC 1
TOC 2
TOC 3
TOC 4
TOC 5
TOC 6
TOC 7
TOC 17
TOC 8
TOC 16
TOC 9
TOC 15
TOC 11
TOC 13
TOC 12
ICEFIELD
Todd Creek
Scale 1:50,000
2 km
REVISED
Todd Creek Property
Claim Map
RB
RB
Jan 1989
1:50,000
NORANDA EXPLORATION
OFFICE: Prince George
2



REVISED	TODD CREEK
	Regional Geology (after Grove, 1982)
PROJ.No. 281	SURVEY BY: R. Baerg DATE: May 1988
N.T.S. 104A	DRAWN BY: R. Baerg SCALE: 1:100,000
DWG.No. 3	NORANDA EXPLORATION
	OFFICE: Prince George

Province of British Columbia
Ministry of Energy, Mines and Petroleum Resources

GEOLOGY OF THE UNUK RIVER - SALMON RIVER - ANYOX MAP AREA

0 10 KILOMETRES

SCALE - 1:100 000

LEGEND

SEDIMENTARY AND VOLCANIC ROCKS

QUATERNARY

RECENT

CENOZOIC

20 UNCONSOLIDATED DEPOSITS: RIVER FLOODPLAIN, ESTUARINE, RIVER CHANNEL AND TERRACES, ALLUVIAL FANS, DELTAS AND BEACHES, OUTWASH, GLACIAL LAKE SEDIMENTS, TILL, PEAT, LANDSLIDES, VOLCANIC ASH, MOTIPPING DEPOSITS

19 BASALT FLOWS (a), CINDERS, ASH (a)

PLEISTOCENE AND RECENT

18 BASALT FLOWS

JURASSIC

HAZELTON GROUP

UPPER JURASSIC

MASS FORMATION

MESOZOIC

17 SILTSTONE, GREYWACKE, SANDSTONE, SOME CALCARENITE, ARGILLITE, CONGLOMERATE, MINOR LIMESTONE, MINOR COAL (INCLUDING EQUIVALENT SHALE, PHYLLITE, AND SCHIST)

MIDDLE JURASSIC

SALMON RIVER FORMATION

16 SILTSTONE, GREYWACKE, SANDSTONE, SOME CALCARENITE, MINOR LIMESTONE, ARGILLITE, CONGLOMERATE, LITTORAL DEPOSITS

15 RHYOLITE, RHYOLITE BRECCIA, CRYSTAL AND LITHIC TUFF

BETTY CREEK FORMATION

14 PILLOW LAVA, BROKEN PILLOW BRECCIA (a); ANDESITIC AND BASALTIC FLOWS (a)

13 GREEN, RED, PURPLE, AND BLACK VOLCANIC BRECCIA, CONGLOMERATE, SANDSTONE, AND SILTSTONE (a); CRYSTAL AND LITHIC TUFF (a); SILTSTONE (c); MINOR CHERT AND LIMESTONE (INCLUDES SOME LAVA (+++)) (a)

LOWER JURASSIC

UNUK RIVER FORMATION

12 GREEN, RED, AND PURPLE VOLCANIC BRECCIA, CONGLOMERATE, SANDSTONE, AND SILTSTONE (a); CRYSTAL AND LITHIC TUFF (a), SANDSTONE (c); CONGLOMERATE (d); LIMESTONE (a), CHERT (f); MINOR COAL (g)

11 PILLOW LAVA (a); VOLCANIC FLOWS (a)

TRIASSIC

UPPER TRIASSIC

TAKLA GROUP (?)

10 SILTSTONE, SANDSTONE, CONGLOMERATE (a); VOLCANIC SILTSTONE, SANDSTONE, CONGLOMERATE (b); AND SOME BRECCIA (c); CRYSTAL AND LITHIC TUFF (d); LIMESTONE (e)

PLUTONIC ROCKS

OLIGOCENE AND YOUNGER

CENOZOIC

9 DYKES AND SILLS (RHYOLITE, DIORITE (a); QUARTZ DIORITE (b); GRANODIORITE (c), BASALT (d)

EOCENE (STOCKS, ETC.) AND OLDER

8 QUARTZ DIORITE (a); GRANODIORITE (b); MONZONITE (c); QUARTZ MONZONITE (d); AUGITE DIORITE (e); FELDSPAR PORPHYRY (f)

7 COAST PLUTONIC COMPLEX: GRANODIORITE (a); QUARTZ DIORITE (b); QUARTZ MONZONITE, SOME GRANITE (c); MIGMATITE - AGMATITE (d)

JURASSIC

MIDDLE JURASSIC AND YOUNGER ?

6 ?

MESOZOIC

5.0 Physiography & Vegetation:

The property lies on the eastern flank of the Coast Range Mountains. Relief in the area is great, from 885 meters in the valley bottom to 2075 meters on the highest summit. Todd Creek glacier and several valley glaciers occupy portions of TOC 11 and 12. The sides of the valley have extensive areas of bedrock exposure which commonly forms steep rock faces and cliffs. The valley has a thick cover of glacier outwash material. Vegetation on the property consists of young willow, poplar and alder in the valley bottom, grading up slope into local stands of fir, hemlock and spruce and higher up into alpine meadows and bare rock.

6.0 Claim Statistics:

The Todd Creek property consists of 12 modified grid claims(Figure #2), as listed below:

NAME	UNITS	RECORD #	EXPIRY DATE
TOC 3	20	5305	April 9, 1991
TOC 4	20	5306	April 9, 1995
TOC 5	20	5307	April 9, 1991
TOC 6	20	5308	April 9, 1995
TOC 7	18	5309	April 9, 1994
TOC 8	18	5310	April 9, 1994
TOC 9	20	5311	April 9, 1994
TOC 10	20	5312	April 9, 1994
TOC 11	20	5518	Sept 17, 1994
TOC 12	16	5577	Oct. 28, 1994
TOC 13	20	5996	Mar. 26, 1991
TOC 14	20	5997	Mar. 26, 1991
TOC 15	20	5998	Mar. 26, 1991

The 2 unit Todd claim in central TOC 7 is currently held by Woodcock Consulting.

The work described in this report will be filed for assessment credit on the TOC 3 to 15 claims.

7.0 Regional Geology:

The area has been mapped as being largely underlain by Lower Jurassic age Unuk River Formation volcanics and clastic sediments which are cut by numerous Jurassic and Tertiary age intrusive bodies ranging in size from narrow dykes and sills to large plutons. (Figure #3)

Reconnaissance property mapping indicates that much of the property is underlain by intermediate to felsic flows, tuffs, agglomerates and volcaniclastics with local areas of fine to coarse clastic sediments. Intermediate volcanics, andesite flows agglomerates, predominate with lesser but significant amounts of rhyolite-dacite flows and volcaniclastics along the west side of the Todd Creek valley from TOC 9 to 11 and on the north side of Virginia Creek on TOC 3 and 4. The clastic sediments, which consist of siltstones, greywackes and conglomerates, occur on TOC 6 and to the east in the main Todd Creek valley. The stratigraphy generally trends north to northwest with moderate northeasterly dips.

8.0 Property Geology:

Fall Creek Zone:

A very brief program of geological mapping was completed in 1989. During the course of mapping on the Fall Creek grid five mappable units were identified:

1) Pervasively altered silica- pyrite +/- sericite assemblage of uncertain parent lithology.
2) Green andesitic volcanic fragmental.
3) Felsic volcanic fragmental.
4) Purple basalt-andesite fragmental.
5) Intercalated epiclastic sediments and green andesitic flows hosting fracture controlled silica-sericite-pyrite alteration.

The intercalated epiclastics and flows appear restricted to the highest and steepest slopes. The purple basaltic andesite and felsic fragmental have a conformable contact trending 340 degrees along the eastern margin of the grid, the basaltic andesite being the eastern most unit. The felsic fragmental thickens to the south and appears to grade into green andesite fragmental to the west. The green andesite fragmental is locally crosscut by both high and low angle carbonate +/- pyrite alteration zones. The baseline green, locally purple, volcanic fragmental interfingers with a pervasively altered silica-pyrite+/-sericite assemblage which is continuous to the west.

9.0 1989 Field Program

Between August 25 and September 7, 1989, a 3 to 6 man camp was established on Fall Creek. During this period the old baseline was reestablished and 10 wing lines, spaced at 100m intervals, were run starting at 19750 N and ending with 20650 N for a total of 5.975 line km. Once established the grid was surveyed with I.P. and total field magnetic geophysical methods. In addition 33 soil samples were collected from lines 19750 N and 19850 N. A limited amount of geological mapping was also completed.

9.01 Soil Geochemistry

A total of 33 soil samples were collected on lines 19750 N and 19850 N. Samples were collected from the B horizon with the use of a prospecting grubhoe at 25m intervals along the lines. Sample depths ranged from 20 to 35cm. Sample material was placed in Kraft wet-strength paper bags and shipped to Noranda Labs in Vancouver. The samples were then analyzed for Cu,Pb,Zn,Ag,Au and Hg. For the analytical procedure refer to Appendix III.

Only the Cu-Au results have been plotted but all the results are included as Appendix IV.

The results, as shown on figure 4, confirm that the Cu-Au soil anomalies continue to the southwest. Values to 915 ppb Au and 1100 ppm Cu were obtained. This southwest orientation is in marked contrast to the observed southeast orientation of the F1 zone, possibly indicating that the soil geochemistry reflects several zones with widely varying orientations. The relatively narrow shape of the anomaly to the southwest also probably indicates close proximity to the source.

9.02 Geophysics

During August 1989, time-domain I.P. and total field magnetics surveys were completed on the Fall Creek Zone of the Todd Creek property. The work was completed by Pacific Geophysical of Vancouver, B.C. The magnetics survey was carried out using the tie-in method and employed EDA magnetometers. Instruments used in the I.P. survey were an EDA IP6 receiver and a Phoenix transmitter operating on an 8 second, 50% duty cycle. The survey used a 25m dipole-dipole array with readings recorded down to the fifth separation. The I.P. data is presented in pseudo-section form at a scale of 1:2500 while the magnetic data is presented in contoured, plan form at a scale of 1:2500 (figure 7).The I.P. interpretation is also presented on the magnetic plan map.

A frequency-domain I.P. survey was completed on portions of Lines 20200N, 20250N, 20300N, and 20350N in September, 1988 by Pacific Geophysical. The current survey was completed on Lines 20650N to 19750N inclusive at 100m line separations. The previous survey's results have been incorporated into the current survey's results. Details of the 1988 work are contained in a report dated October 20, 1988.

Discussion of Survey Results

The magnetic plan map shows a fairly active area dominated by 2 features. The first of these is a symmetrical plug-like feature, with 2 prominent peaks , found at the northwest corner of the map. The sharpness of this feature may indicate a shallow source, possibly an intermediate intrusive body. A narrow, linear feature (a dyke?) cuts between the peaks. The second item is a linear trend striking northerly across most of the grid. It appears faulted just south of L.20150N. Based on it's shape and intensity, it most likely represents a different occurrence than that of the plug feature. It is most intense on Line 20350N.

Background chargeability values of the I.P. survey are considered to be less than or equal to 9 mV/V. The I.P. survey has outlined several zones of interest on the grid.

Lines 19750N, 19850N: Two prominent chargeability zones with closely associated high resistivity signatures are evident and lie close to surface. They appear to converge and end just north of L. 19850N. They are designated "A" on the magnetics map.

Line 19950N: A high resistivity zone is coincident with the middle I.P. anomaly.

Line 20050N: The middle I.P. anomaly of the previous line is more pronounced. This zone, designated "B", has a high resistivity signature. Zone B lies close to, or within, the prominent linear magnetic feature. Indeed, there is a very good correlation between high resistivity values and the geometry of the magnetic feature, i.e. the magnetic feature is quite resistive. The magnetic body is speculated to be intrusive and very dry. Another prominent I.P. anomaly on this line is centred on 203+75E. This anomaly, designated "C", has a relatively low resistivity signature. Zones B and C form a broad anomalous zone on this line.

Line 20150N: The two I.P. zones are extended to this line. Zone C intensifies, is well defined and appears close to surface. It lies open to the east. The resistive unit becomes very shallow, probably due to the inferred fault, however the chargeability source remains at depth. The fault also seems to offset the correlation between the high resistivity and Zone B.

Line 20200N: Zone C possibly continues to the indicated middle and western anomalies. A well defined anomaly, Zone D, with a relatively low resistivity signature develops to the east at 205+75E.

Line 20250N: The pseudo-section incorporates last years results(east half, in PFE) with the current year's (west half). Zone B presents itself as a very good target as it increases in width and intensifies as does Zone D. Both zones are close to surface.

Line 20300N: Zone D increases in width and remains close to surface.

Line 20350N: The pseudo-section incorporates the previous survey's results (east half). Zone B narrows and deepens while Zone D converges to it. These two zones define a broad anomalous area. Two moderate anomalies develop to the east of Zone D.

Line 20450N: A broad, moderately chargeable zone lies at depth and most likely represents a convergence of the anomalies of the previous line. The resistive, magnetic zone appears broken up. An area of high resistivity develops at the eastern ends of the line as does an anomalous, shallow I.P. response at the western end of this line which is located on the eastern peak of the magnetic plug feature.

Line 20550N: The western I.P. zone, Zone E, intensifies and is centred on 201+75E. It has a moderately high resistivity signature., appears to be shallow, and is part of a wide zone. A shallow, moderate anomaly with a low resistivity signature appears at the east end of the line (Zone F). The I.P. signature of this line displays a different character than that of all previous lines, perhaps reflecting a structural control to the mineralization.

Line 20650N: Zone E narrows and appears centred on 201+82E. The wide zone to the west of it shallows out and intensifies and correlates with a high resistivity zone. Zone widens and is more pronounced than on the previous line.

10.0 Conclusions

Based on the previous and current survey results, there are a number of good coincident geophysical/geochemical targets that warrant further attention. Most of these targets represent the strongest part of broad geophysically/geochemically anomalous zones. As outlined by the current surveys, the results of last year's testing should be followed up. The magnetics coverage is a bit sparse, it could be extended to give a more complete overall idea of the area geology as well as outlining potential mineralized zones.

The targets below are all attractive and are given in no particular order.

1. L.20300N/20500E/d=35m,
   L.20350N/204+25E/d=25m

2. L.20250N/203+00E/d=25m

3. L.20150N/203+75E/d=35m

4. L.20550N/201+75E/d=25m

5. L.20650N/208+00E/d=35m

11.0 Recommendations

Based on the promising results of the 1988 and 1989 surveys the following program is recommended for 1990:

FALL CREEK ZONE

1. Extend the geological/geochemical/geophysical(magnetics) coverage to the north, south,and west.

2. Test the coincident I.P./geochemical anomalies with ten(10) 100m drill holes.

3. Run a test VLF survey across the North Zone.

VIRGINIA CREEK

1. Further geological/geochemical follow-up work in the Virginia Creek area to evaluate areas of anomalous geochem which are coincident with areas of felsic volcanics(Mt Dillworth/ Eskay creek formations?).

SOUTH ZONE

1. Complete a test VLF survey across the northern end of the South Zone structure to test for continuity under the Todd Creek gravels.

12.0 References

Alldrick, D. J., (1983) Salmon River Project, Stewart, B.C. B.C.D.M. Paper 83-1

Baerg, R. J., (1987) Geological, Geochemical Report on the Todd Creek Property (TOC 1-12 Claims). Assessment Report.

Baerg, R. J., (1988) Geological, Geochemical and Drilling Report on the Todd Creek Property (TOC 3-15 Claims). Assessment Report.

Gorc, D., (1982) Todd Creek Property, B.C.D.M. Assessment Report # 10404

Grove, E. W., (1982) Geology of the Unuk River-Salmon River-Anyox Map Area.

Hodgson, A. G., (1971) Geological Report on the Todd Group of Claims, B.C.D.M. Assessment Report #3428.

Osborne, T. C., (1960) Todd Creek Project, Newmont Mining Corp., Company Report.

APPENDIX I

STATEMENT OF QUALIFICATIONS

APPENDIX I

STATEMENT OF QUALIFICATIONS

I, Robert J. Baerg of the city of Prince George, Province of British Columbia, do certify that:

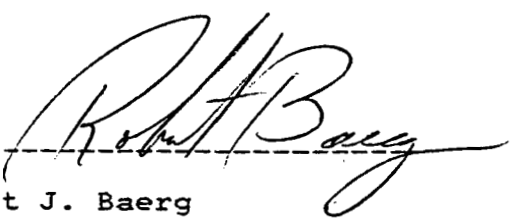
1. I have been employed as a geologist by Noranda Exploration Company, Limited since May, 1984.

2. I am a graduate of the University of British Columbia with a Bachelor of Science (Honors) in Geology (1984).

3. I am an Associate Fellow of the Geological Association of Canada.

4. I am a member of the Canadian Institute of Mining and Metallurgy.

5. I supervised and assisted with the work described in this report.



Robert J. Baerg
Geologist
Noranda Exploration Company, Limited
(No Personal Liability)

STATEMENT OF QUALIFICATIONS

I, Ted Wong, of the City of Vancouver, Province of British Columbia, hereby certify that:

1. I am a geophysicist residing in Burnaby, B.C.

2. I have graduated from the University of British Columbia in 1983 with a B.Sc. in Geophysics.

3. I am a professional geophysicist, registered with the Association of Professional Engineers, Geologists and Geophysicists of Alberta. I am a licensed professional geophysicist, registered with the Association of Professional Engineers, Geologists and Geophysicists of the Northwest Territories.

4. I have practised by profession on a continual basis since 1984.

5. I have been employed by Noranda Exploration Company, Limited since September, 1989.

Ted Wong

Ted T. Wong, P. Geoph.

APPENDIX II

STATEMENT OF COST

STATEMENT OF COST
(FOR ASSESSMENT REPORT PURPOSES)

PROPERTY: TODD CREEK
TYPE OF REPORT: GEOCHEMICAL, GEOPHYSICAL
DATE: JANUARY,1990

a) WAGES:

no. of mandays - 50
Rate per day - $151.70
Dates from - August 25 to September 7,1989
Total Cost - 50 * $151.70 $ 7584.80

b) SUPPLIES AND ACCOMMODATION:

no. of mandays - 50
Rate per day - $67.06
Dates from - August 25 to September 7, 1989
Total Cost - 50 * 67.06 $ 3350.30

c) TRANSPORTATION:

no. of days - 14
Rate per day - $608.89
Dates from August 25 to September 7, 1989
Total Cost - 14 * $608.89 $ 8524.56

d) GEOCHEMISTRY:

no. of soil samples - 33
Cost per sample (Cu, Pb, Zn, Ag, Au) $6.88
Total Cost 33 * $ 6.88 $ 227.70

e) CONTRACTS:

I.P./ Magnetic Surveys $ 6612.50

f) REPORT:

Typing	$ 300.00
Drafting	$ 300.00
Author	$ 200.00
	$ 27098.86

APPENDIX III

ANALYTICAL PROCEDURE

ANALYTICAL METHOD

DESCRIPTIONS FOR GEOCHEMICAL ASSESSMENT REPORTS

The methods listed are presently applies to analyse geological materials by the Noranda Geochemical Laboratory at Vancouver. (March, 1984).

Preparation of Samples

Sediments and soils are dried at approximately 80°C and sieved with a 80 mesh nylon screen. The -80 mesh (0.18 mm) fraction is used for analysis.

Rock specimens are pulverized to -120 mesh (0.13 mm). Heavy mineral fractions (panned samples) are analysed in its entirety, when it is to be determined for gold without further sample preparation. See addendum.

Analysis of Samples

Decomposition of a 0.200 g sample is done with concentrated perchloric and nitric acid (3:1), digested for 5 hours at reflux temperature. Pulps of rock or core are weighed out at 0.2 g or less depending on the matrix of the rock, and twice as much acid is used for decomposition than that is used for silt or soil.

The concentrations of Ag, Cd, Co, Cu, Fe, Mn, Mo, Ni, Pb, V and Zn (all from the group A elements of the fee schedule) can be determined directly from the digest (dissolution) with an atomic absorption spectrometer (AA). A Varian-Techtron Model AA-5 or Model AA-475 is used to measure elemental concentrations.

Elements Requiring Specific Decomposition Method

Antimony - Sb: 0.2 g sample is attached with 3.3 mL of 6% tartaric acid, 1.5 mL conc. hydrochloric acid and 0.5 mL of conc. nitric acid, then heated in a water bath for 3 hours at 95°C. Sb is determined directly from the acid solution with an AA-475 equipped with electrodeless discharge lamp (EDL).

Arsenic - As: 0.2 - 0.4 g sample is digested with 1.5 mL of 70% perchloric acid and 0.5 mL of conc. nitric acid. A Varian AA-475 equipped with an As-EDL measures the arsenic concentration of the digest.

Barium - Ba: 0.1 g sample is decomposed with conc. perchloric, nitric and hydrofluoric acid. Atomic absorption using a nitrous oxide-acetylene flame determines Ba from the aqueous solution.

Bismuth - Bi: 0.2 g - 0.3 g is digested with 2.0 mL of perchloric 70% and 1.0 mL of conc. nitric acid. Bismuth is determined directly from the digest into the flame of the AA instrument c/w EDL.

Gold - Au: 10.0 g sample (Pan-concentrates see below) is digested with aqua regia (1 part nitric and 3 parts hydrochloric acid). Gold is extracted with Methyl iso-Butyl ketone (MIBK) from the aqueous solution. Gold is determined from the MIBK solution with flame AA.

Magnesium - Mg: 0.05 g - 0.10 g sample is digested with 4 mL perchloric/nitric acid (3:1). An aliquot is taken to reduce the concentration to within the range of atomic absorption. The AA-475 with a nitrous oxide flame determines Mg from the aqueous solution.

Tungsten - W: 1.0 g sample sintered with a carbonate flux and thereafter leached with water. The leachate is treated with potassium thiocyanate. The yellow tungsten thiocyanate is extracted into tri-n-butyl phosphate. This permits colourimetric comparison with standards to measure tungsten concentration.

Uranium - U: An aliquot, taken from a perchloric-nitric (3:1) decomposition, usually from the multi-element digestion, is diluted with water and a phosphate buffer. This solution is exposed to laser light, and the luminescence of the uranyl ion is quantitatively measured on the UA-3 (Scintrex).

LOWEST VALUES REPORTED IN PPM

Ag - 0.2	Mn - 20	Zn - 1	Au - 0.1 (10 ppb)
Cd - 0.2	Mo - 1	Sb - 1	W - 2
Co - 1	Ni - 1	As - 1	U - 0.1
Cu - 1	Pb - 1	Ba - 10	
Fe - 100	V - 10	Bi - 1	

APPENDIX IV

INSTRUMENTATION

IP 6

DESCRIPTION

IP 6 is a six channel multiwindow Time Domain Induced Polarization receiver.

The six channels permit to measure six receiver dipoles, which provides a high efficiency in the field.

IP decay curves may be analysed by various types of sampling : up to 10 windows are available, with arithmetic or logarithmic widths. This multiwindow analysis provides a high accuracy in the definition of the decay curve.

Measurements are made very easy through a fully automatic measuring process : self test and calibration, autosynchronization and re-synchronization at each cycle, SP buck out including linear drift correction, automatic gain selection, digital stacking for noise reduction, and fully documented displays are controlled by the microprocessor to ensure the highest accuracy and reliability of the results.

The internal memory can store up to eighteen hundreds measurements ; a serial link permits to transfer the data to a printer for listing the results or to a microcomputer for storing, plotting and interpreting the data.

Efficiency, accuracy, ease to use make IP 6 A high technology key tool for Induced Polarization Prospecting.

SPECIFICATIONS

- 6 input channels.
- up to 10 chargeability windows.
- signal waveform : symmetrical time domain (ON+, OFF, ON-, OFF) with a pulse duration of 1 s, 4 s or 8 s.
- input impedance : 10 Mohm.
- input overvoltage protection up to 1 000 Volts.
- input voltage range - each dipole : 8 V maximum
  - sum of voltages dipoles 2 to 6 : 12 V maximum.
- overload indication.
- automatic gain ranging.
- automatic stacking, automatic SP bucking (-1V to +1V) with linear drift correction up to 1 mV/s.
- sampling rate : 10 ms.
- 50 to 60 Hz power line rejection greater than 100 dB.
- accuracy in synchronization : 10 ms.
- common mode rejection : 86 dB (for RS = 0).
- primary voltage - resolution : 1 µV.
  - accuracy typ. 0.3 % ; max 1 %.
- chargeability - resolution : 0.1 mV/V
  - accuracy : typical : 0.6 %
    max : 2 % of reading ± 1 mV/V for Vp > 10 mV
    2 % of reading ± 0.1 mV/V for Vp > 100 mV.
- battery test : manual and automatic before each measurement.
- grounding resistance measurement from 0.1 to 128 kohm.
- memory capacity : 1-800 measurements.
- transfer rates : 300 to 19 200 bauds.
- dimensions : 30 x 20 x 24 cm (12 x 8 x 9 inch).
- weight : 7.5 kg (17 lb) without dry cells.
- operating temperature range : -40°C to +70°C.
  The above mentionned specifications are given over the entire temperature range.
- storage temperature range : -40°C to +85°C.
- power supply : six 1.5 V D size alkaline dry cells (20 hours of operation at 20°C).

MAGNETOMETER SYSTEM

The magnetometer field system is comprised of three OMNI-PLUS units (formerly) manufactured by EDA Instruments of Toronto, Ontario. The instruments record the Total Magnetic Field with a measuring accuracy of 0.1 nanoTeslas and are generally configured as one recording base station (30 second sampling rate) and two portable field measuring units.

The two field units record the line and station coordinates along with the Total Magnetic Field which is later corrected by the recording Base Station unit, for the diurnal and day to day drift of the magnetic field. All units are controlled by its own internal microprocessor and real time clock which allows for a realistic and useable field accuracy of 1 to 2 nanoTeslas.

APPENDIX V

I.P. PSEUDO-SECTIONS

LOCATION MAP

" ORANGE Mt. GRID "

TODD CLAIMS

" NORTH ZONE "

" FALL CREEK GRID "

TOC 7

TOC 8

TOC 9

CAMP

39,400E.

39,600E.

39,800E.

40,000E.

40,200E.

L. 40,000N.

L. 39,800N.

L. 39,600N.

L. 39,400N.

L. 39,200N.

20,650N.

20,550N.

20,450N.

20,350N.

20,300N.

20,250N.

20,200N.

20,150N.

20,100N.

20,050N.

19,950N.

19,850N.

19,750N.

B/L. 40,000E

B/L. 20,000 Az 180°

10,250N.

T/L. 10,200 N.

10,100N.

9,950N.

L. 9,850E.

L. 9,900E.

L. 9,925 E.

L. 9,950 E.

L. 9,975 E.

L. 10,000E.

L. 10,025 E.

L. 10,050E.

L. 10,075 E.

L. 10,100E.

L. 10,125E.

L. 10,200E.

L. 10,225 E.

L. 10,250 E.

L. 10,275 E.

L. 10,300 E.

20,100E.

20,200E.

20,300E.

20,400E.

20,500E.

20,600E.

20,700E.

20,800 E.

3500

4000

4500

5000

5500

3000

FALL CREEK

ICE CREEK

TODD CREEK

55430

55438

55446

55497

55498

55485

55490

55492

55495

85212

85210

85205

78208 silt
78209 pan

31955 silt
32000 pan

31954 silt
32001 pan

31956

31953

D.D.H. N.T.C. 88-43,44

D.D.H. N.T.C. 88-40

D.D.H. N.T.C. 88-24,25

D.D.H. N.T.C. 88-22,23

D.D.H. N.T.C. 88-20,21

D.D.H. N.T.C. 88-41,42

D.D.H. N.T.C. 88-39

D.D.H. N.T.C. 88-38

LEGEND

SYMBOLS

31955 — Silt sample location

D.D.H. Location

32001 pan / 31954 silt — Pan and silt sample location

ORANGE MT. GRID

0.2/30/320 — Soil sample location Ag(ppm)/ Pb(ppm) / Zn(ppm)/Au>10ppb

≥ 1.0 ppm Ag contour

≥ 100 ppm Pb contour

≥ 250 ppm Zn contour

FALL CREEK GRID

141/470 — Soil sample location Cu(ppm) / Au(ppb)

50 ppb Au contour

100ppb Au contour

200 ppb Au contour

GEOLOGICAL BRANCH
ASSESSMENT REPORT

19,922

For Analytical Results refer to : January 1989 Report

NOTE : Topography based on photocopy enlargement of N.T.S. 1:50,000 scale map 104A/5

0 50 100 150 200 metres
SCALE 1: 2,500

REVISED
R.B. Oct., 1988
R.B. Jan., 1989
R.B. Jan., 1990
R.B. Feb., 1990
PROJ. No. 281
N.T.S. 104A/5
DWG. No. FIG. 4

TODD CREEK

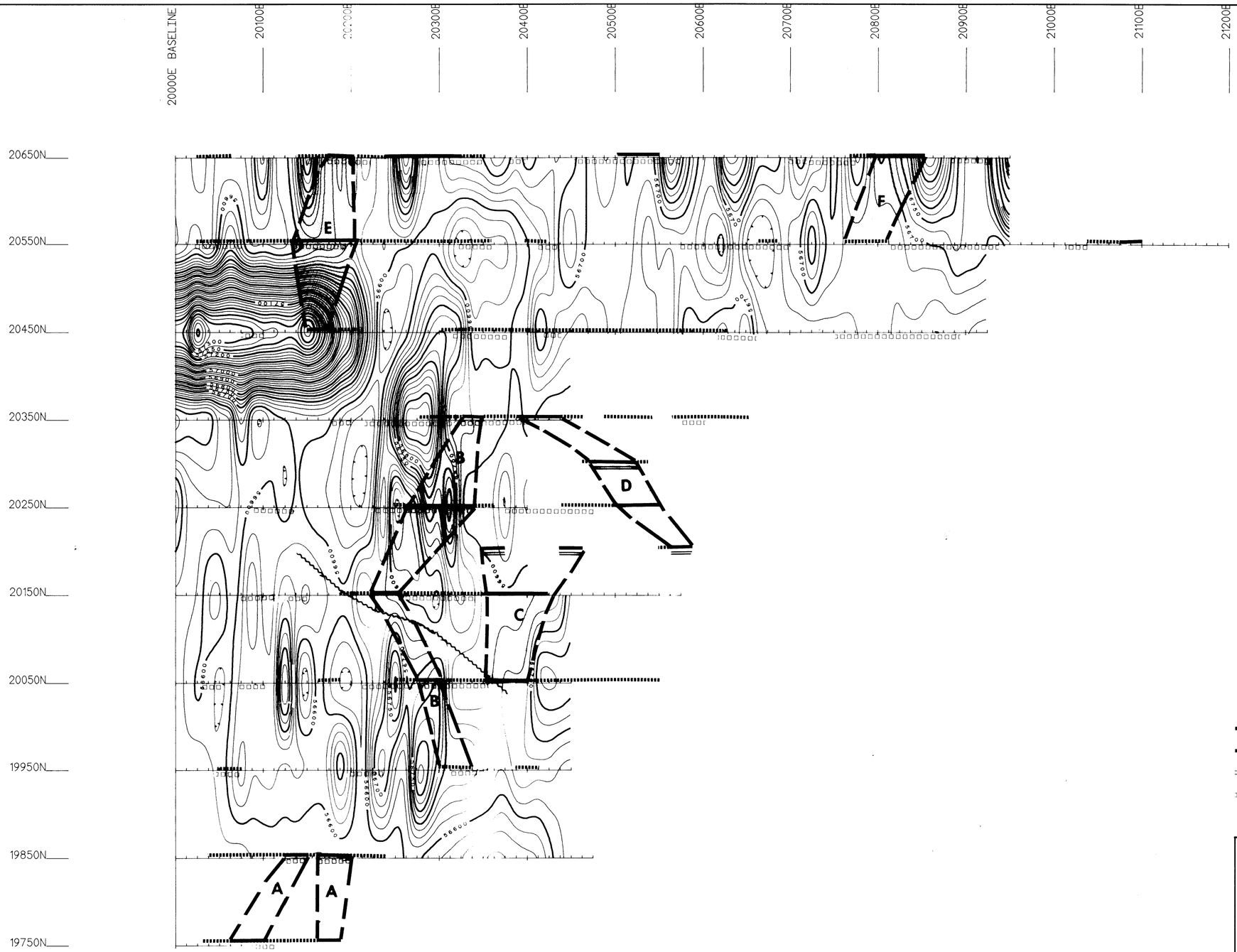
SILT AND SOIL SAMPLE LOCATIONS

SURVEY BY: R.B. DATE: JULY, 1988

DRAWN BY: S.K.B. SCALE: 1:2,500

NORANDA EXPLORATION

OFFICE: PRINCE GEORGE, B.C.



19922

GEOLOGICAL BRANCH
ASSESSMENT REPORT

TODD CREEK

MAGNETOMETER SURVEY

PROJECT: TODD CREEK PROJECT # : 280
BASELINE AZIMUTH : 0 Deg.

SCALE = 1 : 2500 DATE : / /
SURVEY BY : PAC GEOP NTS :
FILE: M280FC
FIG. 5 NORANDA EXPLORATION

LOCATION MAP

" ORANGE Mt. GRID "

TODD CLAIMS

" NORTH ZONE "

" FALL CREEK GRID "

I.P. COVERAGE

TOC 7

TOC 8

TOC 9

CAMP

39,400E
39,600E
39,800E
B/L 40,000E
40,200E

L 40,000N
L 39,800N
L 39,600N
L 39,400N
L 39,200N

5500
5000
4500
4000
3500
3000

T/L 10,200N
10,250N
10,100N
9,950N
B/L 20,000N Az 180°
B/L 10,000N Az 310°

L 9,850E
L 9,900E
L 9,925E
L 9,950E
L 9,975E
L 10,000E
L 10,025E
L 10,050E
L 10,075E
L 10,100E
L 10,125E
L 10,200E
L 10,225E
L 10,250E
L 10,275E
L 10,300E

20,650N.
20,550N.
20,450N.
20,350N
20,300N
20,250N
20,200N
20,150N
20,100N.
20,050N
19,950N.
19,850N.
19,750N.

20,100E
20,200E
20,300E
20,400E
20,500E
20,600E
20,700E
20,800E

A
B
C
D
E
F
G
H
J

CREEK
FALL
ICE
TODD CREEK

LEGEND

SYMBOLS

- 31955 Silt sample location
- D D H Location
- 32001 pan / 31954 silt — Pan and silt sample location
- ORANGE MT GRID
- 0.2/30/320 — Soil sample location Ag(ppm)/ Pb(ppm) / Zn(ppm)/Au>10ppb
- ≥ 1.0 ppm Ag contour
- ≥ 100 ppm Pb contour
- ≥ 250 ppm Zn contour
- FALL CREEK GRID
- 1 Mn/6m — Soil sample location Cu(ppm) / Au(ppb)
- 50 ppb Au contour
- 100 ppb Au contour
- 200 ppb Au contour
- I.P. CHARGEABILITY HI
- MINERAL TREND
- A — PROPOSED 1990 D.D.H.'s

GEOLOGICAL BRANCH
ASSESSMENT REPORT

19,922

For Analytical Results refer to January 1989 Report

NOTE Topography based on photocopy enlargement of N.T.S. 1 50,000 scale map 104 A/5

0 50 100 150 200 metres
SCALE 1 2,500

REVISED
R.B. Oct., 1988
R.B. Jan., 1989
R.B. June, 1989
R.B. Jan., 1990
R.B. Feb., 1990

TODD CREEK

COMPILATION MAP

PROJ. No. 281
N.T.S. 104 A/5
DWG. No. FIG. 6

SURVEY BY: R.B. DATE: JULY, 1988
DRAWN BY: S.K.B. SCALE: 1 2,500

NORANDA EXPLORATION
OFFICE PRINCE GEORGE, B.C.

APPENDIX VI

NORANDA VANCOUVER LABORATORY

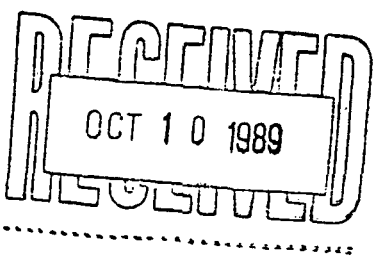
PROPERTY/LOCATION: TODD CK. CODE : 8909-049

Project No. :281 Sheet: 1 of 1 Date rec'd: SEP. 14
Material :33 SOILS Geol.: G.C. Date compl: SEP. 20
Remarks :

Values in PPM, except where noted.

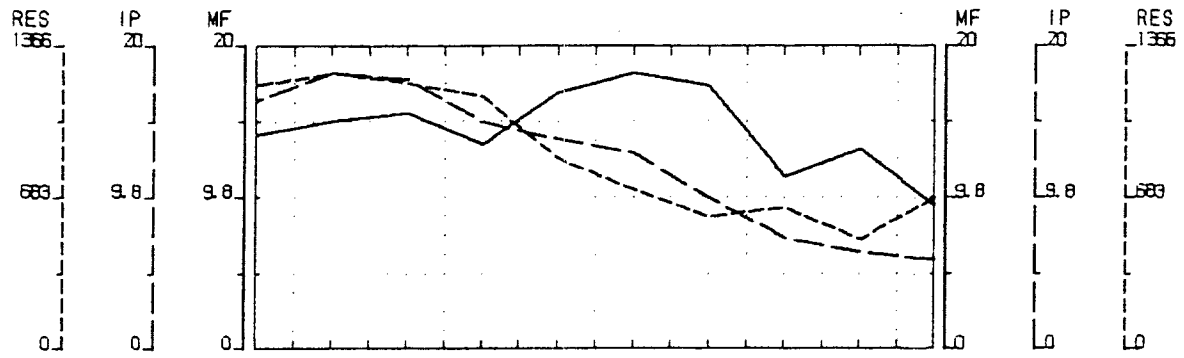
T.T. No.	SAMPLE No.	Cu	Zn	Pb	Ag	PPB Au
2	19750N-20000E	44	132	16	0.2	40
3	20025	66	148	26	0.4	60
4	20050	36	160	20	0.2	5
5	20075	138	166	54	0.6	70
6	20100	42	88	92	0.3	75
7	20125	120	148	28	0.3	10
8	20150	120	118	26	0.5	40
9	20175	1100	146	24	0.6	160
10	20200	94	1130	36	0.8	5
11	20225	54	106	34	0.3	5
12	20250	34	140	30	0.5	5
13	20275	30	74	38	0.7	5
14	19750N-20300E	30	140	34	0.4	5
15	19850N-20000E	72	126	18	0.2	50
16	20025	52	136	20	0.2	25
17	20050	70	132	24	0.2	15
18	20075	68	152	34	0.4	35
19	20100	52	168	40	0.5	5
20	20125	46	62	22	2.1	915
21	20150	88	106	20	0.4	60
22	20175	138	116	26	0.5	40
23	20200	390	110	24	0.6	30
24	20225	64	122	20	0.4	5
25	20250	54	340	18	0.5	5
26	20275	86	290	40	0.5	5
27	20300	36	102	42	0.9	5
28	20325	48	96	46	0.5	5
29	20350	48	144	40	0.6	5
30	20375	138	242	52	0.9	15
31	20400	44	142	28	0.5	10
32	20425	36	126	26	0.4	5
33	20450	36	92	24	0.3	5
34	19850N-20475E	88	288	66	0.7	5

file



Copy to Rob

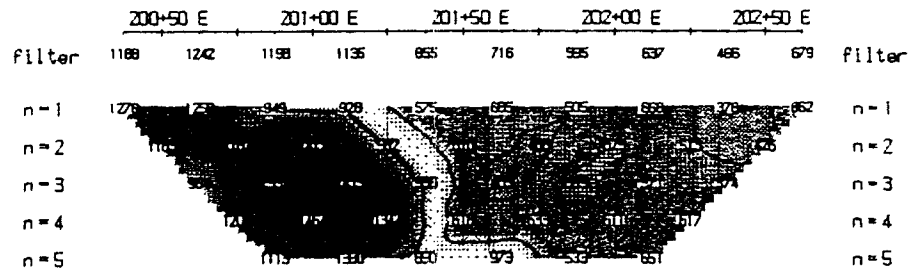
cc: PG RP



INTERPRETATION

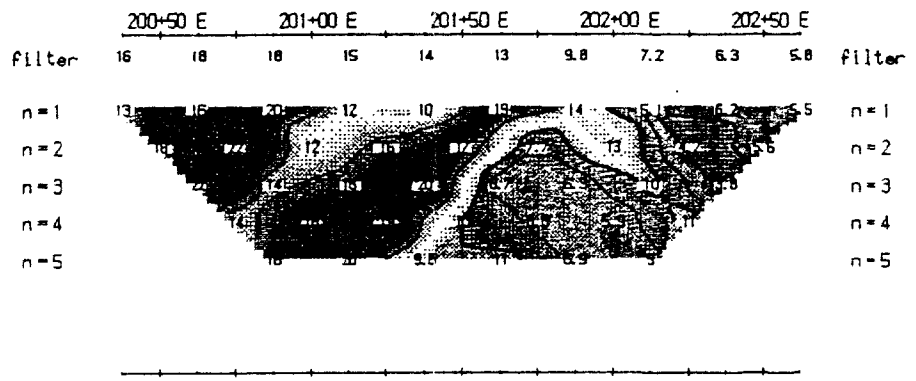
INTERPRETATION

RESISTIVITY
(OHM_M)



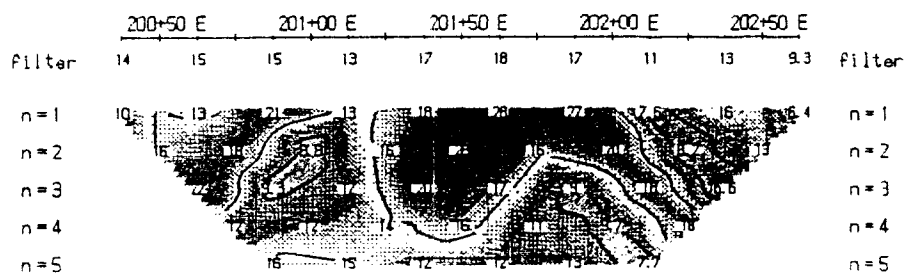
RESISTIVITY
(OHM_M)

IP
(mV/V)



IP
(mV/V)

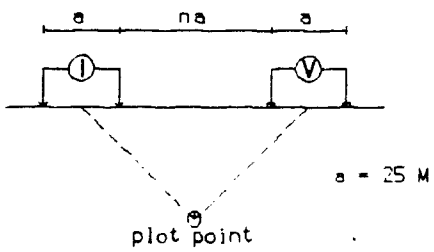
METAL FACTOR
(IP/res * 1000)



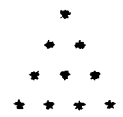
METAL FACTOR
(IP/res * 1000)

Line 19750 N

Dipole-Dipole Array



Filter



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,...

INTERPRETATION

Strong increase in polarization

Moderate increase in polarization

Pronounced resistivity increase

Pronounced resistivity decrease

Scale 1:2500

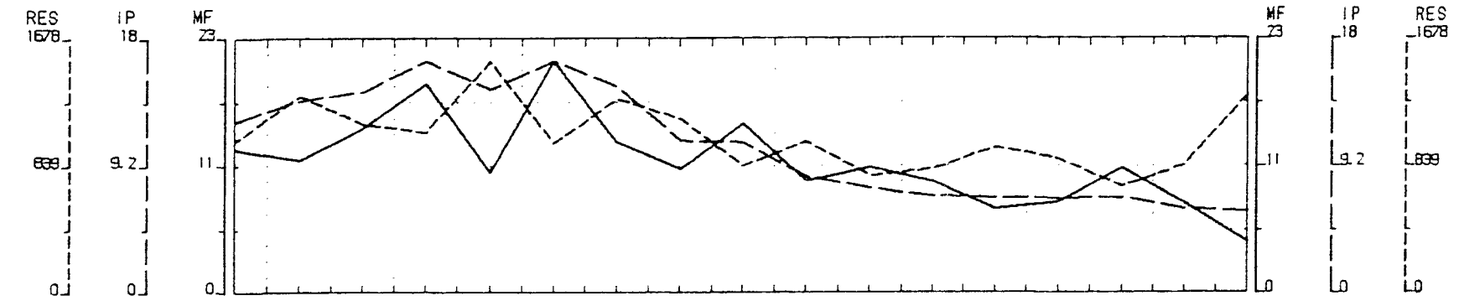
25 0 25 50 75 100 125
(metres)

TODD CREEK PROPERTY

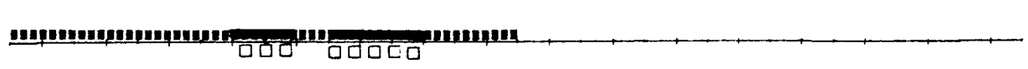
INDUCED POLARIZATION SURVEY
Line 19750 N

Date: 89/09/19
Interpretation by: L. Bradish

norande

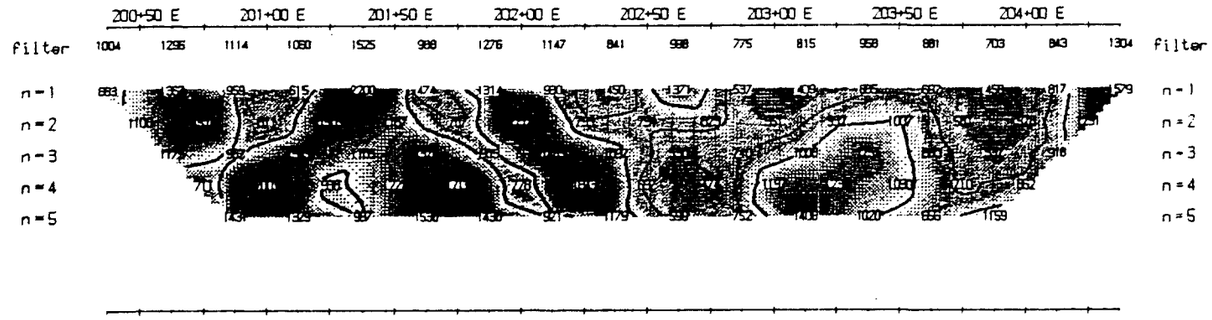


INTERPRETATION



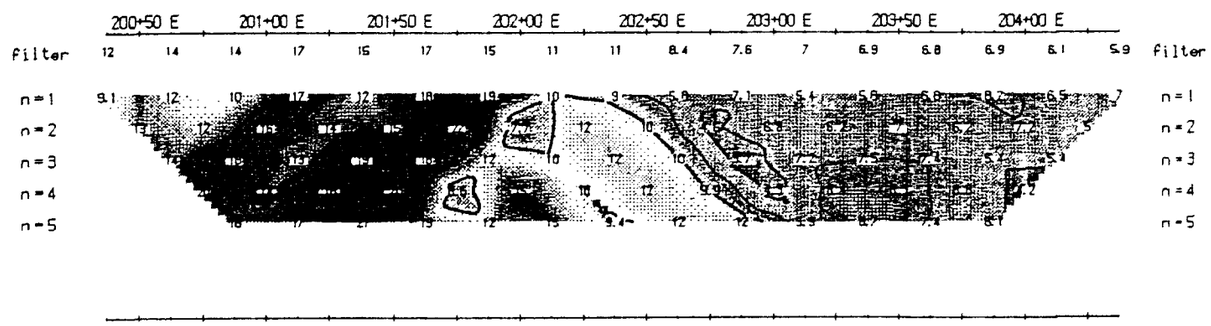
INTERPRETATION

RESISTIVITY
(OHM-M)



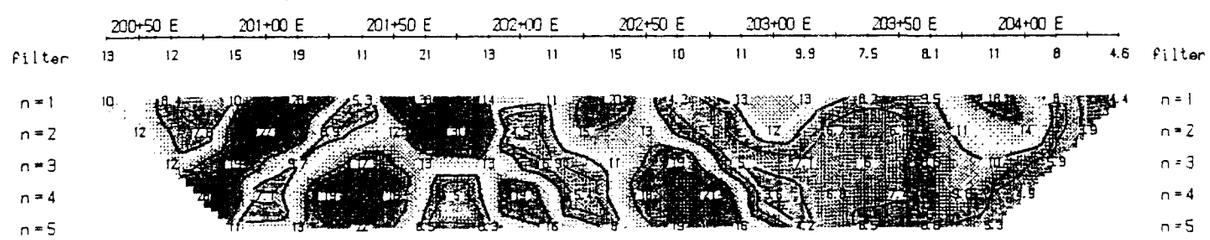
RESISTIVITY
(OHM-M)

IP
(mV/V)



IP
(mV/V)

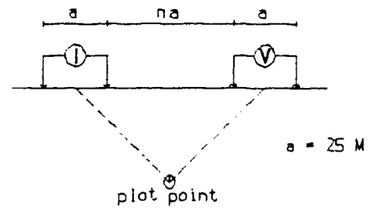
METAL FACTOR
(IP/res * 1000)



METAL FACTOR
(IP/res * 1000)

Line 19850 N

Dipole-Dipole Array



Filter

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,...

INTERPRETATION

- Strong increase in polarization
- Moderate increase in polarization
- Pronounced resistivity increase
- Pronounced resistivity decrease

Scale 1:2500

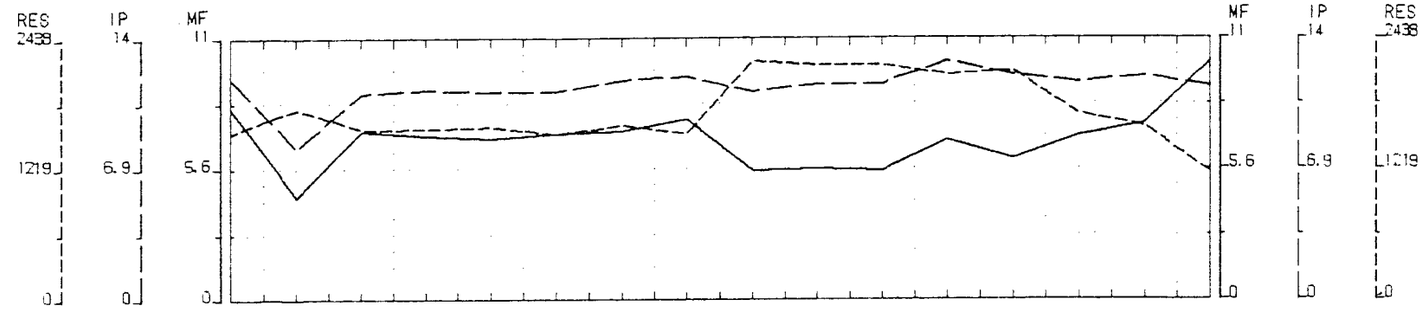
25 0 25 50 75 100 125
(metres)

TODD CREEK PROPERTY

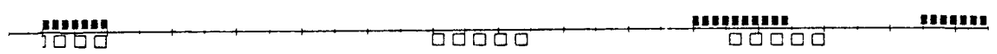
INDUCED POLARIZATION SURVEY
Line 19850 N

Date: 89/09/19
Interpretation by: L. Bradish

norande

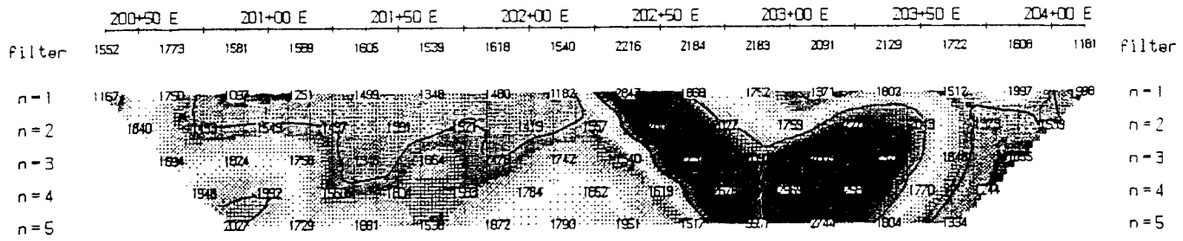


INTERPRETATION

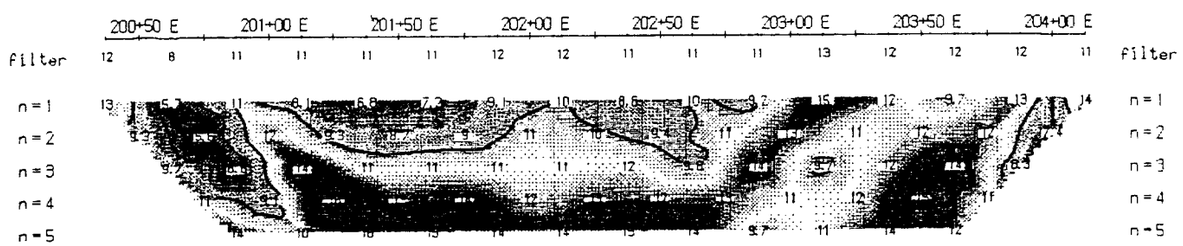


INTERPRETATION

RESISTIVITY
(OHM_M)

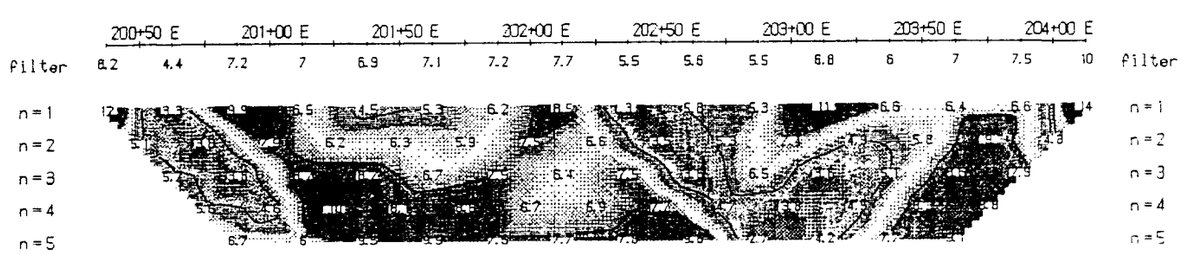


RESISTIVITY
(OHM_M)



IP
(mV/V)

IP
(mV/V)

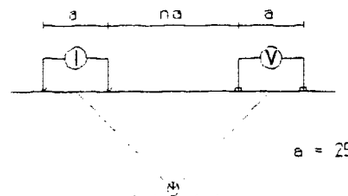


METAL FACTOR
(IP/res * 1000)

METAL FACTOR
(IP/res * 1000)

Line 19950 N

Dipole-Dipole Array



Filter

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,...

INTERPRETATION

- Strong increase in polarization
- Moderate increase in polarization
- Pronounced resistivity increase
- Pronounced resistivity decrease

Scale 1:2500

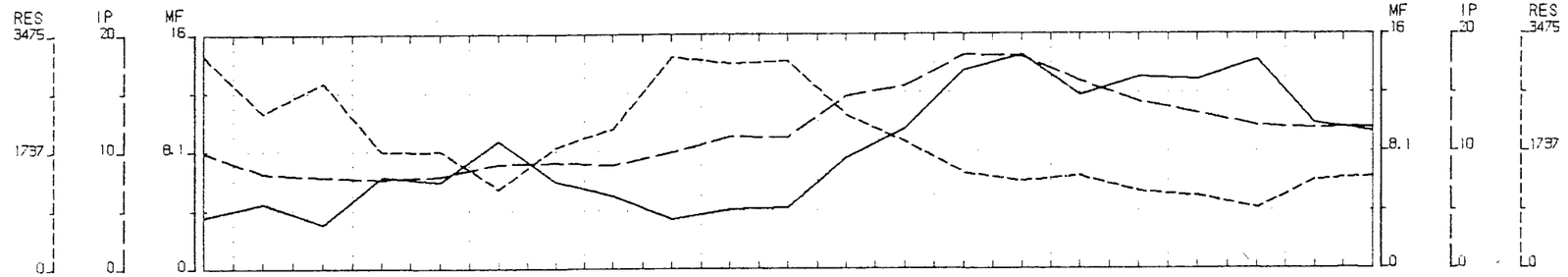
25 0 25 50 75 100 125
(metres)

TODD CREEK PROPERTY

INDUCED POLARIZATION SURVEY
Line 19950 N

Date: 89/09/19
Interpretation by: L. Bradish

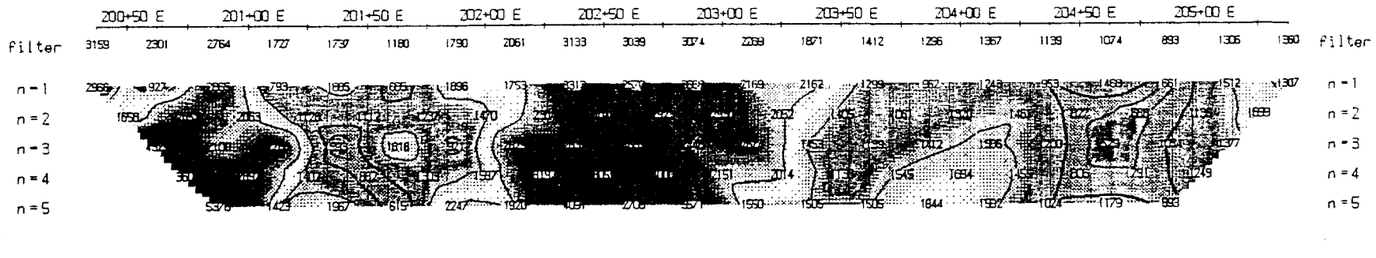
norande



INTERPRETATION

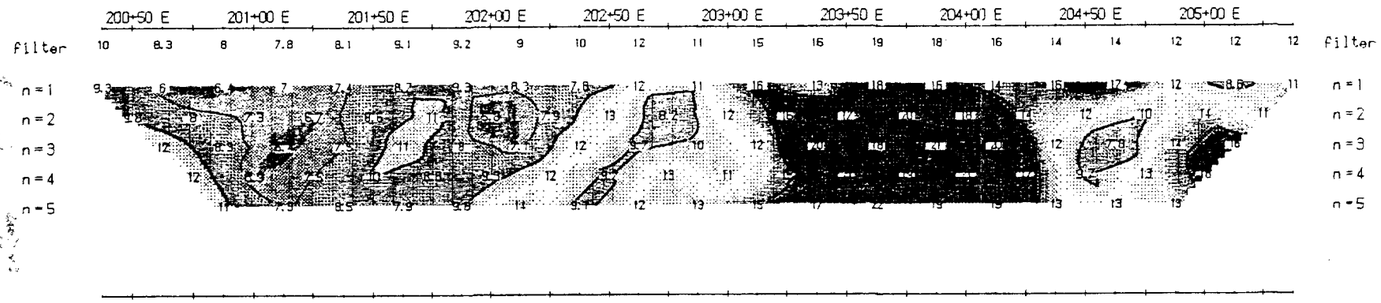
INTERPRETATION

RESISTIVITY
(OHM_M)



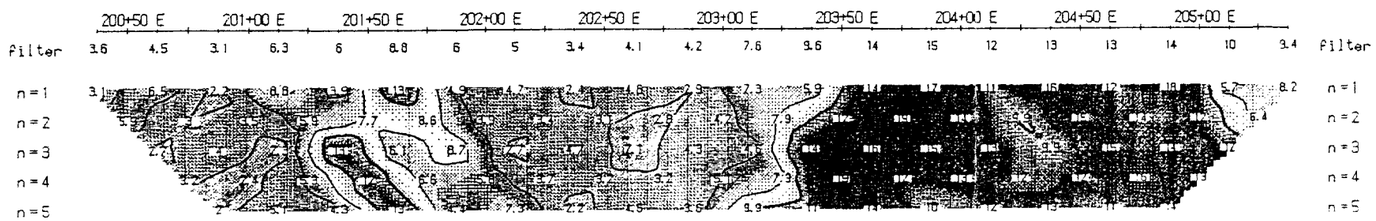
RESISTIVITY
(OHM_M)

IP
(mV/V)



IP
(mV/V)

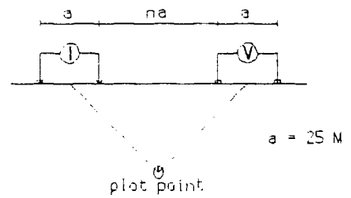
METAL FACTOR
(IP/res * 1000)



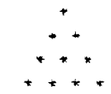
METAL FACTOR
(IP/res * 1000)

Line 20050 N

Dipole-Dipole Array



Filter



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,...

INTERPRETATION

- Strong increase in polarization
- Moderate increase in polarization
- Pronounced resistivity increase
- Pronounced resistivity decrease

Scale 1:2500

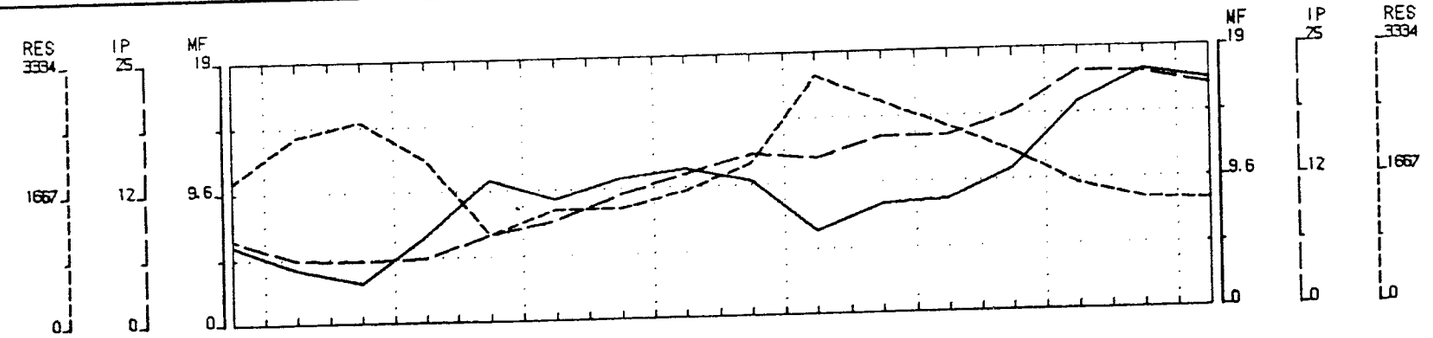
25 0 25 50 75 100 125
(metres)

TODD CREEK PROPERTY

INDUCED POLARIZATION SURVEY
Line 20050 N

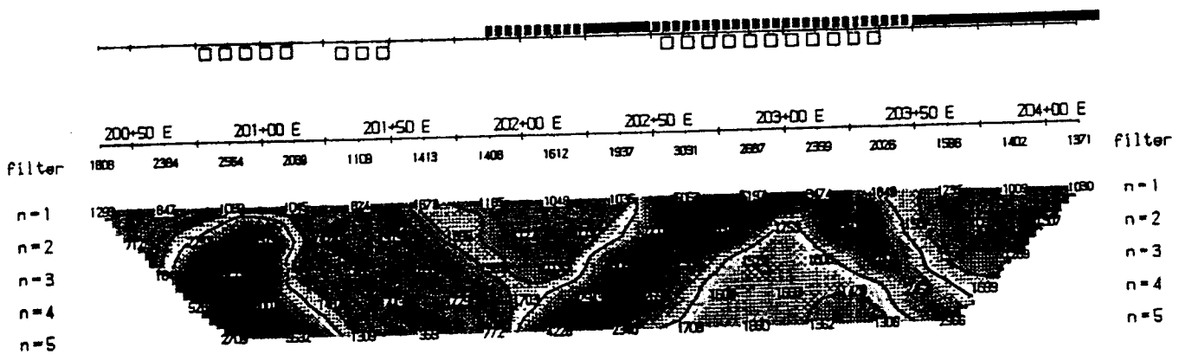
Date: 89/09/19
Interpretation by: L. Bradish

noranda



INTERPRETATION

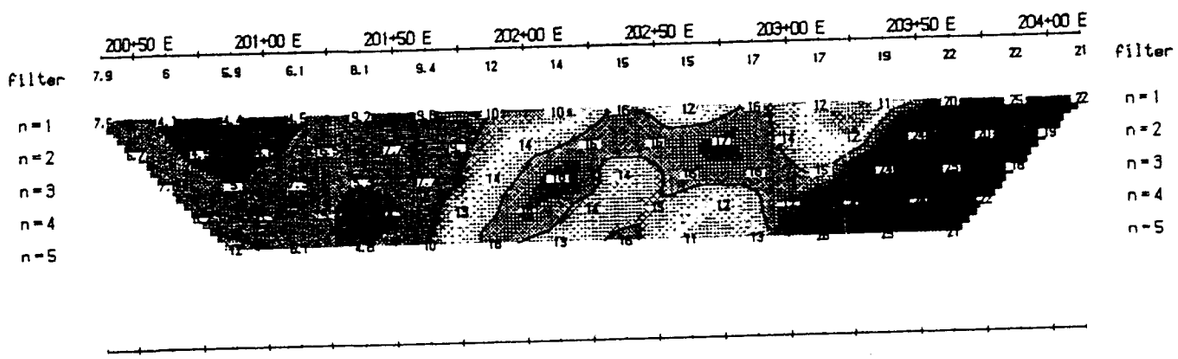
RESISTIVITY
(OHM_N)



INTERPRETATION

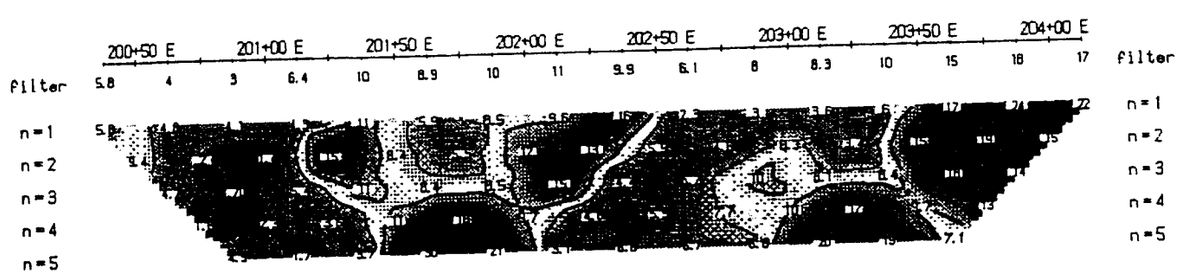
RESISTIVITY
(OHM_N)

IP
(mV/V)



IP
(mV/V)

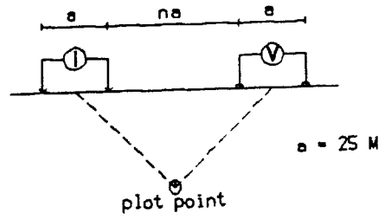
METAL FACTOR
(IP/res * 1000)



METAL FACTOR
(IP/res * 1000)

Line 20150 N

Dipole-Dipole Array



Filter

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,...

INTERPRETATION

- Strong increase in polarization
- Moderate increase in polarization
- Pronounced resistivity increase
- Pronounced resistivity decrease

Scale 1:2500

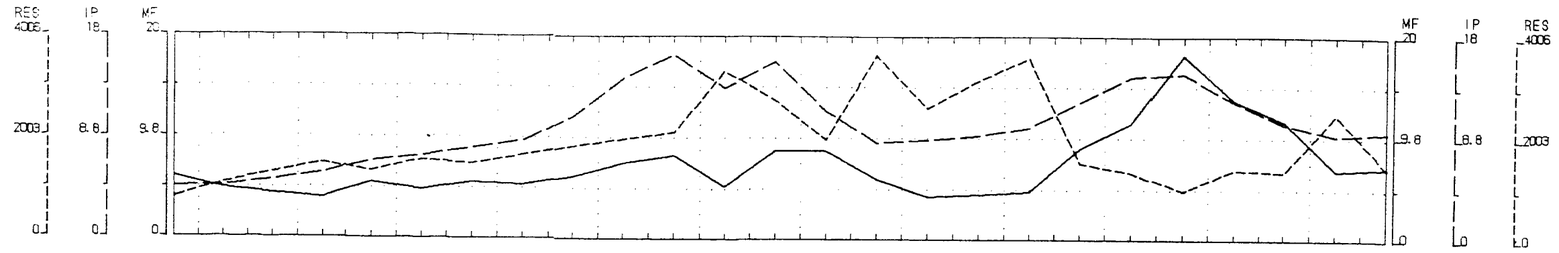
25 0 25 50 75 100 125
(metres)

TODD CREEK PROPERTY

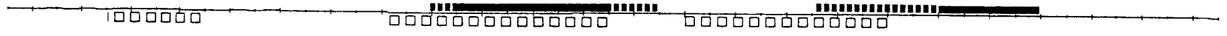
INDUCED POLARIZATION SURVEY
Line 20150 N

Date: 89/09/19
Interpretation by: L. Bradish

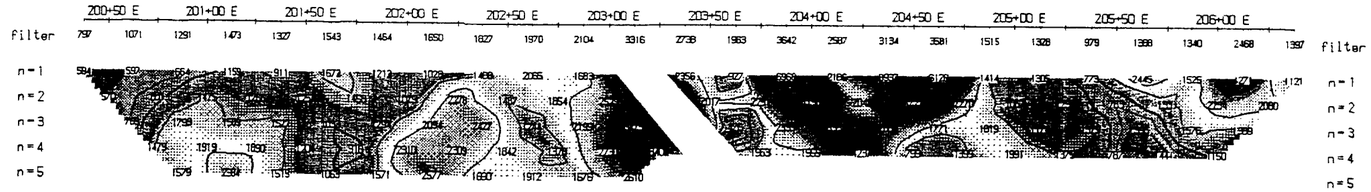
norande



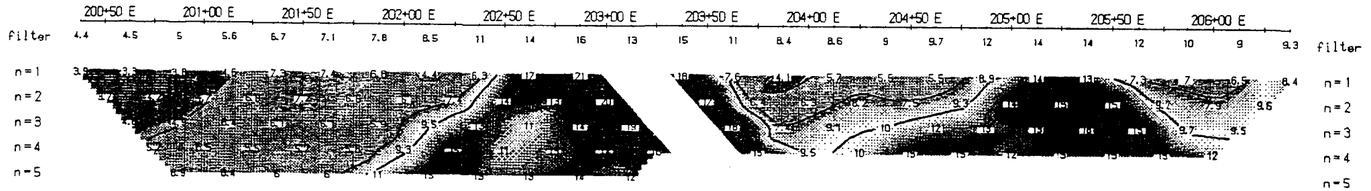
INTERPRETATION



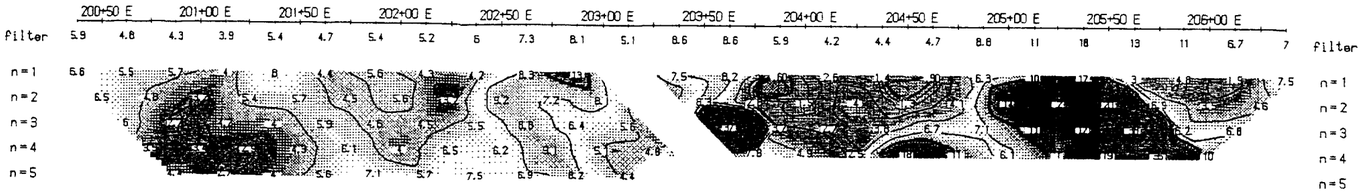
RESISTIVITY
(OHM_M)



IP
(mV/V)



METAL FACTOR
(IP/res * 1000)



INTERPRETATION

RESISTIVITY
(OHM_M)

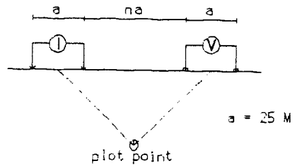
IP

METAL FACTOR
(IP/res * 1000)

GEOLOGICAL BRANCH
ASSESSMENT REPORT

Line 20250 N

Dipole-Dipole Array



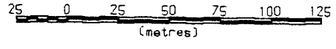
Filter

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,...

INTERPRETATION

- Strong increase in polarization
- Moderate increase in polarization
- Pronounced resistivity increase
- Pronounced resistivity decrease

Scale 1:2500

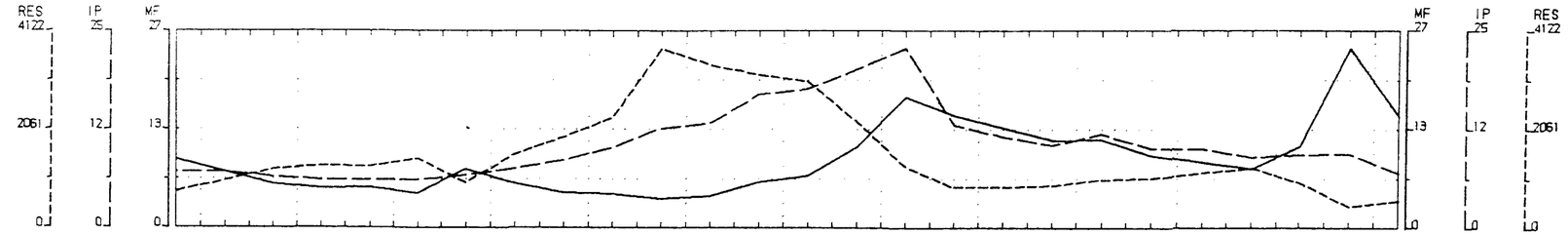


TODD CREEK PROPERTY

INDUCED POLARIZATION SURVEY
Line 20250 N

Date: 89/09/20
Interpretation by: L. Bradish

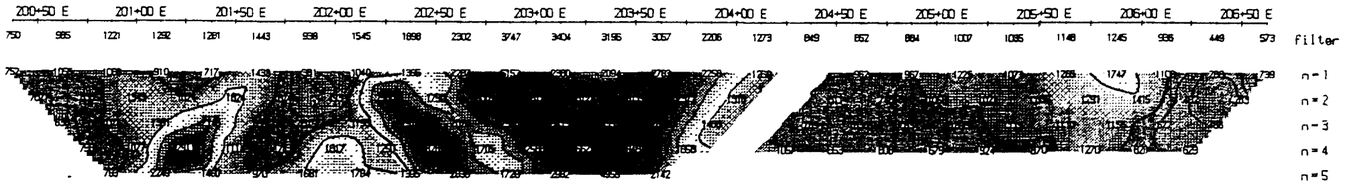
norande



INTERPRETATION

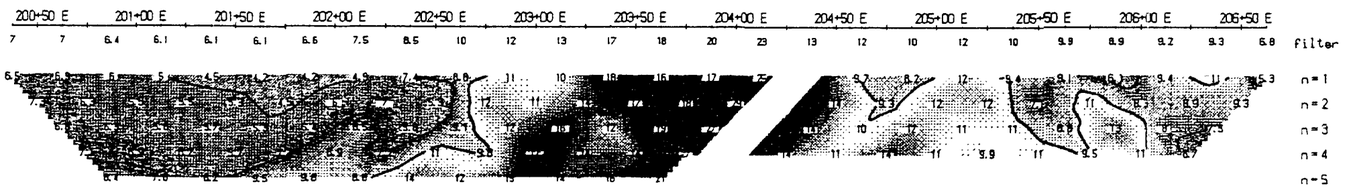
INTERPRETATION

RESISTIVITY
(OHM_M)



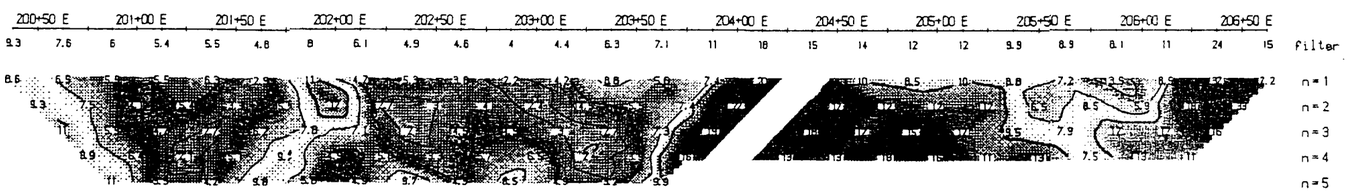
RESISTIVITY
(OHM_N)

IP
(mV/V)



IP
(mV/V)

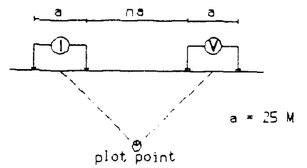
METAL FACTOR
(IP/res * 1000)



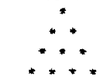
METAL FACTOR
(IP/res * 1000)

Line 20350 N

Dipole-Dipole Array



Filter



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,...

INTERPRETATION

Strong increase in polarization

Moderate increase in polarization

Pronounced resistivity increase

Pronounced resistivity decrease

Scale 1:2500

25 0 25 50 75 100 125
(metres)

TODD CREEK PROPERTY

INDUCED POLARIZATION SURVEY
Line 20350 N

Date: 89/09/20
Interpretation by: L. Bradish

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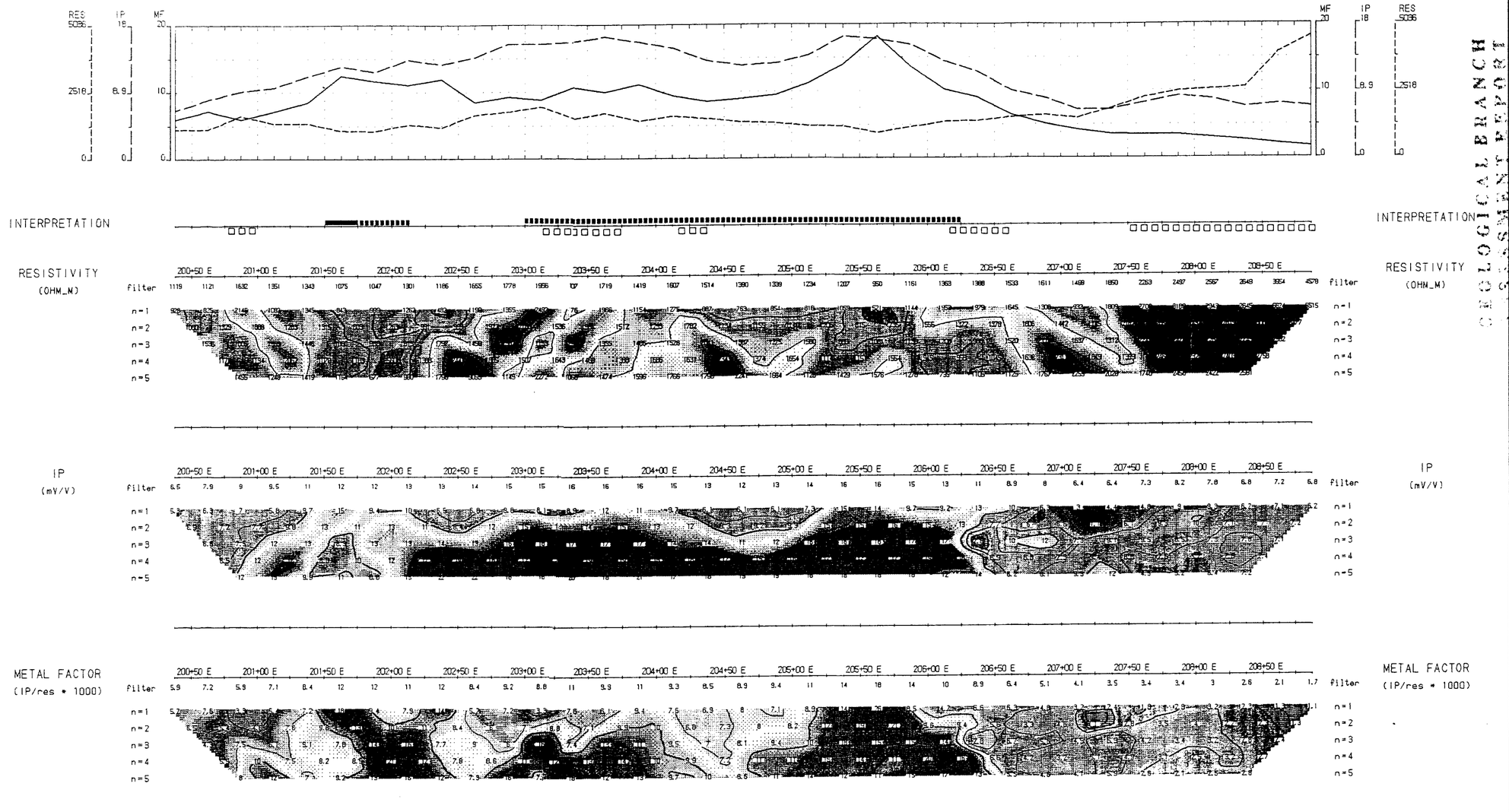
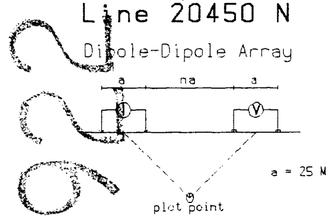


GEOLOGICAL BRANCH
ASSESSMENT REPORT

Line 20450 N

Dipole-Dipole Array



Filter

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,...

INTERPRETATION

- Strong increase in polarization
- Moderate increase in polarization
- Pronounced resistivity increase
- Pronounced resistivity decrease

Scale 1:2500

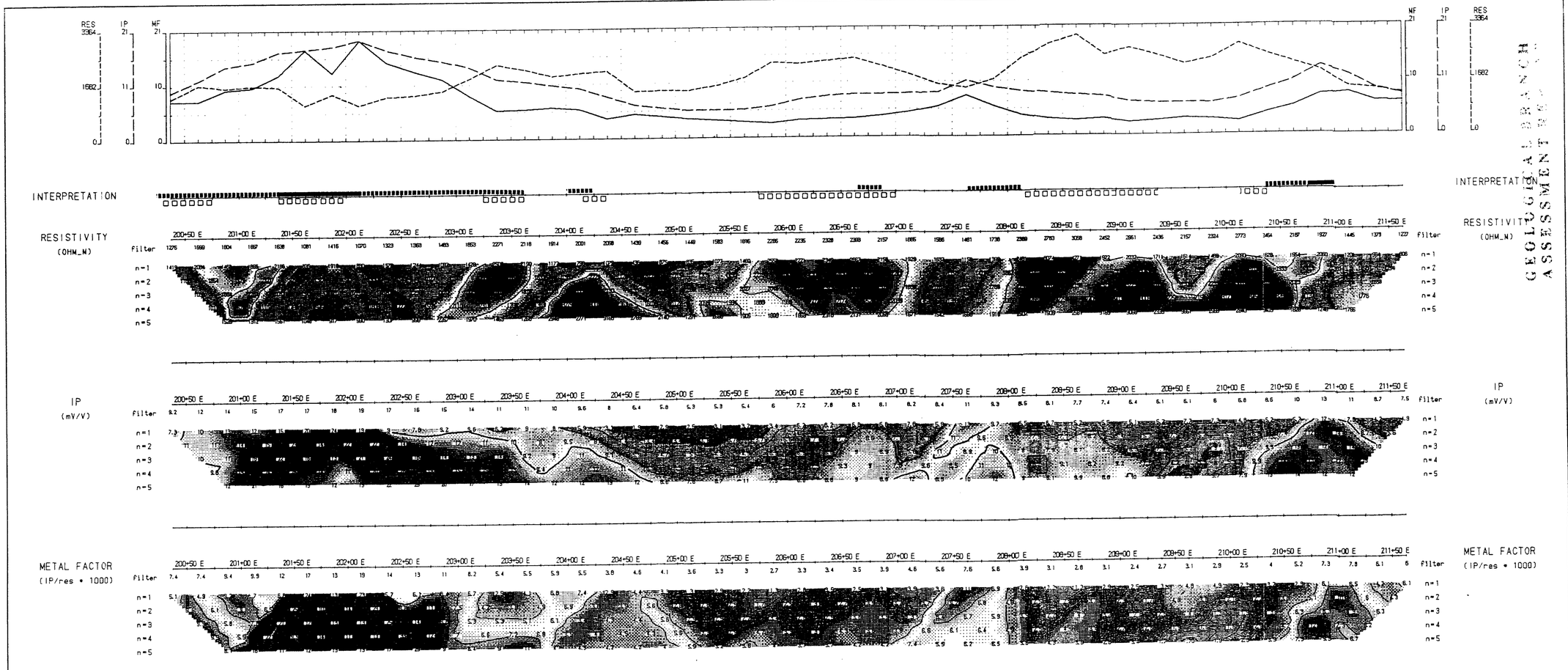
25 0 25 50 75 100 125
(metres)

TODD CREEK PROPERTY

INDUCED POLARIZATION SURVEY
Line 20450 N

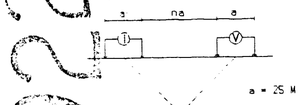
Date: 89/09/19
Interpretation by: L. Bradish

noranda



Lire 20550 N

Dipole-Dipole Array



Filter

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10....

INTERPRETATION

- Strong increase in polarization
- Moderate increase in polarization
- Pronounced resistivity increase
- Pronounced resistivity decrease

Scale 1:2500

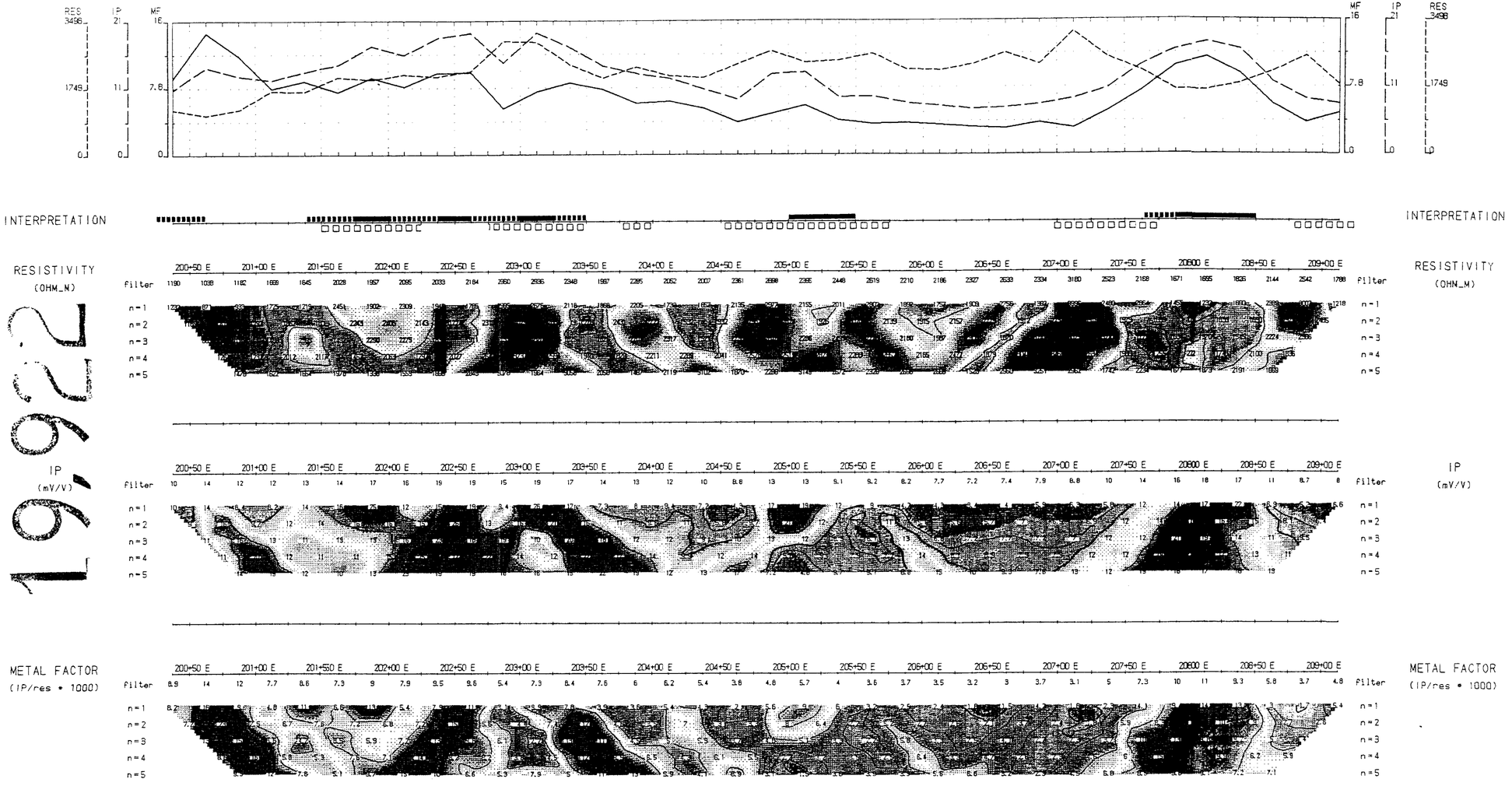
25 0 25 50 75 100 125
(metres)

TODD CREEK PROPERTY

INDUCED POLARIZATION SURVEY
Line 20550 N

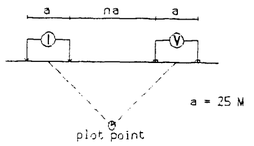
Date: 89/09/19
Interpretation by: L. Bradish

norande



Line 20650 N

Dipole-Dipole Array



Filter

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,...

INTERPRETATION

- Strong increase in polarization
- Moderate increase in polarization
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Scale 1:2500

25 0 25 50 75 100 125
(metres)

TODD CREEK PROPERTY

INDUCED POLARIZATION SURVEY
Line 20650 N

Date: 89/09/19
Interpretation by: L. Bradish

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